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SOME OBSERVATIONS ON THREE DAY STIFFSICKNESS IN THE TRANSVAAL IN 1954

by

I. S. MacFARLANE and D. A. HAIG,
Pretoria District — Onderstepoort.

The field observations recorded in this paper were made by one of us (I. S. MacF.) during the late summer months of 1953-1954 and those on the laboratory research aspect by D. A. Haig. The reason for its publication is that some unusual features of the disease were encountered and it was hoped that a valuable discussion on the paper would follow.

This particular outbreak of three day stiffsickness in cattle has been the cause of serious economic losses to the dairy farmers, a few of whom had to disperse their herds as a sequel to it. The last big outbreak in 1949 was not as serious and was not followed by any sequelae, which lasted for any time. The symptoms noted during this outbreak seemed to be much more severe than those usually encountered in this disease and a number of explanations for this have been suggested. No theories will be put forward but the intention is rather to note some of the striking features of the disease observed during the recent outbreak in the South Central Transvaal.

The observations to be recorded were made on a herd of pedigreed Friesland cattle which was under daily supervision. They were applicable to the majority of herds in the area concerned.

A few cases had occurred in this herd as early as mid December 1953, but no particular attention was paid to the animals in the light of previous experience with the disease. However, from then on it became increasingly obvious that the disease was becoming more virulent or the cattle were becoming more susceptible for some unknown reason. The outbreak reached its climax towards the end of February and the cases continued to occur until the beginning of April, when it ceased as it usually had done in previous outbreaks. The clinical picture was very characteristic and even the native attendants became very familiar with the symptoms.

For the purpose of description the symptoms will be given as they affected different classes of cattle i.e. (1) lactating cows, (2) dry stock in good condition, and (3) dry stock in poor condition.

(1) *Lactating cows*: The first symptoms noticed in all cases were dyspnoea and tachypnoea, associated with a dull look and dejected attitude. During the first week of the outbreak no temperature reactions were noticed but the reason for this became obvious later, as when the animals were temperatured at about six hour intervals the position changed (Refer Plate I.)

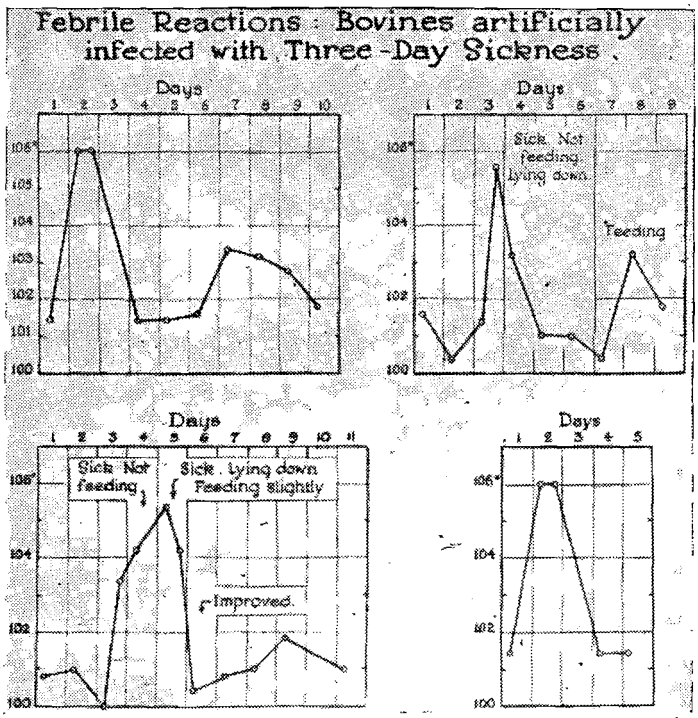

Plate I

It is obvious that most of the temperature reactions were being missed owing to their exceptionally short duration. The febrile period was seldom more than six hours and very high temperatures were recorded as can be seen from the graphs.

During the early course of the disease the animals refused to eat and showed no inclination to graze. In some animals salivation was marked while in others it was absent. Where salivation was present a number of the animals showed a greatly increased regurgitory reflex, some expelling the ruminal contents through the mouth and nostrils with considerable force, but the amount lost was comparatively small. Ruminal movement was slowed down and in some cases complete atony was noticed in the early stages. This was followed at varying intervals by diarrhoea on the one hand or marked constipation

on the other, but these symptoms did not follow any regular pattern.

Muscular tremors were seen in a varying degree in the majority of cases. They were best seen immediately before and after any movement and seemed to be limited to the hind-quarters and flanks. The severity of the tremors did not seem to be related to the subsequent course of the disease e.g. if an animal later developed severe symptoms of the disease the tremors which had been shown were not more severe than if the disease took the normal course.

There was a marked diminution in milk yield in all cases which became apparent at varying intervals after the onset of symptoms (See Plate II). This was associated with what

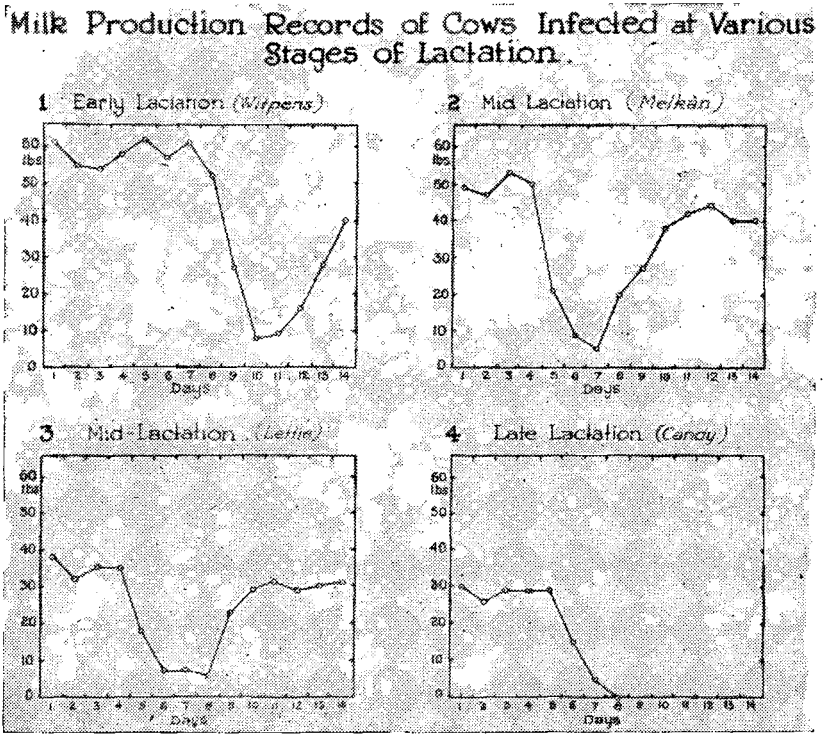

Plate II

appeared to be a varying degree of mastitis. All cases, however, showed some udder changes which could be determined clinically, varying from slight discomfort while being milked, to marked oedema and pain with watery milk, sometimes with blood in it. There was no bacterial infection but in some cases true mastitis due to infection developed and was treated in the usual way.

Apart from the varying degrees of stiffness noticed in the usual type of case, abnormal cases showed incoordination of movement, and the very bad ones ataxia. It also became obvious that these animals were showing acute pain. In all cases the animals showed tenderness of the feet, sometimes with a distinct coronitis. Pain however, could be noted whether there was coronitis or not.

In the severe cases which at one time were considered to be "Aberrant" three days stiffsickness", the animals went down for varying periods, the longest being 59 days before death eventually supervened. These animals showed acute pain, grunting and groaning and complete inability to stand even when lifted. Water was taken avidly but food was refused for a period of up to a week. After that the animals ate well and even appeared to have an increased appetite, although showing no inclination to move. At this stage blood samples showed the presence of up to 35% of acetone bodies. The duration of the severe form varied considerably and seemed to be unrelated to lactation, pregnancy, feeding, etc.

In those animals which recovered and regained their feet, marked muscular weakness and incoordination of movement was observed. After some weeks had passed it became obvious that although clinical recovery had apparently taken place, symptoms of muscular atrophy had begun to appear in varying degrees. Referring back it could be seen that some of these cases had developed early in the year. This muscular atrophy was progressive and two of the animals concerned became walking skeletons. This is a puzzling side to the picture. One particular animal after being dried off, has steadily deteriorated although clinically apparently healthy. It is possible that on some farms these cases have been missed as there is a natural tendency to dispose of such an animal.

(2) *Dry stock in good condition*: The animals here concerned were mainly working oxen. The symptoms noticed were laziness, loss of appetite, coronitis, inco-ordination of movement, falling in the yoke and refusing to move.

Generally speaking the symptoms were less severe than in lactating cows.

(3) *Dry stock in poor condition*: In this type of animal the mortality was high and on one farm reached 29.1% The course of the disease was shorter than usual and ended in death or a lingering recovery.

Cows which had the severe form of the disease while dry and have subsequently calved, have not come up to their full lactation potential. Although it is difficult to make a satisfactory estimate by comparison with cows that did not have the disease, it would appear that these cows are only giving

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Paper read at the 49th annual Congres of the S.A.V.M.A., Aug. 25th 1954.

about 75% of the milk they should. Cows which had the disease while lactating, after being dried off and calving again, also appear to be giving less milk during the subsequent control period than they should, but it is difficult to say with certainty.

Treatments A number of different treatments were tried. No success attended the use of Terramycin, Streptomycin, Chloromycetin and Penicillin amongst the antibiotics, or sulphamezathine and sulphapyridine amongst the sulphonamides.

Of the ruminatorics, acetic acid and glucose were tried and became a standard method of treatment. Glucose intravenously seemed to give the best results when combined with Cortisone but even alone it appeared to hasten recovery. Glucose also became a standard treatment for cases after the primary symptoms had abated. It did not seem to be of much value in the early stages. For a cow of normal size giving four gallons of milk per day, a litre of a 20% solution on two consecutive days was used, but some veterinarians who used the treatment found that one litre was sufficient to hasten recovery.

The following notes on three day stiffsickness from the Laboratory investigational point of view were contributed by one of the authors, (D. A. H.).

Unfortunately there is really very little to be said as our knowledge of the casual agent of this disease is very limited. Most outbreaks of this disease have been mild and have not attracted much attention. As has been related, however, three day stiffsickness can be severe and cause considerable economic loss. The reason for our lack of knowledge is perhaps more the fact that there is no ready means of propagating the virus in the laboratory. As a result, all experimental work has had to be done on cattle of known susceptibility and must therefore be very limited. All attempts at propagation in eggs, or mice or other laboratory animals have failed. I have, however, great confidence that tissue culture will be successful and will be of great value.

The diagnosis of three day stiffsickness in the field is usually relatively certain. However, in some instances such as that described by Dr. MacFarlane where the disease is more severe than usual and especially where the animals are fed special diets there may be some difficulty unless biological tests are undertaken. The duration of the febrile reaction may be very short and might easily be missed. It may then appear that one is dealing not with an infectious disease but with some intoxication or nutritional disturbance. Fortunately the virus is usually present in the blood up to about 4 days after the temperature has subsided and transmission to other cattle can be readily accomplished. The incubation period is then longer and may be five or six days. When blood is drawn at the height of the temperature reaction the incubation period is only two days.

The virus is present in the blood where it appears to be associated with the leucocytes and platelets.

Virus has not been demonstrated in urine of faeces but may occasionally be present in nasal discharge. It is however, doubtful whether this will serve to infect other animals and it would seem that natural transmission is by biting insects, probably culicoides.

Infective blood will remain active for about 48 hours when held at room temperature. In the refrigerator it remains active up to 48 hours. For this reason specimens should be packed in ordinary ice in a thermos flask if they are to be forwarded any distance to the laboratory. While considering the keeping qualities of this virus it is of interest to note that we have found preparations active after storage for five years in a dry ice cabinet.

The reactions produced by artificial infection resemble very closely those of Rift Valley Fever. R.V.F. can, however, easily be excluded by mouse inoculation. Mice are highly susceptible to R.V.F. but not three day stiffsickness.

The symptoms produced in cattle at the Laboratory infected with the Isis virus were mild and resembled those which we have seen in animals infected with other strains which we have examined. Our animals are kept confined and are fed a maintenance ration. Typical reactions observed run as follows. There is a sudden rise in temperature. The animal is disinclined to feed or move. There may be some nasal discharge. Animals usually go down and will not rise for a day or two. Recovery is then rapid. A slight relapse in temperature may occur.

A complication of the disease which we have observed in one case among our animals is subcutaneous emphysema. This condition appears to result from expiratory dyspnoea in grunting. Emphysema of the lungs develops and the air then escapes through the thoracic inlet and gradually spreads over the body. These cases are usually fatal unless counter measures are taken early in the course of the condition. Subcutaneous emphysema, however, may occur with a variety of other conditions in which there is pain or stress and cannot be regarded as diagnostic of three day sickness.

Dr. MacFarlane mentioned udder disturbances as one of the lesions of this disease. We have not observed this condition in the laboratory as we have not done any work on cows in milk. It is, however, possible that there is a virus mastitis since mammary tissue has been found to be a good medium for propagation of certain viruses such as that of Newcastle disease.

Immunity: From observations which have been made in the field in Africa it would seem that the immunity conferred is of short duration and may last as little as six weeks. In Australia, on the other hand, evidence was obtained that a solid and durable immunity lasting two years or more resulted from infection. Con-

trolled laboratory experiments are obviously needed to account for the discrepancy. In the meantime one can only speculate on possible explanations.

Australia was apparently free of the disease until about 1936 when three day sickness first made its appearance and spread rapidly throughout the country. It is possible that a single immunologically homogenous strain was introduced. Immunity to homologous strains is then apparently durable.

In Africa the disease has been present for very many years and it is believed that multiple immunological types exist as in the case of bluetongue and perhaps dengue.

What cross immunity tests we have been able to carry out have been done at the most two months after recovery. Our animals have been fully immune to all strains tested. Thus it must be assumed that in Africa, at any rate, different types of three day sickness virus are present. A strong basic immunity develops apparently shortly after infection and is sufficient to protect against all or most other strains. This basic immunity presumably wanes rapidly but the immunity to the homologous strain i.e. the strain with which the animal was infected is of long duration.

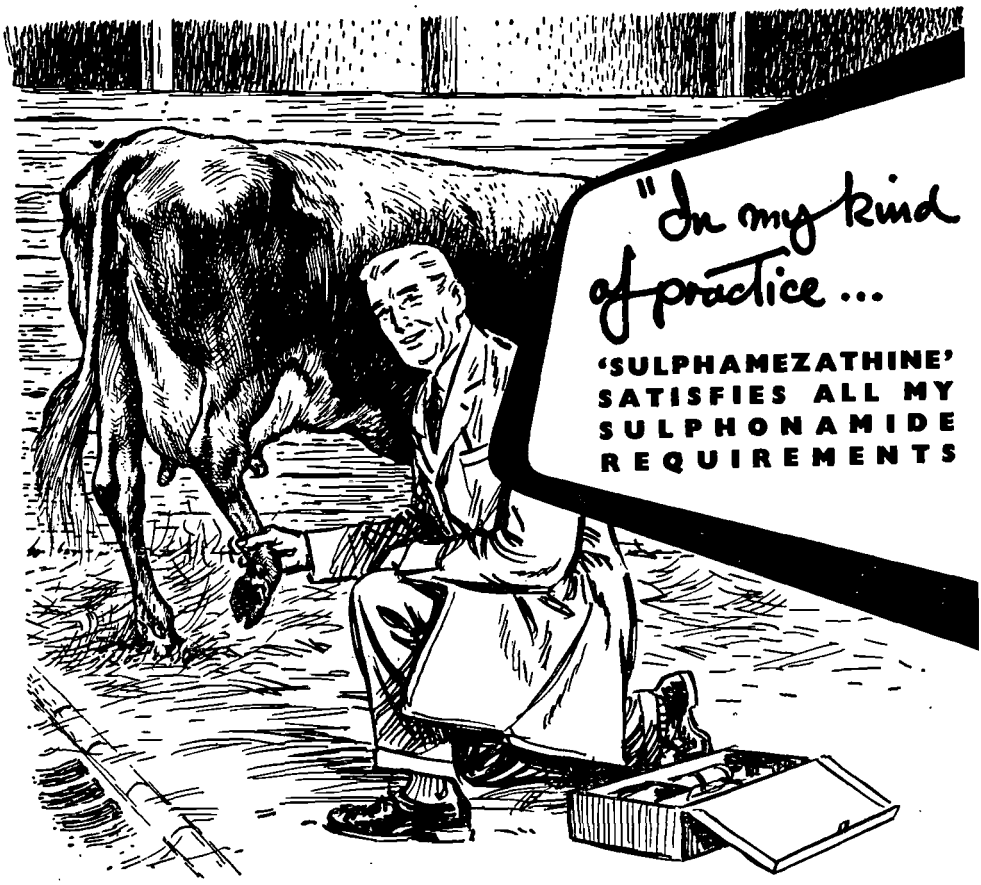
OBITUARY

MAJOR HENRY VICTOR BROWN

We regret to record the death in Johannesburg on March 7th of Dr. M. H. V. Brown. At the time of going to press it has not been possible to obtain all the information required for a full-length memoir but this, contributed by some of his colleagues with whom he was very closely associated at different times, will appear in our next issue.

In the meantime we tender our deepest sympathy to his widow and children in their sad bereavement.

E.M.R.



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INDICATIONS FOR AND TECHNIQUE OF TONSILLECTOMY IN THE DOG

by

C. F. B. Hofmeyr,
Pretoria.

SUMMARY

(1) The indications for tonsillectomy are given.
(2) The surgical anatomy of the tonsils is described.
(3) The technique of the operation is discussed in detail and mention is made of post-operative complications.
(4) A few illustrative cases are reported.

The value of tonsillectomy is disputed by many veterinarians. Nevertheless, provided the subjects for operation are selected with due care, the writer is firmly convinced that removal of the tonsils is the treatment offering the most hope of recovery from constantly recurring angina at present.

In human medicine it is well recognized that tonsillitis may cause nephritis. In the author's experience nephritis and sometimes fatal uraemia in young dogs may be a sequel to severe tonsillitis. In such cases the urine may exhibit a positive van den Bergh test, indicating involvement of the liver. Operation on the wisely chosen subject, if not too long delayed ,may not only accomplish the immediate objective of preventing repeated attacks of sore throat, but may possibly prevent Bright's disease from developing at an early age. The following case is of special interest:

A Cairn Terrier dog of about a year old suffered attacks of sore throat at short intervals. After about five exacerbations, tonsillectomy was suggested to the owner, who was a woman of a worrying disposition. The idea came as such a shock to her that the matter was not raised again. However, after about a month she was forced to ask for the operation, which went off smoothly, as did the convalesence. The patient's health greatly improved and pharyngitis did not recur. About a year later the author was called again to find the dog in the early stages of uraemia. The diagnosis of Bright's disease was confirmed at autopsy. It is possible that, if the operation had been done earlier this unfortunate sequel would have been avoided or postponed.

Clinically, tonsillitis can be divided as follows:—

(1) Primary tonsillitis, where the tonsils are pathological vehicles and *cause* illness or malaise.

(2) Tonsillitis, which is part of a disease complex as in distemper i.e. it *accompanies* illness.

(3) Tonsillitis, which arises after the main illness, that has no direct effect on the tonsils, and is debilitating, has securely established itself, as in many cases of Ancylostoma infestation. Treatment of the basic condition leads to automatic and quick recovery of the tonsils.

An experience that is becoming commoner of late years, is of the dog, which shows unmistakable tonsillitis and then, within a day or two, the first symptoms of biliary fever. Treatment of the biliary fever leads to recovery from the tonsillitis within a day. It is as yet impossible to explain the frequent association of these two disease conditions. The tonsillitis appears to precede the main illness.

It is obvious that the classification is only used as a general indication and that intermediate forms of tonsillitis are common. It stands to reason that any tonsillar infection, irrespective of its classification, frequently predisposes to subsequent attacks, when the tonsils may become septic foci.

Indications for Operation:

After what has been stated, it is hardly necessary to emphasize that, before the advisability of operation can be considered, careful attention should be paid to *both* the history and the clinical condition of the case. A cursory inspection of the tonsils often does not reveal their rôle as harbourers of chronic infection. Other septic conditions such as pyorrhoea, sinusitis, metritis, prostatitis and inflammation of the anal sacs should be looked for.

One or two attacks of tonsillitis are not sufficient grounds for doing tonsillectomy. In a typical suitable case, attacks of tonsillitis occur at shorter and shorter intervals, until the infection is of a continuous and smouldering nature with occasional exacerbations. By that time the dog lacks energy, its coat is dull, appetite capricious and condition poor. The skin may show dry or moist eczema. The presence of a cough is inconstant. The temperature is normal or slightly elevated. The tonsils often are red and enlarged, possibly with yellow foci on their surfaces and pus in the crypts. In connection with these remarks the following case can be cited:

The subject was a Dobermann Pinscher dog about two years old. Although he was shown at various shows, he was never placed because of his poor condition. In spite of the owner's efforts, there was a gradual deterioration in the dog's condition. When the author was consulted, the history and clinical findings were similar to the description in the preceding paragraph. Tonsillectomy was performed and within a month the patient was exhibited at a dog show,

where there was strong competition. By then there was such a very marked improvement in his condition that he carried off the honours.

It is possible that a dog in good general condition might be suffering from rheumatism or arthritis of obscure origin. The clinician might detect chronically diseased tonsils and consider that they were responsible. The only way to prove the correctness of his surmise would be to remove the tonsils. If his examination has been thorough enough, he may suggest operation to his client, provided he points out that the expected improvement might fail to materialize post-operatively.

Hofmeyr (1952) described a case of a two year old Great Dane dog suffering from chronic coxitis. After removal of chronically diseased tonsils, he made a very rapid recovery.

Surgical Anatomy:

As the textbooks on anatomy most frequently used in this country [Sisson (1930), Bradley (1943] scarcely even refer to the tonsils in the dog, an attempt is made to describe the anatomy of the relevant parts. It is pointed out, however, that this is done from the point of view of the operator rather than that of the anatomist.

A work published more recently than those mentioned above (Miller 1949) very briefly describes the tonsil, but too sketchily to be of much use to a surgeon. The misleading impression is also created that the tonsillar bloodvessels are too small ordinarily to require ligation. As indicated later on, great care must always be exercised to avoid excessive haemorrhage, as it must be regarded as a very real risk in every tonsillectomy.

The *situation* of the tonsils is too well known to require description. In the average dog each tonsil is about one inch (2.5 cm.) long and ¼ inch (0.5 cm.) or less wide. It is normally a smooth body, nearly round on cross sections with the one end doubled on itself. This doubled part is described as the *head,* which usually forms less than half of the tonsil. The rest, although not differentiated anatomically, can be called body and tail. The shape of the tonsil is very variable and cases have been encountered where the whole tonsil was doubled on itself.

In situ in the crypt the tonsil is commonly nearly covered by a fold of mucous membrane projecting over it from the medial side. The visible part of the tonsil is the smooth, even border, while the hidden part includes the doubled portion of the head, i.e. the even border is *antero-lateral* and the covered covered border *postero-medial.* The tonsil thus lies in a recess called the *sinus tonsillaris* with the head dorsal and the tail ventral.

The head of the tonsil is attached to the underlying structures by strong fibrous tissue, which suspends the tonsil, as the rest of it lies on the mucous membrane that is separated from the pharyngeal muscles by loose fascia.

The tonsillar artery approaches the tonsil from the *lateral* aspect. It might enter the tonsil close to the suspensory tissues or as low as halfway down the tonsil. It sometimes ramifies into two or three branches ¼ inch (0.5 cm.) or slightly more from the tonsil or this might occur immediately adjacent to it. The implication of this variation is important surgically.

The Operation:

The pre-operative treatment follows the usual pattern. No premedication with atropine is necessary, but an anticoagulent such as Koagamin may be injected if desired.

The anaesthetic of choice is Nembutal Veterinary (Abbot) because of its safety and prolonged effect.

The patient is laid on the operating table, which should be tilted, so, that the head is lower than the rest of the body. This can be accomplished by means of sandbags. This is to prevent aspiration of blood. Gauze bandage is used as a mouth gag as the latter is apt to get in the way. An assistant then holds the mouth open and can move it into any desired position. Bowel clamps or tongue forceps are attached to the tongue as it is kept out of the way by the weight of the instrument.

The operator sits on a stool in front of the dog with a light directed into the mouth from behind him, or, better still, he uses a strong headlight. A pair of either long tissue or long rat-toothed forceps are taken and the tissues between the head of the tonsil and the pharyngeal wall grasped. A pair of scissors ,either curved or straight, and with bluntish cutting edges is used for the operation, because ,if some gnawing is required to divide the tissues, haemorrhage is less than if a clean incision has been made.

By pulling on the forceps the tonsil is delivered from the recess and the mucous membrane on either side is drawn taut. That on the proximal side of the forceps is then nicked with the scissors. By small nibbling movements it is divided along the straight antero-lateral border of the tonsil as close to it as possible and down to the end of the tail. Incision of the suspensory tissues should be avoided as it will result in tearing the very friable tonsil.

At this stage haemorrhage is negligible unless the tonsillar artery has been divided with a clean incision before it branches. In this event it must immediately be seized with artery forceps. It is important to make all incisions as close to the tonsil as possible in the hope of cutting through the arteries after branching and not before. The diameter of the individual bloodvessels is then small and haemostasis occurs more readily. Throughout the operation the throat is kept clear of blood.

The pharyngeal mucous membrane is then separated from the head of the tonsil on the postero-medial border. This leaves the suspensory tissues denuded. These are divided by nibbling with

scissors. Unless the tonsillar artery has been cut through before, it may now happen at any moment. All bleeding points are clamped. Separation of the tonsil is completed by incising the rest of the mucous membrane.

According to the circumstances the bleeding points are disposed of as follows:

(1) By ligating with No. 0 of 2/0 catgut.

(2) By leaving the artery forceps until the patient starts recovering from anaesthesia. They do not interfere with respiration.

(3) By electrical diathermy.

The dog is turned on the other side and the procedure repeated. It must be noted that the branching of the tonsillar artery is often very dissimilar on the two sides.

Complications:

As indicated, the most feared complication is haemorrhage. For this reason a close watch must be kept on the patient for 24 hours, although, in the author's experience, there has been no bleeding later than four hours post-operatively.

If it is necessary to employ hypertensive drugs on account of cardiac and respiratory depression caused by the anaesthesia, sudden, severe haemorrhage may be precipitated. This could happen in cases where the bleeding appeared to have been arrested permanently. The following case illustrates this particular point:

A Pointer dog nearly a year old was considered on account of the typical history to be a suitable case for tonsillectomy. The operation was accordingly performed under Nembutal anaesthesia. About two hours afterwards respiration became dangerously depressed. One ml. Amphetamine was injected intravenously. Within two minutes there was a completely satisfactory response. One minute later there was a massive haemorrhage from one tonsillar artery and only quick intervention prevented a fatal outcome. This happened even though bleeding during the operation was so slight, that tying off of the bleeding points was unnecessary.

Dangerous infection of the operation area might conceivably supervene, although it has not been seen. Antibiotics should control this effectively.

The other complications reported in man have not been experienced.

REMARKS

Because of the pathological changes almost certainly brought about in the parenchymatous organs of the suitable candidate for tonsillectomy, there is an increase of anaesthetic hazard. Slow detoxification of the anaesthetic will lead to prolonged anaesthesia if dosage has not been regulated properly.

The course of the convalescence is very variable without any accountable reason. Many cases eat normally the day after operation and show no signs of discomfort, while others sometimes exhibit pain and lack of interest in food for as long as a week afterwards.

In certain individuals the full benefits of the operation are experienced within a month and in others improvement may be a more gradual process extending over months.

When no improvement at all results the explanation is likely to be one of the following:

(1) Incorrect diagnosis.

(2) Incomplete diagnosis, i.e. failure in detecting other co-existing toxic foci.

(3) Advanced, irreversible changes in vital organs like the kidneys.

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EXPERIENCES IN FELINE PRACTICE

by

E. J. ORTLEPP,
Johannesburg.

Paper read at the 49th Annual Congress of the SA.V.M.A., August 25th, 1954.

In veterinary practice today the cat is playing an increasingly important rôle especially with city practitioners, and during the last few years the growth of interest in cats has been quite phenomenal. Excellent cats have been imported and this is quite remarkable when considered from the financial angle, as the costs per cat often reach £75. Cat clubs have been formed, holding biannual shows with their issue of challenge and champion certificates, similar to canine procedure. All cats can be classified into classes and put on show, with the exception of the black and white variety; he is the last of the alley cats. Thus I feel that it is imperative that we devote more attention to the feline diseases.

Literature on cat diseases is very scanty at present, and, in fact, many of the basic facts are wrongly given. The normal length of season varies from four days to six weeks. The frequency of season varies from every few days to every few weeks, in fact some cats are very rarely off season and sometimes come into season four days after parturition. Ovulation usually occurs after physical contact of copulation—hence the protracted season. The gestation period is about 63 days (not 55 as often published). A pregnant cat is in kitten. A collection of kittens is a kindle (not a litter). The male is a tomcat, the female a queen. (A tabby cat is a *breed* of cat with stripes, e.g. silver tabby, red tabby, hence we get tabby toms and tabby queens).

When a cat is presented for examination, remember two important rules: Do not force the animals and do not frighten them. They are highly strung and respond to kindness only. Rubbing them under the chin acts like a twitch. The important clinical aids are (1) habitus; (2) ausculation of heart and lungs; (3) thorough palpation of abdomen; (4) discharges from eyes, nose and throat; (5) temperature.

Medical Diseases

By far the most important group are the virus infections, of which there are three "Types" — I refer to them as "types" as I do not wish to enter the long-standing argument as to the relationship of the viruses.

(1) *Infectious feline gastroenteritis* or panleucopaenia. The symptoms are well known, so I will only mention them briefly. Pathognomonic yellow vomit, severe depression and excruciating pain are shown, with dehydration, staring fur and severe shedding of hair, prolonged and severe vomiting and gagging, constipation, ulcers on the tongue and the pharynx, green discharge from the ears, prostration and early death, hydrophilia — they seek water in any location and will even lie in pools of water— , the eyes do not discharge but are sunken in their sockets; salivation. Two symptoms are extremely important. A tachycardia with heartbeat so fast that it is impossible to count. Since a normal pulse rate is 120, or four heart sounds per second, then any increase is uncountable. This tachycardia is very important especially in an early case where immediate treatment must be started. Secondly, the bloodsmear shows a complete disappearance of all leucocytes, but a few forms of degenerate leucocytes are seen resembling a mere blob of red serum, a badly damaged "horseshoe" neutrophile or a reddish blue stain which could be anything. The temperature is not a good symptom, as the very high initial fever, 105°F, soons drops to normal or subnormal. A green diarrhoea is sometimes seen. Post mortem lesions are variable, and there may be a small patch of catarrhal enteritis or a severe and generalized haemorrhagic or pseudomembranous inflammation of the whole alimentary canal from the tip of the tongue to the colon.

In any disease there must be pathological changes resulting in death. In this disease, especially where death can occur in twelve hours, there must be some very harmful factors at work, and only if we know these factors can our treatment be rational. My own theory of the cause of death is that there is a combination of four factors (a) pain, (b) absorption of intestinal toxins through the damaged mucosa via the peritoneum, in a similar way to intussusception or a strangulated hernia, (c) secondary bacterial invaders from the bowel and (d) direct toxic action of the virus. The treatment is based on this theory, as above (a) for pain, liquid paraffin 1 teaspoonful is given every hour until 12-15 teaspoons have been administered or a free bowel movement has occurred. It acts as a demulcent on the severely inflamed bowel and also helps to allay vomiting. It also relieves the constipation; (b) being inert and unabsorbed, it prevents absorption of the toxins; (c) $\frac{1}{4}$ gm. Streptomycin intramuscularly once or twice daily. For (d) nothing is known. The effect of the liquid paraffin is remarkable. Here I will be dogmatic — if the bowel moves the cat lives, it is does not it dies. Further treatment is symptomatic. Here I would mention two excellent forms of treatment. (1) Largactil (M & B) in 10 mgm. doses helps to combat the vomiting. (2) Glucose saline either intravenously or per rectum. The results are remarkable in some cases. Three sequelae are very important: (1) a chronic rhinitis; (2) posterior paresis; (3) Jaundice — even the blue eyes of a Siamese turn bright yellow. Treatment is on normal lines.

Immunity is very good after recovery. Burroughs Wellcome feline enteritis vaccine shows plenty of promise as a preventative.

The second type is Infectious Glossitis. Many of the above symptoms are seen but in a much milder form, and the severe dehydration and depression are absent. The temperature remains around 103°F. The important lesions are severe ulcers on the tongue and in the cheek and pharynx. Sometimes the tip of the tongue sloughs aways. Treatment is similar. As regards immunity, repeated attacks occur.

The third type is pneumonic "flu" and is primarily a respiratory infection. Nasal and ocular discharges ,coughing, lobular pneumonia, fever and neutrophilia occur.

Differential Diagnosis

(1) *Lobar pneumonia* (not of viral origin). Complete hepatisation of lungs occurs with severe gurgling dyspnoea and heaves. On auscultation of the lungs there is complete absence of any respiratory sound. Neutrophilia occurs in 90%. Animals lie as if paralyzed. There is a coppery or bloody nasal discharge. The lungs on post portem are quite remarkable, often only one tenth of one lung is not hepatized.

(2) *Kitten snuffles.* A purulent discharge from the nose occurs and sneezing is frequent. It is often associated with a wrong diet or with bone disease. Kittens can be weaned from three weeks onwards using the jelly from scraped raw meat and plenty of milk.

(3) *Biliary Fever.* The temperature is high but severe depression is absent. The piroplasm has been described as Nuttalia felis domesticus, but in the few cases I have seen there have been no Maltese cross forms ,only single round forms or slightly pear shaped ones. It is a very small parasite, resembling Babesia bovis.

(4) *In Season.* Many a veterinary surgeon has been called to visit a Siamese queen "in severe agony". The ghastly noises emitted and falling down are quite normal for the Siamese queen in season.

(5) *Any cause of constipation.* The so called "hairball" as seen in calves is never seen in cats. If anything it is a "hair-sausage"—a mass of intestinal content mixed with hair and grass and leaves. Why owners insist on feeding grass to cats is still a puzzle, as the only thing it does is to cause vomition and constipation. Prevention is better than cure, and for cats inclined to constipation a weekly preventive dose is essential. Liquid paraffin or olive oil slips through without forming bulk, so an emulsion of liquid paraffin and agar must be used. Petrolagar or Agarol can be used, but only in teaspoon doses owing to the Phenolphtalein content. For severe cases where copious quantities must be used, use only plain Petrolagar without Phenolphthalein.

(6) Cystitis is an important disease of cats owing to its complications. Symptoms include an initial fever, painful micturition,

bloody or pussy urine, swollen and very tender bladder and a secondary constipation. Hence if any cat is constipated always examine the bladder as well. Vomiting and inappetence follow. Complications follow when a bloodclot or cellular debris forms a urethal plug, blocking the very small urethra, especially in tomcats. For relief anaesthetise, irrigate the bladder with 5% sodium bicarbonate and then wash out with a solution of Streptomycin, and give a good purgative. For urine retention associated with spasms or spinal injury, Depropanex (Sharpe & Dohme) has given good results in relieving the stoppage.

(7) Vomiting from overeating or hair. Here the vomitus is mixed with food, hair, grass, etc., whereas in "flu" it is a small patch of yellow froth only, together with prolonged gagging.

Surgical Diseases

Pentothal is the anaesthetic of choice for most operations including spayings. Ethyl Chloride for very short and Nembutal for long operations.

Fractures of all types are seen. The causes are trauma, and softened bones due to a shortage of calcium. All kittens and cases of fracture should be given bonemeal powder ($\frac{1}{4}$ teaspoon daily) and hakeliveroil (2 drops daily). For the simple fracture the perfect cast is the fibreglass "airecast", but it requires some experience before the correct tension is obtained. Use only a bandage underneath the cast — if cotton wool is used it is always too slack and falls off and if nothing is underneath removal is extremely difficult. Compound fractures usually heal with difficulty, owing to the digestion of the osteoid tissue by the neutrophiles, but in cats these fractures heal extremely well provided adequate penicillin coverage is given for at least 12 days. It is sometimes impractical to inject every day, and here the 7 day Bicillin (Wyeth) can be used as a cover together with supplementary procaine penicillin injections. Cast the leg as usual, but leave a window over the wound, which enables bandages and antiseptic dressings to be applied every day. Leave it on for 14-18 days. Fracture of the symphysis of the mandible is also easy to deal with. Anaesthetise, and use a small gauge wire and a stitching needle. Place the wire behind each canine and with one end, pierce the mucosa of the lower lip at its junction with the gum and then penetrate the skin on to the ventral surface of the jaw. Repeat on the other side and then join and twist the two ends until immobilisation of the fracture is obtained, yet not too tight to impair circulation. In fractures of the femur, humerus, and pelvis — leave them well alone, as they heal well if given complete rest. Fractured spine or dislocated lumbosacral joint is a serious condition, and if reflexes are destroyed it is hopeless, as usually a ruptured bladder follows four days later. If reflexes are present, an attempt can be made to treat on the usual lines.

Internal Cryptorchid

The indications for operating are precociousness and evil smelling urine. Make a ventral incision $1\frac{3}{4}$ in. long over the bladder and try and pick up the vas deferens which usually lies in a position similar to a uterine horn. Follow the vas deferens very very carefully forwards until the testicle is obtained. Ligate both sides and remove ,then carefully trace the vas deferens posteriorly. Pull the bladder out of the wound and gently press it posteriorly until the junction with the opposite vas deferens, will be seen entering the neck of the bladder. Then follow the second vas deferens anteriorly, and repeat with the other testicle. If the vas deferens breaks, the operation will certainly fail.

Needle in the pharynx

This is a common condition. The symptoms are per-acute and often violent — with severe crying and pawing at the mouth. A general anaesthetic is essential for diagnosis. Removal is then easy but do not cut the needle in two, as there is danger of one part being swallowed.

Panhysterectomy

Cases of dystocia are difficult. The pelvis is extremely small and the kittens are very soft and pliable and fracture very easily. However with artery forceps and manoeuvering, quite a few kittens can be delivered, but usually in a mutilated condition. Should the pelvis be deformed, fractured ,or through heredity shaped like a U, an operation is essential. I prefer a panhysterectomy to a Caeserean section. Whether to save the kittens is an open question, as even if they are saved, the difficulty is to find a foster mother, and very few people are prepared to give 3-hourly feeds for a month. Ether is the anaesthetic of choice should the kittens be wanted, otherwise pentothal. Only a minimal dose should be given as on clamping off the gravid uterus with forceps, the queen goes into a slight state of shock and hence into deeper anaesthesia. I do not invaginate the stump as it is too thin, and one also gets haemorrhage through the stitches. A dab of penicillin ointment on the stump as well as an injection is sufficient. Close the wound with interrupted sutures in three layers. The wound itself need be no longer than one and a half inches.

Cellulitis

Any wound, especially a punctured one, requires penicillin, otherwise the wound heals and the infection underruns the fatty tissues of the subcutis, even going down as far as the pelvic bone. Should a case occur, en anaesthetic is necessary. Cut away a portion of skin, curette all pockets and provide drainage. Penicillin coverage is essential.

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THE VETERINARY SURGEON IN SOUTH WEST AFRICA FORTY YEARS AGO

by

G. SCHMID,
Okahandja.

(Paper real at the meeting of the S.W.A. branch of the S.A. Vet. Med. Association, 1951)

The past may be the guide for the future and after half a century has passed since our country has developed into a white man's land it may be of interest to take a retrospective view of the general conditions our profession lived under during earlier times and on which our present organization has been founded.

Probably there are few countries in the world which have gone through such an exceptional and conspicuous development in every respect during the last half century as our country, South West Africa has. In the beginning of the century S.W.A. was a wild native territory with only a few white people, mainly missionaries, tradesmen or hunters. No larger settlements or towns existed, a small contingent of German troops representing the whole power of the governing authority.

For the first time during the native war, 1904-08, S.W.A. became better known, especially to the soldiers of the "Schutztruppe" many of whom had found the free life in the wilds so attractive that they willingly decided to stay in the country and to accept the favourable conditions granted by the Government for acquiring land for farming purposes (50 Pfennig per hectare). It has been proved since that they generally were a good and hard type of settler, well fitted to the strenuous task of developing such a rough country into a more civilized state. A quiet and peaceful time after the Herero-war gave a good opportunity for the establishment of the young settlers. Many newcomers from Germany were streaming into the territory and a flourishing development could be seen to which the discovery of the diamonds at Luderitz gave a further impetus. In 1910 at Windhoek the first central Agricultural Show was held where already quite a number of the best imported cattle and horses could be seen. The cattle breeds imported in those days were mainly of German origin: Rotvieh, Simmentaler, Friesland, Pinzgauer, and Brown Swiss.

In February, 1909, the first importation of Karakul sheep took place, when 22 rams and 252 ewes were imported from Buchara. In 1913 a second lot was imported from Halle and in 1914 another large flock arrived from Buchara via Russia and the foundation was laid for the most prosperous branch of our farming industry, the Karakul.

VETERINARY ORGANIZATION

During the first years of the century the veterinary services had to be carried out by the military vets and also medical men (Drs. Kuhn, Vock, Trommsdorf, a.o.) assisted in dealing with the serious outbreaks of Rinderpest and Lungsickness. The "Schutztruppe" was used to guard the frontiers and to do the inoculation work. The first foundation of a civil organization of veterinary services was laid by Rickmann who arrived about 1896 and was on duty until after the Herero war, 1908. Rickmann established the bacteriological laboratory at Gamams where he experimented to find a vaccine against horsesickness. With the small staff at his disposal and under the most difficult conditions he nearly succeeded in getting the lungsickness under control when the outbreak of the Herero war ruined all his efforts and the disease again spread over the country along the transport routes. In 1908 Rickmann published his book: "Tierzucht und Tierkrankenheiten in Deutsch Suedwest Afrika". The book contained much valuable information for the farmer. After Rickmann the Gamams laboratory was temporarily managed by Dr. Lux. Further veterinary posts were established at Grootfontein, Karibib Friedrichsfelde, Gibeon and Keetmanshoop. Six veterinary officers including the chief and two lay assistants, one at Omaruru and one at Gamams, had to supervise the large and more and more being settled country.

I arrived in July, 1910, in S.W.A. O. Henning was then the chief in Windhoek, as he, coming from the Union, had an extensive knowledge of the special African veterinary problems. An outbreak of sheep pox was diagnosed in the southern parts of the territory and spread rapidly, causing serious losses amongst sheep. Probably the disease was introduced from Buchara by a consignment of Karakul-sheep. To investigate the disease and at the same time to reorganize the veterinary services and to put them on a more effective basis, Professor Dr. von Ostertag was sent to South West. He had also visited the Union of South Africa and Onderstepoort to study the veterinary organization and stock diseases there. Ostertag took up his task with great enthusiasm. His idea was to build up the bacteriological laboratory at Gamams by adding chemical, botanical and biological sections and to increase the number of veterinarians so that each district should have a Government one. The lay assistants were dismissed and the newly arrived veterinarians had to go through a training course at Gamams to become acquainted with the special problems and diseases in Africa

before they were sent to their districts. Only veterinarians were accepted for the colonial service who had passed their second States examination and also had some special training in animal breeding ("Tierzucht inspector"). Professor Dr. Gmelin, former lecturer in physiology and animal breeding at the veterinary college at Stuttgart, was appointed as Chief. Henning received the department of animal husbandry and Dr. Sieber who had worked some time with Dr .Theiler at Onderstepoort was appointed as Director of the Gamams laboratory. Many young veterinarians were coming out from Germany during the years 1910-1914 and by 1914 all the districts had their own district veterinary officers. Each G.V.O. had a modest laboratory. For transport purposes one saddle horse, six mules and a primitive Cape cart with two native drivers were supplied by the Government. At first the distances to be travelled were very great, the country sparsely settled and consequently the veterinarian had to spend most of his time in the veld on horse back visiting the farmers and investigating stock diseases. During my first years I had practically the whole north under my control comprising the districts of Grootfontein, Otjiwarongo and Outjo.

As an example I might mention one of my first trips in South West from Grootfontein over Otavi to Outjo, to remove the quarantine for glanders amongst the horses there; from Outjo to Okakuejo to examine some cattle for lungsickness and then along the Etosha Pan to Namutoni-Tsumeb and back to Grootfontein. The trip took about a month and gave me a good impression of my area and also of the art of travelling in Africa without overworking one's transport animals. Generally we did about 40 kms. a day. During the night the animals were hobbled and one of the boys was held responsible for their not disappearing and that they were ready for an early start in the morning. Certainly these figures are not very impressive when compared with our mechanical transport of today but they clearly show what a big change has taken place within a comparatively short time in every respect. With the introduction of the motor-car the romantic and free life in the African veld with the nights spent round the campfire has gone for ever. For a young and enthusiastic man it was really an ideal time the G.V.O. being practically the friend and the only technical adviser of the farmer in all the different questions in the new problems of breeding and hygiene of stock. He was absolutely free to spend his time as he liked provided only that his duties were carried out properly. During the first three years the employment was on a temporary basis. After three years of service three months leave could be spent in Germany and then one was accepted into the permanent service.

WORLD WAR 1914-1918

After a short period of normal development and prosperity the first world war, 1914-1918, cast its shadow over the young country. The newly created organization of the veterinary services at once ceased to operate and nearly all the veterinarians were called to

arms and distributed to the different companies of the "Schutztruppe". I was attached to the first Field Company and took part in the fightings at Sandfontein, Kakamas, Trekkopje and Otavi. The German Schutztruppe slowly retreating before superior Union troops from the Orange up to Khorab had to surrender in July, 1915. During the long and strenuous marches through the whole territory from South to North the losses amongst our horses were insignificant. The type of horse used was mainly the Afrikaner horse crossed with the East Prussian (Trakehner), a rather small sized horse with much stamina. Also Arabian blood was used with good results, whilst the larger imported horses (Australian) soon fell out when they could not get their extra food ration.

It was a wise and chivalrous decision made by General Botha to dismiss all the Reservists after signing a declaration not to fight any more during the war. The farmers could go back to their farms and the officers were allowed to take their arms, ammunition and horses with them. Only the active Schutztruppe were taken prisoners of war and had to go to the Internment Camp at Aus.

Most of the Government Veterinarians returned to their headquarters and were called by the military authorities occasionally for assistance in dealing with serious stock diseases. During the war the control of the borders was relaxed and a trader had used this opportunity to bring a consignment of cattle down from the Okavango area to the districts of Outjo and Grootfontein. The immediate result of this was some outbreaks of lungsickness in the Grootfontein and Outjo districts during 1916-17. Immediate steps were taken by the Military Magistrates. Dr. Sigwart at Outjo and I at Grootfontein were asked to deal with the matter and we got the authority to quarantine the infected area, to destroy the sick cattle and to inoculate the in-contacts. About 1918 the country was again free from lungsickness.

After the end of the war, in 1918 ,all the German Government officials were repatriated. The farmers however, made a strong application to the military Administration pointing out that they could not repatriate all the G.V.O.s and leave the country without protection against stock diseases. Colonel Lee was then in charge of the Veterinary Services but as yet no civilian organization had been arranged. Just a few days before our boat was due to leave for Germany we three veterinarians, Maag, Sigwart and Schmid, received our official permission to stay in the country providing the farmers would arrange our appointment. As far as I remember only two military veterinarians, Captains Revington and Jarvis, were then in the country. Captain Revington was taken over later by the civil service.

In 1917 the farmers had founded the "Farmwirtschafts-Gesellschaft", an association to promote the interests of the farming community. A monthly journal was issued with articles on stock diseases, breeding questions, sale of farm products, etc. This journal

existed until 1928 and contained much interesting information on different matters. To further the sale of farm products and to find a market for them another organization was formed, the "Verband der Verwertungs Gesellschaften" with the centre at Windhoek and branches at Grootfontein, Otjiwarango, Okahandja and Gobabis. We were employed by this organization for nearly two years. It was a rather difficult position for us to be appointed and paid by the farmers and to carry out more or less official duties when dealing with scheduled diseases. Also the financial position of our organization was becoming more and more difficult, the prospects for the farming industry were dark and the prices for their products were low.

Fortunately for us in the meantime the military Government had been replaced by a Civilian Administration. Major Goodall had been appointed as Senior Veterinary Officer and he decided to take us over into the Government's service in 1922. During the first years the G.V.O.s had no transport of their own. Either we had to hire transport or the farmer had to provide transport facilities. This arrangement however was in time found unsatisfactory and about 1926 we were all supplied with our own motor-cars under the subsidized scheme. The times of animal transport in South West had gone for ever.

STOCK DISEASES

It might be of interest to give now a short review of the most important stock diseases encountered during the first decades of the century in South West Africa.

Rinderpest: This disease swept through the country twice, in 1897 and in 1900, causing serious losses amongst the large herds of the Hereros. For years the northern boundaries of the territory had to be guarded by cordons of the Schutztruppe against invasion by this disease. The life of these soldiers, far away from their stations and supply depots, is described in the reports as very hard and strenuous. Many of them fell victims to malaria and typhoid fever in the lonely veld. As a strict and effective isolation and control of the infected cattle was not always possible, the disease was dealt with by bile inoculation. From animals with typical symptoms of disease the bile was taken under aseptic conditions and 10-15 cc. of it were injected subcutaneously into healthy animals. Wherever possible these inoculated animals were artificially infected with mucus from sick animals ten days after inoculation to increase the immunity. Often however the natives were not willing to assist and rather preferred to lose their cattle than to allow inoculation. No fresh outbreaks of Rinderpest have occurred in the territory since 1900.

Lungsickness: As mentioned already this disease was widely distributed over the country in the beginning of the century but was successfully dealt with by Rickmann and his successors. Also some

fresh outbreaks in 1916-17 could be restricted to the northern area and no fresh ones were recorded later within the settled area thanks to the strict measures taken and the closing of our borders against Kaokoveld, Ovamboland and Okavango.

Glanders: According to Rickmann this disease was not known in South West until 1904 when it probably was introduced from the Union with the large consignment of horses and mules bought for use in the Herero War. Until 1909 single outbreaks were diagnosed mainly amongst the horses and mules of the Schutztruppe. In 1910 I personally raised the last quarantine for glanders at Outjo and since that time no cases of glanders have been observed in South West.

Epizootic Lymphangitis is mentioned by Rickmann and also by Jacobs as existing in South West and Rickmann described the disease in a popular publication in the press in 1905. No cases have been recorded since.

Sheep Pox: This disease which is unknown in South Africa was found spreading in the districts of Maltahoehe, Gibeon and Rehoboth in 1909 and 1910 and was intrduced to Karibib and Wilhelmstal from there by a consignment of slaughter sheep. Apparently the disease was brought into South West by Karakul sheep imported from Buchara in 1909. These sheep, without showing any signs of disease ,apparently were still carriers of the virus and a number of woolled sheep arriving with the same boat were the first to show symptoms after arrival on the farm. It is known that animals which have gone through the disease and looking quite healthy may be carriers of the virus for some months.

The losses amongst the infected flocks were high, up to 50% of deaths in some herds. Goats were affected as well but only showed the disease in a very mild form. Strict isolation of the infected areas and inoculation of the in-contacts were carried out. The vaccine for inoculation was prepared by taking the scabs from highly infected sheep, putting them in a 4% boracic acid solution for 24 hours and pressing the liquid out under high pressure. Since 1910 no fresh outbreaks of sheep pox have occurred.

Anthrax and Blackquarter had been endemic in the territory since the earliest days. All the old Herero watering places were infected with these diseases, well known to the Hereros and Ovambos. Mostly when an outbreak occurred they removed their cattle to another watering place.

Lamsiekte: One of our most important problems from about 1910, especially in the northern area was lamsiekte. Quite a number of different theories regarding the cause were published by farmers and experts, and all sorts of remedies for it were recommended. I remember that one of our colleagues wrote a large volume proving that lamsiekte is nothing else than a salt poisoning. Protein deficiency, Calcium deficiency, autointoxication and other theories

were investigated with much skill and erudition. But in time the feeding of phosphates became more and more popular although the real cause of lamsiekte remained unknown until the Botulinus toxin was discovered by Theiler to be the cause of the disease.

Horsesickness: This disease is some years killed up to 50% of the horses and mules and no proper remedy or preventive vaccination was available. The Schutztruppe during the rainy season removed their horses to the mountains—so called "Sterbeposten"—at Regenstein near Windhoek and Gaus in the north. Even there in bad years the losses were high.

Dourine: This disease was introduced either from the Union or from Germany shortly before the first world war, 1914, and was fairly prevalent in the Windhoek district during 1916-17.

In consequence of its often mild and chronic character Dourine is still a serious problem today.

Anaplasmosis and Redwater: Whilst Anaplasmosis has always caused many losses in the northern districts, cases of Redwater could be diagnosed and the same observations are being made today.

Calf Disease: It is noteworthy that calf diseases were not so predominant as they are today. This may have been due to the more primitive and natural farming methods and also to the more primitive indigenous breeds of cattle generally forming the foundation of our stock—Afrikaner, Damara and Ovambo cattle.

Pig Diseases: In pigs I remember one serious outbreak of disease in Grootfontein about 1912. Today I would probably make the diagnosis: African Swine Fever, but at that time I considered the disease as a *haemorrhagic septicaemia,* particularly as some inoculation experiments carried out on mice and pigeons showed the presence of a very virulent bacillus bipolaris. As you know it was still the time of the bacteriological era where a bacillus had to be found in any infectious disease whilst today the virus diseases are in the foreground.

Times and also farming methods have changed since the beginning of the century. The cattle population alone has increased from 121,000 in 1910 to 1,340,000 in 1946. The country is now fully stocked or rather overstocked and the problems of soil and water conservation and reclamation of eroded areas are becoming more and more important. Also veterinary science has made great progress and new methods and new remedies have been discovered for dealing with stock diseases. Some diseases have been eradicated but new ones have brought us new problems. I need only refer to Brucellosis, Sterility diseases, various calf diseases, Lumpy skin disease, Rift Valley Fever and numerous diseases in sheep which were not so significant before.

"Prevention is better than treatment". Perhaps the time has come now where we not only have to consider the improvement of the strong constitution, hardiness and stamina of our original

indigenous stock, adapted to the arid nature of South West Africa. I wish in this connection to refer to the experiments made by Prof. Bonsma at Mara station and to the recent publications by Prof. Hagedoorn.

In any case there will always be a number of new problems to be solved by the veterinary staff of S.W.A. I hope that we shall always be guided by the same spirit of professional enthusiasm and cordial co-operation between the members of this staff as has been the tradition within our department since the earliest days in working for the benefit of our profession and the welfare of our country.

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BACTERIAL ENDOCARDITIS IN CATTLE — A POSSIBLE SEQUEL TO THREE-DAY STIFF SICKNESS

by

J. M. M. BROWN,
Standerton.

Recently a number of cases have been encountered in cattle in this area, which at a first glance were very perplexing indeed, and presented rather a problem in forming a definite diagnosis. On reviewing them, it becomes apparent that they all follow one more or less definite clinical pattern, namely that of a subacute or chronic bacterial endocarditis. Six of the cases encountered are presented for discussion here, and it is of great interest to note that all of them suffered from very severe attacks of three-day stiff sickness in the earlier part of this year (1954).

Case 1: A high producing Friesland cow about eight years old. This cow had three days stiff sickness in a very severe form, in February and apparently recovered completely. In June the owner noticed that she appeared to be losing condition rapidly and that her appetite had become very variable. Examination of the animal at this stage revealed signs of epigastric pain, a temperature of 103°F, and a slight anaemia. The heart sounds were dull and irregular. Blood smears revealed a fair degree of anaemia, a definite neutrophilia, but no blood parasites could be found. A tentative diagnosis of traumatic gastritis was made and the advisability of rumenotomy suggested to the owner. The usual treatment for ruminal stasis, however, seemed to bring about a fair improvement, and the rumenotomy was therefore postponed for a while. About two weeks later the condition of the cow deteriorated rapidly and examination at this stage revealed severe pain over the cardiac and epigastric areas, a temperature of 105°F, complete ruminal stasis and constipation, and a fairly marked anaemia. The cow was by now in very poor condition and appeared to be becoming steadily weaker. There was also a fairly marked oedema of the dewlap and the inter-mandibular space, and also a marked jugular pulse. Examination of blood smears at this stage revealed a marked anaemia, a very marked neutrophilia, and once again no blood parasites could be found.

Rumenotomy was therefore performed without further delay and yielded perplexing results. No foreign bodies of any description could be found, and there was no evidence of peritonitis, but

the abdominal cavity was found to contain a large amount of clear straw coloured fluid. No evidence of abscesses in the liver or spleen could be determined, and all the abdominal organs which could be examined during the course of the operation, appeared to be normal.

Faeces samples were taken and examined for internal parasites, but with negative results. Urine analysis yielded no conclusive evidence ,and a van den Bergh test, done on the blood serum for bile pigments proved negative.

The animal was then put on a course of penicillin and was given three million units daily for five days. The temperature came down to normal twenty four hours after the first injection, and remained normal for the next two weeks. During this period the cow grew steadily weaker, and had to be fed with gruels, etc., to maintain her strength. At the end of this two-week period the temperature again rose to 104°F and the cow was then given a course of sulphanilamide which brought the temperature down once more to normal, where it remained for about a week, and then became subnormal, a temperature of 95°F being recorded shortly before death, which took place about one month after the operation. At the time of death the oedema of the dewlap was very pronounced and involved the area along the anterior portion of the sternum.

A post mortem examination was performed about four hours after death and the following lesions were found:—

(i) Marked emaciation, anaemia and general venous stasis, ascites, hydrothorax and hydropericardium, anasarca.

(ii) Degeneration of the liver and kidneys, slight atrophy of the spleen and a slight pulmonary oedema.

(iii) Marked chronic purulent endocarditis of the right atrium and the right auriculoventricular valve. The entire atrium was almost entirely occluded with hard inspissated purulent material, its lumen being practically entirely obliterated, and the valvular opening was partially occluded. The terminal portion of the anterior vena cava was thrombosed, and a marked collateral circulation had developed with a large number of small vessels running through the thrombus and through the inspissated mass in the atrium and opening in the vicinity of the auriculoventricular valve. The valve cusps were in most places firmly adherent to the inspissated mass. There was a severe degeneration of the myocardium. The left auriculoventricular valve, the aortic and pulmonary valves appeared to be normal.

(iv) The gastro intestinal and urino genital systems revealed no unusual changes, and there was no sign whatever of traumatic gastritis, pericarditis, peritonitis or abdominal adhesions.

This case therefore appeared to be a straightforward chronic purulent valvular endocarditis involving the right auriculoventricular valve.

Case 2: An eighteen month old Friesland heifer which had in the earlier part of the year suffered from a very severe bout of three-day stiff sickness. She did not recover entirely but retained a severe chronic cervical myositis, with a slight torticollis and inability to lower the head and feed properly. Recently the owner had noticed that her appetite was becoming very variable and that she had started developing a swelling of the intermandibular space and dewlap. Examination at this stage revealed a poor appetite, emaciation, a harsh staring coat, marked anaemia and a temperature of 103°F. There was a very extensive oedema of the intermandibular space, dewlap and brisket. The heart sounds were dull and very irregular. Blood smears revealed a fairly severe anaemia and a definite neutrophilia, but once again no blood parasites could be found. Owing to the chronic nature of the case, its clinical features and the similarity to the previous case, a diagnosis of chronic bacterial endocarditis was made. The owner was reluctant to incur any expense in treating the case, as no success could be guaranteed, and was also reluctant to slaughter it, so unfortunately no information other than the history and clinical signs could be gained.

Case 3: A high producing Friesland cow, which had been brought up to this area from the Cape. She was first seen in the middle of the stiffsickness epidemic, and was examined at the request of the owner and a fellow practitioner, who desired a second opinion. This case had been considered to be one of traumatic gastritis and a rumenotomy had been performed. No foreign bodies were found however, and no signs of traumatic gastritis were discovered. Examination with the metal detector yielded negative results.

On examination, this animal showed a marked oedema of the dewlap and inter-mandibular space, a marked anaemia, a temperature of 104°F, ruminal stasis and a fair loss of condition. The heart sounds were dull and irregular. The gait was slow and stiff. The pulse was weak and much accelerated. Blood smears revealed only a fairly marked anaemia and neutrophilia, and a faeces examination revealed no evidence of internal parasites. Urine and serum van den Bergh tests yielded no useful information.

In view of the previous laparotomy findings, diagnosis was very difficult. There were numerous severe cases of stiffsickness on the farm at the same time, so a tentative diagnosis of three day stiffsickness with cardiac involvement was made, and the cow was given a course of penicillin. It seemed to be making fair progress, but unfortunately I lost touch with the owner and was unable to follow up the case. Looking back, however, it seems to have been very similar indeed to the first two cases, and may have been an acute case of bacterial endocarditis,as a complication to three days stiffsickness.

Case 4: A high producing Friesland cow in fairly good condition. This cow was brought into the stable one evening with its stable mates and appeared to be quite normal. It had eaten normally in the evening and had given its usual amount of milk. The owner had had no reason to expect any sign of illness. Suddenly while it was being milked, it bellowed and collapsed on top of the milker. It struggled for a while and seemed to be unable to rise and then apparently become comatose. It was examined within twenty minutes of the commencement of the attack, and the following symptoms were observed; marked dullness and inability to rise, with a definite posterior paresis, marked dyspnoea. The heart sounds were dull, and the heart beats were very rapid and most irregular. The cow showed signs of apparent blindness and did not show much reaction to stimuli. The temperature was 94°F. Nothing unusual could be found in the digestive, respiratory and urogenital systems.

Cardiac stimulants were given, but the cow died within an hour of the initial collapse. Blood smears were then taken and examined, and showed a marked bacteraemia, and a marked neutrophilia. The bacteria present were large numbers of extracellular micrococci, rod shaped bacteria and staphylococci.

A post-mortem examination was conducted on the following morning, and revealed the following points:—

(i) Cyanosis, marked general venous stasis.

(ii) Purulent disseminated focal hepatitis, splenic and renal abscesses, and small disseminated pulmonary abscesses.

(iii) There was a marked chronic valvular endocarditis of the right auriculo ventricular valve, with small purulent vegetations on the wall of the right atrium around and on the valves.

(iv) Nothing unusual could be found in the digestive and urinogenital systems and there was no sign of any foreign bodies or traumatic gastritis.

The owner stated that the cow had suffered from a severe form of three day stiffsickness earlier in the year. As the coronary arteries appeared to be free from any occlusions or unusual changes, death was put down to cerebral embolism arising presumably from the cardiac vegetations, or an abscess which burst into the lumen of some blood vessel. It seems likely that the generalized abscessation of the organs described originated from a primary focus on the right auriculo ventricular valve. It seems most surprising that the cow showed no ante-mortem symptoms before its collapse, other than perhaps a slight loss of condition.

Case 5: A three year old Friesland bull in fairly good condition. This bull came to this district early in June from a herd in which three day stiffsickness assumed a severe and most alarming form. This herd was probably one of the most severely affected

ones in the Transvaal. The bull had a very severe attack of the disease during the outbreak, from which he apparently recovered completely. About a month or two after he arrived in this district, the owner noticed that he was losing condition and had a very capricious appetite. When first examined, all that could be found was dullness, a temperature of 104°F, ruminal stasis, a slight anaemia and a fast irregular heart beat. No definite diagnosis was made at this stage, and a course of penicillin was prescribed, the result of which was not very satisfactory. The bull seemed to make some progress for a few days, then became ill again. About two weeks later, signs of trigeminal nerve paralysis appeared, in the form of drooping of the left ear, ptosis of the left eye lids, sluggishness of the pupil of the left eye, slight protrusion of the tongue. The jaw was pulled slightly to the right. The bull made circling movements to the left, while walking and showed a fair amount of ataxia. He seemed to have some difficulty in rising from a prone position. There seemed to be a fairly marked degree of anaemia at this stage, the heart sounds appeared dull, while the rate was accelerated and irregular. Blood smears revealed a fair anaemia and a neutrophilia. The temperature was 104°F. A diagnosis of chronic bacterial endocarditis with cerebral embolism was made in this case, and intravenous terramycin together with intramuscular thiamin was given. Treatment is still proceeding, and although the temperature returned to normal after the first dose of terramycin no further improvement has been made.

Case 6: A Hereford cow in fairly good condition. This cow also had stiffsickness very badly earlier on in the year. During September the owner noticed that she was losing condition, and walking slowly and stiffly. Her appetite was very capricious. A few weeks later he noticed that the left ear was drooping, the left eye seemed retracted and the tongue was protruding slightly. She developed a slight ataxia, and then ceased eating. On examination I found trigeminal nerve paralysis, a fairly marked anaemia, ruminal stasis, a temperature of 105°F, and dull heart sounds with a fast irregular beat. Blood smears revealed anamia and neutrophilia, but no blood parasites. A tentative diagnosis of chronic endocarditis with cerebral embolism was made, and the cow given a course of penicillin. Treatment produced a return to normal of the temperature within twenty-four hours, and the cow's appetite improved after the usual lines of treatment for ruminal stasis had been applied, but so far no improvement in the nervous condition has been reported.

Discussion: Although endocarditis is a very important condition in human medicine and descriptions of its various forms are complete and adequate, most literature regarding its occurrence in large animals is limited to the morbid anatomical changes, and data on clinical symptomatology is somewhat scanty. The condition is, however, fairly well described in dogs. A very good description of the

disease in humans is given in the text book by Scherf and Boyd (1948), and their description of the symptoms of the subacute form of the disease is very similar to that in these six cases, before complications developed.

It seems to be accepted that endocarditis is usually caused by bacterial infections, which have become septicaemic from some primary focus, or their toxins. Scherf and Boyd state that the usual casual organisms in acute bacterial endocarditis in humans are haemolytic streptococci, Staphylococcus albus and Staph. aureus., pneumococci, Gonococci, haemophilus influenzae or in a few cases, B. coli. In the subacute or chronic form of the disease about 90% of their cases have been due to streptococcus viridans, and the rest due to the organisms named above, while a few cases are described as having been caused by Brucellas and Streptothrix. Brumley (1949) states that the acute form of the disease in dogs is usually caused by pyogenic organisms, bipolar bacilli, B. coli and in rare cases Mycobacterium tuberculosis or its toxins. Gaiger and Davies (1947) refer to streptococci and less frequently staphylococci as the usual agents and state that the condition is very common in Erysipelothrix rhusiopathiae infection in pigs. As well as the organisms named above, Runnells incriminates C. pyogenes infection as a cause of the condition, and he states that a more or less constant infection over a considerable period is necessary before the valvular lesions become apparent, and the condition is seldom seen in acute septicaemias, but is common in chronic septicaemia e.g. swine erysipelas, chronic strangles, white scours in calves, or navel ill in foals.

Scherf and Boyd state that is is very unusual for the condition to develop in a healthy heart, and its development usually depends on the presence of a locus minoris resistentiae in the valves of the heart, e.g. fibrosis or thickening of the valves or a rheumatic lesion, the latter being one of the most important in human medicine. They state that the usual portal of entry of the bacterial infection is the upper respiratory tract, the urogenital system, otitis, infected gums or teeth, tonsillitis, wound infections, osteomyelitis, pneumonia or puerperal sepsis. Udall states that most cases in cattle follow traumatic gastritis, puerperal sepsis, or wound infections. Fuken (1929) describes several cases in cows associated with liver fluke infestation. Brumley states that although acute primary cases are seen occasionally in dogs, most cases are usually secondary to other diseases, or a pyaemia or septicaemia from abscesses, wounds, metritis, etc.

Scherf and Boyd divide the condition in humans into acute and subactute infections, the latter being similar to the chronic condition usually described in veterinary medicine. The following is a brief review of the symptoms described by them in the two forms of the condition:—

(i) Acute Bacterial Endocarditis: This is usually the term given to the form of the disease which has a duration less than six to eight weeks. It is characterized by irregular chills, sweating, a high, widely fluctuating temperature, malaise and anorexia, cardiac signs e.g. tachycardia and systolic murmurs are often obscured by the severity of the other symptoms. Very often the short course of the illness precludes the appearance of murmurs. A neutrophilia is usually present and sometimes a tumor splenis is seen.

(ii) Subacute Bacterial Endocarditis: This form of the disease has a prolonged course, and in most cases it begins insidiously with vague and indefinite symptoms e.g. fatigue, loss of appetite, lassitude, sweating and pains anywhere in the body. In other cases it commences with a polyarthritis. In many cases only a fever is present. The course of the disease may be very protracted and last for more than two years, or may be interrupted by a fatal embolism. The disease is observed in all ages from infancy to old age. The syndrome is usually very typical. The temperature shows all sorts of variations e.g. slight elevations or an inter- or remittent curve, and may even disappear completely for weeks or months. As far as the heart is concerned compensation often takes place, and the heart rate is not always increased nor are arrythmia's common. The skin is usually pallid, with a yellow muddy discolouration and a secondary hypocromic anaemia is usually present, which becomes a prominent feature as the disease progresses. This anaemia is much stressed as an aid to diagnosis when taken in conjunction with the other signs shown.

Heart murmurs are variable. They may change in intensity, new ones may appear, or they may disappear, if the vegetations obstruct the valvular surface. A neutrophilia is usually but not invariably present, and there is a moderate increase in the sedimentation rate of the blood. Loss of weight is sometimes rapid. Clubbing of the fingers often develops rapidly, and is regarded as an important sign. Often severe abdominal pain indicates embolism of an abdominal organ viz. the spleen, kidney or intestine.

Udall's description of the acute form of the disease in cows is somewhat similar to the acute human form as described above, but he states that the chronic form is only occasionally seen in cows, where it causes symptoms closely resembling those of traumatic pericarditis but can be distinguished from this condition by the absence of splashing sounds in the pericardium. All his cases have been chronic, without a previous history of acute heart symptoms, and apparently all have been metastatic from a previous puerperal infection or from a traumatic gastritis. He describes a case with lesions almost as extensive as in case number one, mentioned earlier. His description of the chronic disease in cattle closely follows the case history of this one as well.

Gaiger and Davies state that most chronic cases develop from an acute attack of the condition, while Boddie (1946) considers

that acute endocarditis is frequently associated with acute myocarditis. The description of the acute form of the disease in dogs, as given by Brumley and Boddie is very similar to the description, reviewed here, given by Scherf and Boyd.

From the clinical symptoms of the six cases discussed here, and the two post-mortem examinations, it does seem that the cardiac condition is the primary lesion. No signs of any other primary septic foci in these animals could be determined. In all six cases there is the history of a very severe attack of three days stiff-sickness ,during the earlier part of the year, and it does seem very likely that the bacterial infection of the heart followed this disease.

Literature on the pathology of three day stiffsickness is very scanty. Henning (1949) in his text book describes only pericardial effusions, but states that Mulhearn (1937) observed subepicardial, subendocardial and myocardial haemorrhages and pericardial effusions. Neitz also mentioned only these lesions.

During the course of the epidemic of three days stiffsickness in the earlier part of the year complications in the form of pneumonia and upper respiratory tract infections were very commonly encountered in this district, and it is possible that the bacterial infection of the heart followed or developed from one of these complications. Many animals in this district have never recovered condition, or have steadily wasted away after having suffered from three day stiffsickness, and it is possible that bacteria gain entrance to the blood stream of these animals owing to their lowered resistance and poor condition. A few vague cases, showing signs of cardiac embarrassment and a mild temperature, have also been encountered, which have had the history of a previous attack of three days stiff-sickness ,but these cases responded to mild heart stimulants or anti-biotics and were of very short duration, and no definite diagnosis of the cardiac complaint was made.

From the history of the six cases described, the symptoms shown, and the descriptions of Scherf and Boyd, Udall and others, which have been reviewed, the following seem to be the chief criteria, on which a diagnosis of chronic bacterial endocarditis can be based, in cattle:

(i) A gradual loss of condition, variable appetite and bowel movements, and gradually or rapidly increasing weakness.

(ii) Cardiac irregularities e.g. arrythmias, murmurs or differences in the heart sounds on either side, and sometimes pain over the cardiac area, oedema of the inter mandibular space and dewlap, and sometimes dyspnoea.

(iii) A very variable fluctuating temperature, which may be continuous or intermittent.

(iv) An anaemia, which may become very severe during the course of the illness, together with a neutrophilia. If possible a series of blood cultures should be performed in order to demonstrate the presence of bacteria in the blood and to identify them if possible. Scherf and Boyd

consider that one positive culture is not sufficient to confirm the diagnosis, but that at least three or four should be obtained. Also one negative report does not eliminate the condition's presence, for the disease may often be associated with negative blood cultures over a period of some time. The incidence of negative cultures can to a long extent be obviated by taking large amounts of blood for culture.

(v) The sudden onset of cerebral symptoms similar to those described, in the absence of injuries, would give a pointer to embolism from a source like valvular vegetations.

In the differential diagnosis one should consider and eliminate conditions like traumatic gastritis, traumatic pericarditis, other disease conditions or infections which produce anaemia, internal parasites, septic metritis and internal abscessation of organs like the liver, spleen or kidneys. Violent persistent colic may lead one to suspect an embolism of the intestines or mesenteric vessels, arising from valvular lesions.

Summary: A description is given here of six cases of chronic endocarditis in cattle, together with a review of some available literature on the subject of the clinical symptoms found in these cases. The bacteria usually responsible for the condition are noted, and some thoughts are expressed as to its relationship to three day stiffsickness, in so far that it may be a possible sequel to many cases of this disease. Some views on the clinical criteria for diagnosis of the condition in cattle are also given.

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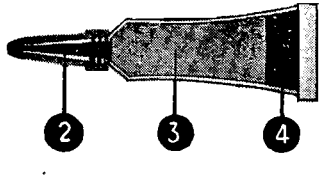

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GLOBIDIOSIS — A CAUSE OF DERMATITIS IN HORSES

by

K. C. A. SCHULZ and J. A. THORBURN.

During 1945 Hofmeyr, reporting on globidiosis in cattle in the Rustenburg district, drew attention to the fact that a globidium had also been demonstrated in skin sections of horses by workers at Onderstepoort. Further reference is made thereto in a more recent publication by Pols (1954). The object of this publication is to record the first case of globidiosis seen in a horse in South Africa. Incidentally there is evidence indicating that it holds priority over the condition diagnosed in cattle.

HISTORY

Towards the end of April 1940 one of us (J. A. T.), at that time Government Veterinary Officer at Grahamstown, forwarded some skin specimens from a horse with skin lesions that had proved completely resistant to all prescribed treatment over a relatively long period. The affection had been diagnosed as an urticaria papulosa. The cause of it was, however, not demonstrable after careful examination of skin scrapings at the local veterinary station during November of the previous year and on a later occasion at Onderstepoort. As likely causes, however, mites and any fungus infections could definitely be eliminated. The very heavy bacterial infection recorded, consisting chiefly of small gram-positive organisms, was ascribed to a secondary invasion. Scrapings from the subcutis showed a large number of what appeared to be eosinophilic leucocytes, Robinson. Histologically, the cause of the chronic dermatitis was found to be a globidium closely resembling that (G. besnoiti) previously rescribed by Bennett in skin affections of horses in the Sudan.

The animal in question was bought on the 24th April 1934 as a three-year-old gelding from De Beer's Consolidated Mines Ltd., at Kimberley. During June, 1935, it was transferred to Grahamstown and from there for variable periods to several police stations in that area. On consulting the veterinary (history) sheet, nothing of importance was recorded until the end of May, 1939, when a swelling of the hind limbs developed. The following October it contracted a sore back which later changed into a skin condition resembling mange. The swellings became progressively worse in spite of the treatment prescribed. Eventually the horse became unfit for patrol work and was transferred back to Grahamstown for closer observation.

The symptoms and course of the disease may be briefly stated as follows:—

The most striking feature, seen at the beginning of December, 1939, was a marked swelling involving both hind limbs from the coronets to the hocks. Signs of scleroderma were evident over the affected areas, the skin being thickened and less pliable than usual. Symptomatic treatment was prescribed and on one occasion an apparent improvement set in. The swelling partially subsided and the animal's condition improved to some extent. However, after some time, the affection reappeared in its old form and became progressively worse; all four extremities, particularly the hind, being affected. Bleb-like lesions developed here and in the visibly thickened and swollen skin of the lips, the face, the head, the neck and in patchy areas over the rest of the body. Crusts developed giving rise to an uneven skin surface and owing to loss of hair in the affected areas, the hairy coat presented an unthrifty appearance.

As the animal was unsound in other respects and the skin lesions did not improve in spite of the prescribed treatment the animal was cast and ordered to be destroyed.

The pathological anatomical changes were consistent with those of a chronic dermatitis crustosa involving practically the whole surface of the body, patchy over the rump but pronounced over the lips, face, head, pectoral region and lower limbs. It is regrettable that no information is available as to whether the pharyngeal and laryngeal areas had been involved. These areas, according to Bennett, form the most interesting site of infection, the epiglottis and the tip of the soft palate being principally affected.

Histologically a distinct thickening of the skin, partially due to hyperkeratosis, the proliferation of epithelial cells, an inflammatory exudate and an increase of collagen fibres ,was in evidence. The outer surface was raised in uneven folds and was covered focally by a fibrinous cellular exudate. The rete malpighii and the papillary bodies were more distinct than usual and a marked proliferation of spinous cells was apparent. There was a relatively large number of sebaceous and sweat glands and the hair follicles were not appreciably reduced. A fair number of large cysts, containing numerous small crescent or banana shaped organisms were situated principally in the depth of the cutis vera. (Fig. 1). Occasionally, however, an odd cyst was seen superficially just below the epidermis. All the cysts were apparently of the same age and were in an advanced stage of maturity.

The structural characteristics of a cyst were similar to those as described by Bennett, 1933, on a former occasion. They may be briefly enumerated as follows: There was a fairly wide capsule consisting of an outer fibrous and an inner homogenous hyalin core containing large spherical, ovoid or flattened, elongated nuclei and a central parasitic portion composed of one or several colonies. The latter were confined in what appears to be a very thin membrane. The

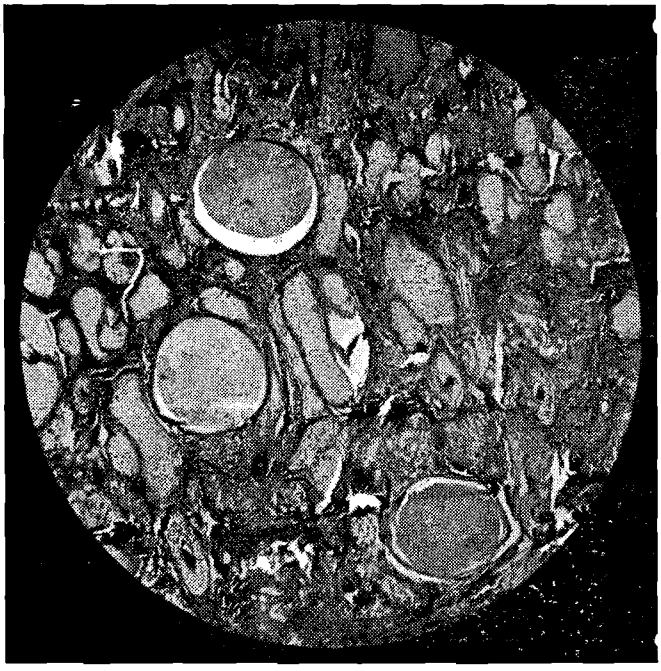

Fig. 1.—Mature cysts in the skin of a horse. Note the relatively large number of sebaceous glands and hair follicles and the few parasitic cysts present.

parasites filled the cyst cavity nearly completely and were arranged in whorls. The vacant space seen between the nucleated border and the organisms was possibly an artefact due to shrinkage arising during the process of fixation. The shape and size of the cysts and the degree of their disintegration varied to some extent in areas of different sections. Either spherical or void cysts were seen and the width of the wall did not only differ in various cysts but also in an individual one. The diameter of the spherical cysts ranged from 298 to 551μ, that of the void from 387 to 610μ (longest) and from 372 to 417μ (shortest). The width of the wall usually varied from 6 to 16μ, but might reach 28μ occasionally. The size and shape of the organisms were variable. Spherical to crescent forms occurred in the same cyst. In the former the diameter was about 3.6 whereas in the elongated forms, it ranged from 1.8 to 3.6μ; the length being 5.5 to 9μ. The above variations probably depended on the plane at which a particular cyst was cut.

A striking feature was that the intensity of the cellular reaction around the cysts varied considerably. Cellular elements might be absent, slight or fairly pronounced. The latter condition developed in the vicinity of degenerating or ruptured cysts. The infiltrating cells consisted chiefly of lymphocytes, plasma cells, fibroblasts, eosinophiles, epithelioids and an occasional giant cell. "Cuffing" even of the deeply situated blood vessels might be seen. The

changes in the degenerating cysts, varied according to the stage of disintegration. In some the outlines of the organisms became indistinct and the cytoplasm might be tinted basophilic or eosinophilic. The nuclei were indicated by minute, round, dark blue staining granules. A homogeneous eosinophilic mass was formed in the more advanced stages. The cyst wall ruptured at the pole at which most cells accumulated, the capsule and the membrane enclosing the parasites were penetrated and peripheral disintegration of the organisms occurred. Groups of parasites enclosed by the markedly cellular reticular tissue enabled one to differentiate between a burst cell and an artefact resulting during the cutting process. The organisms had a tendency to remain clumped together and only occasionally free single forms were found in their neighbourhood. All attempts to demonstrate them in the cellular exudate some distance from the ruptured cysts have failed. Macrophages penetrated through the break in the wall and eventually the lumen of the cyst was cleared of the degenerating parasites. Meanwhile granulation tissue advanced through the breach and completely filled the cavity at a later stage. The remains of a hyalinized capsule and focal scar tissue were indicative of a former ruptured cyst.

Some of the sebaceous glands underwent degenerative and infiltrative changes and the blood vessel walls were thickened owing to swollen and proliferating endothelial cells. There was also to some extent focal distention of the lymphatics.

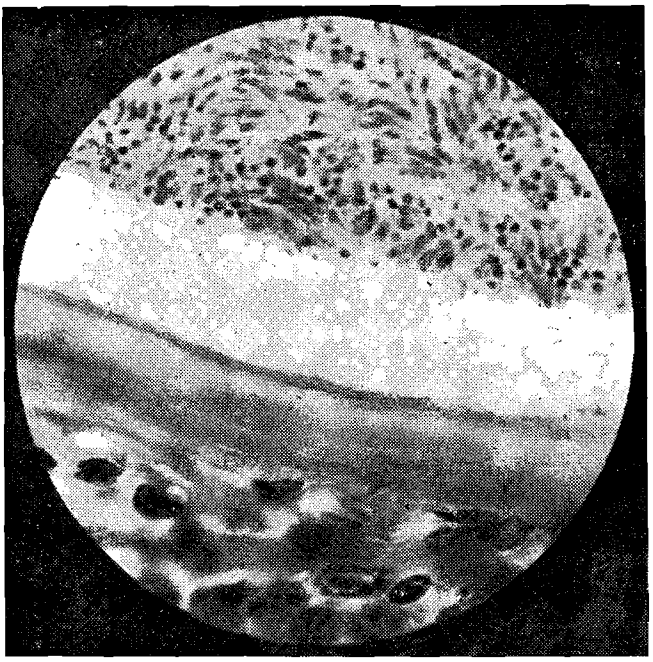

Fig. 2.—Portion of cyst indicating capsule and portion of parasitic colony.

As the condition can easily be confused with other skin affections such as mange, fungus infections and trypanosomiasis in the tsetse fly belts, the diagnosis can only be clinched by examining scrapings, smears and sections of skin biopsies.

CONCLUSION

It is noteworthy to record that, although parasites may erupt from certain cysts and may penetrate some distance into the surrounding tissues and various stages of fibrosed cysts are present, no young developing forms have been seen in the various sections. Presumably, therefore, these organisms degenerate or are phagocytized and apparently play no role in new cyst formation. The mature cyst in the tissues may be regarded, therefore, as a resting stage of the parasite, the organisms developing further as soon as suitable conditions may arise. The possible transmission by an intermediary host (biting or blood sucking arthopods) must be considered as previously suggested by Barrairon (1948).

SUMMARY

The macroscopic and histological changes of globidiosis in a horse, presumably the first case encountered in the Union of South Africa, are described in some detail. From the data it is assumed that only part of the life-cycle occurs in the horse and the role played by an intermediary host, such as biting or blood sucking insects, must be considered.

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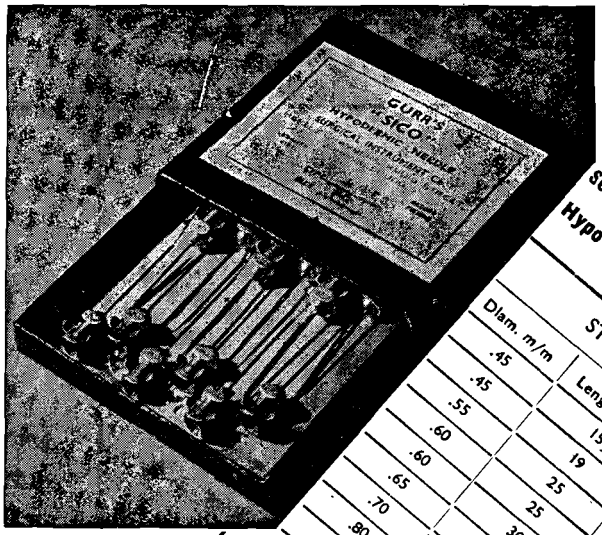

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GESKIEDENIS

Nadat 'n dringende oproep ontvang is dat daar drie kalwers dood is en vyf staan om te vrek op 'n plaas in die distrik, het ek die geval ondersoek. By my aankoms op die plaas het ek gevind dat daar een kalf dood is aan paratifus, een kalf dood is gedurende hewige spiersametrekkings en dat die boer een kalf wat te baie gely het, vernietig het.

Met ondervraging het geblyk dat gedurende die loop van die vorige middag alle Jerseys op die plaas met 'n pomp bespuit is met 'n suspensie van 'n "handvol" 10% gamma isomeer van 'n BHC handelsdip, op twee gelling water. Die ouderdomme van die kalwers het gewissel van 'n paar weke tot oor 'n jaar. Vir twee dae voor die toediening van die handwasmiddel is die kalwers blootgestel aan swaar reën. Die bespuiting van die kalwers met BHC en die intree van dood na 15 uur met hewige senuwee aandoening, het 'n voorlopige diagnose van BHC-vergiftiging regverdig.

SIMPTOME

Om 5 vm. die oggend van die ondersoek het die naturel verslag gedoen dat daar van die kalwers was wat tekens van ataksie getoon het. Meeste van die kalwers het egter nog gesuip. Die eerste simptome van hewige senuweeaandoening is kort hierna opgemerk, en in een geval was die simptome so skrikwekkend dat die eienaar die kalf vernietig het.

Ten tye van my aankoms was daar twee kalwers wat simptome getoon het. Die kalf toon uiters hewige spastiese spiersametrekkings wat uitloop op 'n neerslaan, omrol, ongekoördineerde skopbewegings, knip van die oë en skuim by die bek ,met 'n parese van die tong.

Een van die kalwers het gestaan toe die spasma begin het. Die kalf het teen 'n verbasende snelheid agteruit geloop met die bene hoog opgetel soos in Hartwater, gevolg deur 'n steiergang wat as gevolg het dat die kalf neerslaan. Die tekens kan beskrywe word as 'n baie kwaaier openbaring van simptome soos gesien in 'n hipotetiese geval, Hartwater-cum-Strignienvergiftiging.

Een van die kalwers het dwarsdeur die dag tekens van spasma afgewissel met tydperke van rusteloosheid en rustigheid getoon. Om 4 nm. was sy temperatuur 108°F, moontlik as gevolg van die hewige spiersametrekkings of weens die ineenstorting van die hittesenter of beide. Hierdie kalf is 'n rukkie hierna dood met blykbare verlamming van die asemhalingssenter.

BEHANDELING

Die kalwers is onmiddellik na my aankoms afgewas met sagte seep en water om verdere opname van die gifstof te verhoed. Eienaardig is dat dit veral die 4-6 maande ouderdomsgroep is wat veral tekens getoon het. Van die kleinere en groter kalwers het ook tekens getoon, maar merendeels slegs een aanval.

Gedurende die middag is aan kalwers wat 'n aanval getoon het 'n binneaarse inspuiting van kalsiumboroglukonaat, soos deur dr. Adelaar aanbeveel, gegee. Bykans 10 kalwers is so behandel. Een kalf wat al hewige simptome dwarsdeur die dag getoon het, het opmerklik verbeter na die eerste inspuiting (ongeveer 100 ksm. van M & B se Kalsiumboroglukonaat oplossing.) Daar is toe besluit om na 'n uur en 'n half 'n verdere inspuiting toe te dien en ongeveer 45 minute hierna is die kalf dood. Dit was egter 'n kalf wat reeds sedert vroeg die oggend herhaalde aanvalle getoon het en ook toevallig die kalf met die temperatuur van 108°F.

NA-DOODSE ONDERSOEK

Wit areas ongeveer 1 sentimeter in deursnee was op die korteks van die niere te bespeur. Op seksie het die area blykbaar tot dit medulla gestrek. Die lewer het moontlike tekens van ontaarding getoon. Verder was die ondersoek negatief. Telefonies is my deur dr. Le Roux meegedeel dat geen patalogiese veranderinge mikroskopies vasgestel kon word nie.

GEDAGTEGANG

(1) Volgens berekening deur dr. Adelaar is die sterkte BHC waarin gehandwas is, ongeveer 1,800 dele per miljoen, of te wel 'n sterkte ses maal so sterk as die vereiste dipsterkte.

(2) Gedurende my dienstyd te Ladysmith, is 'n BHC-dipmonster na Onderstepoort versend vir vasstelling van die sterkte met bevinding dat dit 2,080 dele per miljoen was, dus nog sterker as in die geval hierbo na verwys. In hierdie dipbak is kalwers en beeste van alle ouderdomme gedip sonder dat enige gevalle van vergiftiging ooit voorgekom het.

(3) Voorheen is reeds dieselfde handwasmetode toegepas op dieselfde plaas met geen tekens van vergiftiging nie.

(4) Kalsiumboroglukonaat binneaars is toegedien waarna daar nie weer 'n kalf, behalwe die een wat heeldag simptome getoon het en wat twee inspuitings gekry het, gevrek het nie. Die kalwers wat behandeling ondergaan het, het egter om 5 nm., d.w.s. 27 uur ná handwas, nog net een aanval getoon. Die vraag is nou of die

toedien van kalsiumborglukonaat wel gehelp het en of die aanvalle in elk geval sou bedaar het.

(5) Alhoewel BHC algemeen in gebruik is, is dit die eerste geval van BHC-vergiftiging wat ek gesien het en die vraag van die behandelingsmetode soos aanbeveel, kon nie bevredigend op die proef gestel word nie.

DANKBETUIGING

Dr. Adelaar vir inligting verstrek.
Dr. Le Roux vir patologiese ondersoek.

COOPANE...*a new and Safe Anthelmintic for domestic animals*

COOPANE, the new Cooper anthelmintic based on piperazine adipate, is notable for its efficiency and very low level of toxicity. Principal indications are:

HORSES against *Parascaris equorum*, *Oxyuris equi* and the small strongyles.

PIGS against *Ascaris lumbricoides*, and *Oesophagostomum spp.*

DOGS against *Toxocara canis*, *Toxascaris leonina* and *Uncinaria stenocephala.*

CATS against *Toxocara mystax* and *Toxascaris leonina.*

POULTRY against *Ascaridia galli.*

COOPANE can be given to all these animals in *any* type of feed. No fasting or purging is necessary, consequently there is no need to break the training of thoroughbreds. At the recommended dosages there is no toxic hazard.

Through the courtesy of a number of South African practitioners COOPANE has been subjected to a series of user trials in this country, and these have confirmed the suitability of the product under local conditions.

COOPANE is supplied in ½-kilo tins of powder.

Further information on request.

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SUPPLY OF POISONS — HABIT-FORMING, AND POTENTIALLY HARMFUL DRUGS BY VETERINARIANS

COUNCIL S.A.V.M.A.

(1) In terms of the provisions of the Medical, Dental and Pharmacy Act (Act No. 13 of 1928) as amended, a veterinarian authorized by this Act may only import, purchase, acquire, keep, use, prescribe *or supply* poisons, habit-forming drugs, and potentially harmful drugs in the course of his practice, solely for the treatment of animals under his care.

If the veterinarian supplies these substances to a person whose animals are *not* under his care, he may render himself liable to a charge of misconduct under the Veterinary Act (Act No. 16 of 1933) and he runs the risk of having his certificate of authorization under the Medical, Dental and Pharmacy Act cancelled by the Minister of Health.

(2) The Medical, Dental and Pharmacy Act also makes provision for the sale of poisons and potentially harmful drugs on the following conditions:—

i. *Poisons.* A magistrate may authorize a Co-operative society or a general dealer, licensed as such ,to sell or supply any poison or preparation containing a poison specified in the certificate. Government Notice 1903 of 1937, as amended, provides for the sale and supply in this connection of blistering ointments, condition powders, worm remedies, dipping powders, etc., provided they are registered in terms of the Fertilizers, Farm Feeds, Seeds and Remedies Act No. 36 of 1947.

ii. *Potentially Harmful Drugs.* Antibiotics, hormones, oestrogenic substances, para-aminobenzenesulphonamides, phenothiazine, and preparations or admixtures thereof, as indicated in the Sixth Schedule to the Medical, Dental and Pharmacy Act Amendment Act (No. 29 of 1954), provided they are registered under the Fertilizers, Farm Feeds, Seeds and Remedies Act (No. 37 of 1947), can be supplied freely by persons holding trading licences. A registered veterinarian cannot supply these substances in this way unless he holds a trading licence. Under the Veterinary Act he is not permitted to trade under his own name.

(3) Anyone disregarding the provisions of the Fertilizers, Farm Feeds, Seeds and Remedies Act or the provisions of the Sixth Schedule to Act 29 of 1954, may be liable to prosecution.

(4) A veterinarian who supplies to the owner of animals not under his care medicine and drugs not scheduled under the Medical, Dental and Pharmacy Act e.g. colic drenches, therapeutic substances

labelled for veterinary use (section 26 part viii of the Therapeutic Substances regulations, G.N. 1130 of 1935 as amended); or potentially harmful drugs, registered under the Fertilizers, Farm Feeds, Seeds and Remedies Act, may be liable to a charge of trading without a licence depending on the extent of business conducted.

LETTER TO THE EDITOR

10, Caledon St., George,
15 December, 1954.

The Editor,
S.A. Veterinary Journal.

Dear Sir,

To those who are not regular readers of the Veterinary Record, the following extract should be of interest. The "Legitimate Grievance" referred to is the increasing harm being done to practitioners by the prevalence of Animal Welfare Societies.

FIFTY YEARS AGO

The current correspondence under the heading "A Legitimate Grievance," finds an echo in an issue of *The Record* for November 1904. In that case Lord Onslow, in addressing a meeting of Scottish farmers had suggested that official help might be given to them so that they could diagnose and treat their own animals. William Hunting expressed himself as follows:—

"We do not understand the curious paragraph directing attention to the future labours of the Board of Agriculture. The President thinks: 'We shall have to direct our attention very much to what I may call assisting the farmers in helping them to diagnose and treat the diseases of their stock.' We confess we are at a loss to make out exactly what this means. So far the Board has assisted in the diagnosis and treatment of the diseases of stock by publishing and disseminating small tracts containing an account of symptoms of some diseases and a very curt description of treatment. This is bad enough, but no worse than the articles contributed to agricultural papers by veterinary surgeons. The words of Lord Onslow suggest that in future the veterinary experts of the Board will be partially employed in gratuitously diagnosing and treating disease on the farmers' premises as is done in South Africa. We take no objection to the State help given in the Colony because whole districts have no resident veterinary practitioner, and because a large proportion of the more fatal diseases prevalent require investigation and research to determine their nature. At home it is quite different. No district is without its veterinarian and only a few diseases require scientific investigation other than what can be supplied by the local expert. Our practitioners are recognized by a State Charter, they have undergone an expensive course of training, and it would be grossly unfair to take from them their practice by supplying gratuitously what they are quite capable of affording for fair remuneration."

This is very singular indeed — all the more so as it was written by the founder of the Veterinary Record *in the year* 1904.

Yours faithfully,

HUGH C. WATSON.

LETTERS TO THE EDITOR

VACANCY FOR VETERINARIAN

Sir,

I am directed to inform you that vacancies exist for appointment as Veterinary Officer, Veterinary Department, Tanganyika, and to request that you will be so good as to bring this to the notice of the members of your Association.

The salary scale applicable is Scale A, including inducement, which is £816 x 36—960 : 1,032 x 42—1,158 x 48—1,350 x 54—1,620 per annum; Veterinary Officers enter this scale at £1,032 per annum, but the award of further increments for experience up to a maximum of four may be considered. In addition a temporary cost of living allowance at the rate of 10% of salary, subject to a maximum of £162 per annum, is at present payable. Furnished quarters are provided, if available, at a rental varying according to the standard of the quarters, but generally less than 10% of the officer's salary. Leave is at the rate of five days a month but those interested may be referred to the General Conditions of Service, copies of which are attached hereto.

Should any member of your Association wish to be considered for such appointment, it would be much appreciated if you would request him to complete the enclosed P/1 form in duplicate, and forward this direct to the Director of Veterinary Services, Veterinary Department, Dar es Salaam, who will also be in a position to answer any enquiry regarding conditions or terms of service in Tanganyika.

Any expenditure incurred in connection with the advertisement of these vacancies is recoverable from the funds of this Government, on presentation of account.

I am, Sir,
Your obedient servant,
Acting Chief Secretary to the Government.

The Secretary,
The South African Veterinary Medical Association,
P.O. Onderstepoort, Transvaal, South Africa.

EE.
Copy to: The Director of Veterinary Services, Dar es Salaam.

NEW DRUGS

Maybaker (S.A.) (Pty.) Ltd., announce the introduction of three veterinary products. 'Euthatal' brand pentobarbitone sodium is a non-sterile preparation indicated solely for euthanasia in small animals. The solution contains gr. 3 per c.c., and a dosage based on 1 c.c. per 4 lb. bodyweight produces immediate death. 'Euthatal' is supplied in 100 c.c. bottles. The price is 30s. 4d. to the veterinary profession.

'Otoryl' brand ear drops contains 0.15 per cent dibromopropamidine isethionate, 0.1 per cent benzene hexachloride, and 2 per cent promethazine hydrochloride, and is intended for the treatment of otitis externa, and parasitic bacterial and fungus infections in the meatus. It is also useful in eczematous otitis. 'Otoryl' penetrates deeply and rapidly into the ears of dogs and cats, and by limiting the irritation associated with many forms of otitis, prevents self-injury by scratching. 'Otoryl' is available in 15 c.c. bottles, at a cost of 3s. 2d. to the veterinary profession.

'Solcon' brand moulded products are used for the treatment of infective conditions of the prepuce and uterus in the bull and cow. Each product contains 250 mgm. streptomycin sulphate and 50 mgm. dibromopropamidine isethionate, and has been designed in shape and size for easy insertion. The main indications are vibriosis, metritis and pyometra. They are also useful in the treatment of sinusitis after de-horning operations. 'Solcon' is supplied in containers of 20 at 28s. 1d. per container to the veterinary profession.

for MASTITIS

USE THE DRUG OF BROADEST ACTIVITY

AUREOMYCIN

Each ready-to-use, easy-to-use, rolled-in infusion tip tube of Aureomycin Crystalline Ointment Lederle For Udder Infusion contains twice as much Aureomycin as formerly at no increase in price.

Aureomycin is effective against more bacteria commonly found in mastitis than penicillin. One infusion is active for more than 48 hours.
Infusion of infected quarters with Aureomycin Crystalline Ointment, in most cases, results in the production of saleable milk.

In cases of acute septic mastitis, in addition to udder infusion, the injectable form of Sulmet* Sulfamethazine Lederle should be used, by or on the advice of a veterinarian. Sulmet Oblets* may be given as subsequent treatment.

Veterinary Aureomycin Ointment may be used for the prevention of superficial udder infections. When obvious injuries to the udder or teat occur, it is advisable to apply this ointment locally to the wound. At the same time infuse each quarter so affected with one full tube of Aureomycin Ointment as a preventive measure against mastitic infections.

For maximum efficiency in the use of Aureomycin Ointment For Udder Infusion and best management practices and disease-control procedures for avoidance of reinfection, consult your veterinarian.

Write for folder on Aureomycin Ointment.

*Reg. U.S. Pat. Off.

The following further Aureomycin Hydrochloride Veterinary Products are available:
Intravenous with diluent 2.5 gm.
Intramammary Ointment ½ oz.
Veterinary Ointment 1 oz.
Capsules 250 mgm. 16's.
Oblets 5 mgm. 4's (for Metritis).

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SOUTH AFRICAN VETERINARY MEDICAL ASSOCIATION

COUNCIL MATTERS

A meeting of the Council was held on Thursday, January 27th, 1955.
Dr. Hofmeyr was present by invitation.
The following matters were discussed:—

(1) *Jubilee Celebrations of the S.A.V.M.A.*, 1955:

With the concurrence of the Director of Veterinary Services it was agreed to extend the meeting to five days. It was agreed as well that the first day of the Congress, Monday, 29th August, should be an open day and completely separate from the rest of the week's programme. On this day the whole of organized agriculture should be invited to attend, and the proceedings should be opened either by the Prime Minister or the Minister of Agriculture, if it could be arranged. A special committee was appointed to organize this "Open Day". It was proposed that a popular lecture be given during this day, but not in the evening.

As regards the scientific side of the Congress, it was decided that certain distinguished people should be invited as guests of honour. It was decided that instead of two symposia on Tuesday, 30th August, the time should be devoted to one only, on "The role of the veterinarian in animal and public health". The subject would be divided into four sections dealing with different aspects.

(a) The role of the veterinarian in animal health. (Research Division).
(b) The role of the veterinarian in animal health. (State Service).
(c) The role of the veterinarian in animal health. (Private Practice).
(d) The role of the veterinarian in animal health. (The Municipal Veterinarian's Part).

Only one afternoon would be set aside for sporting activities, and one would be utilized for a conference of State Veterinarians.

An appeal was made to colleagues living in Pretoria, to offer accommodation to visiting veterinarians during the Congress, as it would be at a premium at that time.

The matter of inviting overseas guests was brought up, but was referred to the organizing committee. The committee was asked to try to get the papers to be read at the Congress printed beforehand.

(2) *Veterinary Health Certificates*:

The report of the General Purposes Committee was discussed. Dr. Clark explained that the basis of these certificates was

(i) that the veterinarian should not sign any certificate unless he has full personal knowledge of the herd or animal in question.
(ii) that the buyer should not have a false sense of security, and
(iii) that the certificates should be simple and practical for everyday use.

Elsewhere in this journal proposed certificates are given, for consideration by members.

(3) *Indiscriminate sale of Distemper Vaccine to the lay public*:

All the branches of the Association were against the indiscriminate sale of the vaccine, and a letter to the Director of Veterinary Services was drawn up stating "That the Council of South African Veterinary Medical Association is not in favour of the indiscriminate sale of distemper vaccine to the public. Exceptions could be made in the case of registered hunting clubs and certain areas where veterinarians were not available; in which case stock inspectors should do the vacccinations on behalf of the state veterinarian of the area.

Dr. Pfaff tendered his resignation as a member of Council, which was accepted with regret. Dr. P. S. Snyman was elected as vice-president in Dr. Pfaff's place. Dr. L. W. van Heerden was elected to the Council as an ordinary member in Dr. Snyman's place.

SOUTH AFRICAN VETERINARY MEDICAL ASSOCIATION

COUNCIL MATTERS

A meeting of the Council was held on Thursday, November 4th, 1954.

In connection with the difficulties experienced with the S.P.C.A., Dr. Nelson addressed the meeting.

He said that he valued his membership of the S.A.V.M.A. and will be happy to give his services at any time. What concerned him most during the discussions with the S.P.C.A. was the fact that the Society was under the impression that they could make money out of the professional services of their employed veterinarian. This is actually farming out of professional services, and could lead to a great deal of abuse of the veterinary profession.

All appointments of veterinarians to welfare or other societies should be on the basis that any income from professional services should accrue to the veterinarian concerned. The S.A.V.M.A. should prevent future occurrences and correct the existing cases.

The President thanked Dr. Nelson for his contribution, especially since a number of Veterinary Board Members were present, but pointed out that Council could not usurp the functions of the Veterinary Board. Allied conditions are existing in the Co-operative Employment of Veterinarians, which has been investigated by a Committee of Council. However these are the concern of the Board. The President then invited an informal discussion.

On a point of information asked by Dr. de Lange, Drs. Pfaff and M. C. Robinson informed Council that the case of the Johannesburg S.P.C.A. who employ a veterinarian on a salary basis, no actual fee is charged, but only a donation is given. Apparently not only the poor but also the rich make use of the services. The S.P.C.A. as well as the P.D.S.A. are therefore competing with private practitioners. Dr. Pfaff said that there is nothing in the law to prevent a quack from practising.

Dr. Nelson said that Medical Welfare clinics for the poor do exist, but they never charge a fee. The S.P.C.A. is not a charitable association if it profits by the services of their veterinarian. It should be possible to change the Act in order to remedy the situation.

Dr. Alexander pointed out that the nature of the profession has altered in recent years. Societies such as the S.P.C.A. and P.D.S.A. can advertise, and non-professional employees can operate and use drugs under the cloak of the charitable societies and the performance of first aid. The only solution is the education of our own profession to the ethical code.

Dr. Thomas said that this is an exceedingly intricate problem. Even State Veterinarians doing non-scheduled work can be drawn into the net.

Summing up the position Dr. Nelson said that if the Act cannot be changed, some explanatory article should be written for the Journal, in order to educate the profession. The public should also be educated systematically.

Jubilee Celebrations of the S.A.V.M.A., 1955:

A further report from the Organizing Committee was tendered, but is was decided that the Committee should meet again to formulate a complete programme and report back to the next Council meeting.

In connection with the resolution put forward at the 49th General Congress of the S.A.V.M.A., referring to the ante and post mortem inspection of animals slaughtered for human consumption, Dr. M. C. Robinson, Director of the Johannesburg Abattoir pointed out that the whole matter was being discussed by a Consultative Committee.

With reference to Resolution (2) "That this 49th Congress of the S.A.V.M.A. notes with approval that certain members have formed a "Veterinary Public Health Group" and considers that such a group will fulfil a very useful

function in maintaining and furthering the Public Health aspect of the profession. Council is hereby requested to investigate ways and means of affecting formal recognition of such a group within the framework of the S.A.V.M.A.", Dr. M. C. Robinson pointed out that as a group within a group they do not get enough contact with each other. They felt that they should meet within the framework of the S.A.V.M.A. to exchange opinions.

Dr. Alexander suggested that as Council approves of the Constitutions of the Branches, all that is necessary is for this group to form a Branch, and submit a Constitution for Council's approval. Council therefore instructed the Hon. Secretary to write to Dr. v. d. Heever to act accordingly, and to point out that this group will be given opportunity to meet at Annual Congress.

Veterinary Health Certificates:

The General Purposes Committee with Dr. van Rensburg as a co-opted member, was asked to draw up a concise "Guide to Certification of the Health of Animals" for circulation and discussion at the next Council Meeting.

The President reported that Dr. v. d. Heever interviewed him on the question of the new Public Health Amendment Act. Public Health officials stated that the interpretation of the new Act is such that no refund of the salary of a veterinarian employed by a local health authority can take place unless the veterinarian is engaged full-time on public health matters. Dr. v. d. Heever felt that this is detrimental to the employment of veterinarians by smaller municipalities.

Dr. M. C. Robinson pointed out that representations have already been made with no effect and felt that Council could gain nothing by doing so. The Act specifically states that a refund of salary cannot be entertained unless the duties which are not strictly public health are cognate or allied.

The Hon. Secretary was instructed to reply to Dr. v. d. Heever that the interpretation of the phrases "cognate or allied" under the Act, precludes the Association from making representation.

VETERINARY HEALTH CERTIFICATES

In continuation of the paper read by Dr. Diesel at the 49th Annual Congress, 1954, Council submits the following proposed forms for Veterinary Health Certificates for consideration by members. The committee responsible would be grateful if members would submit any comments or suggestions to the Secretary as soon as possible so that they may be considered before the next general meeting when the whole question will be discussed.

It is proposed that the certificates as finally decided upon will be printed and sold to members wishing to purchase them. Consideration should, therefore, be given to the following questions:—

(1) Is it desirable to have such forms? In Council's opinion it is highly desirable as it will ensure uniformity and completeness of all certificates issued.

(2) The form such certificates should take if they are printed.

(3) Method of issue. At present it is visualized that the certificates would be obtainable in either official language but not printed with both languages on one form as this would render them too long. They would be sold in stapled book form, foolscap size, each form serially numbered, with a carbon copy for retention by the veterinarian. Such books could be made up containing 25, 50 or 100 duplicate certificates.

It would also be appreciated if branches would submit their comments.

VETERINARY HEALTH CERTIFICATE

COW.

1. *Description of Animal* (including any special identification marks)

.....

2. *Name and Address of Owner* .....

.....

3. *Clinical Examination.*

The above animal was examined by me on .....

at ..... and no outward sign of any disease or defect was detected other than:—

(Here insert any abnormalities found toegether with your opinion of their effect on the usefulness of the animal for the purpose intended).

.....

.....

4. *Specific Examinations of Tests Performed.*

Disease tested for	Type of test used	Date	Result
e.g. Tuberculosis	Intradermal tuberculin	6/1/55	Negative
Mastitis	Strip cup	6/1/55	Negative, etc.

5. *Genitalia.*

The genitalia of the above animal were examined by me on ..... with the following result:

Pregnant for about ..... months.

Not pregnant .....

Condition of Genitalia .....

6. *Inoculations performed.*

To my personal knowledge the animal was last inoculated against the following diseases on the dates indicated:

Anthrax	Brucellosis	Blackquarter .....
Heartwater	Botulism	Gallsickness .....
Rift Valley Fever.....	Redwater	Paratyphoid .....

7. *Herd of Origin.*

From my personal knowledge of the herd from which this animal is derived I know of no reason to suspect the presence of any infectious disease which might be latent in the above animal.

Signed .....

Registered Veterinarian.

Place .....

Date .....

Note.—In completing the above certificate the Veterinarian should take particular cognisance of the possibility of the following diseases being present: Tuberculosis, Brucellosis, Infectious Epididymitis and Vaginitis, Vibriosis, Foot and Mouth Disease, Lumpy Skin Disease, Trichomoniasis, External Parasites and Diarrhoea.

VETERINARY HEALTH CERTIFICATE

BULL.

1. *Description of Animal* (including any special identification marks) .....

2. *Name and Address of Owner* .....

.....

3. *Clinical Examination.*

The above animal was examined by me on ..... at ..... and no outward sign of any disease or defect was detected other than:—

(Here insert any abnormalities found together with opinion of their effect on the usefulness of the animal for the purpose intended).

4. *Specific Examinations of Tests Performed.*

Disease tested for	Type of test used	Date	Result

5. *Genitalia.*

(a) The genitalia of the above bull were examined clinically and I find no reason to suspect he is impotent or infertile.

(b) The semen of the above bull was examined on .....

and found to be:— (specify tests applied) .....

.....

In my opinion the breeding potentialities of this bull are .....

.....

6. *Inoculations performed.*

Anthrax	Brucellossis	Blackquarter .....
Heartwater	Botulism	Gallsickness .....
Rift Valley Fever.....	Redwater	Paratyphoid .....

7. *Herd of Origin.*

From my personal knowledge of the herd from which this animal is derived I know of no reason to suspect the presence of any infectious disease which might be latent in the above animal.

Signed .....

Registered Veterinarian.

Place .....

Date .....

VETERINARY HEALTH CERTIFICATE

HORSE.

1. *Description of Animal.*

Breed ..... Name .....

Sex ..... Age .....

Colour ..... Height .....

General Description .....

.....

Special Identification Marks .....

2. Name and Address of Owner .....

.....

3. *Clinical Examination.*

The above animal was examined clinically by me at ..... on ..... with the following results:—

Heart and Lungs .....

Eyes .....

Teeth .....

Near Fore .....

Near Hind .....

Off Fore .....

Off Hind .....

Remarks .....

4. *Specific Examinations of Tests Applied.*

Disease tested for	Type of test used	Date	Result
e.g. Dourine			

5. *Genitalia.*

(i) Mares.

The above mare was examined clinically for pregnancy on..... and found to be pregnant for about.....months/not pregnant.

An Ascheim-Zondek test was performed on..... and the result was positive/negative.

The condition of the genitalia were found to be.....

.....

(ii) Stallions.

(a) The genitalia of the above stallion were examined and I find no reason to suspect he is impotent or infertile.

(b) The semen of the above stallion was examined on..... and found to be (specify tests applied).

In my opinion the breeding potentialities of the above stallion/mare are

.....

6. *Inoculations performed.*

To my personal knowledge this horse was inoculated against horsesickness on .....

7. In my opinion this horse is fit for the following purposes.....

.....

(e.g. Breeding, hack, polo pony, etc.)

Signed .....

Registered Veterinarian.

Place .....

Date .....

VETERINARY HEALTH CERTIFICATE

(All animals except Cattle and Horses)

1. *Description of Animal(s).*

Species ..... Breed .....

Sex ..... Colour .....

Name (if any) .....

General Description .....

Name and Address of Owner .....

2. *Clinical Examination.*

I have examined the above animal(s) on .....
In my opinion it/they is/are healthy and free from infectious disease.
Remarks:

3. *Specific Examinations or Tests performed.*

Disease tested for	Type of test used	Date	Result

4. *Inoculations performed.*

To my personal knowledge the above animal(s) was/were inoculated against the following diseases on the dates specified.

Disease ..... Date.....

.....

.....

Signed .....

Registered Veterinarian.

Place .....

Date .....

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AN UNUSUAL OSSEOUS GROWTH (OSTEOMA) IN THE BRAIN OF A SHEEP

K. C. A. SCHULZ and A. D. THOMAS

Osteomata are tumours consisting of the components of bone (*Tela ossea and marrow*), and are considered to be the most peculiar type of all bone tumours.[1] They are rare, usually benign, solitary, hard, circumscribed structures having a slow expansive growth, but acceleration may occur in some instances after repeated trauma or changes in the endocrines (during puberty, the period with most intensive osseous growth,[2] or pregnancy). Occasionally they may reach the size of a man's head. The texture is either very dense, eburneous or cortical-like (*osteoma eburneum*) or loose spongy containing marrow spaces (*osteoma spongiosum, osteoma medullare*). The skeleton is principally involved (*homoplastic osteoma*) the sites of origin being as a rule the periosteum and endosteum (*periosteal and endosteal ossification*) or the cartilage (*enchondral ossification*). Less frequently, however, they develop independently from preformed bone by metaplastic ossification or as neoplasms in various soft tissues and internal organs, such as the meninges, brain, lungs, muscles, scar tissue, mixed tumours etc. (*heteroplastic osetoma*)[3]. It has been stressed on several previous occasions, that hyperplastic, inflammatory and metaplastic bone formations should not be confused with the rare typical ("true") osteomata[4,5,6]. Sometimes, however, it is extremely difficult to differentiate the former from the latter group.[7] The use of this term is thus rather ambiguous and may lead to confusion. Even *Ewing*[8] emphasizes that it has never been possible to define this type of growth clearly. Histological study, according to him, fails as a rule to distinguish between simple hyperplastic growths and true osteomata; and that clinical and gross features seem to offer the best criteria for separating them. Since the primary process in the production of these growths is ossification, there may be some justification for the tendency to apply the term osteoma to any abnormal mass of osseous tissue. Naturally the aetiology will differ for the various ailments comprising this group.

We are inclined to agree with *Henschen*[9], who states that chondromata and osteomata are, if they do occur in the brain, very rare. The cases that have been described, according to him, are presumably doubtful. He is inclined to support *v. Lehoczky*[10], who ascribes the pathogenesis of the ossification in the brain principally to a metaplastic bone formation and not to a "true" (typical) osteoma.

On several occasions benign osseous tumours and calcified structures of variable size, shape, and consistence have been described in different parts of the brain of man, and to a lesser

extent in our domesticated animals. In the former the recorded sites are the left frontal lobe of the cerebrum[11], chiefly the left cerebral hemisphere[12], the left cerebellar hemisphere[13], the right putamen[10], and a calcified structure[14]. Although ossification and calcification are two closely related processes, they should not be confused with each other as they are separate entities.

Osteomata occur fairly frequently in the nasal cavity and sinuses of bovines and horses[15]. They may reach an enormous size and sometimes after becoming separated from their base, lie free in the cavaties ("dead osteoma"). How this detachment occurs is still obscure, presumably after the rupture of their pedun-cles or as the result of a demarcative inflammation. Osteomata have been recorded in other cavities also, for instance in the vitreous humor of the eye of a horse[16] and in the orbit of man (illustrations 97a & 97b in Hdb. d. path. Anat. IX/5). The latter case closely resembles that to be recorded by us.

Of extremely rare occurrence is the so-called "petrified" or ossified brain in cattle, horses, sheep and goats. *Joest* describes an intracranial compact osteoma of a horse[17] and of a three year old wether[18], and an interesting case of a peculiar exostosis is recorded in an aged goat ewe by *Roth*[19]. In view of the rarity of this location it is deemed worthwhile to report a case of a solitary osteoma involving the left cerebral hemisphere of an adult sheep and to present a brief review of the literature.

During September 1940 a specimen of a "versteende harsings" (petrified brain), was forwarded from Petrus Steyn to Onderste-poort for examination and comment. The history of the case is as follows:- The structure to be described was removed from the left side of the cranial cavity of a six year old hamel by its owner. The animal concerned had been the fattest of a group of 12 hamels selected for home consumption. Noteworthy to record is, that the sheep had never shown any symptoms which could have been correlated with this abnormality. In fact, it was in all respects visibly not affected; its gait, general behaviour and habitus did not deviate appreciably from the normal and its wool was considered to be of good type and quality. No abnormality of the skull was observed externally, except that the skin over the site of the lesion appeared thinner than usual.

On opening the cranium a hard bony structure, completely filling the left half of the cranial cavity and partially encroaching on to the right cerebral hemisphere, was observed. The latter was displaced and compressed to some extent, paler than usual and its size appreciably reduced. After careful examination no other densities could be found in the remaining portion of the brain. The nose and other parts of the skeleton were not visibly affected.

Unfortunately the specimen with a portion of the skull attached to it was received in a dry state. Thus several salient features may be lacking in the description of this condition.

Description

The fragment of the skull partially enclosing the large, extremely hard and heavy growth, is not fused to it except over a narrow and more or less circular area around one of the most pronounced protuberances. Here the roof of the cranium is slightly raised, thinned down and even eroded over the apex of the prominence (fig. 1). The first assumption that the tumour arose from or near the temporal bone proved fallacious on closer examination.

Fig. 1.
Tumour with fragment of skull which is eroded over the most prominent protuberance.

In the antero-dorsal aspect of the fragmentary skull, there are signs indicative of a sinus (frontal) and the anterior part of the growth is in close proximity to the olfactory cavities, their fenestrated structure is still apparent.

The tumour is separated from the cranial fragment by a thin, dry membranous tissue which penetrated into the underlying sulci and crevices. It is roughly pear-shaped. The dorsal side is distinctly convex and the ventral obviously flattened. Superficial or deep, branching sulci divide the surface into a number of more or less prominent bosselations, which may be smooth or distincly pitted. Intermingled with the latter are depressions or cavities of variable dimensions, fig. 2. A peglike projection of the outer cranial surface (a remnant of a frontal sinus septum) is loosely attached in a cone-shaped depression lateral to the median line of its dorsal surface.

Antero-ventrally to this there is a distinct V shaped cavity (1.5 x 0.5 cm) with its apex pointing upwards and separating the front portion into two distinct lobes of variable size. A probe can

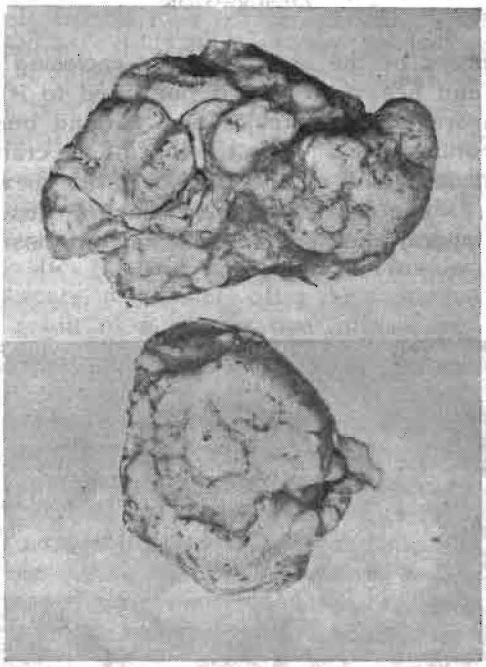

Fig. 2.

Left (upper) and right sides of tumour indicating deep and prominent sulci, prominences and depressions.

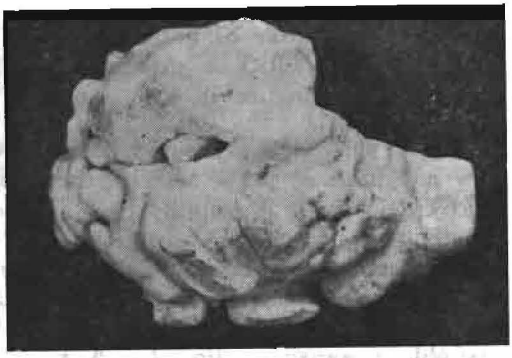

Fig. 3.

Dorsal surface of tumour, illustrating cavities, crevices, sulci, bosselations, pitted areas and depression in which peglike remnant of septum was lodged. Right lower half removed for chemical analysis.

be passed into it to a depth of 2.5 cm. and it is partially occluded by a stumpy bony prominence, fig. 3. Ventrally to this there is an irregularly club-shaped, pedunculated lobe extending across to the lateral surface of the main tumour to which it becomes firmly

fused. Anteriorly it is separated from the major lobe by a distinct deep sulcus, the bifurcations of which form the boundaries of several more or less prominent nodes along its course to the ventral surface.

The cavities in the antero-ventral aspect of the tumour are partialy covered by platelike osseous tissue and narrow bands of less dense bony tissue join up several bosselated structures. Presumably they are formed during the progressive ossification process.

For convenience the weight, volume, specific gravity and dimensions of this structure, and those of the above mentioned sheep and goat and the average figures of normal brains of unaffected sheep are tabulated below.

TABLE 1.

Animal	Age Yrs.	Wt. of br. or T (gm)	Vol. (cc)	S.G.	Dimensions (cm) L.xb.xh.	Affected area of br. and Shape of Tumour
Sheep adult normal	Full mouth	99	96	1.03	—	—
Sheep (T) (case) *Hamel*	6	140	70	2.0	7x5-2.5x4.2-2.5	Left cerebral hemisphere, un-attached except s. area (frontal). Pear-shaped.
Sheep (T) (Joest) *Wether*	3	30.2	—	—	6x3.3x2.2	Ant. port. of cran. cav., loosely attached to base of cranium. Slightly flat.; ovoid shape.
Goat (T) (Roth) *Ewe*	Aged	310.0	175.5	1.8	9.5x6x6.25	Cerebral hemispheres & cerebellum, major increase in latter, 4 x larger than usual. Firmly fixed to left petrous bone & adjacent area. Shape resembling that of brain enclosed in its meninges.

Owing to the extremely hard and bony consistence, great difficulty was experienced in sawing through the tumour. The segment had a dense and ivory-like texture like that in the shaft of a normal metacarpus and is traversed by clearly defined linear concentric markings but without any central marrow spaces. There are, however, a few small less dense irregular areas, the contents of which can be removed fairly easily (possibly vascular or necrotic foci) Fig. 4.

Fig. 4.

Cut surfaces of right (upper) and left halves. Concentric lines, compact texture with small less dense areas, cavity and pedunculated bosselations clearly defined.

The tumour is considerably larger than an equivalent normal cerebral hemisphere, as it practically fills the entire cerebral cavity after being placed into a macerated cranium of an adult sheep. It forms about five sevenths of the volume of an average normal brain. Although the cranial cavity may have been distended to some extent, it may have not been so obvious as in the case of the goat[19]. Since the outer frontal surface is eroded, the growth must have penetrated through the roof of the cranial cavity into the frontal sinus. Such an encroaching tumour may possibly expand considerably without causing any visible external changes in the skull or a marked distension of the cranial cavity.

The histological sections of a bosselation have a distinctly variegated appearance, small basophilic alternating with larger eosinophilic areas, especially in those stained with Giemsa and Haematoxylin and Eosin. The structural details are, however, obviously clearer and better differentiated in the former than in the latter. The growth is enclosed by a fairly thin, cellular, fibrous membrane from which trabeculae penetrate into the mass for a short distance. They seem to be closely related to the basophilic areas which may form strands of a large meshed network. The cells of the capsule and the trabeculae seem to increase in size towards the osseous tissue and gradually change into osteocytes. The growth consists entirely of bony tissue the density of which may vary being more compact in the major part than in centrally

placed areas. Here lytic and disintegrated changes become apparent. Spaces enclosed by granular, fragmentary lamella are formed, the latter staining less intensely than the apparently unaffected ones. No osteoclasts are seen in these areas in which the osteocytes are reduced in number and appear distinctly swollen. In the Van Gieson section the spaces are traversed by fine fibrous fibrils. The growth consists mainly of mature lamellar bone with more of less complete Haversian systems. These may be more densely packed in various places without a distinct functional arrangement. The interstitial lamella form irregular patterns between the various Haversian systems. Their stratified structure is reminiscent of that ascribed to multiple apposition of bone following a previous resorption as occurs in osteodystrophia fibrosa of the horse. The newly formed lamella have a jagged outline and are arranged in different planes and directions from the original ones. These changes are indicative of a slow progressive process of ossification. The marginal lamella instead of running parallel to the peripheral surface deviate into different directions. In the basophilic areas osteocytes are more numerous than in the adjacent eosinophilic ones. They are somewhat increased in size, have enlarged nuclei and a more intensely tinted cytoplasm. Here the small cavities, enclosing the osteocytes, and the many canaliculi radiating from them in all directions are also very clearly defined. These variations may be regarded as significant.

The section of the major part of the tumour reveals also very compact and regularly arranged osseous tissue (A.D.T.). The lamellar bony mass is traversed by smaller and larger vascular canals comparable with Haversian and Volkmann's canals of normal bone. The Haversian systems, however, instead of lying in one main plane appear to be interwoven and to run in all directions. It is evident from the above that, although the development of the bony substance resembles the normal type in cortical bone to some extent, there are several chararcteristic differences manifested by the irregular arrangement of the lamella and architecture of the bone. The number, form and distribution of the osteocytes are also unusual. This is in accordance with an observation previously recorded by *Borst*[20] and others.

The chemical analysis of a portion of the growth is consistent with that of bone in all respects. Ash 60.23%, Ca. 23.32%, P. 10.85%, F. 0.025%, Cl. 1.323%, and CO_2 1.262%. The calcium : phosphorus ration, Ca : P = 2.149.

Diagnosis. A heteroplastic osteoma presumably of meningeal origin.

The above tumour can be easily differentiated from bony growths encroaching on to the brain and originating from the skull, nasal cavity (ethmoids), sinuses and orbita by taking the site and symptoms associated with them into account. The various mixed tumours with osteogenic tissue (benign and malignant) differ from the above case in their histological structure. Gid or circling

disease may be excluded from the history and the absence of the coenurus cyst.

Our case differs from those described by *Joest*[18] and *Roth*[19] not only in its site of origin and pathogenesis but also in its lack of obvious clinical symptoms. This is no unusual feature for osteomata in the brain and other tumours of the connective tissue series, for instance lipoma and meningioma. On the other hand, if symptoms are present, they need not necessarily be directly associated with the lesion. In the beginning the clinical manifestations may be so slight that they are easily missed, unless the affected animal is closely observed. They become progressively worse during the course of the disease. Signs of depression, undecided movement and disinclination to carry out complicated movements, twisting of the head to one side, somnolence, a staring gaze, partial to total blindness, interference with hearing, complete loss of smell, lack of co-ordination of masticatory movements, anorrhexia, hypoaesthesia and those of circling disease may become evident. The animal must be eventually slaughtered.

Comment

The presence of bony structures within the brain has aroused speculation as to the origin of the osseous tissue. Several possibilities have been considered. Bone is formed secondarily to degenerative, inflammatory (exostosis[19]) or necrotic processes including calcified parasitic lesions[20]; from embryonal rests detached during the early development of the skull[18], or from intracranial branchiogenic heterotopic teeth[17] including the odontoma[15]; from the overlying skull, the ethmoids or the orbit and encroaching on to the brain; in a number of mixed tumours (meningiomas, lipomas, etc.)[22] under certain circumstances by metaplasia in regressively changed connective tissue; and from multipotential mesenchymal cells of meningeal or perivascular origin[9,23].

Since this tumour was received in a dry state, little can be said of its probable origin. Nevertheless, by elimination, the last mentioned theory seems to be the most acceptable. The presence or the formation of bone within the dura mater and in the arachnoid is not unusual, and when it occurs within the former it is commonly in the region of the *falx cerebri*. Our case may have arisen here or in its close vicinity taking its position in the cranial cavity, and the erosion instead of a hyperostosis of the skull into account.

The pathogenesis of this type of tumour is still obscure. *Virchow* explains the development of these "osteomata" on an inflammatory basis; the encephalitis giving rise to the connective tissue forming the matrix for the bone formation. Views have changed since then and *Borst* stresses that one should differentiate between osteoma of the brain and ossified encephalitids. Osseous new growths may arise in the dura as a result of its inherent osteoplastic activity[24]. Ossification is also closely associated with

the arachnoideal cells in which it may occur fairly frequently[25]. They are, according to *Mallory*[26], undifferentiated cells which may form osteoblasts as well as osteoclasts. Thus apposition and "abbau" of bone are direct functions of the tumour cells. It may be reasonably assumed, that an *osteoma may develop in the brain like any other tumour of the connective tissue series (lipoma), and not necessarily from a detached, retained embryonal rest,* or *by metaplasia or re-differentiation of the adult connective tissue.*

The gross and microscopic appearance of the case presented is typical of the description given for an osteoma by *Borst* and others. The bony structure in the decalcified sections consists entirely of compact lamellar bone and no detritus is enclosed by the tissue. There are only slight signs of an active osteogenesis confined to the delicate, fibrous capsule and its short trabeculae penetrating into the substance of the tumour. The irregularly placed lamellar groups show signs of apposition and "abbau" of bone and in the bosselated portion they enclose islands and strands consisting of groups of more closely packed osteocytes than in the adjacent areas. This mottled and mosaic appearance is suggestive of periodical growth from one or more centres for a longer or shorter time, temporarily stopping or increasing as the growth impulse subsides or reappears later. Several growth centres functioning at the same or possibly at different times may give rise to the irregular bosselated surface. The tumour is presumably in a resting stage, since no signs of active osteogenesis, except only very slight in the periphery, nor of osteoclasia by osteoclasts are seen. The nature of the focal disintegration and absorption of bone and its possible replacement at a later stage could not be determined from the sections. It is acceptable too that the tumour is not a "dead" osteoma. *M. B. Schmidt* (1902) stresses that usually an eburnating growth develops directly and not as a result of sclerosis of a spongious neoplasm. We are inclined, however, to agree with *Virchow,* who observes that cranial osteomata of the spongious type may become eburneous but may later again assume a spongy character.

Very little is known about when such tumours begin to develop and the time which elapses before a certain size is reached. In our case, presumably, the period involved must have been considerable (years) taking the slow rate of growth and the lack of symptoms into account.

Since the skull is eroded instead of a hyperostosis having been formed, and as the growth is enclosed in a delicate cellular membrane, it is assumed that its site of origin is from the pia-arachnoid rather than from the dura mater. Tumours which arise from the dura are usually firmly attached by means of a fairly wide base. The diagnosis of an osteoma, presumably arising from the pia-arachnoid, is justified.

Summary

The gross and microscopic appearance of an osteoma presumably arising from the meninges of the brain of a six year old hamel is described. The histogenesis of the tumour is discussed hypothetically.

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AMERIKAANSE REISINDRUKKE

H. P. A. DE BOOM,

Onderstepoort.

Onlangs het ek die buitegewone voorreg gesmaak om as „Commonwealth Fund Fellow" bykans 'n jaar in die Verenigde State van Amerika deur te bring; die eerste nege maande in die Departement Soölogie van die Cornell-universiteit te Ithaca, N.Y., en die laaste twee maande in 'n manhaftige aanslag op die uitgestrektheid van die Amerikaanse vasteland en sy veelvuldige wetenskaplike institute en universiteite.

Gewoond aan die algemene idee dat die Amerikaanse wêreld van wetenskaplike kennis ietwat mank gaan aan daardie eienskap wat so mooi deur die Engelse woord „scholarly" omskrywe word, was my verrassing groot om die heel eerste aand te Ithaca 'n kykie in professor Howard B. Adelmann se privaat biblioteek te kry. Dit is seker een van die allerbeste versamelings van ouer geskrifte op die gebied van ontleedkunde in die algemeen en ontwikkelingsleer in die besonder: van Leeuwenhoek, Fabricius, Malpighi, Spallanzani — was almal verteenwoordig. Om alles te kroon kom daar 'n perfekte eksemplaar van Vesalius se „De Corpore" vorendag! Professor Adelmann se beginsel om niks aan sy studente te onderrig wat nie minstens tien jaar oud en deeglik beproef was nie, staan in skrille teenstelling met die algemene drang om alleen die allernuutste en allerlaaste te aanvaar en te doseer. Op die oomblik is hy besig met die geweldige taak om Malpighi se beskrywings van die ontwikkeling van die kuiken krities, ingrypend en omvattend te beskou.

Die mees treffende indruk is die van entoesiasme, ywer en aktiwiteit op wetenskaplike gebied. Dis 'n verkwikkende ervaring om ineens in so 'n „byenes" geplaas te word. Offisiële ure bestaan net nie: nagte en naweke is daar om harder en ongesteurd te kan deurwerk. Dit kom my voor dat die algemeen aanvaarde metode is om baie, en gou, te produseer, en later eers die koring van die kaf te skei. Ek meen dat 'n mens hierdie gedragslyn in gedagte moet hou as mens Amerikaanse wetenskaplike publikasies bestudeer. Veral in die Ooste is die ambisie van en die kompetisie onder die jongere wetenskaplikes geweldig. Daar is 'n ongelooflike drang om naam te maak, en dus begryplikerwyse sommige van die onvermydelik daarmee gepaard gaande minder gunstige verskynsels.

Ek het die indruk gekry dat die veeartsenykundiges minder aan die algemene biologiese wetenskappe en gees van die tyd deelneem as wat hulle behoort. Hulle vorm dan ook 'n meer afgesonderde groep. Die tradisie van klem op kliniese aspekte ter uitsluiting van die meer akademiese benadering gebaseer op breë

wetenskaplike beginsels het hier sy nadelige effek. Daar is egter gelukkig orals tekens van 'n ontwakende besef te bespeur.

'n Ander opvallende punt was die verskil in atmosfeer, entoesiasme en ywer tussen nie-staats- en staatsinrigtings. 'n Moontlike uitsondering was die „National Health Foundation" te Bethesda, maar dis ook moontlik dat tydens my baie kort besoek ek heeltemal oorweldig is deur die ongekende, ongedroomde weelderigheid van die inrigting. Terloops, van weelderigheid gepraat, dis maar die enkele laboratorium wat strook met die gewone opvatting dat die Amerikaanse institute so besonder weelderig ingerig is! Met 'n paar uitsonderings is daar van luukse geen sprake nie — goeie uitrusting, ja, en selfs hier net die hoog nodige. Maar as 'n apparaat nodig blyk dan word geen koste ontsien nie. Met die geografiese nabyheid van groot firma's is apparaat en chemikalieë geen probleem nie. Ek het ook dankbaar gebruik gemaak van die behulpsaamheid van handelsfirma's om vry en kosteloos klein hoeveelhede van chemikalieë, wat normaalweg nie maklik in die handel vir laboratoriumdoeleindes verkrybaar is nie, in die hande te kry. Geen navraag is te gering om nie alle moontlike hulp van die tegnici en wetenskaplikes van sulke firma's te kry nie.

Vanweë die enorme aantal universiteite en verwante opleidingssentra is dit te begrype dat opleiding baie variëer. Van die wat ek besoek het, het ek deurgaans die indruk gekry dat beide dosente en studente baie gesteld is op handhawing van 'n hoë peil. Te Cornell het studente 'n vraelys onder hulle kollega's laat sirkuleer waardeur die verskeie kursusse baie krities onder die soeklig gekom het. Die veterinêre kolleges word gekontroleer deur 'n komitee van die „American Veterinary Medical Association". Meer as dit was ek beïndruk deur die verantwoordelikheid wat studente opgelê word, veral t.o.v. eie werk, oplees van artikels, gebruik van biblioteek en laboratoriumfasiliteite, opstel van oorsigte en selfs doen van navorsingswerk.

Vir die Baccalaureus-graad in enige tak van die wetenskap (B.S.) word 'n vierjarige kursus vereis, en dan nog word weinig waarde aan so 'n graad geheg. Trouens, die jong wetenskaplike kom nêrens sonder sy Ph.D. in aanmerking nie. (Die Magistergraad is nie altyd 'n voorafgaande vereiste nie.) Die veeartsenykursus met sy D.V.M.-graad is 'n sesjarige, waarvan die eerste twee propedeuties is i.p.v. een soos by ons die geval is. Die vooraanstaande veterinêre skole bied Magister- en Ph.D.-grade in meeste departemente aan. Die resultaat is dat bykans elke departement van 'n universiteit of kollege 'n aantal „instrukteurs" of „wetenskaplike assistente" het: jong mense wat hulle vir gevorderde grade bekwaam en tewens deelneem aan die onderwys en/of wetenskaplike ondersoek om sodoende hulle studie te kan bekostig. Op die wyse kan 'n professor 'n groot studentetal en tegelykertyd uitgebreide navorsing behartig. Die lewe met hierdie groep hardwerkende en geesdriftige mense behoort tot die aangenaamste van my herinnerings. Hulle vorm wat ek genoem het die „skoktroepe"

van die intellektuele bestaan aan 'n universiteit. Sonder hulle is 'n universiteitsdepartement tot leegheid en steriliteit gedoem. Tenspyte van allerlei praktiese hindernisse behoort ons Fakulteit van Veeartsenykunde alles in sy vermoë te doen om studente vir gevorderde studie te trek. In die veeartsenyskole is sulke studente nie net tot D.V.M.-graduandi beperk nie, sodat studente uit 'n wyer veld getrek kan word.

Gereelde departementele seminare vorm 'n instelling *sine qua non* van universiteitsbestaan. Dit het my in staat gestel om kennis te maak met die interessantste en belangrikste aspekte van die werk in 'n groot aantal verskillende departemente. Ook hierdie aspek van universiteitslewe wil ek sterk as voorbeeld voorhou. Die sogenaamde „Faculty Seminars" te Cornell wil ek veral in hierdie opsig beklemtoon. Dit word deur studente sowel as dosente bygewoon. Spanne van twee senior-studente dra gevalle voor: een beskrywe die geval en 'n ander bespreek die wetenskaplike aspekte. Daarna volg 'n algemene diskussie.

In die doseer van Veterinêre Anatomie is die belangrike vrae beskikbare tyd en watter dier as „tipe" bestudeer moet word. Formele lesings is meesal iets van die verlede. Net soos hier, word te Cornell die gebrek aan 'n basies begrip van dierstruktuur by nuwe studente, tenspyte van die voorbereidende kursus, sterk gevoel. Dit word oorbrug deur met 'n oorsig van die anatomie van die hoender te begin. Daarna word die hond as tipe bestudeer, gevolg deur 'n vergelykende oorsig van die plaasdiere. Die hond dien ook as basis te Colorado en te Ames, Iowa, terwyl onlangs oorgeskakel is na die bees as tipe te Oklahoma. Hier is Professor Duane R. Peterson besig om 'n disseksiegids vir hierdie doel op te stel. Hy volg die nuttige beginsel van tegniek dat alle gedissekteerde strukture in hul oorspronklike posisie teruggeplaas moet kan word. Op die wyse word herhalings- en oorsigwerk vergemaklik. Sy disseksies was 'n genot om te aanskou. Professor Logan M. Julian te Davis, Californië, neem 'n hipotetiese „prototipe" as patroon. Met hierdie basiese kennis deur middel van lesings verkry, gaan studente voorbereid die disseksiesaal binne om 'n bepaalde gebied te dissekteer in perde, bees, vark, hond en waar nodig, die hoender. Aan die einde van elke periode demonstreer die studente die betrokke disseksies onderling aan mekaar en die volgende periode ontleed elke student 'n ander species — dus waarlik 'n vergelykende benadering. Aan die einde hiervan kom kat en skaap ter vergelyking en herhaling by. Die hele kursus word in een semester afgehandel en laat die dosente 'n aansienlike tyd vir navorsing vry. Professor Julian verseker my dat 'n baie beter basiese begrip by die studente ingeburger word en dat die resultate in die kliniek duidelik na vore kom. Sy kritici meen dat studente geneig sou wees om verward te raak. Orals word Toegepaste Anatomie later in die studie gedoseer. Dit word intiem geïntegreer met die praktika in Operatiewe Chirurgie (wat op lewende diere beoefen word en algaandeweg meer en meer oorslaan na sogenaamde „herstelchirurgie".)

Invoer van so 'n anatomie-kursus behoort sterk deur ons eie fakulteit oorweeg te word, asook die kursus in radiologie en radiografie. Heelwat klem word op visuele hulpmetodes by die onderwys gelê, soos gedissekteerde monsters, droë monsters, stereoskopiese kleurfoto's, rolprente e.d.m. Ek was verbaas om te ontdek hoe baie handleidings oor veterinêre anatomie in mimeografiese vorm daar bestaan.

'n Teleurstellende feit vir my was dat Histologie by drie van die vyf besoekte skole nie onder die anatomie-departement ressorteer nie; trouens by twee van die drie nie eers binne die raamwerk van die veterinêre fakulteit nie, maar onder die nabygeleë dierkunde departement. In al die gevalle was dit 'n gerieflikheidsreëling. Dis geensins dat die studente daardeur nie 'n goeie opleiding kry nie, maar dat veterinêr-histologiese navorsing daardeur neig om verwaarloos te word, en gevolglik veterinêre patologie gevaar loop om sy stewige fondament te verloor. Daar is ook 'n betreurenswaardige neiging om Embriologie as doseervak af te skeep, soos dit, na my meegedeel word, by mediese skole die neiging is.

'n Interessante verwikkeling is die aanstel van rein dierkundig opgeleide personeel as dosente in die anatomie-departemente, soos by mediese skole die geval is. Dit lei ongetwyfeld tot sterker toespitsing op akademiese aangeleenthede, groter aanvraag vir graduandi in dierkunde en dus sterker dierkunde departemente.

Erflikheidsleer en oorerflike misvormings word as 'n spesiale vak te Cornell gedoseer — 'n navolgenswaardige voorbeeld. Professor Hutt deel my mee dat hy besig is om 'n boek hieroor te skrywe.

Anatomiese navorsing lê in die rigting van chirurgiese toepassings, alhoewel dit te Davis baie breëre biologiese velde betree, soos toepassing van radio-aktiewe isotope in die chemiese embriologie.

Op algemeen biologiese gebied is die vordering wat onder stimulus van biochemie en biofisika gemaak word opvallend. Ek was veral onder die indruk van die pogings om die struktuur van eiwitte te ontrafel, omdat ek hier 'n oorbrugging sien begin deurskemer tussen morfologie aan die een kant en die meer eksakte chemiese en fisiese dissiplienes aan die ander. Die vordering van kennis t.o.v. selstruktuur en funksie is geweldig. Met die gekonsentreerde aandag wat virusse (in die vorm van fages) veral van biochemici en biofisici geniet wil ek die voorspelling waag dat 'n antibiotiese aanslag op die kleinere virusse binne 'n dekade of twee prakties moontlik sal wees. Aangesien dit hier hoofsaaklik handel om die vermeerdering van ribonukleoproteine met gebruikmaking van die gasheer-sel se kernmetabolisme is mens benuud of hierdie benadering nie ook die eerste sal wees om 'n antwoord te gee op die basiese vraagstukke van neoplasie, genetika en morfogenese nie.

Oor histochemie slegs dit: weens tegniese moeilikhede en leemtes in ons biochemiese kennis is die waarde van die bekombare

inligting beperk. Koue mikrotomie — d.i. sny van weefsel sonder fiksering by plus minus −20°C — gaan op hierdie gebied van groot hulp wees.

Die uitbouing van die „Army Institute of Pathology" te Washington, D.C., in 1944 om 'n „Registry of Veterinary Pathology" ook te omvat, is een van die betekenisvolste ontwikkelings vir veeartsenykundige patologie in onlangse tye. Voortvloeiende hieruit is die „American College of Veterinary Pathologists" gestig. Onder bekwame presidentskap van Dr. Charles L. Davis van Denver, Colorado, bied dit die veterinêre patoloog moontlikhede vir gespesialiseerde opleiding: vyf jaar nagraadse studie, ten minste twee jaar hiervan onder formele toesig van 'n preseptor, ten minste nog een jaar gewy aan doseer en navorsing, en aflê van formele eksamens. Belangrik ook is die sirkuleer van standaard preparate aan alle patologie-departemente om 'n eenvormige norm te probeer hou. Die „Army Medical Museum" is uitgebreid, maar van 'n wetenskaplike en uitstallingsoogpunt teleurstellend. Die Onderstepoortmuseum vergelyk in hierdie opsigte baie gunstig.

Dit was by hierdie instituut waar ek my vasgeloop het teen die „Security Regulations". Die privaat persoon van die buiteland mag alleen een dag daar deurbring, anders moet hy van sy regering spesiale opdrag hê om daar te kom inligting inwin vir militêre doeleindes, en boondien goedkeuring wegdra van die „Pentagon". Dit was uiters irriterend dat die leër soos 'n hond in die krip op so 'n wetenskaplik waardevolle bron sit.

Die „Carnegie Institution of Washington" se Embriologiedepartement te Baltimore was vir my vanuit die oogpunt van uitnemendheid van sy navorsingswerk die hoogtepunt. Die waarde van 'n hooggeskoolde, byna fanaties-entoesiaste tegniese personeel het hier duidelik geblyk. Dit betaam ons om met oog op steriliteitswerk deeglik op hoogte te bly van die werksaamhede van hierdie inrigting. Dr. Böving bv. is besig met waarnemings op inplanting van die konynblastosist. Dr. Bishop vors die biochemiese aspekte van spermaktiwiteit na.

By die serologiese museum te Rutgers, New Jersey, het dr. Allen Boyden se medewerker, dr. Douglas Gemeroy, my hulle toepassing van foto-elektriese turbidometrie op die presipitientoets gewys. Dit stel mens in staat om bv. sera van nouverwante species te onderskei.

Wat diersiektes betref kan ek slegs met 'n kort lys volstaan. Hepatitis van perde is welbekend onder die naam van „Theiler's Disease". Volgens professor Olafson kom dit slegs voor na gebruik van perdesera, soos veral swangermerrieserum. Leptospirose geniet heelwat aandag en veral dr. Bryans te Cornell is geinteresseer in die moontlike verband tussen hierdie siekte en periodiese oftalmie van perde. By die „Snyder Hill Virus Laboratory", onder leiding van dr. James A. Baker, word veral immunologiese aspekte van hondesiekte en infeksieuse hepatitis van honde bestudeer. Hier word 'n groep vatbare honde, verkry deur keiser-

snee van uitgesoekte tewe, onder strenge isolasie aangehou. Eksperimentele werk word in volledig en streng afgesonderde eenhede uitgevoer.

Virusdiaree by beeste, in 1946 deur Olafson beskrywe, is een van daardie siektes wat vanweë sy wisselende gedrag 'n ware nagmerrie vir die navorser is. Een van die probleme is nog sy identiteit al dan nie met „Mucosal Disease" deur Ramsey van Ames beskrywe. (Sien North Am. Vet. 34, 629-633). Naas virusdiaree is daar die diaree veroorsaak deur Miyagawanella bovis, 'n organisme van die psittakose-groep. Interessant was vir my die diagnostiese prosedure: Intraperitoneale inspuiting van die bo-vog van die faecesuitswaaisel in marmotte, wat dan in 5-6 dae 'n koorsreaksie ontwikkel met akute fibrineuse peritonitis, veral oor die milt. Smere hiervan wys die 3μ groot kokkus-agtige liggaampies. 'n Prikkelende hipotese is deur Baker uitgespreek t.o.v. virusbestrydende meganismes. Varkies onder drie maande, van varkpesvatbare sôe, ingespuit met verswakte entstoftipe varkpes virus en op „standaard hog cholera ration" geplaas, bly swak, verpot en draers van die virus; gaan selfs dood en word nie deur immuunserum beskerm nie. Varkies van immuun sôe toon goeie groeikrag en gesondheid, sonder demonstreerbare virus, na 'n identiese behandeling. Op grond hiervan postuleer Baker die teenwoordigheid van 'n stof, vermoedelik eiwit, wat in colostrum sou voorkom en selektief anti-metabolies op die virus sou inwerk.

Te Cornell het ek ook kans gehad om 'n geval van „scrapie" te sien. Die siekte is onlangs vir die eerste keer in New York-staat vasgestel. Die maande- tot jarelange inkubasieperiode maak beheer 'n onbegonne taak. Die oorsaak van hiperkeratose of „X-disease" is nou deur die briljante werk van Olafson vasgepen as 'n vergiftiging deur hooggeklorineerde naftole. Hierdie stowwe word as smeermiddels gebruik in masjiene wat veevoer in koeke of blokkies pers, en kom dus as kontaminasie in die kos. Die beeld is min of meer een van hewige avitaminose-A. Aantasting van die geslagsorgane, veral epididymis, is vir ons 'n belangrike feit: een eksperimentele geval sou ek klinies sonder blik of bloos as besmetlike onvrugbaarheid gediagnoseer het.

Op die „Swine Disease and Nutrition Conference" te Ames, Iowa, is die belangrikste varksiektes naas varkpes bespreek, t.w. varkerisipel (verantwoordelik vir 'n groot persentasie slaghuisafkeurings omrede artritis), brucellose, leptospirose (L.pomona is die belangrikste, en aborsie die enigste simptoom), oordraagbare gastroenteritis, derm-edeem (etiologie nog steeds 'n raaisel) en besmetlike atrofiese rhinitis. Toe ek daarna die proefstasie, waarvan dr. Biester die direkteur is, besoek het, het dr. Switzer my elektronmikrofoto's gewys van die pleuro-pneumonie-agtige organismes wat hy meen die oorsaak van laasgenoemde siekte is. (Soortgelyke organismes is te Snyder Hill-laboratorium in honde met „kennel cough" gevind!) Daar is egter 'n aantal ingewikkelde bykomstige oorwegings wat by gebrek aan ruimte hier nie genoem kan word

nie, maar wat die siekte van Glässer by varke in die gedrang bring. Switzer meen dat ons stellig die siekte in Suid-Afrika sal vind as ons net goed genoeg soek.

'n Paar ander interessante toestande wat genoem mag word is:

1. Enterotoksemie by beeste en sy verhouding met „fodder poisoning". (Sien bv. J.A.V.M.A. 122; 99-102).
2. Akute longemfiseem by beeste in die Rocky Mountain-gebied. (Clostridiose?)
3. Snotsiek-agtige simptome by „feed-lot" beeste in Colorado.
4. „Star Thistle" vergiftiging by perde met sy hoogs selektiewe vernietiging van die globus pallidus.
5. Lewer-atrofie, nekrose en vervetting by skape in Californië. (Sien Cornell Vet. 42; 46-50).

Die jaar in die buiteland het my terdeë laat besef dat die waarde wat aan oorsese studiereise geheg word beslis meer as bloot lippetaal is.

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CORRIDOR DISEASE: A FATAL FORM OF BOVINE THEILERIOSIS ENCOUNTERED IN ZULULAND

W. O. NEITZ, A. S. CANHAM, AND E. B. KLUGE

INTRODUCTION

During the course of the tsetse fly eradication campaign in the Hluhluwe Game Reserve (du Toit, 1954) sporadic cases of a fatal form of Theileriosis were encountered in cattle by Kluge (1954). These ruminants had been employed as bait animals for tsetse fly surveys. As these losses did not hamper the surveys greatly, no attempt was made to identify the *Theileria sp.* It became apparent from the enzootic in cattle to be described below that this disease is probably related to "Buffalo disease", a form of Theileriosis occurring in Southern Rhodesia (Lawrence, 1934), and not to Tzaneen disease (*Theileria mutans* infection) described by de Kock, van Heerden, du Toit and Neitz (1937) from the Northern Transvaal.

During the autumn and winter of 1952, several farmers from the Mkuzi area (Zululand) were permitted to introduce their cattle for grazing into the Corridor, a stretch of country 100 square miles in extent lying between the Hluhluwe and the Umfolozi Game Reserves. Although the tsetse fly (*Glossina pallidipes* Aust.) had been exterminated from both reserves, it was nevertheless considered advisable to maintain the animals several miles away from their boundaries. For the control of tick-borne diseases in the Corridor the cattle were sprayed with a B.H.C. formulation at weekly intervals. As no mortality of any significance occurred it was assumed that the Corridor was relatively safe for cattle.

Due to the prevailing drought in the Mkuzi region in Zululand, several farmers were again permitted to transfer their stock into the Corridor in 1953. A condition of entry was that cattle had to be sprayed regularly at weekly intervals for the control of ticks. Since the danger of Nagana no longer existed, two farmers allowed their animals to graze along the border of the Hluhluwe Game Reserve. It was well known to the game rangers and farmers that buffaloes and other game often strayed for variable distances into the Corridor. Tick life was active at the time (20/4/53) when the cattle were introduced but it was not suspected that these arthropods harboured any infection pathogenic for domestic ruminants other than possibly *Rickettsia ruminantium* Cowdry 1925.

Farmer A who had introduced 360 Afrikaner cattle failed to take any steps to control ticks during the first fortnight after their arrival even though he noticed that they were becoming severely infested. Farmer B who had introduced 225 cattle of various breeds commenced to spray his herd with a B.H.C. formulation six days

after arrival. However, by this time his animals had already become fairly heavily infested with ticks.

Approximately 12 days after arrival it was noticed that several animals were listless, and within a few days five oxen belonging to farmer A died. The morbidity and mortality rates increased rapidly from the 6th to the 24th May, 1953. No less than 90 animals died on the 9th and 10th May, 1953. The inability to control the disease chemotherapeutically with Pirevan prompted both farmers to move their stock several miles away from the boundary of the reserve on the 12th May, 1953. A trail of carcases was lying in the veld. Vultures and animals of prey frequented this area. Farmers A and B lost 225 and 75 cattle of all ages and both sexes respectively.

It should be mentioned at this stage that the other farmers who were grazing their stock several miles away from the Hluhluwe Game Reserve did not suffer any significant losses. They commenced to spray their herds with a B.H.C. formulation within a few days after their arrival. The application of this prophylactic measure at weekly intervals made it impossible to establish whether or not infected ticks occurred in other sections of the Corridor. Only a few sporadic cases of babesiosis were diagnosed. Treatment with Pirevan was effective.

From this account it is apparent that the enzootic lasted 22 days. It terminated 12 days after the two farmers had evacuated their stock from the boundary of the Game Reserve. The rather remote situation of the site of the outbreak did not permit an immediate investigation. In addition the limited number of herd boys for locating sick animals and carcases in the undulating bushy country with a luxuriant growth of grass, the prevailing hot weather which encouraged rapid decomposition of carcases, and the absence of adequate facilities in the veld for handling sick animals, made a systematic investigation during the height of the enzootic very difficult. Nevertheless, it was possible to prepare blood and spleen smears from 88 dead animals. Organ specimens collected in formalin from a few carcases proved to be unsatisfactory for histopathological studies. A careful investigation became possible after farmer B had transferred his animals to an open stretch of grass veld within the Corridor. Sick animals could be kept under observation and autopsies could be conducted within several hours after death.

The clinical symptoms exhibited by the animals can be briefly summarized as follows: Affected animals became listless and showed a tendency to lag behind the herd. A continuous or irregularly intermittent fever (104° to 107°F.) persisted for periods varying from four to ten days. The temperature became subnormal before death. Inappetence, lachrymation often associated with keratitis, photophobia, bilateral muco-catarrhal nasal discharge, drooping ears, twitching of various groups of muscles, groaning, grinding of the teeth, swaying gait, a decrease or complete cessation of milk

production, loss in condition, diarrhoea and a variable degree of swelling of the superficial lymphatic glands were common symptoms. Several days after the onset of the disease respiration became costo-abdominal and increased in frequency. Coughing at irregular intervals was observed. When the oedema of the lungs was well established the respiration was very distressed. Animals lay down, froth escaped from the nostrils, and death due to asphyxia supervened. Nervous symptoms were not observed.

Citrated blood was collected, and blood and lymphatic gland smears were prepared from several sick animals for further studies at the laboratory.

Autopsies conducted on a few animals shortly after death and on one animal killed in extremis showed the following lesions :— Marked oedema and hyperaemia of the lungs were the most obvious pathological changes. Multiple localized ulcerative abomasitis, sometimes associated with hyperaemia and oedema of the gastric mucous membrane, was observed in several cases. Hydropericardium, hydrothorax, ascites, subepi- and subendocardial haemorrhages, tumor splenis, tumor hepatis sometimes associated with a mahogany brown discolouration of this organ, slight or marked hyperaemia of the kidneys, irregularly distributed red patches in the intestinal mucosa, dehydration of the omasal contents, and a generalized lymphadenitis were common lesions. Advanced degenerative changes in the gracilis and adductor muscles were observed in one animal.

Specimens from various organs were collected for biological tests and histopathological examination. In addition blood and organ smears were also prepared.

It became apparent from the examination of spleen, lymphatic gland, liver and blood smears that this form of Theileriosis is distinct from East Coast fever. Furthermore, there was no recurrence of this disease at the new sites to which the cattle had been moved, even though the brown tick (*Rhipicephalus appendiculatus* Neumann) and the red tick (*Rh. evertsi* Neumann) were widely distributed within the Corridor. Had *Theileria parva* (Theiler, 1904) been responsible for the disease one would have expected that some of these vectors would have become infected. Further cases could then have developed after three to six weeks, which corresponds to the period of moulting and that for the inclination of ticks to attach on cattle. This was not the case. After careful consideration of the epizootiology farmers A and B were allowed to transfer their cattle, which included several recovered animals, back to their farms. These were situated 30 miles north east of the Corridor. The farms were quarantined and the animals were kept under veterinary supervision for a period of a year. It is of interest to note that the disease neither spread along the route nor did it appear on any of the farms.

LABORATORY INVESTIGATIONS

A. Biological tests :—It was possible to conduct the biological tests within two hours after the collection of blood and organ specimens at the Nagana Research Station at Masimba and within a period of six hours at Onderstepoort. Tests conducted on cattle, sheep, guinea-pigs and mice gave negative results.

B. Smear examination :—The rapid decomposition of the carcases rendered many of the smears prepared during the height of the enzootic unsatisfactory for microscopical examination. However, it was possible for Drs. M. C. Lambrechts and P. de la Harpe, stationed at Vryheid (Natal) to demonstrate Koch bodies in relatively small numbers in spleen smears in 49 out of the 88 animals.

In spleen, liver, kidney and lymphatic gland smears prepared by the writers from 11 animals, Koch bodies in small numbers only were demonstrated. Both intra- and extracellular schizonts were seen. As a rule less than 5 per cent of the lymphocytes were parasitised. The Koch bodies appear as round or oval cytoplasmic bodies harbouring from 1 to 16, rarely more, chromatin granules. The size varies from 1μ to 10μ with an average of 5μ in diameter. Blood smears revealed a limited number of erythrocytic parasites indistinguishable from *Theileria mutans* (Theiler, 1906). Their identity could not be established microscopically. The number of parasitised erythrocytes did not exceed 5 per cent.

The microscopical picture of the spleen and lymphatic gland smears of this disease as seen consistently in 60 animals, differed from that observed in both East Coast fever and Tzaneen disease. The schizonts of *Th. parva* and *Th. mutans* vary from 1μ to 15μ in size. In East Coast fever more than 80 per cent of the lymphocytes harbour Koch bodies, while more than 60 per cent of the erythrocytes contain one or more and even as many as 12 parasites during the final stages of the disease. In Tzaneen disease schizonts as well as the erythrocytic stage of the parasites usually occur in small numbers.

The application of these criteria indicates clearly that the protozoon responsible for the enzootic in the Corridor is distinct from either *Th. parva* or *Th. mutans*. We feel, however, that further studies on this *Theileria sp.* should be undertaken in order to establish more fully its species characteristics and status and its immunogenic features. It is suggested that the disease produced by it be provisionally termed "Corridor disease". This observation naturally prompted us to establish whether or not a similar form of Theileriosis occurs in Africa. It became apparent from the literature (Lawrence, 1934; 1940; 1941), that a form of Theileriosis popularly known as "Buffalo disease" in Southern Rhodesia is caused by a *Theileria sp.*, the schizonts of which are indistinguishable from those described by us in Corridor disease.

C. Histo-pathological studies :—These were undertaken by Dr. K. Schulz of this Institute. Besides the alveolar and interstitial oedema in the lungs it was found that nephrosis, slight fatty

degeneration of the liver, perivascular cuffing in the cerebrum, ulcers in the abomasum and myocarditis, were fairly constant lesions. Severe muscular necrosis of the gracilis and adductor muscles were observed in one of the animals.

D. Toxicological tests :—According to Dr. T. F. Adelaar no poisonous plants were seen at the site of the enzootic. Organs collected from a typical case of Corridor disease proved to be negative for arsenic, lead and hydrocyanic acid.

RESEARCH WORK ON CORRIDOR DISEASE

Circumstantial evidence suggested that Corridor disease was tick-borne, and that the brown tick (*Rh. appendiculatus*) is probably a vector. As all attempts to reproduce it artificially had failed, it became apparent that further studies depended upon the availability of infected ticks. Consideration of the epizootology suggested that two methods could be employed for procuring infected vectors. These would involve collecting engorged larvae and nymphae from cattle reacting to the disease, and gathering drag-ticks at the site where the enzootic had occurred, as well as in the adjacent section of the Hluhluwe Game Reserve. It was realized that in these circumstances some ticks could have become infected with *Th. mutans*, a protozoon widely distributed in the eastern regions of Southern Africa. Cattle available for exposure in the Corridor had been reared on a farm on which *Th. mutans* occurs enzootically. It was anticipated that some of the drag-ticks might also have become infected with this parasite while feeding on cattle owned by farmers A and B. These possibilities had to be considered so as to avoid faulty deductions on the nature of the *Theileria sp.* responsible for Corridor Disease.

A. Exposure of cattle in the Corridor.

Twenty animals of both sexes varying from 5 to 20 months of age were selected for this experiment. They had been raised on the Institute's farm Kaalplaas, in the Pretoria district, on which *Th. mutans* infection occurs enzootically. Several of the animals were known carriers of this parasite as revealed by blood smear examination. They were transferred by rail to Zululand, and exposed in the Corridor on the 19th June, 1953. As tick life was not very active during winter, the animals were allowed to graze within the Hluhluwe Game Reserve three weeks after their arrival. The temperatures of the cattle were recorded twice daily, and blood smears were examined on alternate days. When they commenced to react to Corridor Disease blood and lymphatic gland smears were examined daily. Despite the prevailing cold weather a fairly large number of ticks attached. On the 5th July, 1953, the first case of Corridor Disease, which terminated fatally, developed. During the ensuing seven weeks 17 animals contracted this disease and of these 13 died. The duration of the reaction varied from 4 to 16 days with an average period of 10 days. Koch bodies,

identical with those seen previously in cattle owned by farmers A and B, could be demonstrated in the lymphatic gland smears for periods varying from 2 to 16 days. The erythrocytic stage of a *Theileria sp.* was found in blood smears of nearly all the animals. The clinical symptoms and lesions at autopsy closely resembled those described previously. Koch bodies in fairly large numbers could be found in spleen, liver and lymph gland smears. Two of the recovered animals died several weeks later from undetermined causes. The two remaining animals did not exhibit any clinical symptoms even though they were fairly heavily infested with ticks. Koch bodies were never demonstrated in either of them.

Engorged larvae, nymphae and adult ticks were collected from affected animals at various stages of the disease or immediately after death. In addition a large number of drag-ticks were gathered in the Corridor and in the adjoining section of the Hluhluwe Game Reserve. All these ticks were forwarded to Onderstepoort for identification and transmission experiments.

B. Tick Transmission Experiments at Onderstepoort.

(i) Infestation of cattle with ticks collected from cattle reacting to Corridor disease.

The ensuing stages of the larvae and nymphae, which had been identified by Dr. G. Theiler of this Institute as *R. appendiculatus,* were allowed to feed on nine cattle approximately 18 months old. After an incubation period varying from 10 to 17 days a mild form of Theileriosis developed in five of them. The disease was characterized by a mild fever (103° to 105°F) which persisted for 2 to 6 days, and by a moderate swelling of the superficial lymphatic glands. A relatively small number of Kock bodies (1μ to 15μ in diameter) resembling those occurring in Tzaneen disease were demonstrable in gland smears for periods varying from 5 to 10 days. All these animals recovered. On challenging the immunity of two of them with *Theileria parva* infected ticks, both reacted to East Coast fever and died.

The conclusion is drawn that the mild form of Theileriosis to which the five calves reacted was Tzaneen disease. The larvae and nymphae had become infected with this disease while feeding on the *Th. mutans* premune cattle during the course of the Corridor disease reaction. The erythrocytic stage of the *Theileria sp.* of Corridor disease had apparently not developed, and hence the ticks failed to infect themselves with this disease. The diagnosis of Tzaneen disease is based on the absence of an immunity against East Coast fever in two of the challenged animals, and the presence of Koch bodies in the five animals larger than those observed in typical cases of Corridor disease.

(ii) Feeding of drag-ticks gathered in the Corridor and the adjoining section of the Hluhluwe Game Reserve.

The failure to reproduce Corridor disease with ticks collected

from reacting animals suggested that successful transmission might still be achieved by feeding drag-ticks. It was assumed that at least some of them had fed on the natural host or hosts of Corridor disease. For the transmission experiments only the adult stage of *Rh. appendiculatus* was selected. Other species of ticks, namely *Amblyoma hebraeum* Koch and *Hyalomma transiens* Schulze, were rejected so as to avoid unnecessary complications with heartwater (Lounsbury, 1900) and sweating sickness (Neitz, 1953).

The adult ticks (*Rh. appendiculatus*) were allowed to feed on four calves. Two of them were non-splenectomized and apparently free from *Th. mutans*. The remaining two calves had been splenectomized. One was a carrier of *Babesia bigemina* (Smith and Kilborne, 1893), *Anaplasma marginale* (Theiler, 1910) and *Th. mutans*. The remaining calf did not harbour any blood parasites. All four calves commenced to react to Corridor disease 12 to 15 days later. A continuous or irregularly intermittent fever (105° to 107°F) which persisted for periods of 8 to 15 days was observed. The clinical symptoms resembled those previously described in exposed cattle. The splenectomized calf free from blood parasites showed marked oedema of the head and the jowl region. Three to six days before death the respiration became costo-abdominal. A periodic cough was a symptom common to all the calves. At the end of the disease they exhibited marked respiratory distress and death due to asphyxia supervened.

Koch bodies in relatively small numbers could be demonstrated in lymphatic gland smears throughout the entire course of the reaction. In blood smears Koch bodies were found towards the end of the disease. With the exception of the *Th. mutans* carrier, the erythrocytic stage of a *Theileria sp.* did not appear in the remaining three calves.

Consideration of the clinical symptoms, the macroscopic and and microscopic lesions, and the presence of relatively small Koch bodies in blood and organ smears permits the conclusion that Corridor disease was produced in four calves with drag-ticks. The absence of the erythrocytic stage of a *Theileria* sp. in three of these calves offers an explanation why ticks which had fed on natural cases following exposure failed to become infected with Corridor disease.

DISCUSSION

Field and laboratory investigations have shown that besides East Coast fever and Tzaneen disease, a third form of Theileriosis, provisionally termed Corridor disease has been encountered in South Africa. Evidence is available that this disease is not confined to the Hluhluwe Game Reserve and the adjacent section of the Corridor. Dr. P. G. Joubert, State Veterinarian at Barberton, Tvl., recognized this infection on a farm bordering on the Krüger National Park. In this instance the history was that buffaloes had strayed

from the Park and that they had roamed among the cattle. Several weeks later a fatal form of Theileriosis developed in several animals. Spleen smears prepared from these animals showed Koch bodies indistinguishable from those described in Corridor disease.

It has been possible to establish experimentally that the adult *Rh. appendiculatus* tick is a vector. Epizootological observations in the Corridor have shown that this form of Theileriosis can maintain itself in game in the complete absence of cattle. The reverse process apparently does not take place. When the two herds of cattle which included many affected animals were moved to other sections of the Corridor the enzootic ceased, even though the potential vector occurred in this region. Furthermore, no outbreaks developed subsequently on several farms situated north east of the Corridor on to which both herds were finally transferred. The deduction that cattle do apparently not act as reservoirs appears to be confirmed by the failure to transmit the infection by means of nymphae and adults which had fed in the preceding stages on cattle reacting to Corridor disease.

Although circumstantial evidence suggests that the African buffalo (*Syncerus caffer* Sparrmann) is probably a carrier of the infectious agent of Corridor disease, an attempt should nevertheless be made to establish whether or not other game animals can also act as reservoirs. It has been proved experimentally that the buffalo is susceptible to *Th. mutans* (Walker, 1932) and *Th. parva* (Lewis, 1943). The susceptibility of this animal to the *Theileria* sp. of Corridor disease is, therefore, by no means unlikely.

SUMMARY AND CONCLUSION

1. An account of an enzootic in cattle following tick infestation in the Corridor adjoining the Hluhluwe Game Reserve in Zululand is given.

2. During the three weeks of exposure the morbidity rate was 50 per cent, while the mortality rate was more than 90 per cent.

3. The clinical symptoms and pathological changes in this disease have some resemblance but are not identical with those observed either in East Coast fever or Tzaneen disease.

4. Examination of blood and organ smears from affected cattle revealed Koch bodies relatively smaller than those of *Th. parva* and *Th. mutans*.

5. As no cattle had been maintained at the site of the enzootic, the inference is drawn that either buffaloes or other species of game served as reservoirs of the infectious agent.

6. It has been suggested that this disease be provisionally termed Corridor disease.

7. The ensuing stages of *Rh. appendiculatus* larvae and

nymphae collected from *Th. mutans* premune cattle reacting to Corridor disease transmitted Tzaneen disease but not Corridor disease.

8. Corridor disease with a fatal termination was produced in four calves by means of adult *Rh. appendiculatus* drag-ticks gathered at and around the site of the enzootic.

9. Although the epizootological and experimental observations suggest that cattle do not act as reservoirs for the infection of the vectors, it is nevertheless considered important to confirm this assumption by critical experiments.

10. Comparative studies have shown that the *Theileria* sp. of Corridor disease is morphologically identical with the *Theileria* sp. of Buffalo disease described in Southern Rhodesia.

11. Further studies on this *Theileria* sp. must be undertaken in order to establish more fully its species characteristics and status and its immunogenic features.

12. Progress in these investigations will only be possible provided the infectious agent is established in the arthropod vector.

ACKNOWLEDGMENTS

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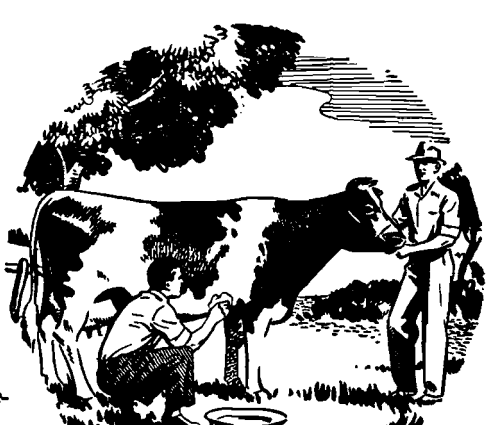

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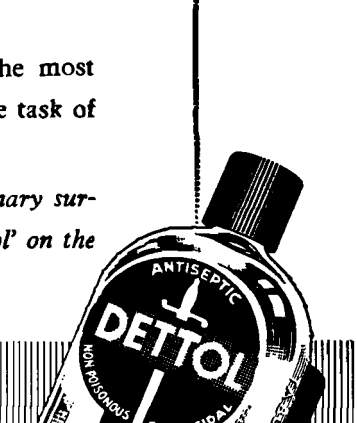

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PORCINE PIROPLASMOSIS. BABESIA TRAUTMANNI INFECTION IN SOUTHERN RHODESIA.

D. A. LAWRENCE and D. K. SHONE,

Veterinary Research Laboratory, Salisbury.

Historical.

The first record of piroplasmosis of pigs is that of Dementjew (1911) and Kowalewski and Dementjew (1911) in Russia. They found various forms of babesia in the erythrocytes of two pigs suffering from febrile reactions associated with gastric disturbances.

According to Knuth and Du Toit (1921) Trautmann observed piroplasmosis of pigs in Tanganyika in 1914. In 1917 Sparapani (quoted by Wenyon, 1926) recorded piroplasms of the *Babesia ovis* type in three pigs which had died in Italy, some three months after having eaten the flesh of sheep which had died of piroplasmosis. He supposed that the infection of the pigs had resulted from this.

Cavalletti (1938) described an outbreak of porcine piroplasmosis in Perugia and noted the presence of *Rhipicephalus sanguineus* on the animals.

Cerruti (1938) made a study of *Babesia trautmanni* in Sardinia and included in his description of the symptoms fever, haemoglobinuria, jaundice and anaemia. During the course of his investigations he encountered another type of piroplasm to which the name *Babesiella perroncitoi* was given. Both types responded well to Acaprin therapy.

Osborne and Canham (Neitz 1948) diagnosed *B. trautmanni* in pigs at the Pongola Estates, Southern Eastern Transvaal, Union of South Africa.

Nardi and lo Muzzio (1952) investigated thirty outbreaks in Italy, of which twenty-nine were attributed to *B. perroncitoi* and one to *B. trautmanni*. *Rhipicephalus sanguineus* was the only arthopod found. Randazzo (1951) described an outbreak which was characterised by icterus, tumor splenis, haemoglobinuria and high fever. The causal agent was a large piroplasm resembling *B. bigemina*.

Pavlov and Paschev (1946) recorded a mild outbreak of babesiosis of pigs in Bulgaria.

Jussiant (1948) reported a case in a Large White pig in the Belgian Congo which responded well to intravenous injection of 10 cc. of a 50% solution (*sic*) of Trypan blue.

The first published record of piroplasmosis of pigs in Southern Rhodesia is that of Lawrence, D. A. (1948) but as is evident from the table below he had noted its existence here some three years earlier.

Aetiology.

The causal parasite, *Babesia trautmanni,* resembles *B. bigemina* and *B. canis* and occurs as an endogobular parasite of the erythrocytes in the form of round, oval or pear-shaped bodies. The last mentioned form has a large chromatin mass towards the narrow end and a smaller chromatin granule at the broad end. The size varies from 2.5 to 4μ in length and 1.5 to 2.0μ in width.

Transmission.

Rhipicephalus sanguineus is incriminated as the vector in Italy and Pavlov and Paschev (1946) suggest that certain members of the family Argasidae may be responsible for the transmission.

In Africa no experimental evidence is available but it is considered that *Boophilus decoloratus,* the vector in bovine babesiosis, is probably responsible.

Distribution in Southern Rhodesia.

Records of blood smears examined at the Veterinary Research Laboratory, Salisbury, during the period May, 1933 to December, 1953 show that twenty cases were diagnosed there between February 1945 and December 1953. Reports of cases having been diagnosed in the Fort Victoria veterinary district in recent years, including one case in November 1954, have been received from the District Veterinary Officer of that district.

In the table below are given details of cases recorded from the smears submitted to this laboratory.

TABLE.

Date of Diagnosis	No. of Cases	Area of Origin	Sex
February 1945	1	Hartley	Sow
March 1946	3	Salisbury	1 sow, 2 unspecified
April 1948	1	Salisbury Abbatoir	unspecified
November 1948	1	Mazoe	unspecified
September 1949	1	Norton	unspecified
December 1949	3	Norton	1 sow, 2 unspecified
February 1952	3	Salisbury	3 sows
February 1952	1	Norton	1 sow
December 1952	3	Shamva	3 sows
March 1953	1	Salisbury	Boar*
May 1953	1	Salisbury	Sow
November 1953	1	Salisbury	Boar*

* Same animal.

Pathogenicity.

The disease has been recorded in domestic pigs only, but it is quite probable that wild pigs are susceptible or at least capable of harbouring the parasite. Cerruti (1939) states that young pigs suffer from a less severe form of infection than adults.

The ten cases recorded at the laboratory from February 1952 to November 1953 were in adult pigs, but there is no record of the ages of the earlier cases. Although at least twelve of the twenty cases recorded were sows, this is considered to be due to the great preponderance of females over males in the breeding stock, which is the only type that goes out for grazing and therefore runs the greatest chance of coming in contact with the vector.

Symptoms and Postmortem Lesions in an Outbreak in the Salisbury Area.

Symptoms:- Three live sows were available for examination and the following symptoms were noted in them:- General weakness, dullness, inappetence and dyspnoea; anaemia, as evidenced by the pallor of the conjunctival mucus membranes and the erythrocytic alterations in blood films; high fever, the temperature ranging from 105°F to 107°F. One of the sows aborted during the period of observation and according to the farm manager, the other two had aborted previously. Abortion has been a frequent symptom in a number of other outbreaks.

While none of the sows was seen urinating by us the farm manager stated that the urine seen by him was red in colour.

Postmortem Lesions:- A postmortem examination was made on only one sow and this revealed:- Marked anaemia, as evidenced by the general pallor of the carcase and the poor staining quality of the blood; moderate hydropericardium and hydrothorax and slight ascites; pulmonary hyperaemia and oedema; subendocardial and subepicardial haemorrhages and petechiae in the serous tissues; tumor hepatis, the liver tissues being very friable and yellowish in colour; moderate tumor splenis with prominent malpighian bodies, hyperaemia of the gastric and intestinal mucosa, renal hyperaemia and haemoglobinuria. The icterus described by both Cerruti (1939) and Randazzo (1951) was not observed by us.

Diagnosis.

This was based upon the symptoms and lesions seen and confirmed by demonstration of *B. trautmanni* in Giemsa-stained blood films.

Treatment.

The earlier cases were successfully treated with Acaprin and this drug was reported on favourably overseas by Cerruti (1939) and Caveletti (1938). The more recently encountered cases have responded well to Phenamidine injected subcutaneously at the rate of 1.5 cc. of the 40% solution per 100 lbs. body weight. In the

Fort Victoria district Williamson (1954) has reported that Phenamidine frequently causes an unpleasant swelling at the site of injection and that he has had equally good results by treating with Babesan.

Recovery following treatment has often been as spectacular as in the piroplasmoses of dogs and cattle, the animal appearing to be clinically normal within 12-24 hours of treatment. No cases of natural recovery have been recorded in this country.

Preventive Measures.

As this disease is tick-borne, preventive measures are primarily directed against the vector. For this purpose spraying the pigs with a benzine hexachloride dip wash has been recommended. During an outbreak owners have been advised to take temperatures of all the pigs in the infected herd each morning. This enables them to pick out the sick animals at an earlier stage than would otherwise be possible and to ensure that timely treatment can be undertaken.

No attempts at immunisation have been made and although it may be assumed that a "premunity" could be set up against babesiosis in pigs as is done in the case of cattle, reference to the table shows that in at least one case, the boar, treatment was required twice in eight months. On each occasion Phenamidine was used and the curative response was spectacular. This drug does not normally sterilise the system of infection so it is possible that re-infection with a different strain was responsible for the second attack only eight months later.

Summary.

The article deals with:—

1. A brief historical review, in so far as this has been possible from the literature available to us, of porcine piroplasmosis in various countries.
2. The occurrence of the disease in different localities in Southern Rhodesia.
3. The clinical and postmortem picture noted in a local outbreak which was characterised by high fever, anaemia, haemoglobinuria and abortion.
4. Drug therapy, preventive measures and immunity.

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TUBERCULOSIS IN SHEEP AND GOATS

E. M. ROBINSON,

Onderstepoort.

The tests to be described in this article were undertaken with the idea of attempting to find an animal which could be used to replace the infected bovine one for testing batches of tuberculin on before issue. The sheep and goat are known to be experimentally susceptible to bovine tuberculosis though, more particularly in sheep, the disease is rarely encountered in nature.

Foulerton (1902) produced lesions of tuberculosis in guinea-pigs with caseo-calcareous material from lesions in the lymphatic glands and internal organs of a sheep from an abattoir in England. In the United States, Harshfield, Roderick and Hawn (1937) found the avian type in all but one of 26 specimens from sheep from packing houses. They were able to produce the disease in sheep by intravenous inoculation of cultures and by feeding infected material. In two out of 15 sheep exposed to a flock of infected fowls, definite lesions of tuberculosis developed. Stubbs and Live (1939) and Creech (1941) have isolated the bovine type from sheep.

With a view to providing a large area of skin to use for the tests, Persian sheep were used in addition to the goats. In the Persian sheep there is a large mass of fat under the tail with very little hair on it and black in colour. It was thought that this large area might provide a very suitable area for doing tuberculin tests on.

There are numerous references in the literature to tuberculosis in the goat and the susceptibility of this animal is well known though cases are uncommon in nature.

The susceptibility of the Persian sheep had not been previously determined according to the writer's knowledge. During the course of the tuberculin testing over a period of eight months, serological tests were carried out at the same time, the test used being the haemagglutination one, first described by Du Bos and Middlebrook (1948). Five sheep and five goats were each given about 10 mg. of a South African bovine strain (1637) and the same number of sheep and goats a human strain H 37, imported from Great Britain, in both lots per os. The dosing was carried out on three occasions, the doses being divided into about 3 mg. ones and given with intervals of three days, commencing on 30/3/53.

On 13/3/53 haemagglutination tests were carried out on the sera of all 20 animals. Only one, goat 82369, gave a reaction in a 1:4 and a partial reaction in the 1:8 dilution. This would be regarded as a suspicious reaction, but the animal was left in the experiment to see what its subsequent history would be. Actually it developed a quite strongly positive serological reaction as a sequel

to infection, but never showed a definitely positive tuberculin reaction. At the same time as the serological tests were done, a tuberculin test was carried out on all the animals with completely negative results.

The first tuberculin tests after the dosing were done on 6/5/53, about six weeks later. The animals were all inoculated intradermally in the left ear, using mammalian tuberculin. To get an idea of the state of the sensitization, haemagglutination tests were carried out on them all at the same time. The following table gives the results of these tests.

TABLE I.

As will be seen from the table, all the sheep and goats with bovine infection reacted, some very severely. On the other hand with the human strain the reactions were slight or absent. The goats with bovine infection reacted more severely than the sheep did. Taking the haemagglutination reactors as a whole, more of the animals infected with the bovine strain reacted than did those with human infection. A positive reaction was taken as complete haemagglutination in a 1:8 dilution of the serum.

TABLE II.

For the tests in Table II, the tuberculin was inoculated into the skin of the neck in the case of the goats and into the skin over the pad of fat under the tail in the sheep. The hair was removed from the necks of the goats with barium sulphide paste to get a bare area for the inoculations. Unfortunately as will be seen from the table the area of skin over the pad of fat in the Persian sheep did not prove suitable for testing. The reactions were too diffuse and badly demarcated, so that when several inoculations were done the reactions tended to run together, forming a continuous diffuse swelling. This result was rather disappointing, but it is probable that the skin in this region is too thin for satisfactory testing. With the human infection three sheep showed slight reactions, but only one goat gave a definite reaction. Only three of the 20 animals were negative to the haemagglutination test. There did not seem to be any definite correlation between the reactions to the two tests.

TABLE 1.

FIRST TESTS on 6/5/53.

++ Complete haemagglutination.
+ Incomplete haemagglutination.
∓ Traces of haemagglutination.

Animal.	*Inf.*	*Tuberculin Test. Read at 72 hours.*	*Haemagglutination Test.* 1/4	1/8	1/16	1/32	1/64	*Controls*	
Sheep 83368	Bovine	Marked swelling and puffiness, upper part of ear.	++	++	++	+	−	−	−
do. 83371	do.	do.	++	++	∓	−	−	−	−
do. 83317	do.	do.	++	++	+	−	−	−	−
do. 83366	do.	do.	++	++	+	−	−	−	−
do. 83332	do.	do.	++	+	−	−	−	−	−
Goat 81303	Bovine	Whole ear very swollen, exuding greenish yellow fluid.	++	++	++	++	+	−	−
do. 82368	do.	Marked swelling of upper ear.	+	−	−	−	−	−	−
do. 82379	do.	Whole ear swollen and puffy.	+	∓	−	−	−	−	−
do. 82914	do.	Whole ear very swollen, exuding greenish yellow fluid.	++	++	++	+	−	−	−
do. 86476	do.	do., not so severe as in 82914.	++	++	++	++	+	−	−
Sheep 83335	Human	Slight swelling of whole ear.	+	−	−	−	−	−	−
do. 83370	do.	Moderate swelling of upper part of ear.	+	+	−	−	−	−	−
do. 83338	do.	Slight swelling of ear.	∓	−	−	−	−	−	−
do. 83329	do.	do.	+	−	−	−	−	−	−
do. 83312	do.	Marked swelling, upper part of ear.	++	++	++	+	−	−	−
Goat 77623	Human	No swelling.	+	∓	−	−	−	−	−
do. 82369	do.	do.	++	++	+	−	−	−	−
do. 82372	do.	Slight swelling, upper part of ear.	−	−	−	−	−	−	−
do. 84019	do.	do.	+	+	−	−	−	−	−
do. 85127	do.	do.	+	+	−	−	−	−	−
Positive Control			+	+	+	+	+	−	−
Negative Control			−	−	−	−	−	−	−

TABLE 2.

SECOND TESTS 18/6/53. (Tuberculin P P D batch 85.)
Tuberculin tests in sheep done on fat pad under tail, goats in the skin of the neck.

+ + Complete haemagglutination.
+ Incomplete haemagglutination.
∓ Traces of haemagglutination.

Animal.	*Inf.*	*Tuberculin Test. Read at 72 hours.*	*Haemagglutination Test.* 1/4	1/8	1/16	1/32	1/64	1/128	*Cont.*	*Cont.*
Sheep 83317	Bovine	Very swollen right across pad.	+ +	+ +	+ +	+	−	−	−	−
do. 83332	do.	do.	+ +	+ +	+ +	+ +	+	∓	−	−
do. 83366	do.	do.	+ +	+ +	+ +	+ +	+ +	∓	−	−
do. 83368	do.	Slight diffuse swelling right across.	−	−	−	−	−	−	−	−
do. 83371	do.	Very swollen right across.	+ +	+ +	+ +	+	−	−	−	−
		Initial *Conc.* 1/1								
Goat 81303	Bovine	4 17 16	+ +	+ +	+ +	+ +	+ +	+ +	−	−
do. 82914	do.	3 6 5	+ +	+ +	+ +	+ +	+ +	+ +	−	−
do. 82368	do.	4 13 7	+ +	+ +	+ +	∓	−	−	−	−
do. 86476	do.	5 large flat unmeasureable swelling	+ +	+ +	+ +	+ +	+ +	+ +	−	−
do. 82379	do.	5 15 14	+ +	+ +	+ +	+	∓	−	−	−
Sheep 83312	Human	Slight diffuse swelling right across.	+ +	+ +	+ +	+	−	−	−	−
do. 83329	do.	do.	+	−	−	−	−	−	−	−
do. 83335	do.	do.	+ +	+ +	+ +	∓	−	−	−	−
do. 83338	do.	No reaction.	+	−	−	−	−	−	−	−
do. 83370	do.	Fairly marked diffuse swelling right across.	+ +	+ +	+ +	+	−	−	−	−
		Initial *Conc.* 1/1								
Goat 85127	Human	4 No reaction No recation	+ +	+ +	+ +	+	−	−	−	−
do. 84019	do.	4 do. do.	+ +	+ +	+	−	−	−	−	−
do. 77623	do.	5 do. do.	+ +	+ +	+ +	+	−	−	−	−
do. 82369	do.	4 do. do.	+ +	+ +	+ +	+ +	+	−	−	−
do. 82372	do.	4 12 11	+ +	+ +	+	∓	−	−	−	−
Positive Control			+ +	+ +	+ +	+	∓	−	−	−
Negative Control			−	−	−	−	−	−	−	−

TABLE 3.

THIRD TESTS on 7/8/55.

\+ + Complete haemagglutination.
\+ Incomplete haemagglutination.
∓ Traces of haemagglutination.

Animal.	*Inf.*	*Tuberculin Test. Read at 72 hrs.*	1/4	1/8	1/16	1/32	1/64	1/128	1/256	*Cont.*	*Cont.*
Sheep 83317	Bovine	No reaction.	+ +	+ +	+ +	+ +	+ +	+ +	∓	−	−
do. 83332	do.	do.	+ +	+ +	+ +	+ +	+	−	−	−	−
do. 83366	do.	Positive, increase of 15 mm.	+ +	+ +	+ +	+ +	+ +	+ +	∓	−	−
do. 83368	do.	No reaction.	+ +	+ +	+ +	+ +	+ +	+ +	+	−	−
do. 83371	do.	do.	+ +	+ +	+ +	+ +	+ +	+	∓	−	−
Goat 81303	Bovine	Positive, increase of 10 mm., hot, painful.	+ +	+ +	+ +	+ +	+ +	+	∓	−	−
do. 82914	do.	do. 17 mm., do.	+ +	+ +	+ +	+ +	+ +	∓	−	−	−
do. 82368	do.	do. 8 mm., do.	+ +	+ +	+ +	+ +	+ +	∓	−	−	−
do. 86476	do.	do. 17 mm., do.	+ +	+ +	+ +	+ +	+ +	+ +	∓	−	−
do. 82379	do.	do. 21 mm., do.	+ +	+ +	+ +	+ +	+ +	−	−	−	−
Sheep 83312	Human	No reaction.	+ +	+ +	+ +	+ +	+ +	+	−	−	−
do. 83329	do.	do.	+ +	+ +	+ +	+	−	−	−	−	−
do. 83335	do.	do.	+ +	+ +	+ +	+	∓	−	−	−	−
do. 83338	do.	do.	+ +	+ +	+ +	+	∓	−	−	−	−
do. 83370	do.	do.	+ +	+ +	+ +	+ +	∓	−	−	−	−
Goat 85127	Human	No reaction.	+ +	+ +	+ +	+ +	+	−	−	−	−
do. 84019	do.	do.	+ +	+ +	+ +	+ +	+	−	−	−	−
do. 77623	do.	do.	+ +	+ +	+ +	+ +	+ +	+	−	−	−
do. 82369	do.	do.	+ +	+ +	+ +	+	∓	−	−	−	−
do. 82372	do.	do.	+ +	+ +	+ +	+ +	∓	−	−	−	−
Positive Control			+ +	+ +	+ +	+	∓	−	−	−	−
Negative Control			−	−	−	−	−	−	−	−	−

TABLE III.

At the third test only one of the sheep with bovine infection still gave a positive reaction to tuberculin, but all the goats reacted well. With the human infection both sheep and goats were negative. All the animals were still positive to the haemagglutination test.

TABLE IV.

In these tests, two sheep with bovine infection gave doubtful reactions and one a positive one to tuberculin. All the goats with bovine infection gave good reactions to tuberculin. All the animals with human infection, both sheep and goats, were completely negative to the tuberculin test. With the haemagglutination test, all the animals with bovine infection still remained positive, but with those infected with the human strain the reactions were in some cases weaker that at the previous test.

TABLE V.

At the fifth and final test, one of the sheep with the bovine strain still gave a positive tuberculin reaction and one of the goats had ceased to react. No reactions were obtained with any of the animals with human infection. With the haemagglutination test the reactions were slightly better than in the previous test.

Post Mortem Examination of the Experimental Sheep and Goats.

The twenty animals in the experiment were all killed during the two months following the last test in November 1953. The results of the post mortems were as follows:—

Human infection: Of the five sheep dosed with the human strain, none showed lesions of tuberculosis. One animal, number 88312 was very poor in condition and showed lesions of caseous lymphadenitis (C. ovis infection) at post mortem. From two of the sheep, material from the mesenteric glands was inoculated into guineapigs to see if any infection was present, but the results were negative.

Of the five goats dosed with the human strain, none showed lesions of tuberculosis, but two, numbers 77623 and 82369 showed lesions of caseous lymphadenitis (C. ovis infection) in some of the lymphatic glands. From two of the goats material from the mesenteric glands was inoculated into guineapigs with negative results.

TABLE 4.

FOURTH TESTS on 17/9/53.

++ Complete haemagglutination.
+ Incomplete haemagglutination.
∓ Traces of haemagglutination.

Animal.	*Inf.*	*Tuberculin Test. Read at 72 hrs.*	1/4	1/8	1/16	1/32	1/64	1/128	1/256	*Cont.*	*Cont.*
Sheep 83317	Bovine	Negative.	++	++	++	∓	−	−	−	−	−
do. 83332	do.	Doubtful, increase of 3 mm.	++	++	+	∓	−	−	−	−	−
do. 83366	do.	Doubtful, increase of 8 mm.	++	++	++	++	+	∓	−	−	−
do. 83368	do.	Positive, increase of 12 mm, hot, painful.	++	++	++	++	+	∓	−	−	−
do. 83371	do.	Negative.									
Goat 81303	Bovine	Positive, increase of 10 mm., hot, painful.	++	++	++	+	∓	−	−	−	−
do. 82914	do.	do. 21 mm., do.	++	++	++	++	+	∓	−	−	−
do. 82368	do.	do. 14 mm., do.	++	++	++	+	+	∓	−	−	−
do. 86476	do.	do. 11 mm., do.	++	++	++	+	+	∓	−	−	−
do. 82379	do.	do. 13 mm., do.	++	++	++	+	∓	−	−	−	−
Sheep 83312	Human	Negative.	++	++	++	++	+	∓	−	−	−
do. 83329	do.	do.	++	+	−	−	−	−	−	−	−
do. 83335	do.	do.	++	+	∓	−	−	−	−	−	−
do. 83338	do.	do.	++	∓	−	−	−	−	−	−	−
do. 83370	do.	do.	++	++	+	∓	−	−	−	−	−
Goat 85127	Human	Negative.	∓	−	−	−	−	−	−	−	−
do. 84019	do.	do.	++	++	±	++	−	−	−	−	−
do. 77623	do.	do.	++	++	+	∓	−	−	−	−	−
do. 82369	do.	do.	++	++	++	∓	−	−	−	−	−
do. 82372	do.	do.	++	+	∓	−	−	−	−	−	−
Positive Control			++	++	++	+	∓	−	−	−	−
Negative Control			−	−	−	−	−	−	−	−	−

TABLE 5.

FIFTH TESTS on 3/11/53.

++ Complete haemagglutination.
+ Incomplete haemagglutination.
∓ Traces of haemagglutination.

Animal.	*Inf.*	*Tuberculin Test. Read at 72 hrs.*	1/4	1/8	1/16	1/32	1/64	1/128	1/256	*Cont.*	*Cont.*
Sheep 83317	Bovine	No reaction.	++	++	++	+	∓	−	−	−	−
do. 83332	do.	do.	++	++	+	+	∓	−	−	−	−
do. 83366	do.	Increase of 9 mm. at 72 hours.	++	++	+	∓	−	−	−	−	−
do. 83368	do.	No reaction.	++	++	++	+	∓	∓	−	−	−
do. 83371	do.	do.	++	++	+	+	−	−	−	−	−
Goat 81303	Bovine	Increase of 17 mm.	++	++	++	+	∓	−	−	−	−
do. 82914	do.	Increase of 15 mm.	++	++	+	+	∓	−	−	−	−
do. 82368	do.	Increase of 10 mm.	++	++	++	+	+	∓	−	−	−
do. 86476	do.	No reaction.	++	++	++	++	+	∓	−	−	−
do. 82379	do.	Increase of 11 mm.	++	++	∓	+	−	−	−	−	−
Sheep 83312	Human	No reaction.	++	++	++	++	+	∓	−	−	−
do. 83329	do.	do.	++	+	∓	−	−	−	−	−	−
do. 83335	do.	do.	++	++	+	∓	−	−	−	−	−
do. 83338	do.	do.	+	∓	−	−	−	−	−	−	−
do. 83370	do.	do.	++	++	+	∓	−	−	−	−	−
Goat 85127	Human	No reaction.	++	++	+	−	−	−	−	−	−
do. 84019	do.	do.	++	++	+	∓	−	−	−	−	−
do. 77623	do.	do.	++	++	++	+	−	−	−	−	−
do. 82369	do.	do.	++	++	++	+	∓	−	−	−	−
do. 82372	do.	do.	++	+	∓	−	−	−	−	−	−
Positive Control			++	++	++	++	+	−	−	−	−
Negative Control			−	−	−	−	−	−	−	−	−

Bovine infection: In the case of the sheep and goats dosed with the bovine strain, one, 83332, did not show lesions of tuberculosis at post mortem, but the other four did.

Sheep 83317: Lesions were only present in the mesenteric glands. These were enlarged and showed yellowish caseous centres, but the lesions were not extensive. Material from the glands inoculated into guineapigs produced tuberculosis.

Sheep 83366: Lesions of tuberculosis were present in the pharyngeal, bronchial, mediastinal and mesenteric lymphatic glands. There were ulcers in the small intestines as well.

Sheep 83368: Lesions of tuberculosis were present in the pharyngeal, bronchial, mediastinal and mesenteric glands but there were none in the internal organs.

Sheep 83371: Lesions were present in the mesenteric glands only. Some of them were very much enlarged and hard. On section they showed yellow, caseous and calcareous centres.

All five of the goats showed lesions of tuberculosis at post mortem.

Goat 81303: The lesions in the internal organs were quite limited and there were only a few discrete nodules in the lungs and spleen. The mesenteric glands showed extensive lesions of a yellow caseous type.

Goat 82914: Lesions were present in the pharyngeal and cervical lymphatic glands. There was one nodule in the right lung and one in the liver. The periportal glands showed lesions and the mesenteric glands contained yellowish semi-calcareous material. Ulcers were seen in the small intestine.

Goat 82379: Lesions of tuberculosis were present in the form of yellowish white semi-calcareous centres in the mediastinal and all the mesenteric glands.

Goat 86476: This animal was losing condition for some weeks before it was killed. At post mortem extensive generalized tuberculosis was found. Yellowish white nodules were present in the lungs, liver, spleen and kidneys. Extensive lesions were present in both lungs and the bronchial and mediastinal lymphatic glands. Most of the mesenteric glands were enlarged and were caseous on section. Ulcers were seen in the small intestine. Lesions were present in the pharyngeal glands.

Goat 82368: Lesions were present in the pharyngeal glands, and the bronchial, mediastinal and mesenteric glands.

DISCUSSION

Ordinary boer goats and Persian sheep were successfully infected with a bovine strain of M. tuberculosis, but although reactions to the serological tests were obtained it was not possible

to demonstrate infection in the same species infected with a human strain. In the sheep it was only possible to do satisfactory tuberculin tests on the skin depilated with Barium sulphide paste. In goats if the hair were clipped short, satisfactory tests could be done and the animal appears to be suitable for doing tests on for the standardization of tuberculin.

CONCLUSIONS

(1) Persian sheep and boer goats developed lesions of tuberculosis when dosed per os with a bovine strain of M. tuberculosis, but not with a human one.

(2) The goat is a satisfactory animal for doing tests on for the standardization of tuberculin.

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TETRAZOLIUM REDUCTION AS A RAPID QUALITY TEST FOR BRUCELLA VACCINE

G. C. VAN DRIMMELEN

Onderstepoort

Under specific circumstances the activity of certain bacterial enzymes is an indication of the number of active viable cells present in a suspension. Methylene Blue reduction has on this basis been employed to measure the bacterial count of milk and rezasurin reduction is being favoured more and more as a platform test for the quality of fresh milk.

In the present paper a technique is suggested which may provide a very useful rapid quality test for the *Brucella abortus* Strain 19 Vaccine, which consists of a standardized suspension of 12 x 10^9 living *Brucella* organisms per ml.

The tetrazolium reagents used as viability indicators in plant physiology have been applied in dilute solutions for staining bacteria[1, 2, 3, 4, 5, 6]. The non-toxic nature of the salts and the fact that they belong to the few organic compounds which are coloured in the reduced state, has suggested that they might be employed in tests involving differences of tissue viability[7]. The reduction of these compounds can, however, not be considered as a general test for life because Autopol, Glaubach and Goldman[2] have shown that cystein and glutathione reduce neo-tetrazolium at pH 6.9 and higher. The colour reaction in tissue could be prevented by arsphenamine treatment and enhanced by NaCN treatment indicating the essential role of active sulphydryl groups and of the oxydation-reduction potential.

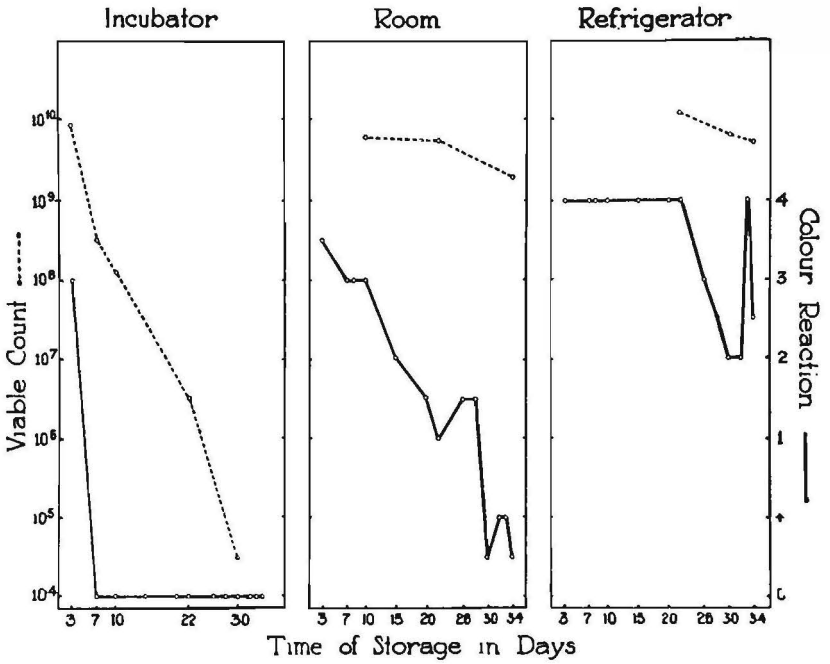
Nevertheless, colourless 2-3-5-triphenyl-tetrazolium-chloride was found to be reduced to insoluble red formazan by glucose-dehydrogenase-coenzyme I in the presence of its substrate at pH 6.6[2]. It was also found possible to detect histo-chemically the sites of dehydrogenase activity on penicillin assay plates with a precision previously unobtainable[3]. The reagent was used as a stain for antigen prepared from *Brucella* organisms and the colour was found to be retained in the bacterial cells[4]. Guggenheim[8] has pointed out that dehydrogenase activity depends on structural integrity of the micro-organisms and since tissues heated at 62°C. lose the ability to reduce tetrazolium salts[7] the value of this reagent as an indicator of the quality of *Brucella* vaccine was examined. This vaccine as produced at the American Bureau of Animal Industry and elsewhere is a suspension of 12 x 10^9 living bacteria per ml. and subject to rapid deterioration during storage and transportation[9, 10]. The usefulness of a rapid vaccine quality

test suitable for application immediately before inoculation is evident. In some countries the liquid vaccine is being replaced by the longer viable frozen-dried product. This is, however, also subject to deterioration on exposure to light and heat. After reconstitution the dehydrogenase activity in the vaccine could, all circumstances being equal, also indicate the viability of the organisms in suspension and thus prove the satisfactory state of the vaccine.

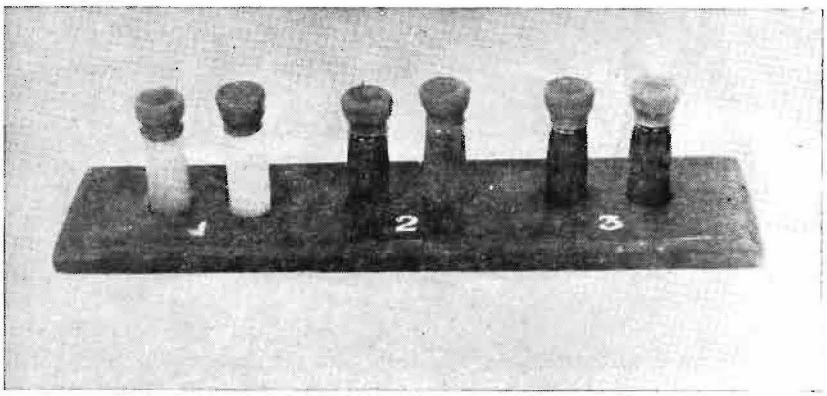
Experiments performed to test the viability of samples of vaccine prepared under standard conditions and held at different temperatures for different periods have proved that the colour reaction produced by 0.25% 2-3-5-triphenyl-tetrazolium-bromide in serial two-fold dilutions of samples of vaccine, gave a good indication of the number of viable organisms per ml. present in the sample at the time of testing. Fortunately the test reaction was most sensitive in the range of the very high counts peculiar to the *Brucella* vaccine and thus revealed relatively slight degrees of vaccine deterioration. The test reaction depends on the enzyme activity of the cells, which suggests that in addition to supplying the quantitative information usually relied upon, this test may also have a qualitative value.

The tentative technique for the simple test which is being investigated further consists of injecting a dilution of the vaccine as ready for use into a small rubber stoppered ampule containing sterile powdered tetrazolium and holding this 1-2 hours at body temperature. Sterile saline at pH 7 is aspirated in a sterile syringe; say 1.8 ml. After lightly shaking the bottle of liquid vaccine, or of frozen dried vaccine reconstituted to the recommended volume containing 1 dose per 5 ml., an amount of 0.2 ml. vaccine is aspirated into the syringe and mixed with the saline. The point of the needle is pressed through the rubber cap of the test ampoule and the diluted vaccine is filled into the ampule to the exclusion of all air bubbles. The ampule is incubated in warm water or in the hand or vest pocket, and examined after 1 and 2 hours. Since only 0.2 ml. of vaccine is used the dose of 5 ml. is not affected and can still be used.

Fresh vaccine shows a deep red colour of a rose madder shade in the ampule. Fully viable stored vaccine also shows a deep red colour, but there is no or slight reaction with vaccine of a viability count below that required for successful immunization. If desired a negative reaction may be controlled by repeating the test with undiluted vaccine which will often react at a subminimal viability if not below 1×10^9 orgs. per ml. The illustration shows: (1) two tests on old unsuitable vaccine (3×10^7 orgs. p. ml.); (2) two tests on stored good vaccine (15×10^9 orgs. p. ml.); (3) two tests on fresh vaccine (22×10^9 orgs. p. ml.).



Vaccine samples subjected to heat showed reduced colour reactions within a day or two which was accompanied by a rapid reduction in the number of viable organisms present per ml. of vaccine as shown in the graph.



Contaminated vaccine samples unfortunately also show marked colouring or variable reactions so that the test is only suitable for use at the time the bottle is first opened or immediately after reconstitution of frozen dried material. Work is being continued to determine the extent to which these factors influence the application of the test.

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PREPARATION OF MEAT MEDIUM FOR THE PRODUCTION OF ENTEROTOXAEMIA VACCINE IN FLASKS

G. D. SUTTON

Onderstepoort

SUMMARY

A modification which facilitates the preparation of meat medium for the production of enterotoxaemia vaccine in large flasks is described.

INTRODUCTION

When approximately a million doses of enterotoxaemia vaccine had to be produced each month, the method of preparing meat medium by boiling the meat in water and syphoning off the water so as to obtain the meat particles was found cumbersome. It was decided to try cooking the meat without water. The method was found satisfactory and was developed for vaccine production. Previous experiments had shown that phosphate was essential for high toxin production. Di-potassium hydrogen phosphate was selected because it did not have any water of crystallization. Di-sodium hydrogen phosphate or di-ammonium hydrogen phosphate were also satisfactory if enough extra of these salts was added to make up for the water of crystallization. The amount of di-potassium hydrogen phosphate required in the medium was 0.5 per cent. Peptone was not found necessary. A small quantity of sodium chloride was added to the medium but was not really necessary.

METHOD OF PRODUCTION

The afternoon previous to the day on which the meat is to be cooked the production flasks are prepared. These are forty litre (five gallon) capacity pyrex glass flasks. Two hundred grams of di-potassium hydrogen phosphate, twenty grams of sodium chloride and eighty millilitres of 40% sodium hydroxide solution are placed inside the flasks which are then half filled with tap water. At this stage the contents of the flasks have a pH of 11.

The next morning a quantity of one hundred and twelve pounds of minced horse meat is placed in a steam jacketed cauldron without any water and the steam turned on. The meat is cooked for 45 minutes and is stirred by means of a strong wooden pole while it is being cooked. This quantity of meat loses about twenty pounds of weight in the form of moisture given off. A large stainless steel funnel is now put into the neck of a flask. About nineteen pounds

of the cooked meat is placed in the funnel and is washed down into the flask with tap water. Finally the flask is filled with tap water and plugged. At this stage the medium has a pH of 8.4. The flasks are placed in an autoclave and sterilized for 6 hours at a pressure of fifteen pounds per square inch. The pH after sterilization is 7.2.

After seeding with Clostridium welchii type D and cultivation for six days this medium regularly produces a culture containing 10,000 m.l.d. of toxin per ml. for mice after activation with trypsin or 100 m.l.d. of toxin per ml. for mice if it is not activated with trypsin.

MAJOR HENRY VICTOR BROWN

A Memoir

Dr. Brown was born in Salisbury, Southern Rhodesia, on May 2nd, 1912, and obtained his B.V.Sc. degree in 1931 at the very early age of 19, a record which will probably never be broken. On qualification he was appointed to the staff of the Onderstepoort Laboratory where he worked in the Section for Pathology in collaboration with Dr. A. D. Thomas who has supplied most of the information in this memoir. During his period at Onderstepoort he did very valuable work for the South African Veterinary Medical Association, and it was mainly due to his initiative and sustained efforts that the Book Fund was established and developed to what it has now become.

In February, 1936, Dr. Brown resigned to take up an appointment at the Insein Veterinary Laboratory near Rangoon in Burma. He remained there for several years but had to abandon his post when the country was overrun by the Japanese in 1941. He then returned to South Africa and went into partnership with Dr. J. G. Boswell in Johannesburg. He developed a keen interest in surgery and became a very able exponent of it, ultimately confining his work mainly to it.

About fifteen months ago he became seriously ill and for some time his recovery was despaired of, but his health improved for a short period and he was able to take up his work again. The improvement was temporary, however, and his health suffered a setback which culminated in his death on March 7th of this year, at the early age of 41.

As a student Dr. Brown was modest and retiring by nature and although he avoided social activities, was always very ready and willing to do his share of work behind the scenes. This attitude was characteristic of him in his later life. He was very much liked and respected by all who knew him and by his death the veterinary profession in South Africa has suffered a severe loss.

E.M.R.

CASE REPORT

A DISTENDED GASTRO:HEPATIC FISTULA IN A PIG

L. W. VAN DEN HEEVER

Germiston

SUMMARY

A brief report is given on the occurrence of a large hepatic cyst in a pig which was found to communicate with the lumen of the stomach, thus forming a fistula.

DESCRIPTION OF CASE

A large sow (Large White type) in a good state of nutrition was slaughtered at the abattoir. At the post-mortem inspection, a large sac filled with fluid was found between the liver and the stomach.

Examination revealed a sac of some 10 inches in diameter adherent to the greater curvature of the stomach and also attached to the liver. On section it was noticed that the sac was distended with dark blackish-green foetid fluid containing sand, hair and particles of vegetable matter such as grass and plant stems. A narrow channel connected the cavity of the sac with the lumen of the stomach and this admitted an ordinary lead pencil with difficulty. The wall of the sac consisted of an outer layer of greatly compressed hepatic tissue, a middle layer of dense white fibrous tissue and an inner layer of crumbly material blackened by the fluid in the sac.

The sac actually occupied the greater part of the central lobe of the liver and had caused considerable flattening of the rest of the liver as well as the spleen. Otherwise the carcase was normal and after removal of the affected parts the carcase was passed as fit for food.

Details and specimens were despatched for histo-pathological examination, kindly undertaken by Dr. J. D. Smit of Onderstepoort, who reported as follows:—

> "Die letsel bestaan uit 'n laag platgedrukte lewerweefsel, 'n bindweefsellaag en 'n nekrotiese massa. Na my mening was die patogenese 'n primêre abses in die lewer wat adhesie aan die maag gevorm het en toe 'n fistula ontwikkel het. Mens moet ook die moontlikheid van 'n dubbele galblaas waarvan een direk in die maag uitmond, oorweeg, maar dan sou mens verwag dat die galblaas ook aangetas was."

As the biliary system of the liver was perfectly intact and small bile ducts were actually found passing from the layer of compressed liver tissue of the sac to the bile ducts leading to the normal gall bladder, it may be accepted that this case does not in any way resemble that described by Schulz and others. Contractions and mobility of the stomach no doubt forced food particles into the cavity of the abscess, thereby preventing normal healing. The small lumen of the fistula into the stomach probably prevented return of the fluid in the stomach, and the tense condition of the unopened sac was evidence of a valve-like action by the particles in the fluid or of the sinuous tract connecting the sac to the stomach.

The above theory would satisfactorily explain the existence of a most unusual case of gastro-hepatic fistula.

REFERENCE

SCHULZ, K. C. A. "A Unique Case of a Sand Laden Liver in a Pig." *Jnl. S.A.V.M.A.* 24 (1) 1953.

STRAIN 19 BRUCELLA VACCINE

III. The Route of Inoculation and Vaccinal Reactions

G. C. van DRIMMELEN

The earliest studies on immunizing cattle against brucellosis were founded on the results of repeated subcutaneous doses of live bacilli (Bang, 1906). Large, massive, single subcutaneous doses were introduced by McFadyean and Stockman (1909), (Stockman, 1915).

Cotton, Buck and Smith (1933) found a satisfactory agglutinin response to smaller doses injected intradermally in a few cattle but Buck, Cotton and Smith (1938) encountered an infected animal in three intradermally vaccinated heifers when these were later exposed by the conjunctival route. The latter had good results with smaller subcutaneous doses.

Corbett (1942) estimated that a good immunity developed from 0.1 ml. vaccine injected intradermally by comparing the resultant agglutination reactions with those of calves inoculated subcutaneously with 5.0 ml. vaccine. Crawford (1944) considered that intradermal vaccination with smaller doses in adult pregnant cattle and cattle in milk could be carried out with greater safety than subcutaneous vaccination.

Rabstein and Cotton (1943) investigated the intradermal method by inoculating 29 calves and in a preliminary report showed a satisfactory opsonocytophagic index resulting from a 0.2 ml. dose.

Comparative tests by Campbell and Rodwell (1945) showed equal agglutinin response from intradermal inoculation of 0.2 ml., intracaudal inoculation of 1.0 ml. and subcutaneous inoculation of 5.0 ml. Strain 19. *Brucella* vaccine containing 12 x 10% viable organisms per ml. The intradermal method showed the slightest local reaction and no side effects. This finding is comparable to the antitoxic responses elicited under similar circumstances by *Staphylococcus* toxoid and *Clostridium welchii* type D, epsilon toxoid.

Buddle (1949) compared agglutinin titres, infection and abortion rate in two groups of vaccinated heifers exposed to natural infection plus a single dose of virulent organisms applied to the conjunctiva during their first pregnancy. The results are shown in table I.

Table 1.

Dose of Vaccine	5 ml. Subcutaneously	1.0 ml. Intracaudally	Control
No. of heifers	50	46	46
Agglutinin titre (Geometric mean) two weeks after inoculation.	1:677	1:857	—
Percentage infections	35	43	71
Percentage abortions	25	36	55
Percentage calves living	73	57	43
Mean gestation period	267	260	241

He concluded from this work that the intracaudal route did have greater appeal, but before its general adoption could be considered, more complete information on its efficacy compared with the established procedure was desireable.

McDiarmid (1948) experimented with intradermal vaccination in guinea pigs and obtained promising results. Subsequently he tested the different techniques and doses on groups of 10 heifers each, (McDiarmid, 1950). Results of exposure showed satisfactory intracaudal inoculation techniques. (See table 2.)

Table 2.

	Subcutaneus inoculation 5.0 ml.	Intradermal inoculation 0.2 ml.	Intracaudal inoculation, 1.0 ml.	Controls tested
No. of heifers in group	10	10	10	12
No. pregnant when exposed	8	10	10	12
Conjunctional exposure with strain 544	15×10^7	15×10^7	15×10^7	15×10^7
No. of cows infected	1	1	2	12
No. of live calves	6	9	7	2

In his opinion: "Certain advantages are associated with the immunization of cattle by 0.2 ml. intradermally. The quantity of vaccine required is diminished considerably, thereby reducing the cost of production and lessening the technical difficulties associated with the production of large quantities of viable antigen. The technique of inoculation is simplified, especially for those accustomed to routine tuberculin testing. The local reaction is slight and severe systemic disturbances are eliminated; this might be of value in the inoculation of lactating animals with a view to avoiding a decrease in the milk yield. The undoubted advantage of ease of administration, especially in the case of dairy cows limited in their movements by the yoke system of tying."

Gregory (1953) assessed the immunity produced by *Brucella* vaccine inoculated via the subcutaneous and the intracaudal route. He exposed vaccinated and control animals in a camp to infection by introducing a series of artificially infected animals which aborted at intervals in the camp. Exposure during the second pregnancy in the third year after vaccination showed that results of the intracaudal method were not significantly inferior to those of conventional inoculation methods. This is summarized in table 3. Heifers which had resisted exposure during their first pregnancy were re-exposed during their second pregnancy.

Table 3.

	Subcutaneous inoculation 5.0 ml.		Intracaudal inoculation 1.0 ml.		Controls tested
	First exposure	re-exposure	First exposure	re-exposure	
No. of cattle in group	17	22	20	22	21
No. of cows infected	6	2	8	4	20
No. of cows aborted	1	—	5	—	11
Premature calves	1	1	—	1	6
Infected full-term calves	4	1	3	3	3
Non-Infected calvings	11	20	12	18	1
Infection percentage	35.3	9.1	40	18.1	95.2

It is obvious that the vaccinated animals which had resisted exposure during the first pregnancy possessed a better immunity than animals exposed for the first time in their second pregnancy. This may have been due either to a better immunization or to a better natural resistance or from a boosted immunity when in contact with infection the previous year. Differences between results form subcutaneous and intracaudal vaccination methods are, however, not significant, both conferring highly significant protection.

Thorne (1953) reports the use of frozen dried *Brucella* vaccine in Nigeria by means of "intracaudal" inoculation of 1.0 ml. vaccine. The inoculation was done by African assistants, not into the tip of the tail as in Australia, but into the *caudal tail fold,* with which technique these workers were familiar as the result of tuberculin testing. The method produced agglutination reactions equal to those following subcutaneous inoculation.

Berman, Beach and Irwin (1954) vaccinated adult cattle in 1946 and exposed them in 1950 during the third pregnancy. Eighteen (18) animals were inoculated into the tip of the tail with 0.25 ml. vaccine, i.e. 1/20th of the subcutaneous dose. Six (6) of these were pregnant of which 3 aborted after vaccination, one showing *Brucella abortus* Strain 19 in the foetus. Twenty-one (21) received the conventional subcutaneous dose. The results of conjunctival exposure are shown in table 4.

Table 4.

	Subcutaneous inoculation	Intracaudal inoculation	Controls tested
Number of cattle exposed	21	18	18
Infected abortions	3	1	14
Non-infected abortions	1	nil	1
Infected calvings	2	2	3
Non-infected calvings	15	15	nil
Number of cows infected	5	3	17
Percentage infection	24	17	94

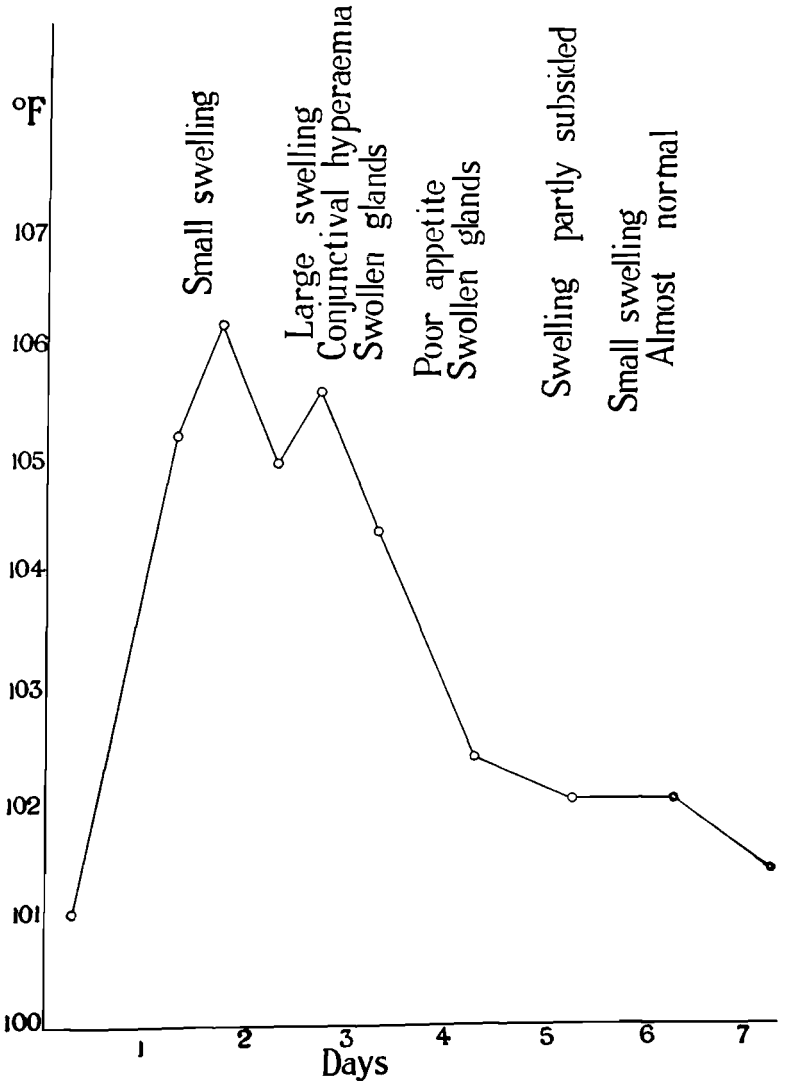
In this review of the literature it has been shown that no objections to the vaccination of cattle into the skin with smaller doses than the conventional subcutaneous dose, have been advanced. The Joint F.A.O./W.H.O. expert committee on brucellosis (1953) finds that "the minimal dose (i.e. content of viable strain 19) necessary to produce an adequate protection by the subcutaneous, intradermal or any other route, is not, however, yet known. It is therefore concluded that, at present, the recommendation for a dose of 5 ml. (approximately 60,000 million viable organisms — 60 x 10^9) injected subcutaneously should be adhered to."

ROUTE OF INOCULATION

In this country the subcutaneous dose only has been prescribed. Owing to the difficulties of transporting liquid vaccine to distant ranches in the hot climate it is almost certain that a large number of doses used in the past had been rendered ineffective before application. Hence the experience on many farms that the vaccine could be used with hardly any side effects in the form of swellings at the site of injection and in the regional lymph glands. The frozen dried vaccine introduced with the intensification of the anti-brucellosis campaign has altered the circumstances by permitting vaccination in remote herds with 60,000,000,000 fully viable *Brucella* organisms, which represent a truly formidable dose of antigen.

The usual site of inoculation is the side of the neck or the flank behind the shoulder. In most animals the swelling develops overnight and disappears slowly after 5 to 15 days. The regional lymph gland is frequently swollen on the 2nd to the 7th day which is also the period of an irregular fever with a temperature range of 104.5 to 107.5°C.

Figure 1.



Temperature curve and remarks on a typical reaction to *Brucella abortus* Strain 19 liquid vaccine in a Jersey heifer. (Dose: 5 ml., subcut., side of neck, fresh vaccine viability controlled 14 x 10^9 viable organisms per ml.)

Graph showing typical reaction to Strain 19 *Brucella abortus* vaccine in a Jersey heifer.

The intradermal and intracaudal methods were tested locally in a few animals but neither can be recommended for S.A. circumstances.

(1) Nearly all inoculations here are done by means of metal syringes with rubber fitted glass barrels and rubber pistons. The adjustment of these syringes to work at the pressure necessary for intracaudal or intradermal injections is very difficult.

(2) Partly experienced and inexperienced laymen perform the majority of inoculations and they are only familiar with the subcutaneous method.

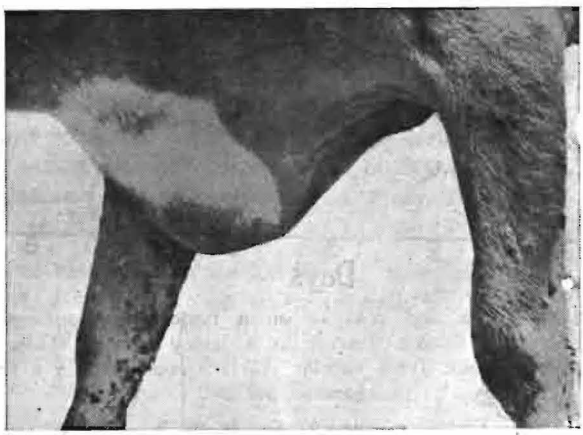
(3) Dental syringes suitable for intradermal and intracaudal inoculation of cattle are expensive and require very careful sterilizing to avoid breakage.

(4) Only veterinarians are experienced in handling these instruments in animal practice and all *Brucella* vaccine cannot be inoculated under veterinary supervision at present.

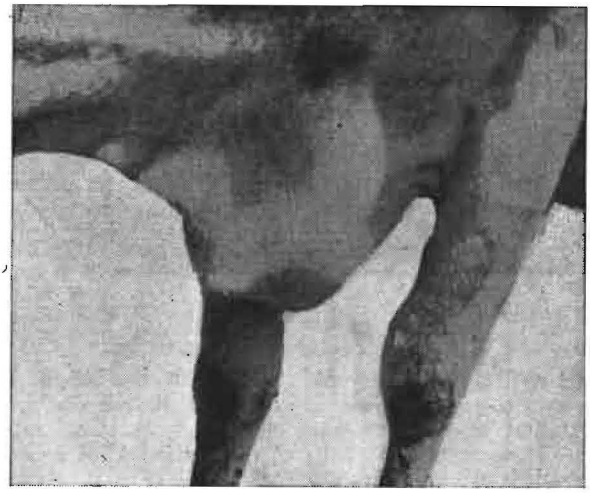
(5) For economical use syringes of a robust construction would be required with rapid fitting and locking needles so that it would necessitate keeping special syringes for intracaudal vaccination.

Discussions with farmers have produced the suggestion to use the lower dewlap as a site for inoculation. The swelling formed here though obvious, is much less unsightly and soon becomes invisible to the uninitiated. In adult cattle the lower dewlap is not very convenient but fastidious owners will appreciate the effort.

Figure 2.



Photographs of reactions to Strain 19 *Brucella abortus* vaccine in the lower dewlap of Jersey heifers.



The present experience was extended by examining the effect of
(a) concentrating the dose to a smaller volume for inoculation.
(b) inoculating large numbers of killed bacteria along with the vaccine.
(c) increasing the number of living *Brucella* organisms injected in one dose. (See table 5.)

(a) A dose of 60 to 100 x 10^9 viable organisms given in a dose of one ml. under the skin and not spread by massage failed to show anything unusual. From a field test with this method there is some evidence that abscesses and lasting swellings of the skin have been caused by this.

(b) Doses of 60 x 10^9 viable *Brucella* organisms with 600 x 10^9 killed organisms in 5 ml. or 1 ml. doses also showed nothing unusual.

(c) Doses of 600 x 10^9 viable organisms in seven animals produced extremely large swellings and in one case an abscess which burst on the sixth day and healed in 4 days without special treatment.

Doses of 120 x 10^9 viable organisms in the tail tip resulted in necrosis and loss of skin in two out of three cases.

Recommendations as the result of these experiences must insist on subcutaneous inoculation of *Brucella* vaccine in fully viable condition, with special regard to the sterilization of the syringes and cleanliness in handling the containers of vaccine and diluent. Spreading the vaccine under the skin and selecting a convenient site for injecting the dose should receive the necessary attention.

ACKNOWLEDGEMENT

Dr. R. A. Alexander, Director of Veterinary Services is thanked for facilities and permission to publish this report. Technical assistance from Mr. F. D. Horwell and G. du Plessis is warmly appreciated.

TABLE 5

The Route of Inoculation and Vaccinal reactions with Strain 19.

Inoculum			Route and Volume of Dose				Reaction to Vaccination									
							Temperature	Maximum Swelling						Blood serum titre 1-6 months after inoculation		
Type of vaccine	Dose of *Brucella* organisms		Number of cattle	Side of neck	Tip of tail	Lower dewlap	Max. temperature in °C.	Day after inoculation	Size of swelling	Incidence (No. of cases)	Glands painful and swollen (No. of cases)	Abortion (No. of cases)	Skin Necrosis	Minimum	Maximum	Remarks: Milk Production and Abortion
	Live x 10^9	Killed x 10^9														
Liquid	60	40	38	5 ml.	—	—	107	2nd	10 cm.	9	—	Nil	Nil	1:10	1:2560	10% drop in milk yield
Frozen dried	100	200	105	5 ml.	—	—	106	3rd	25 cm.	6	21	1	Nil	1:20	1:2560	Kaalplaas not all pregnant
			6	—	1 ml.	—	105.	2nd	2 cm.	1	Nil	—	Nil	—	—	
Frozen dried	100	1000	2	5 ml.	—	—	103	5th	10 cm.	1	1	Nil	Nil	1:320	1:640	
			3	—	1 ml.	—	104.5	4th	2 cm.	1	Nil	1	Nil	1:1280	1:5120	? Heartwater reactions
			2	1 ml.	—	—	103	5th	10 cm.	2	1	Nil	Nil	1:320	1:2560	
Frozen dried	750	1000	7	—	—	5 ml.	105	3rd	14 cm.	4	Nil	1	1	1:640	1:5120	
			3	—	1 ml.	—	104	2nd	3 cm.	1	Nil	—	2	1:640	1:1280	
Frozen dried	100	100	64	5 ml.	—	—	106	2nd	30 cm.	11	43	—	Nil			
			30	—	—	5 ml.	105.6	3rd	30 cm.	5	5	—	Nil			

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LETTERS TO THE EDITOR

College of Agriculture,
Potchefstroom,
17.3.1955.

The Editor,
Journal of the S.A.V.M.A.,
P.O. Onderstepoort.

Sir,

CHRONIC PICA IN A STEER:

In the September 1953 number of this Journal I reported the removal of a mass of foreign bodies weighing 29 lbs. from the rumen of a young steer. I also quoted a radiographer as stating that humans frequently become "chronics" addicted to the swallowing of foreign bodies. I omitted to mention that the steer had constant access to an adequate bonemeal-salt lick so that the question of Phosphorus deficiency probably did not arise. (In this connection Dr. Bisschop tells me that some individuals will not partake of the lick voluntarily.)

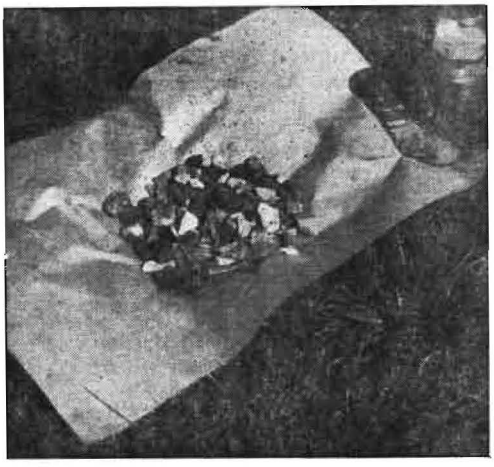
On his return to the experimental group this steer was kept under observation and I received reports from time to time of his being seen chewing at pebbles and bones. His favourite place was a left-over heap of pebbles for the concrete work of a dipping tank. Later one could hear the characteristic grinding sound as of pebble in a sack from his abdominal cavity at dipping tims. By placing him in a crush and using the lower rail as a fulcrum I was able to reproduce this sound by lifting his anterior abdomen with a 3"×2" spar.

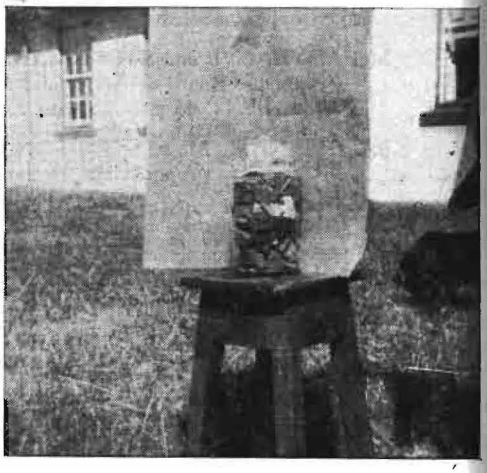
In due course this steer was slaughtered and, in all, 13 lbs. of pebbles, sand, glass, earthenware and metal were removed from his rumen. The metalware included a mower blade tooth and a Joseph Rodgers clasp knife!

Perhaps some reader can suggest a reason for this depraved appetite.
I enclose two photos taken by Mr. W. A. Verbeek of this institution.

Yours faithfully,

J. R. FREAN.





Polyclinic Building,
Germiston,
July 1st, 1953.

ARTIFICIAL LACTATION EXPERIMENT

As promised, I am submitting a few notes on the two sterile cows which I attempted to bring into lactation by the use of Stilboestrol implants, subcutaneously.

Cow 156: Grade Friesland, approximately 7 years of age, and calved 2½ years prior to the oophorectomy which took place through the left flank on 21/10/52. She had dried off approximately six months previously, and was sterile due to ovarian adhesions and salpingitis. On 21/10/52, 75 mgm. of Stilboestrol ("Stilkap" — Maybaker) was implanted subcutaneously, and one week later she was placed on the usual dairy ration and the udder massaged and milked twice daily. By 15/11/52 she was producing 6 to 7 lbs. of milk daily. On 25/11/52 a further 60 mgm. was implanted, and by 15/12/52 she produced 10-11 lbs. of milk daily. This continued until 21/4/53, when another 90 mgm. was implanted. Within a week production had dropped to 6 lbs. per day. She has now been dried off. Symptoms of nymphomania, with elevation of the root of the tail being particularly marked, were shown.

Cow 16: This animal had been dry for approximately four months, having last calved 15 months prior to the operation being undertaken. She was sterile due to extensive adhesions of the ovaries, which had apparently caused a degree of auto-castration, as she had shown no signs of oestrus for approximately six months.

The oöphorectomy was unsuccessful in that peritoneal and ovarian adhesions were so advanced that the ecraseur could not be applied to the ovaries, and no oöphorectomy therefore took place.

105 mgm. of Stilboestrol ("Stilkap", Maybaker) was implanted subcutaneously at the side of the neck, on 28/10/52, and one week later a dairy ration was fed and the udder was massaged and milked twice daily. By 15/11/52 she was producing 6-7 lbs. of milk per day, and this rose to 10-12 lbs. per day by 25/11/52. She has been producing this quantity of milk to date. She shows nymphomania, with a slightly elevated tail root, but with an extremely enlarged and flabby vulva. This and her good condition leads most strangers to remark that she is on the point of calving.

I should like to have your remarks or comments on these two cases.

Kind regards,

Yours sincerely,

LOUW V.D. HEEVER.

Maybaker (S.A.) (Pty.) Ltd. announce that "Thiazamide" powder is available in plastic puffer containers of 20 grammes; containing Sulphathiazole with 1% Proflavine Hemisulphate, this powder affords protection against pyogenic cocci, and some Gram-negative bacteria which are not affected by sulphonamides. Cost to the public is 6/9d. per container.

Methylamphetamine Hydrochloride is available as a respiratory stimulant and vasoconstrictor, in 10×1 cc. ampoules of 1% solution, at cost to the public of 6/3d.

Reference

CLARK, R. and WEISS, K. E. (1952): The efficacy of Methylamphetamine as an analeptic in pentobarbital overdosing. *J. S.A. Vet. Med. Ass.*, V. 23 (2) p.

VETERINARY BOARD MATTERS

Excerpts from and comments on certain disciplinary cases recently dealt with by the Veterinary Board are published for the information of members of the Veterinary profession.

ENQUIRY No. 4

In a complaint laid by a private practitioner A against a colleague B, it was alleged that B having been called as a consultant about a sick cow, had treated the case as his own and failed to extend the courtesies usually expected under such circumstances, especially to report back to A his findings and the treatment prescribed.

It was also alleged that B was advertising or allowing himself to be advertised in the local press, and by so doing was undermining A's practice or competing with him by unfair means.

On this complaint the Veterinary Board decided to hold an enquiry and the charge against B reads as follows:—

You are hereby summoned to appear at ..... Pretoria on 21/10/1954 at 10 a.m. before the Veterinary Board when the following charges which have been preferred against you will be considered:—

1. That you, being a Veterinarian registered according to the provisions of the Veterinary Act 1933 (Act 16 of 1933) conducted yourself improperly or disgracefully in that on 27th March, 1954, you as a Consultant, gave a professional opinion to the owner of a patient, in the absence of the attending Veterinarian and without first contacting or consulting with the said attending Veterinarian.
2. That you, being a Veterinarian registered in accordance with the provisions of the Veterinary Act 1933 conducted yourself improperly or disgracefully in that you inspired, or permitted, or allowed the publication of an advertisement in the issues of 5, 12 and 19 August, 1954, of a newspaper named ..... referring to you in your professional capacity as a Veterinarian.

Should you fail to appear, the Veterinary Board may consider and deal with the charge in accordance with the relative regulations.

Given under the hand of the Registrar of the Board this .....

Both complainant A and defendant B appeared before the Board on due date. Neither was represented by Counsel.

At the conclusion of the examination the findings of the Board was announced to the parties as follows:—

Charge 1. Not guilty.

Charge 2. Guilty. Registration suspended for 90 days as from date of enquiry.

COMMENTS

According to the evidence a certain farmer, client of A was dissatisfied with the latter's treatment of his one cow. With A's knowledge and concurrence the farmer obtained the services of B who prescribed treatment. B quite understandably did not feel that he had been called in as a consultant — since he was called by the owner and not by the colleague — and at the same time he was assured by the owner that A had no objection. This is why he did not consider it necessary to report to A what he had done.

It was clear also that A did not at once take exception to B's conduct, but actually continued B's prescribed treatment of the same cow after B had left. It was only 4½ months later that A decided to lodge the complaint against B. Clearly A's complaint was quite groundless.

In regard to the second charge, namely advertising, B readily admitted that his name had appeared in the three newspaper issues mentioned. In his explanation B stated that he had recently been appointed Veterinarian to the local Farmers Co-operative on a salaried basis.

He denied however at any time sponsoring, inspiring or allowing the advertisement. He produced a letter from the Manager of the Co-op. stating that he (the Manager) was entirely responsible for inserting the advertisements, that he did so without B's knowledge, and without knowing that he might do B harm thereby.

It was put to B that when he saw the first advertisement he might then have objected and taken appropriate steps to prevent further advertisements appearing, and even informed the Veterinary Board of his predicament. Instead of this he merely protested to the Manager and did nothing more.

While accepting the plea that B had not sponsored or inspired the advertisement, the Board held that he had in fact "allowed" publication of the second and subsequent adverts even if he did not know about the first one. The difficult circumstances in which B was placed — i.e., being a newly appointed servant of the Co-operative and therefore not wishing to offend or create trouble was fully appreciated by the Board. Nevertheless, it was made clear to B that the Board would have exonerated him only if he had been able to prove that he had taken immediate and positive steps to stop or attempt to stop further appearances of the offending advertisement either by lodging vigorous protests, by conditionally tendering his resignation to the Co-op. or by other significantly urgent steps supporting his bona fides.

ENQUIRY No. 3

Y a firm of veterinary practitioners employed Z as an assistant for four and a half years. There was no written contract between them. Z then left of his own free will and set up for himself within 10 miles of Y's surgery. From this place he attended regularly to clients and cases within what Y regarded as the heart of his practice. Many of those clients were formerly Y's clients and Y believed that Z made use of the introduction to them that he obtained while working as an assistant, in order to further the establishment of his new practice.

Realizing the importance of this case to the profession and the complex situation created by the preparation and issue of a revised code or guide to professional conduct, the Board offered to meet the two parties to attempt to find a solution acceptable to both, rather than hold a formal enquiry.

This offer was accepted. During the meeting which took place on 17/12/53 Z did not dispute any of the allegations made by Y. It appears that at one time he was even contemplating an offer of payment for goodwill to Y. On his side Y stated that he had never deemed it necessary to enter into a written contract with any of his assistants, seeing that this question of intrusion is so clearly covered by a clause (B2, p. 16) in the R.C.V.S. guide to professional conduct which reads:—

"An assistant whether required to sign a bond or not, is bound in honour not to set up in practice for himself in the district of his former employer except with his consent, which should be in writing and expressed in clearly defined terms.

It therefore follows that an assistant who does so engage in practice without such consent, before a reasonable lapse of time may be deemed guilty of conduct disgraceful in a professional respect."

On 31/7/53 when Z terminated his employment with Y, the code of Ethics then in force, namely Government Notice No. 925 of 6/7/34 as published under Section 14 of Act 16 of 1933, and amended by roneod circular dated 1/11/48, did not prohibit an assistant from setting up practice in the area of his former employer.

At about this time also the Veterinary Board was preparing a new Guide to Professional Conduct. A rough draft of this is dated 26/1/54 and the Proposed Guide was issued to the profession for final approval on 14/5/54.

Both Y and Z are M.R.C.V.S. and knew and understood the importance of the rule quoted above.

If Z was under the impression that no such rule existed in this country, then that erroneous impression must have been corrected at his meeting with

the Board on 17/12/53. Here the intention of the Board to adopt a similar rule was made very clear indeed. So much so that there and then Z undertook to act on and by the suggestions put to him in this light. He was to cease practising in this area altogether for 12 months or alternatively to remove his headquarters so that it was not nearer to Y's surgery than a place specified.

Later however, Z decided he would not honour his undertaking and consequently the Board had no alternative but to hold an enquiry. This took place at Pretoria on October 20th, 1954. Z was represented by Counsel. Y not.

The gist of the Board's findings was as follows:—

The Veterinary Board rules that the setting up of a practice by an assistant or locum tenens in the area of his former principal constitutes unprofessional conduct, unless such setting up is permitted in writing by the principal.

It is clear that Z set up practice within the area of his former employees against their express wishes.

The Board therefore find Z guilty of improper conduct and by virtue of the powers vested in it by Section 15 (1) (b) of Act 16 of 1953 orders that he be suspended for a period of 180 days with effect from October 20th, 1954.

On this Z lodged an urgent application to the Supreme Court praying that the findings and sentence of the Board be set aside.

The Board was advised by its legal advisers not to oppose the application as there was insufficient evidence in the record of the enquiry to show that a rule similar to that contained in clause (B2 p. 16) in the "R.C.V.S. guide to professional conduct" mentioned above, existed in the profession in S.A. *at the time the conduct complained of occurred,* and that therefore the Board would be unable to justify its finding.

The grounds advanced in support of this opinion were the following:—

1. The complaint was based only on the rule of the R.C.V.S. (which does not apply in this country).
2. Applicant's (i.e., Z's) defence was limited to that ground.
3. Applicant was not told that the Board accepted that a similar rule existed here.
4. Applicant was not told that he was charged with a contravention of such a rule. (In other words if the Board used its own discretion and professional knowledge to decide that such a rule applied in this country, then that fact was not communicated to or brought to the applicant's knowledge, and neither he nor his Counsel had the opportunity to meet it either by evidence or in argument).

In the face of this opinion the Board could not oppose the application.

The findings and sentence of the Board were thus duly set aside by the Supreme Court on 9/12/54.

COMMENTS

In retrospect it is easy enough to see what should and should not have been done. It has been the practice in the past not to appoint a legal representative to lead the evidence on behalf of the Board. This omission is the main cause of the failure of this prosecution. If the Board had been represented by Counsel, the probabilities are that the required evidence would have been led and that the conviction would have been upheld.

However, steps have now been taken to remedy the position and to ensure that the Board's case in future will be presented by a competent person.

The Board has gained valuable experience. Its functions and powers as well as the procedure to be followed in future are more clearly defined as also the status and value of the Guide to Professional Conduct.

The tricky and at times seemingly conflicting relationship between Common Law and a special group law like the Veterinary Act is also better understood.

A few remarks in this respect may be of general interest, since there exists considerable doubt in the minds of many practitioners concerning the law in regard to restriction of competition by an ex-assistant, locum tenens, etc.

A "group law" concerns and controls only the members of a given group of persons, such as a club, an association or a society. Persons join such a group voluntarily and with full knowledge of the rules and articles which govern it. Membership also implies that they agree and undertake to abide by those rules or laws.

Now the Courts do recognize and administer such "group laws."

They recognize them even if they overrule or conflict with the Common Law to a certain extent, always provided that there is valid ground for such departure and that the extent of departure is reasonable.

Thus in Common Law it is held generally that anyone can set up in business, or earn a living wherever he chooses and that there should be no restraint whatsoever on healthy competition.

Nevertheless restrictive contracts are often entered into by Medical and other practitioners. Such contracts are upheld by the Courts only when it is shown that the terms thereof are reasonable and that they are intended to protect the principal from unfair competition only.

By unfair competition is understood the use by an assistant or locum of *special* or *secret* knowledge imparted by the principal, or the use of his *introduction* to the principal's clients or other special privileges. These materially and unfairly facilitate his setting up against his principal in that area.

A case recently decided in Court namely Rogally v. Weingartz (Durban & Coastal Division) June 3, 7, 1954, Holmes J., recapitulates the argument for this type of contract. Likewise in the absence of a contract the application of professional rules or "group laws" will be upheld by the Courts, again provided they are fair and reasonable.

In as far as the Veterinary Profession is concerned the Veterinary Board holds the view that it is desirable for recent graduates to obtain some practical experience by working as assistants or locums to established practitioners. It realizes that it is not always possible or expedient to have a contract or bond drawn up and signed especially where short term employment is involved. Hence its decision to adopt the rule prohibiting setting up in practice in ex-employer's area except with his written permission.

This notwithstanding it is earnestly recommended that practitioners taking on assistants, locums or partners, should in their own interest always enter into agreements drawn up in very clearly defined terms to cover all or any circumstances peculiar to themselves, not forgetting that such agreements must be fair and reasonable in respect to Common Law, otherwise they may prove valueless if challenged in a Court of Law.

INTERNATIONAL SOCIETY FOR HUMAN AND ANIMAL MYCOLOGY

The International Society for Human and Animal Mycology was founded on the 6th July, 1954 by a group of scientists of 10 different nations assembled on the occasion of the 8th Congress of Botany.

The Committee of the Society is constituted as follows:—

President	:	P. Redaelli — Milan.
Vice-Presidents	:	C. W. Emmons — Bethesda,
		G. T. Ainsworth — Exeter,
		P. Negroni — Buenos-Aires,
		G. Segrétain — Paris.

General Secretary: R. Vanbreuseghem — Anvers.

The objects of the Society are: to bring together qualified persons interested in the study of fungi living on humans and animals; to encourage the formation of regional groups of these persons; to organise meetings of the members of the Society on the occasion of International Congresses; to publish, as soon as possible, a bulletin, devoted to human and animal mycology.

All those who wish to become members of the International Society for Human and Animal Mycology, are invited to send their requests for admission to the General Secretary, giving details of their qualifications together with a list of their scientific publications. The annual subscription has been fixed at 3 dollars, account No. 133 700 of the General Secretary of the Society, at the Banque d'Anvers, Antwerp, Belgium.

Prof. Dr. R. VANBREUSEGHEM,
General Secretary of the International Society for Human and Animal Mycology.

BOOK REVIEW

WOOL RESEARCH (1918-1954).

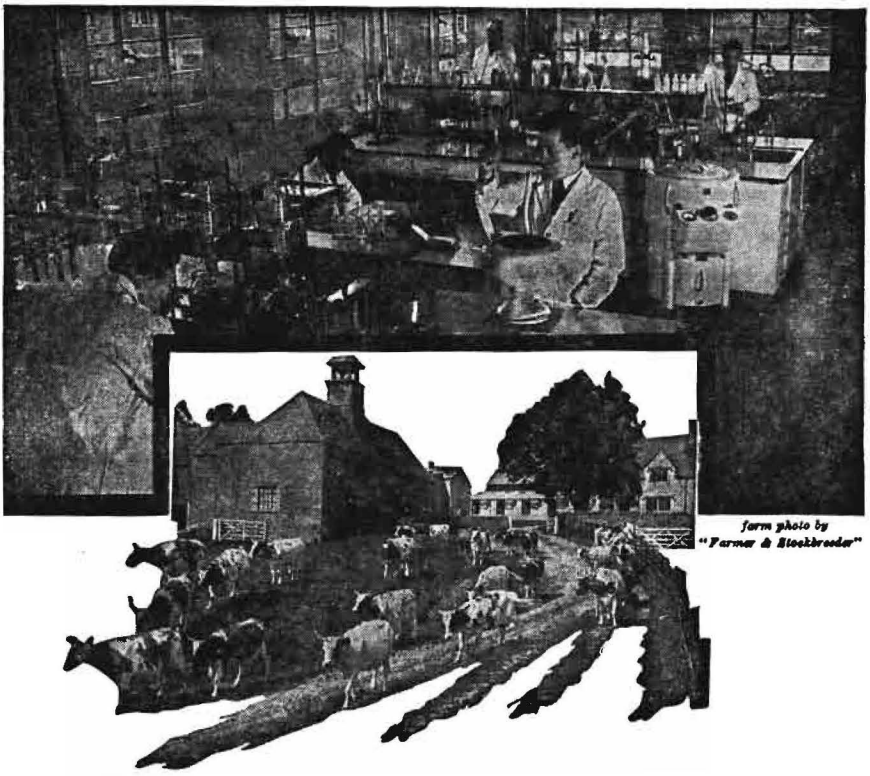
Volume 3: Testing and Control in the Wool Industry.

Published by: Wool Industries Research Association. Torrington, Headingley, Leeds6. 277 pages, 143 Fig. 108 Tables. Price —

This excellent reference on the methods and technique used in wool research laboratories consists of 15 chapters contributed by no less than 32 different authorities. The most important aspects covered are the control of humidity in testing rooms, sampling and measuring wool fibres, and twist. All aspects in the testing of fabrics for strength, wear, thickness, shrinkage and water repellency are described in detail.

This volume would prove of great assistance to those engaged in wool research.

J. W. G.



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Agents: M. & J. Pharmaceuticals (Pty.) Ltd., P.O. Box 784, Port Elizabeth

SOUTH AFRICAN VETERINARY MEDICAL ASSOCIATION COUNCIL MATTERS

A meeting of the Association was held on April 28th, 1935. *Present*: Drs. A. M. Diesel (President), G. D. Sutton (Hon. Treasurer), R. Clark, E. M. Robinson (Editor), A. D. Thomas, P. S. Snyman (Vice President), A. C. Kirkpatrick (Hon. Life Vice President), M. C. Robinson (Acting Hon. Secretary), Drs. P. J. J. Fourie, L. W. v.d. Heever and W. J. Wheeler were present by invitation.

Dr. van den Heever was welcomed as a new council member by the President.

The meeting was mainly devoted to the arrangements for the August Congress. In connection with the Opening Day, Dr. Clark reported briefly on the plans for it. The University of Pretoria would contribute £25 towards the expenses. It was decided to authorize expenditure of up to £35 by the Association. It was decided that the Popular Evening Lecture should be dropped.

Council was informed that the Prime Minister had accepted an invitation to open the Congress.

Powers of condemnation: In the discussion in which the members of the Public Health Group took part, Council was asked for guidance in regard to replying to certain articles in the Public Health Journal. It was decided not to proceed further in the matter.

PROGRAMME FOR JUBILEE CONGRESS MEETING

Programme for the Jubilee Congress Meeting of the South African Veterinary Medical Association, to be held at Onderstepoort from August 29th to September 2nd, 1955.

Opening day, 29/8/55: This will be held at the Faculty Buildings and there will be exhibits showing the various aspects of veterinary science. Tea and lunch will be provided by the Vroue Federasie at a nominal cost.

Tuesday, 30/8/55: *Registration,* from 8 a.m.; *Convocation of the Meeting,* 8.45 a.m.; Official Opening by the Prime Minister, 10 a.m.; Tea, 10.30 a.m.

11 — 12.45: Symposium on "The Role of the Veterinarian in Public and Animal Health.

(1) Research — Dr. R. A. Alexander.
(2) Field Services — Dr. A. M. Diesel.
(3) Municipal Services (Nominee of Public Health Group).
(4) Private Practice — Dr. A. F. Tarr.
(5) Veterinary Education — Dr. P. J. J. Fourie.

Wednesday, 31/8/55: 8.30 — 10.15: Symposium on "Breeding disorders of the domesticated animals". Dr. S. W. J. van Rensburg (convenor), Dr. J. S. van Heerden and a private practitioner.

10.45 — 12.30: Symposium on "Recent advances in animal nutrition". Dr. J. W. Groenewald (convenor), R. Clark, Dr. Coles and a representative of one of the animal food firms.

Afternoon: Trips to various places and institutions of interest. Civic cocktail party, 5.30 p.m.

Thursday, 1/9/55: 8.30 — 1015: Symposium "The tuberculosis problem".

Dr. P. S. Snyman (convenor), M. C. Lambrechts and E. M. Robinson.

10.45 — 12.30: Clinical demonstration (Medical). Dr. W. D. Malherbe and a private practitioner.

Sports afternoon.

Friday, 2/9/55: 8.30 — 10.15: Clinical demonstrations (Surgery). Dr. N. C. Starke and a private practitioner.

19.45 — 12.30: Symposium on "Insect Vectors and Virus Diseases". Dr. K. Smithburn and R. du Toit (convenor).

2 p.m.: Business Meeting.

Dinner, 7.30 p.m. for 8.

Saturday, 3/9/55: Rugby Test Match.

OBITUARY

J. G. BRANDSEN

By the sudden death of Dr. J. G. Brandsen the Veterinary profession has lost one of its most highly respected members.

Born in 1892, he qualified at the Veeartsenijkundige Hoogeschool, Utrecht, in 1918. On release as Military Veterinary Surgeon from the Dutch Army, he first practised in Friesland and subsequently in South Africa for a few years. Emigrating to Australia he practised in Queensland and New South Wales where he built up a large equine practice in Sydney. He married an Australian girl, Moyah Perkins, and had two daughters, Janice and Peta. In 1937 he returned to Holland for refresher studies. Back in South Africa he acted as Technical Adviser to a leading firm dealing in stockfeeds until war broke out. Undeterred by his failure to serve in his professional capacity in the S.A. Veterinary Corps, he enlisted as a layman in the S.A. Medical Corps with the rank of sergeant. On demobilisation he started a practice in Ficksburg in 1946 where his skill in large animal work soon won him well-deserved recognition. He was the most skilful large animal obstretrician the writer has ever known and in clinical matters in the words of the late Sir Arnold Theiler "he observed instead of only looking". He was of the most cheerful disposition, endowed with a natural gift for music and was a brilliant raconteur with a charm and dignity possessed by few. His professional conduct both as regards his clientele and his colleagues was exemplary at all times.

Two members of the O.F.S. Branch of the S.A.V.M.A. attended his funeral, one of the largest ever to take place in Ficksburg. To his wife and two daughters the sympathy of the profession goes out in their sad loss.

W. J. RIJKSEN.

EDITORIAL

The Jubilee Congress of our Association has come and gone and to those veterinarians who were privileged to attend, it will remain a memorable meeting. The Open Day before the Congress commenced was a very successful demonstration of the progress which veterinary science has made in South Africa and similar days will have to be considered in the future. It was opened by the Honourable P. Sauer, Minister of Lands. The Congress itself was opened by the Prime Minister, the Hon. J. G. Strijdom, a signal honour to our profession. His address on that occasion is published elsewhere in this issue.

Over 170 members registered at the Congress, a number which constitutes about half of the veterinarians on our Register. This assisted materially in making the meeting the success it was. The social side of the meeting was one of the highlights and the Ladies' Committee arranged for the entertainment of the wives of members.

As regards the scientific programme, which was in the form of symposia, it was the intention to review the position in which the veterinary profession in all its aspects finds itself today and to consider certain aspects of particular problems. Under the circumstances, therefore, the programme did not take the usual form of a series of papers on original research work or on practical experiences in medicine or surgery, with a few exceptions.

It is always a good thing from time to time to survey the progress which we have made and to consider in what directions we should try to go forward. From this point of view the Congress was undoubtedly a success and we may look forward to the future with confidence.

It seems likely that within the next few years, sectional meetings will have to be introduced such as one for Public Health problems and for medicine, surgery, etc., with plenary sessions for subjects of general interest. With the growth of the profession, this is a natural development and will lead to much more discussion on papers than we have now.

OPENING OF CONGRESS

The Congress was opened by the Honourable, the Prime Minister, Mr. J. G. Strijdom, at 10 a.m. on August 30th. In his address he said that the value of the veterinarian to the stockbreeder and therefore to the country as a whole could not be overestimated. As a result of his own personal experience of the assistance given by veterinarians to farmers, he considered them as a group of people and scientists deserving of the greatest respect and appreciation. He then went on to trace the history of Association from its registration as the Transvaal Veterinary Medical Association in November, 1903, to its becoming the South African Veterinary Medical Association in April, 1920. The Association had thus some time ago outgrown its provincial form and spread its work over the whole country. Its unbroken 50 years' existence was a proof of its virility and a guarantee of its future and was a result of the great work which had been and was still being done.

Mr. Strijdom mentioned that the membership of the Association now amounted to 350, distributed all over the country and there were now seven branches in different areas which made better co-ordination and contact between members possible. He would like to refer to the interesting and important subjects to be discussed at the congress, the immeasurable value of the services of Veterinary Science to the country and the high esteem and appreciation the country as a whole and more particularly the progressive farmer had for the veterinarian.

The human health aspect of the work of the veterinarian was also emphasized and the part he played in the control of animal diseases transmissible to man.

Veterinary Science played a very important role today in the general world-wide field of scientific research and activity as a result of scientific publications.

A tribute was paid to the work of Onderstepoort initiated by Sir Arnold Theiler and emphasis was placed on the value of the contact of veterinarians with the Institution. During the last four or five decades, studies of invaluable importance to South Africa and the world in general had been made at Onderstepoort and a number of the diseases against which satisfactory remedies had been discovered were mentioned, such as horsesickness, lamsiekte, anthrax, blackquarter, gallsickness, redwater, etc., and also for internal parasites of large and small stock. Innumerable other diseases had been satisfactorily investigated.

In conclusion the Prime Minister expressed his own personal tribute to the work of the veterinarians and how he personally appreciated their devotion to their work and their unselfishness in service. It was on this account of this characteristic that they nearly all possess and not alone on the practical value of their work

that the veterinarians of our country were so highly appreciated. He concluded by wishing the Association and its members great success with their work and scientific investigations in the future and — alles van die beste.

Congratulations and good wishes were received from:—

The British Veterinary Association.
The American Veterinary Medical Association.
The Director of Veterinary Services, Belgian Congo.
The Director, Animal Research Division, New Zealand.
The Director of Veterinary Hygiene, Australia.
The Veterinary Director General, Canada.
The Director, Animal Health Division, Ministry of Agriculture, Great Britain.
The Director of the East African Veterinary Research Organization, Kenya.
The Director of Veterinary Services, Bechuanaland Protectorate.
The Veterinary Department, Nova Lisboa, Angola.
The Director of Veterinary Services, Northern Rhodesia.
The Assistant Director of Veterinary Services (Research), Southern Rhodesia.
The Assistant Director of Veterinary Services, Angola.
The President of the South African Agricultural Union, Dr. G. J. Russouw.
The Chairman of the Wool Board, Mr. J. H. Moolman.
The President, Orange Free State Agricultural Union, Mr. de la Harpe De Villiers.
The Chairman of the Dairy Industry Control Board, Mr. B. H. Ryder.
Dr. P. J. du Toit, Chairman, Scientific Council for Africa South of the Sahara.
Mr. W. G. Beaton, Inter African Bureau of Tropical Diseases.
The South African Poultry Association.
The Egg Control Board.
The Director of the Bureau of Standards.
The Pharmaceutical Society of South Africa.
President, Organized Agriculture in the Cape Province.
The Medical Officer of Health, Johannesburg, Dr. Scott Millar.
The Acting Medical Officer of Health, Cape Town.
The Natal Branch of the S.A.V.M.A.
Col. J. Irvine Smith.

Messages were received from a number of veterinarians in the Union of South Africa, including the following: Drs. M. Bergh, W. M. McHardy, N. F. Viljoen, Johan Louw, G. Martinaglia, H. G. Watson, J. W. A. Brookes, S. G. Turner and C. J. Muller. Messages were also received from Dr. R. Clark from England and Dr. D. K. Shone from Southern Rhodesia.

As it would take up too much space to publish the individual messages, it was decided to give only two of them, that from Col. J. Irvine Smith, who is now the sole survivor of the Transvaal Veterinary Medical Association, formed in 1903, and the one from Dr. P. J. du Toit. Their letters are published in full and read as follows :—

"Inveraray,"
39 Honey Street,
Berea,
Johannesburg,
23rd August, 1955.

The President,
S.A.V.M.A.,
Onderstepoort.

Dear Dr. Diesel,

Re: JUBILEE CONGRESS

I herewith submit the following in compliance with your request received through Dr. M. C. Robinson, for a few notes on the past for the S.A.V.M.A. Jubilee Congress.

I regret that I shall be unable to attend the whole Congress, but hope to be present at the opening by the Prime Minister on Tuesday. The years roll by and are counted against us, and I wish you every success.

My mind goes back to the meeting of a number of Veterinarians in Long's Hotel, Rissik Street, Johannesburg (long since demolished) some 53 years ago when the Transvaal V.M.A. was formed, and a few years later to be merged into the S.A.V.M.A.

During over half a century I have carefully read the Council's Minutes and Reports and can testify to the dignity and efficiency of the work performed in protecting the Profession's interests. So long as a stream of prominent members come forward, offer their services, and regard the positions of President, Office Bearers and Councillors as an outstanding honour without fee or reward, so long will the interests of the Profession be furthered and flourish.

After the death of the late Mr. P. Conacher I believe I am the sole survivor of the first meeting of Veterinarians which I called together.

After I had diagnosed the first outbreak of East Coast Fever and enforced quarantine, which occurred at Komatipoort and which was strongly disputed but subsequently confirmed by Drs. Theiler, Hutcheson and Turner, I was instructed to organise the first Civil Veterinary Services for the Transvaal. Subsequently these were handed over to Stewart Stockman as I preferred to remain with the S.A.C.

As chairman of the Egg Export Commission (1925) I recommended amongst other reforms, that the Government erect

export cold stores at the docks at Cape Town, Port Elizabeth, East London and Durban, which was adopted and has enabled South Africa to enter the ranks as a great Perishable Products Exporting country worth millions of pounds annually. This has created and opened up tremendous development, and has given Perishable Products an unlimited access to the world markets.

Yours faithfully,

Col. JAS. IRVINE-SMITH, C.B.E., V.D.

Message from Dr. P. J. du Toit, Chairman, Scientific Council for Africa South of the Sahara.

We members of the veterinary profession have reason to feel pleased and proud when we look back over the last fifty years. The progress which can be recorded in every branch of veterinary science is quite phenomenal.

In the early years of this century veterinary *research* in South Africa was in its infancy. Since then it has developed at a speed which probably cannot be equalled in any other country in the world. And to-day we have at Onderstepoort an institute of which any country, even the oldest and richest, can be very proud.

Fifty years ago veterinary *practice* in South Africa did not exist. To-day it is in a flourishing state and can boast of a proud record.

Veterinary *education* too has made exceedingly rapid strides and to-day the Veterinary Faculty trains veterinarians whose achievements prove that they are at least the equals of veterinarians trained anywhere in the world.

In this remarkable development the South African Veterinary Medical Association has played an important part. It has held the profession together and secured rights and privileges which otherwise we would not have enjoyed. It has raised and maintained the status of the profession.

Its Journal has played no mean part in achieving these objects. Great credit is due to the editors who have set and maintained a very high standard.

As one of the older members of the Association it gives me great pleasure to record my appreciation of what has been achieved in this relatively short period and to express my fervent hope that further great advances will be made in the years that lie ahead.

P. J. DU TOIT.

9th September, 1955.

THE TRADE EXHIBITION AT THE CONGRESS

For the second year in succession the Trade Exhibition was held in the new Faculty Buildings. More time than previously was available for members attending the Congress to visit the Exhibition

and full use was made of the opportunity. The President of the Association opened the Exhibition just before the official opening of the Congress by the Prime Minister, the Hon. J. G. Strijdom. Mr. A. R. Taylor replied on behalf of the firms exhibiting. The descriptions of the exhibits have been placed in alphabetical order.

Agricura had a comprehensive range of veterinary instruments on display, also some new preparations of special note pertaining to the veterinary profession.

A new powder form of stabilised Vitamin A, marketed under the name of Duravit A, was introduced. In this form it will remain active for approximately 6 weeks, as against the oil product which lasts but 10-14 days once exposed to sunlight.

Also a new nasal worm remedy was displayed, which is administered direct through the nostrils and will reach all parts of the sinus cavities, as it contains a solvent which will dissolve the mucous matter.

A neo-stigmine preparation, sold under the name of Nupurgon and which replaces Purgon, is now available.

For mastitis a preparation containing Aureomycin, Streptomycin and Penicillin, and marketed under the name of Aureocillin, was on display.

Messrs. Cooke, Troughton & Sims take pleasure in exhibiting their new range of M25 Series Microscopes at the 1955 Jubilee Veterinary Congress. These are of the most advanced design and are outstanding in their optical characteristics and mechanical performance.

The Dysons Interforometer Microscope is of special interest. A research tool capable of optical staining to give a high degree of contrast and reveal the varying optical densities of specimens. It is also used to calculate the mass per unit area of cell constituents. Keen interest was shown in all "Cooke" Microscopes.

Amongst the newcomers to the Trades Exhibition this year, were The Crookes Laboratories Ltd., of London, who were exhibiting several preparations, new to the South African veterinarian.

B Complex Injection (*Veterinary*) — A standardised veterinary injection, containing B1, B2, nicotinamide, B6 and B12.

Collotone (*Veterinary*) — A tonic for general use providing iron, copper, manganese together with nux vomica, caffeine, B1 and glycerophosphates.

Ferrovet — A purified iron corbohydrate complex solution for intramuscular injection, providing 50 mg. of iron per ml.

Haemostem — A new combination of oxalic and malonic acids suitable for intramuscular and intravenous injection, where rapid coagulation is required.

Stilboestrol Injection (*B Vet C*) — A solution of stilboestrol dipropionate in ethyl oleate providing 10 mg. per ml. of very low viscosity at all temperatures.

Vitamin A Injection (*Veterinary*) — A stable concentrate of vitamin A affording 100,000 i.u. per ml. for intramuscular injection.

Gurr Surgical Instruments (Pty.), Ltd., of Johannesburg, exhibited further great improvements in respect to injection equipment. Their Laminex Record Syringe and Interchangeable Luer Lock Syringe have proved themselves to excel both in quality and price moderation. They have now introduced an entirely new type of syringe. This syringe is called "The New Camper Syringe." It brings into use the internal hollow of the plunger. This does not interfere in any way with the normal working of the syringe but does greatly increase the number and type of operations that can be carried out. It can be used for injecting mixed medicaments and contents may be sealed in the syringe and kept sterile for transportation and has numerous other uses. Gurr's "Siso" needles have proved themselves in this country for a quarter of a century or more and in addition to the full range of sizes with Record mounts, this firm carries 53 different sizes of such needles in stock with Luer Lock mounts. The latest needle they exhibited is the "Laminex" Hypodermic Needle with Record mount and an improved "Huber Point" — this point is centred on the Axis of the needle. Also was shown a new type of leather bag for Practitioners as well as the wellknown Bard-Parker Rib-Back Scalpel blades.

I.C.I. South Africa (Pharmaceuticals) Limited.

The wellknown "Sulphamezathine" veterinary products and "Mysoline" for use in the nervous manifestations associated with canine distemper and canine encephalitis were displayed on the I.C.I. South Africa (Pharmaceuticals) Limited stand. In addition the new I.C.I. discovery "Hibitane" was featured. "Hibitane" is a unique substance of an entirely new type, which has high activity against Gram-positive and Gram-negative organisms and Trichomonas Foetus. "Hibitane" is available in the form of —

"Hibitane" Efferescent Pessaries for preventing and treating metritis and endometritis in large animals.

"Hibitane" Intramammary Cream for the treatment of acute and chronic cases of staphylococcal mastitis.

Another product which attracted attention was "Minel" which has been used in large-scale schemes overseas for the combined treatment of roundworms and flukes in cattle and sheep.

Lederle Stall.

Lederle Laboratories (represented in South Africa by Messrs. Alex. Lipworth Limited) had on view at the 1955 Veterinary Congress the latest developments in the field of Antibiotics. A feature of this year's display was the new Intramuscular form of Achromycin. Samples of this product are available to Veterinarians who wish to carry out field investigations.

Lederle also had on display the new Aureomycin Soluble Tinted Powder, as well as the 20 mg. Aureomycin Veterinary Tablets, for increasing the weight of calves, pigs and poultry.

Maybaker (S.A.) (Pty.), Ltd.

The following products were featured on our stand:—

Compron. This well known formula has been fortified by the addition of Dibromopropamidine, which enhances the anti-bacterial coverage.

Dibrogan Cream combines bacteriostatic and bactericidal properties with anhistaminic and local analgesic activity.

Euthatal. Employed solely for euthanasia, being three times the strength of Sagatal with a definite saving in cost.

Methyl-Amphetamine. This pack provides a suitable dosage for small animals, being 10 mgms. per 1 cc. ampoule. Mainly indicated as a respiratory stimulant and a vasoconstrictor to counter the effects of barbiturates.

Otoryl. These ear drops are indicated in parasitic, bacterial and fungous infections in dogs and cats.

Protegan with Penicillin. Indicated in streptococcal, staphylococcal and coliform mastitis, particularly where previous treatment with penicillin alone has not been successful.

Soleon. A convenient form of treatment indicated in impaired fertility of cows and bulls, particularly in vibriosis.

Thalazole. A recent price reduction has been introduced for this outstanding treatment of intestinal bacterial infections.

Thiazamide Powder with Proflavine. The new plastic puffer pack of this wellknown product ensures even distribution in the treatment of wound infections.

Trinamide ensures potent antibacterial activity against common animal pathogens, dosage being on a twenty-four hourly basis.

M. & J. Pharmaceuticals (Pty.), Limited; and

A. J. White (South Africa) (Pty.), Limited.

Our range of veterinary products is steadily increasing and this year we take pleasure in introducing "Soluble Nefco" and "Neftin" — the former for the prevention and treatment of coccidiosis by incorporation in the feed or drinking water, the latter for the treatment of Fowl Typhoid. With these two powerful weapons freely available at reduced and economical prices, the Veterinary Surgeon is in an excellent position to aid poultry farmers in combating these diseases.

A visit to our stand will enable us to introduce to you our other products which are of considerable interest to the Veterinary Surgeon. They include "Mandelamine" for the treatment of infections of the urinary tract; "Pragmatar", an improved presentation of the well accepted ingredients coal-tar, sulphur and salicylic acid, for seborrhoeic conditions of the skin; "Quotane Ointment" for symptomatic relief of itchy conditions; "Furacin Soluble Ointment", the antiseptic wound dressing of choice; "Iodex", the ideal iodine ointment for veterinary use; "Edrisal" an effective and useful stimulating analgesic combination; "Eskacillin '100' " and "Eskacillin '100' Sulpha", liquid oral penicillins for conditions responding to penicillin alone or penicillin and sulphadimidine therapy; "Tonets" the conditioner and alterative for small animals; "Dustex" the

B.H.C. dusting powder; and "Euthanex" the surest, safest and most economical drug for euthanasia of small animals.

Milborrow & Company (Pty.), Ltd., 70 Payn Street, Pietermaritzburg.

The exhibit was attended by Mr. J. Jarvie and Mr. R. Lambert.

Products of particular interest included two new additions to the Pen-Strept-Amide range — P.S.A. Intra-Uterine Jelly and P.S.A. Metritis Powder — together with a range of associated instruments for the treatment of Uterine and Vaginal infections. The jelly is used with a cheap but efficient plastic applicator and is safe, convenient and more economical than conventional pessaries. The Metritis Powder is packed in plastic tubes with a special diluent which is added prior to attachment to the special threaded "Ball-Point" Catheter. It is used for the treatment of Metritis and for Intra-Uterine post-service antibiotic therapy in infertile dairy cows.

Pen-Strept-Amide Wound Powder in its new puffer-bottle, and "Ferromyl" an economical intravenous iron injection were other items of special interest.

The "Phen-Master" Automatic Dosing Gun with a predirected gullet tube, the most modern and efficient equipment in the world for drenching Phenothiazine, was a prominent feature of the display.

Parke, Davis & Co.

Parke, Davis & Co., who last year inaugurated a South African branch of their world-wide organisation, have now commenced manufacture in Port Elizabeth, and a number of products made by them in South Africa were amongst those featured on their stand number 20.

Foremost amongst these was Chloromycetin — the first of the broad spectrum antibiotics and the first antibiotic to be manufactured in Africa. It was displayed in a wide range of preparations the latest addition being a 2 gm. size of Chloromycetin Intramuscular which, because of its wide spectrum and low cost has already proved invaluable to veterinary surgeons for numerous infections in animals. Other Chloromycetin products featured included the palatable suspension — Chloromycetin Palmitate which is ideal for small animal oral administration, the Ophthalmic Ointment which has proved effective and convenient for many eye infections and the Cream for skin conditions, infected wounds and ulcers.

Other products manufactured by Parke, Davis in Port Elizabeth and featured on the stand were Abidec Drops and Capsules for the treatment of vitamin deficiencies in small animals, and Carbrital, a hypnotic for the treatment of convulsions, and eclampsia in the form of capsules and elixir; Benadryl Parenteral for the treatment of bloat, serum sickness and erythema; Epanutin Capsules and Suspension for hysteria and convulsions and Caladryl Lotion and Cream for allergic skin conditions.

Roche Products, Johannesburg.

The present day need to increase world supplies of food for human consumption is well recognised. It is equally well recognised

that by good husbandry an effective increase can be made in the production of such essential foodstuffs as meat, eggs and milk. Good husbandry implies a scientific knowledge of animal feeding including an appreciation of the fact that some natural foodstuffs may be lacking in essential nutrients.

Livestock rations deficient in certain essentials may adversely affect growth and development, reproductive ability and general health. During recent years therefore the nutrient value of animal foodstuffs has been given a great deal of attention.

In addition to proteins, carbohydrates and fats, a number of accessory food factors, in particular certain vitamins and minerals play an important part in the composition of well-balanced rations. A great deal of information regarding the vitamin requirements of various species of animals and the symptoms caused by deficiency of one or more of these essential food factors has been obtained by careful research. The results clearly demonstrate their necessity for growth, and for the maintenance of health and even of life itself.

The Hoffmann-La Roche Companies throughout the world have specialised in the isolation and synthesis of pure vitamin substances and their Vitamin Factories—turning out "Vitamins by the tons" — are models of modern scientific equipment.

Our latest additions, especially designed for treatment and prophylaxis of vitamin deficiencies in domestic animals are our "Rovimix" preparations:

Rovimix A
Rovimix A + D_3
Rovimix A + B_2 + D_3
Rovimix E

PRESIDENTIAL ADDRESS

FIFTIETH ANNUAL GENERAL MEETING

AUGUST 30TH 1955

A. M. DIESEL

Pretoria

Your Association now enjoys a membership of approximately three hundred and fifty Veterinarians, the majority of whom are actively pursuing their profession, within the Union.

As our membership increases, so can we expect the development of problems affecting our general and individual welfare.

With one hundred and sixty members now actively engaged in practising their profession outside the avenues of State and Municipal employment, it is not surprising that a measure of overlapping in activities and disquieting competition is being felt. This is something which we shall have to appreciate and to accommodate in a manner designed to give the maximum benefit to all concerned.

Healthy competition based on genuine attempts to live and let live, and arranged in a true spirit of esprit des corps, is essential to our aims as an Association, and vital to our existence as a corporate body, capable of speaking with one voice.

With the development of trade and industry in South Africa to-day and the resounding slogan of "buy South African", it is not surprising that veterinarians are exploring all avenues of appropriate employment. It is commendable that this should be so.

After a long period of strenuous endeavour and intimate consideration, it would appear that veterinary education in South Africa is entering a new era. Our sincere appreciation and congratulations go out to those who have been responsible for this progress. Not only can we look forward to an increasing number of new graduates, but also to the fact that the door has been opened to the training of students in a manner which will fit them best for the various types of veterinary employment offered.

I now wish to refer to the matter of overlapping of activities which has been referred to your council from several sources.

It will indeed be a sad day when we as an association fail to appreciate the significance of a maximum number of established veterinary practitioners in the country.

Everything possible should be done to encourage veterinarians to develop and establish practices, particularly in rural areas, and to maintain them at a high level over long periods. In such practices, new graduates, by acting as locums, can immediately gain valuable experience. Here they can pause and consider their eventual destinations as Veterinarians. An established practice has moreover

a stabilising effect on the further development of stock raising in the area in which it is situated.

The practitioner must however, be equally conscious of the possibility and perhaps even of the need, for colleagues to co-exist in his environment even though they may not be strictly following his own type of veterinary activity and pattern of livelihood.

So long as such competition is not unfair and providing competing veterinarians are imbued with the true spirit of esprit des corps, give and take, live and let live, it should soon be apparent that unity of purpose creates confidence and confidence creates progress.

Should there be unfair competition or should the provisions of the Veterinary Act and its associated code of ethics be violated, the Veterinary Board is there to take care of the offender.

Your council is very conscious of the need to analyse all aspects of this apparent overlapping of interests and activity and you can expect to hear more about it in the very near future.

It would seem that the seven branches of the Association have remained very active during the year. This is very encouraging as it gives the opportunity to solve local problems in the best possible way. I may mention here that your council has welcomed the suggestion put forward by one of the branches, that branch office bearers should be allowed to attend the council meeting immediately preceding an annual general meeting. This will be brought into effect next year.

Your council has been very active during the year, and you will see from the financial statement that it is taking good care of your affairs. The finances of the Association are in a very sound state.

Quite soon now, members will be able to purchase through the Association, standard forms of Veterinary Health Certificates. The General Purposes Committee of your Association has been responsible for this and our thanks go to them for their assistance in this matter.

During the year, your council, with your approval, engaged the services of a firm of paid Secretaries, to undertake the large amount of clerical work now necessary for the transaction of its business. This arrangement is working very well, as you will have noticed from the circulars which you have received. I would like to thank Messrs. Glover & Dyer for their interest in our affairs.

It is still necessary for me to remind all members of their responsibilities in completing and forwarding voting papers. During the recent election of office bearers, 185 out of 350 members voted and five spoilt papers were received. This is an improvement on last year's figures, but it is still not satisfactory.

I am sure you will wish me to express on your behalf, our grateful thanks to the Organizing Committee, for their efforts in arranging the programmes for this Jubilee Celebration. You will see on the printed programme the message which we have received

from our Prime Minister. We are indeed grateful to him for his personal interest in our affairs and I'm sure you will wish me to thank him most sincerely for the honour he has bestowed upon us on this memorable occasion.

I wish to express my personal thanks to all the members of Council and to all those who have served on the various committees and sub-committees. Your honorary secretary and treasurer have as usual not spared themselves to attend meticulously to all matters requiring their attention. My particular thanks go to both these gentlemen.

Lastly I would like to thank Mrs. Malherbe and Mrs. Coles for the services which they rendered to us up to the time when our present firm of Secretaries took over; and to Mrs. Weiss and Mrs. van Rensburg who are now giving us such valuable help during the present congress.

I hope this congress will be one which we all will remember for many years to come and I trust it will be an inspiration to us all to co-operate with each other to the full, for the maximum benefit of those we serve.

Jl. S.A.V.M.A. 26(3), 1955.

THE ROLE OF THE VETERINARIAN IN PUBLIC AND ANIMAL HEALTH

1. RESEARCH

R. A. ALEXANDER

Onderstepoort

The choice of this symposium on the role of the veterinarian in public and animal health for this jubilee meeting of the South African Veterinary Medical Association is an indication that we, as veterinarians, whose first duty it is to safeguard and preserve the health of our domestic animals, appreciate that there are a variety of aspects to this important matter.

We shall discuss the role of the private veterinary practioner, the opposite number of the medical general practitioner who is regarded generally as the back bone of the medical profession. We shall discuss the role of the veterinarian in municipal service in assisting to safeguard human health by making available for consumption sound food of animal origin. We shall discuss the role of the state veterinarian in preventing the introduction and spread of a formidable list of infectious diseases with a view to their ultimate elimination. But, when we come to consider the research worker it will be agreed that, without continued research, the other links in the chain of the practice of veterinary medicine will slowly but surely wear and ultimately snap under pressure.

It is not my intention to give a comprehensive review of even the high-lights of the achievements in veterinary research in this country. But, to each and all of us, it cannot do other than engender a feeling of pride that our former and present colleagues not only in the recognized Institutes of which Onderstepoort is the largest but also in the sphere of applied research in the field have so much to their credit. To Sir Arnold Theiler, the father of veterinary science in South Africa, must be given not only the credit for signal personal achievement, but also the credit for the foresight and drive which ensured that, through the results of research work of the highest order, the veterinary profession as a whole would be enabled to assume its rightful proud position in the economy of the country. Do not let us forget that even a few decades ago the veterinary profession was regarded as probably the cinderella of all the professions. It is, in my view, research and the application of the results of research that have lifted the profession to its present honourable and often envied position.

One must delve into history to see in the pioneer research instinct of Gray, Hutcheon, and Watkins-Pitchford to name but three, the beginnings of what is a magnificent but as yet a woefully

incomplete piece of work. Here was a comparatively new country bristling with new and hitherto unheard of problems of animal health. As happens so frequently the need found the men and these problems were attacked with discrimination and energy, but hampered by lack of fundamental knowledge at the time. To the very wise legislators of the day must be given full credit for providing the necessary financial support and for bringing into being an organization to initiate and carry on the work. There is no doubt that the encouragement and support given to veterinary research has proved a sound investment which has paid handsome dividends down the years. It cannot be agreed that the scale of support was or is out of proportion to the production potential of the country, but it is agreed that the time is ripe to remould that organization to meet the present and future needs of an ever changing world.

To develop my theme it is essential to refer briefly to a few of the numerous benefits that have accrued to the live-stock industry of the country from the research work carried out in the past. Lounsbury focussed attention on a huge new field with his work on the role of ticks in the dissemination of disease. An army of workers has tackled this and the allied problem of the elimination of disease by the effective control of ticks. A wealth of knowledge has been accumulated over the years on the aetiology, transmission, pathogenesis, symptomatology, pathology, therapy and prophylaxis of such diseases as biliary fever of horses and dogs, red water and gallsickness of cattle, East Coast fever and the other theilerioses of cattle, heartwater of cattle, sheep and goats to name but a few wellknown disease conditions. After viewing this wealth of data the uninformed may be excused for believing that the work has been completed. I would point out, however, that as recently as 1955 Neitz isolated and transmitted by ticks (Rhipicephalus appendiculatus) from the African buffalo to domestic cattle a piróplasm which may well be a new species of the genus Theileria that is capable under conditions, at present imperfectly understood, of causing in cattle a disease which is almost invariably fatal. It is of interest to note that the laboratory investigations were stimulated by a report that of 800 cattle exposed to this tick infestation in the field over 400 died within 40 days, an indication that the work is of more than mere academic interest. Further, the same research worker showed, as late as 1954, that sweating sickness of calves is transmitted by the bont-poot tick Hyalomma transiens, that in addition to cattle, sheep, goats and pigs are susceptible and that infection is far more widespread than had ever been anticipated. His collaborators have consistently failed to transmit by needle passage this disease which appears to have all the characteristics of an infectious disease of viral aetiology. It is within the bounds of reasonable conjecture that in sweating sickness, lumpy skin disease and possibly tick paralysis there has been unearthed a group of disease producing entities which lie somewhere between the toxins and the viruses, just as the rickettsias lie between the viruses and the bacteria.

But what of the ticks that transmit these conditions? The life histories of a number of genera and species have been worked out accurately and in great detail but it is certain that our knowledge is by no means complete. Distribution particularly over the whole of the African Continent frequently is a matter of mere conjecture. In regard to control, the benefits that have accrued from the development of the method of using arsenical dip washes in plunge type dipping tanks can never be estimated but we have gained little if anything from the advent of the new synthetic insecticides, probably because our knowledge of their mode of action is so very incomplete. In actual practice we have found that the introduction of the new insecticides has coincided with the loss of control of ticks followed naturally by an increased incidence of tick borne diseases. I am confident, however, that the research work being carried out will rectify the damage that has been done.

In browsing through the pages of the history of research our attention is focussed upon the classical research by Theiler and his collaborators on the role of calcium and phosphorus in the metabolism not only of ruminants but eventually of all domestic animals. Frequent reference has been made to the fact that one result of this work was the transformation of a poverty stricken, desolate agricultural region into a flourishing cattle breeding area as exemplified by our own outstation which today, with pride, can tolerate the indignity of the name Armoedsvlakte. Not only did this work lead to the eventual solution of the lamsiekte problem by the development of an efficient preventive vaccine, of which in round figures, $2\frac{1}{2}$ million doses were issued in 1954, but it may be regarded as the corner stone of the foundation upon which has been built much of our work on animal nutrition. A logical sequence was the present day conception of a nation wide survey of possible deficiencies in trace elements in our soils and pastures as also the detailed research into ruminal digestion which has been planned and is being carried out. Here I may mention that recent work on the cause and thereafter the prevention of bloat in ruminants by our physiologists has attracted world-wide attention.

In the highly specialized fields of pathology, histology, helminthology, entomology, biochemistry and sex physiology many notable contributions have been made. Even in the field of veterinary jurisprudence our workers have evolved a method of identifying biltong by the hairs invariably present, that is acceptable to our courts of law.

In the field of bacteriology there is a record of honourable achievement. There are among us today some who will remember the threat that South Africa would be declared an anthrax infected country. I will not digress to discuss the possible outcome of such international action. The gravity of the situation was fully appreciated and the state embarked upon a nation wide campaign of mass immunization. Remember, however, that apart from all other considerations it was necessary in the first instance to produce

a safe and effective vaccine. Onderstepoort was able to meet its obligations and eventually this led to the development by Sterne of a vaccine based upon a new approach to the attenuation of virulent bacterial cultures that is the method of choice for anthrax vaccine production over the greater portion of the globe today. Similarly, an appreciation of the necessity to control the ravages of enterotoxaemia in sheep did not find our research workers wanting so that in 1954 they were able to meet a demand for nearly 10 million doses of vaccine and today are in a position to face an ever increasing demand with equanimity. Further, our bacteriologists as a result of persistent and tenacious research are in a position to view with some confidence the prospect of playing their part in the present campaign against Contagious Abortion by the continued immunization of all breeding stock in an attempt to build up an immune population.

We now turn to a consideration of the ever widening field of diseases caused by the viruses. It is of more than passing interest to note that one of Theiler's first official assignments was the production of calf lymph for the vaccination of the inhabitants of the future Witwatersrand Goldfields in the face of an epidemic of smallpox. Subsequently he had to contend successively with major epizootics of rinderpest and lung sickness with undoubted distinction but with somewhat variable success. Undaunted he accepted the challenge of bluetongue in sheep, and horsesickness and tackled these problems with a tenacity and fixity of purpose which will always remain a source of encouragement and inspiration to his sucessors. I will repeat again that there are present today at least a few who will remember the painstaking, inflexible and reasoned approach to the problem of horsesickness. The efforts were accompanied by a succession of bitter disappointments, for instance the accidental transmission of infectious anaemia and the production of fatal hepatitis. It is open to doubt that control of horsesickness has been achieved by the application of new methods and conceptions but it is certain that failure to solve the hepatitis problem remains a blot upon our escutcheon. At this stage it is essential to point out and to emphasize that the underlying conception of disease control was the use of living, not inactivated, though by modern standards unmodified strains of the causal viruses. It is in this sphere of immunology as a means to disease prevention and elimination that veterinary medicine has far outstripped its medical counterpart. Not only has the application of this conception made possible the successful breeding and maintenance of domestic animals in areas where it would otherwise have been doomed to failure, but, in recent years it has provided the modern research worker with the machine tools to prepare the battery of armaments to withstand the onslaughts of new invaders such as Newcastle disease of poultry, Rift Valley fever and rabies.

This very brief resumé of achievement in research of necessity must be woefully incomplete when one bears in mind that the

Onderstepoort Journal in which the greater part of the work is recorded is in its 27th Volume, each of four numbers, and that this journal superseded the earlier series of annual reports. The summary, however, will serve to focus attention upon the great volume of sound and at times brilliant research that has earned not only for Onderstepoort but for the veterinary profession in South Africa an international reputation of which we may be justifiably proud. All this was achieved by an organization which probably was born when Paul Kruger appointed Theiler to the post of Staats Bakterioloog to the Transvaal Republic, and grew to its present stage of development when the Faculty of Veterinary Science of the Transvaal University College was formed in 1920. With minor modifications, which chiefly concerned the position of the State Field Veterinary Services in the Division that organization has persisted unchanged for some 35 years. Very briefly this organization is set up within the frame-work of the Civil Service as a Division of the Department of Agriculture.

The Division as a whole is subdivided into two parts each with a separate administrative headquarters but under single control. Field Services is charged primarily with the responsibility of administering the Stock Diseases Act which is designed to prevent the introduction and spread of infectious diseases. The manner in which it discharges this function will be discussed elsewhere. Here it will suffice to say that the tools it uses namely diagnosis or confirmation of diagnosis, information, and prophylactic vaccines are made available by the Research Division with headquarters at Onderstepoort. The latter has a wide variety of functions which may be grouped broadly under five main headings namely research, diagnostic services, dissemination of information, vaccine production, and University teaching.

The era subsequent to World War II is characterized by two major developments — world-wide industrial expansion and unprecedented development of all phases of agriculture in an endeavour to meet the ever increasing demand for human food. These developments with all the attendant changes in relative values have brought to light the defects and deficiencies of our veterinary setup which has functioned admirably in the past but, in my view, is incapable of continuing to meet the exacting demands made upon it today.

In the first instance provision must be made for a rational approach to veterinary education. This aspect will be discussed elsewhere so that I will limit my remarks to observing that no longer can teaching be regarded as the fifth wheel to a wagon which creaks on its overloaded way with research, diagnostic services, dissemination of information and vaccine production as its main supports, with the unavoidable red tape of the Civil Service hitched to the disselboom of the Public Service Commission. Teaching must be given its rightful place as a full time service in the atmosphere of a University. One can only express the hope that this serious matter

will receive the earnest attention of the responsible authority in the immediate future.

Now let us consider the diagnostic service provided not only for the profession but also for owners and breeders of domestic animals. There are many present today who will remember the good old days when we sat over a microscope day after day and month after month examining blood, spleen, and gland smears from animals which had died or had been slaughtered for human consumption, possibly months previously, in the hope that we were making a material contribution to the East Coast fever eradication campaign. Eventually the Field Division very correctly relieved the research workers of an intolerable burden, assumed responsibility for discharging this service and organized it on a rational and effective basis. The research worker was now in a position to devote his attention to other problems fully appreciating that accurate diagnosis is the first essential in any effort to reduce not only our terrific mortality figures but also to combat the insidious erosion diseases. Over the years there had developed a system whereby material collected in a haphazard manner by all and sundry is forwarded to Onderstepoort in the fond belief that once received at its destination an accurate diagnosis of the cause of death would be made immediately. This farcical state of affairs must stop. Field Services and the Veterinary Practitioner must do the initial screening of all this material and the research officers must provide only a specialized or consultative service. Time does not permit even a brief discussion of how this service will operate but I may say that a start has been made to bring it into operation.

Since the value, in fact the absolute necessity of disseminating information of any nature with the least possible delay is so self evident I need not take up your time by discussing it here and will pass directly to a consideration of the last remaining function of Onderstepoort, namely, the preparation of biologicals in general and of prophylactic vaccines in particular.

The year 1949 marked the beginning of a dramatic change in the demand for vaccines of all types. Up to that time there had been issued with minor fluctuations a total of some 12 to 13 million doses of vaccines per annum. In 1949 the demand rose to 15¼ million doses and increase steadily each year until in 1954 there were issued no less than 45½ million doses in 155,000 separate packages. It is of interest to note the increase in demand for a few separate products. Bluetongue vaccine issues rose from 2½ million to 16½ million doses, enterotoxaemia from 57,000 to over 9 million, contagious abortion vaccine from 117,000 to 435,000, anthrax from 7 million to 9 million, lamsiekte from 852,000 to 2¼ million, and even dog distemper from 1,600 to 16,000. In addition there were added to the list four separate vaccines, namely, redwater, Newcastle disease, Rift Valley fever, and rabies, the demand for each of which is rising steadily each year.

It is not possible to discuss now the reasons for this tremendous increase in the demand for preventive vaccines. We as veterinarians

have seen their value in the prevention of disease and I do not fear contradiction when I state that without these products the animal industry of this country would indeed be in a sorry plight.

The opinion has been expressed that the time has arrived for research workers to be relieved of this burden of routine vaccine production by entrusting the work to private enterprise in the form of commercial firms. To this point of view I am completely opposed. I do not suggest for a moment that commercial firms are interested only in their annual profit and loss accounts and not in the production of ethical effective products. It is common knowledge that some of the major contributions to veterinary and human medicine have sprung from research work wholly sponsored by these firms and today in many countries the major contribution to research is being made by these firms. Nevertheless I believe the State must assume the responsibility to assure that the public and the professions are supplied with ethical products of the highest order, a belief endorsed in this country by the provisions of our Farm Feeds, Seeds, Fertilizers and Remedies Act 36 of 1947. To set up an organization which will concern itself only with routine testing of products is a wasteful ineffective duplication of only one phase of vaccine production that can be avoided by State control in some form of all phases of that production. Research, diagnosis and vaccine production are so inextricably interwoven that separation cannot be visualized.

In the time available I have attempted to indicate in some measure the magnificent contribution that our present organization has made to biological sciences in general and to animal health in particular. I am convinced, however, that the time has arrived for a reorientation of the general structure, in fact, that the time is overdue.

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SYMPOSIUM

THE ROLE OF THE VETERINARIAN IN ANIMAL AND PUBLIC HEALTH

(2) EMPLOYMENT IN THE STATE VETERINARY FIELD SERVICES

A. M. DIESEL

Pretoria

State Veterinary Services in South Africa developed in consequence of the ravages of the major epidemic stock diseases which were present in and introduced into the pre-union Republics and Colonies.

The need for an organized national effort against diseases was so great that the stock-owner had perforce to be left to attend to the less serious sporadic ailments and disorders affecting his animals, as best he could. This he had been accustomed to do for years in any case. Many of us recall somewhat distastefully, the reliance which was placed on such agents as axle-grease, tar, paraffin, vinegar, garlic, tobacco, spider webs, the fleam, etc., etc.

The brilliant researches of Theiler and the substantial contributions in the field of Veterinary Epidemiology by Koch, Hutcheon, Bruce, Stockman, Pitchford and many others, soon set the stage for full-scale control measures against these major epidemics. The National Veterinary Service so established, grew eventually into the Divisions of Veterinary Research and Education, and Veterinary Field Services. These were later amalgamated, under the directorship of Dr. P. J. du Toit, into the present Division of Veterinary Services.

There were very few private veterinary practitioners during the early years of the present century, largely because of the overwhelming need for a National Service to stem the onslaught of the major epidemics.

It has been jokingly said of Theiler that his initial efforts to establish himself as a practitioner failed because he was unsuited to that type of work. I think the most accomplished practitioner of those times would, in South Africa, have been caught up in the net of National Service. And it must be remembered that the practitioner of those early days had little to pull out of his dispensing bag with which to match his skill against diseases of completely unknown course and aetiology.

Upon this background the State Veterinary Field Services developed and expanded. Its personnel were left under no illusions as to their duties in this national effort of suppressing the major epidemics.

The control of Rinderpest, Pleuropneumonia, Anthrax, Glanders, Redwater, Anaplasmosis, East Coast Fever, Horsesickness, Bluetongue and the other diseases which threatened stock raising, was given top priority in the national veterinary organization. The staff was centred in the areas where these diseases were taking the greatest toll, and reduced to skeleton strength elsewhere.

By the time of Union, Rinderpest had been eliminated, Pleuropneumonia practically eradicated and the control of many other diseases, except East Coast Fever, had developed very satisfactorily.

The period between the two world wars, found the State Veterinary Service enjoying the maximum degree of organization — even to the extent of a measure of discouragement to Veterinary students. By the end of this period, even East Coast Fever had been very substantially controlled, and so had Sheep Scab, Bluetongue, Horsesickness, Redwater, Anaplasmosis and many of the other major epidemics. Glanders had been eradicated and while Rabies, Nagana, Foot and Mouth Disease, Dourine, Bovine Tuberculosis, Brucellosis, Heartwater and others, still required much attention, stock raising had developed into a primary industry. The national effort against the major epidemics had unquestionably succeeded.

Then came the post-war period of prosperity. The war efforts of the combatant countries became available for peacetime application. And here we appreciate in particular the advances made in transportation, road building, medical supplies, including the wonder drugs of chemo-therapy and chemo-prophylaxis; new techniques in the manufacture of vaccines, improved methods of diagnosis, etc., etc.

While we didn't particularly realise it at the time, this post-war era created opportunities for veterinarians to abandon the National type of service in favour of a more direct pursuance of the art of Veterinary Medicine and Surgery. In consequence it left the State Veterinary Service in a less favourable position to deal with the challenge to the livestock industry by some new epidemics such as Lumpy Skin Disease, Infectious Epididymitis and Vaginitis of Cattle, Rift Valley Fever, Newcastle Disease and Epidemic Tremor.

The story of continued staff shortages in the State Service has become a painful topic to those of us who are left to maintain the national effort and to ensure the livestock industry against any possible challenge by major epidemic diseases, old or new, known or unknown.

There are now thirty-seven Veterinarians in the Field Services of the Division, excluding the seven members of the directorate — in other words eleven less than there were in 1945. Meantime, since 1945, one hundred and forty-five students qualified through the University of Pretoria. Excluding the Director, and the three members of the directorate there are presently thirty veterinarians employed at the Onderstepoort Research Institute and its substations. Fifteen veterinarians are employed full time by munici-

palities. Compare these figures with that of over one hundred and sixty which represents the number employed in private practice and private enterprise.

Farmers' co-operative societies have recently embarked on the development of Veterinary Services for their members, and here and there farming communities have collectively chartered the services of individual veterinarians.

Despite the growing veterinary facilities which are being arranged for stock owners in rural areas, the voice of organized agriculture is clearly heard emphasizing the dangers attendant on a depleted State Service.

While every Veterinarian serving in whatever capacity, is an asset to the country it must inevitably be the responsibility of the State organization to preserve the overall welfare of the livestock industry which today is valued at many millions of pounds.

The position now seems to be just the opposite of what it was during the early years of the present century. Then the most accomplished practitioner could expect to be caught up in the net of National Service. Now, the veterinarian showing the greatest aptitude for research and Veterinary Field Service finds it very difficult to withstand the magnetic attraction of private practice and private enterprise.

Some say the pendulum will swing back and that the time for it is "later than you think." It must, however, always be regarded as doubtful practice and poor speculation to arrange matters on the swing of a pendulum.

While destinies are frequently shaped by events, the significance of which is inapparent at the time, a policy of wait and see has but a limited application to problems surrounded by hard facts. Taking the situation at its face value, it would seem that the attractions offered by almost every other form of veterinary employment, are superior to those offered by the State Service. If this is so, then a comparative analysis is necessary in order to ascertain in respect of which factors the State Service is particularly discouraging. One need only attempt this assessment in respect of a few of the more important factors, such as:—

1. Salary scales and progression.
2. Type of work.
3. Amenities.
4. Social status.

I think it can be accepted that the State Service offers amenities and social status, at least equal to those offered by other avenues of employment. Perhaps the practitioner can more truly claim to be the master of his own soul — perhaps not!

Let us consider the type of work undertaken by the State Veterinarian employed in the Field Services of the Division and let us try to assess its attractions. Firstly, the State Veterinarian enjoys the protection of his employer and a good measure of security of tenure. He is not so likely to be adversely affected by accidental

insufficiencies as his counterpart in practice or in private enterprise. I do not wish to create the impression that each stands at the opposite end of a pole — the one sheltered and the other exposed.

Secondly, within reasonable limits the State Veterinarian has ready and free access to the necessary facilities and appliances essential to the performance of his duties — instruments, drugs, publications, stationery, transport, etc. In respect of all items falling under the heading of facilities for the performance of duty, except one, he is, or can be, as well equipped as his colleague outside the State Service. The exception I refer to is motor transport. While his transport is adequate so far as his State duties are concerned, he receives no recognition for his attempts to preserve this transport to the maximum advantage of his employer and to himself.

This is, however, not the time or place to enter into the pros and cons of state owned transport. Veterinarians who undertake field duties in whatever capacity, spend considerable portions of their lives in motor cars and they must inevitably be influenced by attractions in this regard which afford the greatest measure of comfort and the minimum of disruption to their family life.

With regard to the duties of the State Veterinarian: He is, of course, employed primarily as an epidemiologist and field veterinary investigator. He has an inspectorate Staff operating under his control and he has clerical assistance in his office. He is subject to the instructions of his senior officers and can conversely appeal to them for guidance and advice.

When not acting in competition with a veterinary practitioner, and when his official duties permit, he can give attention to the healing of individual animals and practise the art of Surgery, Medicine, Obstetrics, Dietetics, Meat and Milk, Hygiene, etc.

As a veterinary epidemiologist he has to administer the provisions of the Diseases of Stock Act, and co-operate in the execution of other legislation associated with and pertinent to his employment. In this capacity, he has often to give decisions which may affect his popularity. Generally speaking the farmers are his friends and if his decisions are well founded, the majority will support him and even acclaim him.

In the course of time he can expect to become an expert epidemiologist, diagnostician, field veterinary investigator, meat inspector and a good clinician. Quite accidentally he will become a good veterinary journalist, a good motorist and a fair mechanic. He therefore has nothing to lose in veterinary and general interest by joining the State Service — in fact he can become a veterinarian well sought after by persons who arrange Veterinary Services outside the State Service of the Union.

What of the comparative analysis concerning salaries and progression? I have no figures with which to compare the attractions within and outside the Service. It is said that the salaries offered to veterinarians by farmers' co-operative societies are equal to those obtaining in the State Service, except that the former may provide

higher commencing salaries. The salary scales offered by municipalities are now in the main, identical with those enjoyed by State Veterinarians.

Undoubtedly, the facilities offered in the Service for progression are much more attractive than one can visualise in outside organizations. Any comparison of the remuneration available in State employment with that of private practice must to a large extent be speculative as the latter is based on factors which cannot be standardized, viz., energy, enterprise, geographical position, ability of clients to pay promptly, etc.

It may be that the State Veterinarian is, in a direct way, insufficiently remunerated and that this is the chief reason why the State Service does not attract him.

The State is however, in a very difficult position. It employs hundreds, where others employ tens. Its standards are in constant danger of being used as bases of bargaining by outside bodies. It has to disburse its funds in terms of the general needs of the population as a whole.

If the full-time State Veterinary Service is for one or other reason not attractive to veterinarians, the question arises as to whether some form of part-time service should be considered, particularly as a means of making the maximum amount of veterinary man power available at any given time. I feel that this is a matter worthy of investigation and trial.

I may not in this paper have given you all the answers, but if I have succeeded in stimulating discussion or of prompting someone to make a better analysis of the situation than I have done, my efforts in presenting this subject to you will have been adequately rewarded.

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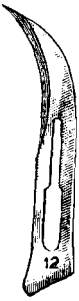

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MUNICIPAL VETERINARY SERVICE WITH SPECIAL REFERENCE TO JOHANNESBURG

M. C. ROBINSON and E. J. PULLINGER,

Johannesburg.

Municipal Veterinary Service is probably the least known and is certainly the smallest of the various branches of the profession; and, because municipal services have to be adapted to the needs of local conditions, they have not all developed according to any uniform pattern.

The work of most veterinarians is confined to matters concerning animal health, but the municipal veterinary officer enters into the field of Public Health and forms the link between the medical and veterinary professions. His efforts are largely concerned with ensuring that meat and milk, two of the most important foods of man, are derived from healthy animals and are handled in a hygienic manner until they become available for consumption. In addition to public health work, the municipal veterinarian may be called upon to attend to any animals that are the property of his local authority.

A. Public Health Services

The duties required under the Public Health Act include the ante-mortem inspection of livestock prior to slaughter, and the post-mortem examination required in terms of the Regulations re Slaughtering and Meat Inspection, etc. The Public Health Act also places upon the veterinarian certain responsibilities in regard to the safety of milk supplies.

Meat Control

The various phases of meat control can best be described by tracing the course of an animal from the farm to the wholesale butcher. Livestock usually arrives by train and is off-loaded by employees of some firm of Livestock Agents. The veterinarian takes charge at this stage together with a staff of inspectors and he is required to control any cruelty of handling, check numbers of arrivals and inspect for injured or dead animals in the truck. Injured animals have to be specially examined and probably have to be subjected to immediate, or so-called "emergency" slaughter, whilst animals which either die in the truck or in the "waiting pen" have to be examined to ensure that "in contact" animals are not likely to be suffering from epizootic disease or from disorders that would render their flesh unfit for consumption, e.g. Swine Fever, Anthrax, arsenical poisoning, etc.

The Livestock Agency arranges for the penning, watering and if necessary the feeding of the animals. Ante-mortem inspection is performed by the veterinarian before slaughter, the object of ante-mortem inspection being :—

1. To watch for veterinary epizootics, i.e. Foot and Mouth disease, Anthrax and Swine Fever, etc.;
2. to eliminate any stock which are unfit for slaughter because they show symptoms of diseases which are dangerous to man;
3. to expedite the handling of consignments of animals infected with diseases such as Bluetongue where immediate slaughter may result in the salvage of stock which would otherwise have developed the disease and died;
4. to inspect for injuries, wounds, skin diseases, etc. that might be causing the animals unnecessary pain and suffering;
5. to control and supervise penning, watering and feeding procedures;
6. to control the slaughter of animals arriving under quarantine restrictions;
7. to examine horses, because ante-mortem inspection is particularly necessary with this class of animal.

Stock are slaughtered in strict rotation based upon their arrival times, and this sequence is normally only broken for veterinary reasons, should it be desirable to hasten or delay slaughter. The slaughter times of quarantine stock are subject to special regulations issued by the Director of Veterinary Services and full-time veterinary officers should always be employed at quarantine abattoirs.

When the time for slaughter arrives, animals are drafted to the "waiting" pen, and from there they go in succession into the slaughter box to be killed according to the provisions of the Slaughter of Animals Act of 1934. After being rendered unconscious either by the "captive bolt" or "electro-lethal" methods the animal is hoisted and hung head downwards and bled out through the jugular vein. Adequate facilities are also provided for ritual slaughter required by Jews and Moslems. The fully bled carcase is then flayed and dressed, during which time it is examined by a qualified Meat Inspector in terms of the Regulations re Slaughtering, Meat Inspection, etc. Any diseased carcases are detained for secondary inspection by the veterinary officer whilst healthy ones are stamped and passed as fit for consumption.

During these processes the veterinary officer is responsible for suppressing cruelty, maintaining discipline, supervising meat inspectors and performing secondary inspection on all detained carcases. Secondary inspection involves re-examining the carcase, confirming or altering the meat inspectors' findings, and deciding whether the carcase should be condemned or passed as fit for consumption. Also he must be prepared to issue a certificate in respect of any condemned material.

The authority to condemn is confined to "approved veterinarians", Medical Officers of Health and Medical Practitioners and this "power of condemnation" is entrenched in the Public Health Act. For some years agitation has been in progress to extend "powers of condemnation" to meat inspectors. Decisions on condemnation cannot be made by "rule of thumb" methods and in many cases there is room for the application of discretionary powers that can only be developed from experience coupled with a wide scientific training, in biology, pathology, bacteriology and other natural sciences. It is the view of the veterinary profession that "powers of condemnation" should be confined to people who are suitably qualified, and in most countries overseas the veterinarian is regarded as the final authority in this connection.

Carcases passed as fit for food are purchased by the Meat Control Board on a grade and weight basis, and are then resold to the meat trade. Mutton, however, is sold direct to the trade or to the consumer by public auction.

A good average daily kill for the Johannesburg abattoir is 1,200 cattle, 3,000 sheep, 800 pigs, 200 calves, and 50 horses, but greater numbers than these can be handled when the need arises. To maintain such figures mechanised dressing methods have to be installed, whilst adequate weighing, hanging, outloading, refrigeration and by-product manufacturing facilities have to be provided. Actually 300,000 cubic feet of refrigeration space is available, capable of accommodating nearly 8,000 carcases of beef when stacked, whilst seven two ton carcase digestors and a proportionate capacity of blood drying plant is also available. More than 1,000 people gain their livelihood at this abattoir which has a gross turnover of over £10 million per annum.

In Johannesburg a veterinarian is appointed as Director of the abattoir because it has been found satisfactory to have one individual able to fulfil the triple role of administrator, business manager and veterinary officer. On the business side the aim is to run the department "at cost", a task which is rendered extremely difficult by the ever fluctuating supplies of livestock from which the bulk of the revenue is derived. All abattoir facilities including penning, building, machinery and inspectorate services are provided at a charge of 4/- per bovine, 2/9 per pig and 1/- per sheep.

An analysis of condemnation figures for the past three years shows that in some years as much as 3 lbs. of meat are condemned for every 100 lbs. marketed. During 1952/53, which may be classed as an average year in regard to condemnations, 237,471 cattle, 714,694 sheep, 37,943 calves and 160,000 pigs were slaughtered and from these 2,043 tons of valuable protein-rich food had to be seized and destroyed. In this particular year, 1.875% of cattle, 0.146% of sheep, 3.239% of calves and 2.733% of pigs were condemned. It is instructive to analyse the incidence of the causes of condemnation.

Cattle: More than one-third (i.e. 33.7%) of the total of

4,453 condemned cattle were rejected for traumatic causes such as wounds, bruising and gangrene. This amounts to about 1 lb. out of every 100 lbs. of beef that was marketed. Cysticercosis accounted for 31% of condemnations, or approximately another pound out of every hundred, whilst many more "measly" carcases were detained for freezing. The condemnation rate for Cysticercosis has actually risen during the last seven years by about 0.2%. The pleurisy and peritonitis rate was 11% as result of the condemnation of culled dairy cows; there were 10% of emaciated bovines, whilst only 0.9% were found to be infected with tuberculosis.

Sheep: Sheep condemnations are always low. Of these 54% were due to emaciation, 15% to pneumonia, 10% to caseous lymphadenitis, and 5.5% to extensive bruising.

Pigs: As might be expected Cysticercosis accounted for 51.7% of pig condemnations, but actually there has been a decline of 2.8% in the condemnation rate for Cysticercosis during the last seven years due to a decrease in the marketing of native-bred pigs, and an upward trend in the production of properly grown baconers. Bruising and gangrene accounted for 15.6% of condemnations, the cause in this case usually being due to fighting amongst the pigs during transit. Pyaemia, generally of scrotal origin caused 9.4% of condemnations, tuberculosis 7.7% and pleurisy and peritonitis 6.7%. The high incidence of tuberculosis is usually associated with the combination of pig and dairly farming.

In addition to inspecting stock slaughtered at their own abattoirs, Local Authorities are empowered, under the Public Health Act and the Local Government Ordinance to reinspect all meat arriving from outside sources. The object of this is to ensure that it was properly inspected at the time of slaughter, and to check upon deterioration that may have occurred during transit.

Refrigeration and by-product manufacture are mainly engineering problems but constant supervision has to be maintained over both the Cold Stores and By-product Plants, whilst Public Health functions also appertain to the working of both these sections. Meat which is not freshly slaughtered must be reinspected for decomposition before admission to the Cold Stores for fear of tainting the contents of refrigerator rooms.

In a large by-product plant, meat and offal condemned at the abattoir must be processed but also a knackers yard must be provided for handling all carcases of animals which may die in the area. Public health control includes ensuring that all condemned material does actually reach the by-product plant and is not stolen. Secondly all extraneous carcases must be examined for Anthrax to safeguard the operators, whilst one carcase digestor should be maintained into which a whole dead ox can be loaded without cutting it up, for processing dangerous carcases (e.g. Anthrax). The third public health responsibility is to ensure that the temperature and time of processing are such that the fully digested material is sterile when the machine is finally unloaded.

All blood is harvested during slaughter and is coagulated, heat sterilised and dried. It is estimated that one ox yields about 7 lbs. of dried blood meal. A third and very valuable by-product is tallow which is extracted from the condemned carcases during processing and is sold for soap manufacture.

Apart from these by-products, "face and leg" pieces of skin of cattle are sold for gelatine manufacture, pig's hair is sold for bristle making; whilst the manufacture of biological products such as insulin is undertaken by an outside firm which collects endocrine glands at the abattoir. Surgical gut is made from sheep intestines, rennet from calves' stomachs, and ox gall is collected to produce cholic acid, used in the manufacture of cortisone.

MILK CONTROL

Veterinary control of milk supplies follows a less uniform pattern than does that of meat control, probably because there is no set of regulations comparable to the Regulations re Slaughtering, Meat Inspection, etc. For this reason various local authorities have been free to develop different systems, with the result that in some centres veterinary control is confined to animal health, whilst elsewhere this control also includes the hygiene of production and of marketing.

No adequate control of milk can be maintained without the extensive use of bacteriological tests, and for efficient operation any large city should provide its own laboratory service. Experience has, however, shown that it is best to limit the scope of such a service to certain types of tests, and to rely upon State-subsidised laboratories for all specialised work.

The first duty of a field veterinarian engaged upon milk control is to learn to know his district, the farmers and their herds. If no veterinary supervision has been applied in the past, a certain number of obviously diseased animals will have to be sorted out of every herd, and gross shortcomings of animal management will require correction. Thereafter the work develops into attempting to improve the efficiency of dairy farming, a thankless task were it not for the information that can be provided by the laboratory. This information falls into three categories, namely:—

(a) concerning the safety of the milk, which in practice amounts to the results of tests for tuberculosis, contagious abortion, mastitis and anthrax;
(b) results of simple tests for keeping quality, hygiene of production and handling methods; and
(c) chemical analysis for fat and solids-not-fat.

Provided that frequent, regular and representative samples of milk are tested, the veterinarian will have a continuous guide as to what is happening and in what direction faults must be sought.

It must be stressed, however, that laboratory results are of comparatively little value unless they can be interpreted by someone who knows the field conditions, and who has the scientific background necessary to correlate laboratory and field findings.

To give some idea of the magnitude of the problem that can be involved it is worth referring to the milk supply of Johannesburg which is derived from about 750 herds comprising 50,000 head of dairy stock. The majority of these farms lie within a radius of 150 miles to the east, south and west of the city, but a certain number of farms are much more distantly situated. To cover this area merely from the veterinary aspect and exclusive of laboratory work, the full-time services of at least two officers are required.

Safe Milk

Whilst many diseases may be transmitted to man by milk, most of these conditions are encountered rarely, and routine veterinary control generally develops in practice into the control of tuberculosis, contagious abortion, mastitis and anthrax.

Tuberculosis: Until 1954, comparatively little was known of the incidence of bovine type tuberculosis infection amongst humans in South Africa, but in a recent survey it has been reported that out of 180 strains of tubercle bacilli isolated from human beings, 7.2% were found to be of bovine origin. It is worth mentioning that, when the figures were calculated on a basis of European as opposed to Non-European subjects, the incidence of the bovine type of infection was as high as 17.2 per cent. The municipal veterinarian's main weapon in locating this condition is by means of biological tests, because clinical examination, unassisted by laboratory results, is not fruitful. In the Johannesburg area in one year the clinical examination of 944 herds, involving about 81,000 cows, revealed only one case of tubercular mastitis, whereas during the same periad 9 cases were identified by subjecting 1,588 samples to biological test. To indicate that the elimination of tuberculous mastitis is of value, the percentage of infected samples found has dropped from 2.4% to 0.5% in the course of ten years of control although a better coverage of the herds is applied now.

Contagious Abortion: Clinical inspection of herds gives in itself but little information regarding the presence of this disease. Laboratory investigations, however, using either biological or serological tests of milk give a very clear picture of the incidence of infection. Up to the present it is not possible to claim any decrease in the incidence of this disease as the result of such municipal veterinary inspection, but a stage has now been reached in the Johannesburg area where practically all dairy farmers are inoculating their stock regularly, and it is anticipated that a drop in the carrier rate will occur in the near future.

Mastitis: Strictly speaking, bovine mastitis cannot be regarded as a disease that is infectious to man, though certain specific types of infection do fall into this category. The mastitis infected udder, however, usually produces milk heavily overloaded with pus cells and degenerated udder tissue, and so it is appropriate to classify the disease in this way.

In the case of mastitis a great deal of good can be done by the veterinarian inspecting cows visually, by palpating udders and by the application of the "strip cup" test in the milking byre. Many obviously diseased cows can thus be recognised but latent and subacute cases of infection must be identified by laboratory means. The most accurate laboratory technique is to culture milk samples — a very cumbersome procedure, but the recognition of diseased udders by the microscopical examination of cream smears from bulked herd samples has been developed to such a high degree of accuracy that the elimination of herd infection has now become a practical policy. The preliminary procedure is to examine bulked herd samples by the cream smear technique and those herds giving positive results can then be handled individually. Over a ten year period of survey in Johannesburg, the percentage of mastitis-positive herd samples has dropped from 35%, using the less sensitive Breed smear technique, to 15% using the more sensitive cream smear technique. The above percentages are worked out from the testing of about 1,500 herd bulk samples annually.

Other Diseases: There are numerous other diseases which can be spread to man by the drinking of milk, but they occur rarely and cannot be regarded as part and parcel of a routine testing programme. Two examples may, nevertheless, be quoted. In the one instance the investigation into the cause of an outbreak of human diphtheria on a dairy farm revealed that quite a large number of cows in the suspected herd were carrying diphtheria-like bacilli on their teats whilst the teats of three cows were temporarily infected with typical toxogenic diphtheria bacilli. In the second instance the investigation of a milk-borne epidemic of Salmonella foodpoisoning revealed a cow infected with *Salmonella dublin* and excreting this organism in her milk.

Milk of Good Keeping Quality

Not all centres regard the hygienic production of milk as part of veterinary control, but where the comprehensive control is placed under the charge of the veterinarian, his responsibilities include all phases of fluid milk production, supply and processing, and in this he is assisted by Dairy Inspectors (i.e. Health Inspector) who have concentrated on this field of the work.

The success that can be achieved by visual inspection is limited, especially after the obvious faults have been eliminated, unless the inspector is guided by a regular sequence of results of laboratory tests carried out on the milk that is supplied to the market. Tests used must be chosen for their simplicity as well as for their informative value, because it is imperative that they should be repeated at frequent intervals, and that the results should be available as soon as possible.

Tests found suitable for this purpose are the methylene blue reductase test or the resazurin test (as alternatives), the coliform

test and the Breed clump count. With the results of these as a guide it is possible to keep a close watch upon the keeping quality of milk supplies arriving in a city and also to direct dairy inspectors in their field work. What has been said of farm inspection applies equally well to the inspection of bulking depots, pasteurising depots and milk shops, except that in the case of heat-treated milk, suitable tests such as the phosphatase test have to be included to check upon the adequacy of the heating process.

As has already been mentioned, no detailed regulations have ever been promulgated under the Public Health Act to serve as a guide in controlling production of milk and for inspecting milk and milk products. Nevertheless, in spite of this lack, tremendous strides have been made in milk control by the application of educative propaganda and persuasion. The intangible but nevertheless real benefit derived from the veterinary supervision of dairy herds lies in the fact that regular routine visits by veterinarians encourage producers to discuss their problems and the farmer becomes interested in maintaining a healthy herd and he learns how to recognise and control mastitis infection and how to protect his herd from Contagious Abortion by routine inoculation. Possibly the main function of the dairy veterinarian in municipal service is the education of the farmer towards producing clean safe milk in an economical manner. This involves, in addition to personal talks to farmers, the production and circulation of pamphlets dealing with specialised problems. Advantage is also taken by these officers of addressing milk producers at Farmers Association meetings and by illustrating their talks with charts and other visual aids.

B. Veterinary Treatment of Municipal Livestock

Of the staff of six Veterinarians employed by the City Council of Johannesburg, the time of two of these officers is largely spent in attending to the veterinary welfare of Council-owned animals.

Draught Animals

The City Engineer's Department (Cleansing Branch), uses over 1,500 mules and horses for the removal of household refuse. These animals are stationed at strategically placed compounds to minimise travelling distances. Household refuse is collected from house to house and tipped at controlled tipping sites, where it is necessary to level ground for building sports fields, etc. Experience has taught that the large draught horses are most suitable for work in the centre of town, where heavy loads are pulled for short distances, and that mules are more suited to the suburban work entailing moving lighter loads at a faster pace over greater distances.

The horses are inoculated annually against horsesickness but the death rate from horse-sickness amongst stabled mules has not so far warranted a general immunisation programme for these more hardy animals. A breeding scheme started at one of the Municipal Sewage Farms is now paying dividends and replacements of heavy

draught horses, which are difficult to buy, come largely from the Council's own breeding establishment. When the incidence of Tetanus at a compound becomes serious, the disease is effectively controlled by antitetanus inoculations.

These draught horses and mules suffer from the usual equine complaints, such as lameness, colic, sore backs and wounds; and the veterinarian's chief duty is to regulate their feeding and stable management, and to treat and discharge "sick line" cases with the minimum of delay.

Sick and injured animals are rested periodically at one of the sewage farms where "soft going" and abundant green grazing make ideal animal health resorts.

The Council of Johannesburg also utilizes nearly 900 trek oxen, mainly for pulling sanitation vehicles in the native townships. Because the houses are in close proximity to each other, ox transport is economical and in fact profit making, as trek oxen are normally being sold, after years of service at a price well above their original cost, moreover the ox is superior to equines and to mechanical vehicles for this class of work. The main function of the municipal veterinarian is to purchase the right type of ox, and to advise upon the shoeing, harnessing and feeding of these animals. Thereafter it is necessary to maintain general supervision and to provide veterinary treatment. In the case of injured trek oxen, because of their high meat value, the veterinarian may find it expedient to market such animals at the abattoir immediately, rather than to initiate lengthy and expensive treatment. Apart from handling minor wounds and harness galls the main treatment is to rest animals that are lame, footsore or "down in condition". All oxen are inoculated against Anthrax annually.

Beef Herds:

In 1936 it was observed that Council-owned oxen on the various sewage farms fattened readily and, at slaughter, were relatively free from "measles" infestation. From 1936-1940 experiments in feeding and observations on measles infestation were carried out and it was found possible, where animals were grazed on land irrigated with treated sewage effluent, to produce high quality beef steers at relatively low cost. After a period of trial the beef breeding scheme was developed and now the Council of Johannesburg has what is probably the largest and best beef herd in South Africa ,the main sewage farm at Olifantsvlei carrying a herd of 1,800 head of beef-type cattle. All the necessary preventive inoculations are carried out annually, i.e. Anthrax, Blackquarter, Contagious Abortion, etc., and Rift Valley Fever in epidemic years. In addition the veterinarians supervise all stock purchases whilst general control of feeding and herd management is maintained. The City Council, in the past few years has won the highest award at the Spring Fat Stock Show for the best animal on the show as well as for the best beef carcase.

Experience has shown that the herd is a very healthy one and apart from sporadic cases of redwater and gallsickness no trouble has been encountered, but it would appear that the grazing is of such good quality that cows are inclined to become overfat, with consequent loss of fertility. As regards the incidence of Cysticercosis, out of the last 961 fattened store cattle that where marketed 4.5% were infected, 2.2% being condemned in terms of the appropriate Regulations.

Social Welfare Department:

The Rietvlei Farming project offers sheltered employment to alcoholics and to physically and mentally handicapped persons, and about 70 such people work there. This form of labour is inefficient and unreliable, giving rise to many problems, and changes in personnel are numerous. Because the farm is administered by a Social Worker instead of by a trained farmer the veterinarian in charge has largely to formulate policy as well as administer clinical service. The farm consists of a dairy herd, piggery, and a poultry plant and in addition to clinical treatment, the veterinarian controls stock purchasing, breeding, culling and feeding. Records have to be maintained of fertility and productivity (of milk, eggs, etc.). Artificial insemination has recently been introduced in an attempt to up-grade the quality of the cows and the milk yield.

Veterinary treatment consists of the application of all preventive treatment in the form of sound animal management, hygiene control and the administering of a wide range of preventive inoculations; whilst all forms of clinical diagnosis and treatment come into the picture.

Zoological Specimens:

Veterinary services are also supplied to the Zoo. The number of exhibits at the Zoo last year was:—

Birds	1,374
Mammals	630
Snakes and Reptiles	80
	2,084

The service at the Zoo consists largely in giving advice on feeding, animal management and the treatment (when possible) of animals requiring veterinary attention.

Because of the sheltered life led by zoo exhibits the majority of deaths amongst the animals is due to old age, and the veterinarian has to decide at what stage an animal is no longer fit for exhibition.

Because of the prohibitive prices of meat and the irregularity and difficulty in obtaining supplies of ordinary butchers meat, a decision was made some years ago to feed to the Zoo animals, the mules and horses which were unfit for further service in the

Cleansing Department. This decision solved a double problem as the Council were opposed to selling aged and unfit mules on the open market and they were faced with the difficulty of obtaining regular meat supplies for the Zoo at an economic cost.

Conclusion

The authors of this paper wish to emphasise that the sort of work that has been outlined can only be successfully carried out as a result of teamwork, with each veterinarian contributing his fair share to achieve the composite service. An attempt has also been made to show that the work of a municipal veterinary officer need not be confined to dull routine.

In conclusion it is worth quoting an extract from the Presidential Address to the Veterinary Hygiene Section of the Royal Sanitary Institute on the occasion of the Annual Conference held in 1953. Professor James McCunn stated, *inter alia,* that "The food producing animals convert the products of the field into valuable protein food for man. This is a complicated biochemical process and there are many hazards between the field and the table. It is not sufficient that attention should be directed only to the finished product as delivered to the housewife. The whole process should be kept under supervision from start to finish. The animals must be in good health, and the hygiene of the byre, the slaughterhouse, the dairy and the food processing plant must be kept under constant supervision so that the finished product can be guaranteed to be clean and wholesome when delivered to the consumer or to his agent . . . . All these supervisory and administrative duties come within the purview of the veterinary department; indeed, this department is the only one in the (Public Health) organisation which is competent to undertake all duties from start to finish."

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THE ROLE OF THE VETERINARIAN IN ANIMAL AND PUBLIC HEALTH VETERINARY PRIVATE PRACTICE

A. F. TARR,

Pietermaritzburg.

Before the turn of this century there were very few veterinarians in this country. Of these, odd ones set up private practice in some of the larger towns. After the close of the Boer War veterinary surgeons who came out to South Africa with the British Army remained here; a number joined the various provinces as Government men and a few more took up private work. The private men, however, for the most part made little headway, the public preferring to utilise the services of the Government men at no cost to themselves rather than pay a private practitioner. After 1936 private practice made rapid strides, especially during and after the last war.

This can be attributed to various factors of which the following appear to be the most significant.

The phenomenal industrial, mining and agricultural development which has taken place in recent years has led to a heavy demand upon agricultural productivity with particular emphasis upon food production. With the demand for animal products came a corresponding increase in the value of livestock and it became economically sound to call upon expert services for all matters pertaining to the welfare of the livestock industry.

Secondly one must consider the influence of communications. During the last twenty years the development of roads throughout the country, though restricted by financial considerations, has nevertheless been remarkable, thus rendering most areas easily accessible to all forms of transport.

Other means of communication must also be considered such as telephonic and telegraphic services which are steadily improving. Even the radio falls within this category and will no doubt assume greater importance in the future. In most cases the services of a practitioner can be enlisted with the minimum of delay.

Today the practitioner has fast moving motor transport at his service. With improved roads, postal communications and modern motor cars, private practice today constitutes a highly specialised branch of the veterinary profession in South Africa. One must also bear in mind air travel which provides an easy and rapid mode of transport which is frequently used by practitioners.

Because of improved communications and motor transport the present day practitioner is able to accomplish many times the amount

of work done by his predecessor, for, not only is he able to traverse distances of 300 or more miles per day in the performance of his duties, but, in like manner, his clients can bring their patients to him at a centralised surgery or clinic. This applies not only to small animals as horses and cattle present no transportation obstacles today.

Finally an important fact is the realisation on the part of veterinarians that private practice is not such a hazardous and insecure undertaking and that it affords a comfortable means of livelihood to anyone with ability, initiative, incentive and a willingness to work hard.

With the general all round improvement in the standard and consequently economic value of livestock so has the demand for veterinary services grown and stockowners have become more conscious of the ability and service which the practitioner has to offer. In short, where we once had a community steadfast in the belief that, if its manual efforts or the giving of large portions of substances varying from dynamite to paraffin failed to produce the desired effect nothing else would succeed, we now have a community which is daily becoming more and more veterinary minded and for this happy state of affairs the practitioner is in no small way responsible.

In 1922 there were about 22 veterinarians in private practice while today the number has risen to over one hundred and sixty and constitutes the largest group of veterinarians in this country. This is all the more remarkable when one considers the prognostication of responsible veterinarians over the last twenty years to the effect that private practice had no future in this country and that those who had resigned from the state service would soon be clamouring to return. This has not come to pass, and indeed, one may say that the tendency has been in the opposite direction.

The value of the private practitioner to the livestock industry and to the promotion of animal welfare and public health is obvious. Of necessity the first essential in protecting the livestock industry is concerned with the fight against diseases of an epizootic nature and this has naturally tended to a neglect of the afflictions of the individual. It is in this sphere, amongst others, that the practitioner has an important function to fulfil. A practitioner's worth or reputation is measured by hard practical economic standards and his enthusiasm for his calling. Many practitioners are idealists and although economic considerations must obtrude, their greatest satisfaction lies in the grateful appreciation, respect and friendship of their clients.

For the promotion and maintenance of public health the practitioner must be given an integral part in the general scheme of health services. He plays an important role in combating animal diseases which are communicable to man and in ensuring as far as possible that infected food is not transmitted to the public for consumption. The practitioner renders a national service where,

through his efforts, more food of animal origin becomes available to the public. Not only should there be sufficient food but it should be of high nutritive value. A well fed community enjoys better health, is more resistant to disease and consequently is an asset to the state.

In this country millions of our under-nourished natives are slowly but surely increasing their earning potential and are thus spending more and more on food of a higher nutritive value than has been the custom in the past. This, coupled with our ever increasing population as a whole, calls for the production of more food. In order to accomplish this we must utilise to their fullest extent the resources we have at our disposal. Every effort must be made to reduce the enormous losses of cattle and sheep through disease, sterility, verminosis, poverty, etc. Although the practitioner is concerned largely with the care of the individual he also has a vital role to fulfil in the prevention of disease. His frequent contacts with his clients place him in a favourable position to enjoy the confidence of his clients and to impart expert advice and opinions on matters affecting the health and breeding problems of his stock. On many farms the practitioner assumes entire responsibility for the health and general well-being of the herd. In this manner the general health is so improved and sterility problems so reduced as to ensure that maximum yields can be obtained and losses reduced to a minimum.

In addition to the general factors mentioned above, the practitioner also plays a more direct role in maintaining animal welfare and public health. In many of the smaller areas he is called upon to carry out inspection of meat, meat products, dairies and milk. Many practitioners devote much time to the examination of samples of milk for mastitis with resultant benefit not only to the animals concerned but also to the consuming public.

Practitioners are also called upon to render services to agricultural societies, especially at exhibitions. In Pietermaritzburg, for instance, we devote approximately a fortnight per annum to the interests of the Royal Agricultural Society. In this manner the practitioner protects the society against the introduction of disease, gives expert advice on general hygiene and accommodation of livestock and is always available in cases of emergencies. This is an important point as the societies must be protected against justifiable criticism from the public in all cases, where through accident or disease an animal suffers unnecessary pain or neglect.

The various kennel clubs also call upon practitioners to examine all animals prior to their admission to a show. Here again the purpose is to safeguard the interests of the club, to ensure that only healthy animals are admitted.

In some areas Polo is a very popular winter sport and at Polo tournaments the presence of a veterinarian is essential for not only does the association receive protection from a disease point of view and the ponies enjoy immediate attention when neces-

sary, but the players themselves can be guarded against serious injury. A lame horse can prove extremely dangerous to both players and animals and in these cases a practitioner can and should insist upon the withdrawal of the horse concerned.

Wherever there is a practitioner the S.P.C.A., Animal Welfare Societies or similar bodies will find him and he will be called upon at all times to act on their behalf. In many instances their demands may prove irksome, especially when cases prove trivial. It must be remembered, however, that these organisations enjoy the support of the public and the approval of the governing authorities. Their supporters and officials are generally imbued with the highest ideals and it is essential that any organisation which has as its aim the alleviation of pain and prevention of cruelty to animals merits our fullest co-operation and support.

The South African Police frequently utilise the services of practitioners, especially in cases where authority to destroy an animal is required and also in court cases where expert advice pertaining to veterinary matters is required.

In all the above cases the services of the practitioner, in my experience, are given voluntarily, and, in my opinion, quite rightly so. I feel, however, that it is not generally appreciated how much time the practitioner does devote voluntarily in the service of the public and for the general welfare of animals in particular. This service is often given at great inconvenience and I, for one, am grateful to all the practitioners who unselfishly devote much time in aiding these worthy causes.

Practitioners play a very important part in horse racing. All the larger clubs employ at least two practitioners, one to ensure that all horses taking part in a race are in good condition, clinically sound and free from disease, and that they are suitably and properly saddled. This is necessary to guard against unnecessary discomfort to the horse, to ensure the safety of the rider and horse, and to protect the racing public by satisfying himself that the horse is in a fit state to run. Furthermore, in case of accidents or injuries prompt and expert attention is immediately available. In addition a practitioner is appointed by the clubs, whose duty it is to collect saliva and urine for doping tests from any horse which the stipendiary officials may select. In order to eliminate some of the malpractices connected with the racing world and to protect the racing public this is a very necessary precaution. Practitioners appointed by the racing clubs are all paid officials and, in my opinion, the clubs are not ungenerous in the treatment of those officials because they appreciate the valuable services rendered by them.

In addition to veterinarians engaged in private practice on their own account, there are a number employed by co-operative societies or farmers organisations whose duties constitute private practice for the benefit of members of these societies. In many instances these societies were established in a sincere effort to provide a service for their members which had, hitherto, not been available.

In such cases practitioners do not enjoy complete freedom of action and must of necessity be subject to some form of control by a body of laymen whose business methods, through no fault of their own, may not measure fully up to our professional standard of ethics. It is in this aspect that I fear some danger to the high prestige and status which our profession enjoys in this country. We have the necessary control over our professional men but what control can we exercise over their employers ?

Finally, reference should be made in regard to those veterinarians employed by private enterprise in the production of foodstuffs, veterinary medicines and various remedies concerned with the eradication of internal and external parasites, the destruction of plant pests, etc. Their value to the community is obvious as by their efforts, maximum production of animal products can be achieved through the elimination of disease and the production of wholesome and nourishing foodstuffs.

The liaison between State and Municipal Veterinarians and practitioners including veterinarians employed by private enterprise or co-operatives, should be on a basis of strict co-operation and mutual respect and goodwill. Every effort should be made to get away from the parochial outlook which clouds the endeavours of veterinarians in this country. Possibly one of the reasons for this state of affairs is the fact that for many years the state service was virtually the only body of the profession in this country. Not unnaturally there has probably been opposition to the intrusion upon its erstwhile virtual monopoly. Secondly our paucity in numbers has tended to a vigorous and perhaps unilateral emphasis upon the virtues and merits of one particular group to the exclusion of others. All parties are guilty and no useful purpose would be served in apportioning the blame.

To ensure mutual benefit amongst veterinarians and the advancement of animal welfare and the livestock industry there must be complete harmony and collaboration amongst all the various sections. Whatever our spheres, there must be inevitable overlapping of our activities. The sooner we realise that we cannot confine our activities to watertight compartments, the sooner will we achieve unanimity and progress in combating the many problems which beset our livestock industry. The practitioner is subject to various restrictions by the state department and this is necessary but the time is approaching when, perhaps, the practitioner could be given a bigger share in the combat against scheduled diseases. While the state has every right to determine the extent of its own activities it should be mindful at all times of the fact that practitioners and municipal veterinarians are part of the profession and willing to play their part in the interests of the state, and that they are entitled to receive official consideration in regard to all aspects of their preservation, wellbeing and advancement.

One often feels that practitioners are not fully mindful of the debt they owe to the research worker and generally take him for

granted. To gain full value from research, practitioners and research workers must work closely hand in hand. Each must appreciate the problems which confront the other. A practitioners' life is full of variety and he should endeavour to contribute to scientific journals the experiences, which of necessity are so varied. By recording in proper perspective his observations he will in some measure repay the debt he owes to the research worker.

In order to achieve the necessary liaison and smooth working amongst the various sections the formation of a body representative of all sections may be worthy of consideration. This body could meet periodically to consider various problems and differences of opinion, which, if dealt with properly and promptly, would eliminate many misunderstandings.

It would seem that some form of newsletter is highly desirable to acquaint practitioners with the latest developments. It is with a sense of shock that one's first knowledge of a new vaccine for instance comes by way of the Farmers' Weekly. The question of cost should not be a deterrent.

The important point to remember is that we as veterinarians constitute a vitally important professional body whose abilities and resources will be taxed to the utmost in the interests of the state. We must consolidate our position in order best to serve the future. It has been estimated that the population of South Africa will increase by over 50% during the next fifty years and it will be our duty in the face of diminishing natural resources to ensure that there will be sufficient food of animal origin. The ever increasing shortage of animal products in the food supply must be remedied in order that the ever increasing human population may receive a suitable and adequate diet. One cannot emphasise too strongly the necessity for complete harmony within the profession.

We now come to a consideration of methods by which the service rendered by practitioners can be improved. Many areas are without the amenities of veterinary services as it is economically unsound to attempt private practice in such areas. In these cases I would suggest some form of subsidisation. Apart from the direct official duties such a practitioner would be called upon to perform, one must remember that, with the extension of the benefits which private practice confers, there is the ultimate benefit to the state. Many municipalities and local authorities could with considerable advantage to themselves employ practitioners on a part-time basis.

Secondly there is room for the practitioner in helping to combat scheduled diseases. For the performance of certain duties the state department would be responsible for the payment of a mutually agreed upon scale of fees. In both these cases there is no plea for their general acceptance but the state could and should make more use of the Veterinary potential in this country. For instance, a start could be made by calling upon some practitioners approved by the state to undertake tuberculin testing of cattle.

Examination of animals and animal products for export is another avenue which suggests itself. Once the principle of employment of private practitioners on a part-time basis becomes an established fact, many new avenues culminating in mutual benefit will become apparent.

In conclusion it would appear that the private practitioner is upon the threshhold of great things in this country. His services will become more and more sought after, his prestige more firmly established and he can look to the future with a sense of sober confidence and optimism.

Let us retain all the good we have inherited from the past, consolidate the present and build for the future, and above all, let us be conscious of the duty and obligations we owe to one another, to our profession in particular and to this great country we are privileged to serve.

VEEARTSENYKUNDE IN SY VERHOUDING TOT DIE GESONDHEID VAN DIER EN MENS.

VETERINÊRE ONDERWYS.

P. J. J. FOURIE,

Onderstepoort.

1. *Die geskiedenis en ontwikkeling van Veterinêre Onderwys in Suid-Afrika.*

Toe die eerste blankes meer as 300 jaar gelede in Suid-Afrika aangekom het om hulle hier te vestig (1652), was daar selfs in Europa nog geen veterinêre opleiding nie. Smith F. (1927) stel die periode 1600 tot 1796 as die een wat die hoefsmid (farrier) in Engeland die outoriteit oor siektes van perde was. Hy was die voorganger van die veearts en gedurende hierdie tyd het die persone as gevolg van loutere onkunde en bygeloof in verband met siektes van diere, soms die grofste wreedhede gepleeg in die behandeling van die stomme diere, soos die brandyster op die verhemelte van die perd vir die behandeling van Lampas. Aan die anderkant weer het die persone as gevolg van praktiese ondervinding en met buitengewone insig, soms korrekte voorsorgsmaatreëls vir die versorging van diere aanbeveel, soos byvoorbeeld dat stowwerige hooi nie aan die dampige perd (broken wind) gevoer moet word nie of dit moet gereeld aangeklam word voordat dit gevoer word.

Die eerste Veterinêre Onderwys in Engeland is gegee in 1791. Een van die persone wat 'n baie belangrike invloed op die veterinêre onderwys uitgeoefen het, is Coleman. Hy was 'n medikus en volgens F. Smith (1927) het hy sowel as een van die kuratore (governors) van die eerste veterinêre skool in London, naamlik Sir Astley Cooper van die standpunt uitgegaan dat die gesondheid en siektes van diere maar 'n baie eenvoudige saak was en dat geen basiese wetenskaplike kennis daarvoor nodig was nie. In diè gees is die veterinêre onderwys dan ook beplan en ingestel. Die gevolg hiervan was dat die veeartsenykunde en die veterinêre professie in Engeland vir 'n lang tyd as 'n minderwaardige professie beskou was deur die publiek en veral deur die mediese professie.

In ons land was die eerste veeartse wat hier kom werk het meestal lede van die Royal College of Veterinary Surgeons. Tot in 1924 toe die eerste groep van ons eie graduandi gekwalifiseer het, is die veterinêre werk in Suid-Afrika, met die uitsondering van Theiler, du Toit en 'n paar ander, omtrent alles gedoen deur lede van die Royal College. Die eerste dosente van ons Fakulteit van Veeartsenykunde het ook hoofsaaklik uit lede van die Royal

College bestaan en ek wil graag van hierdie geleentheid gebruik maak om hulde te bring aan hierdie inrigting en sy lede wat hier in Suid-Afrika pionierswerk gedoen het op die gebied van veeartsenykunde. Om 'n paar name te noem, dink ek aan manne soos Duncan Hutcheon van die Kaapse Veterinêre Veld Organisasie, Watkins Pitchford van Natal en Irvine Smith, die man wat oneindig veel gedoen het om Munisipale Veterinêre Dienste in Suid-Afrika status te gee.

Die Stigting van die Fakulteit van Veeartsenykunde in Suid-Afrika

Net na die eerste Wêreldoorlog was die veeartse in die Unie ook nog hoofsaaklik lede van die Royal College. Heelwat van hulle was Afrikaners wat oorsee gegaan het vir hulle veterinêre studies. Theiler, die navorser by uitstek in die geskiedenis van Suid-Afrika tot iets meer as die einde van die eerste kwart van die twintigste eeu, was 'n uitsondering: hy was 'n Switser en het sy veterinêre opleiding in Switserland gehad.

Theiler het 'n goed georganiseerde navorsingsinstituut hier op Onderstepoort tot stand gebring. Dit is vanselfsprekend dat die behoefte om ons eie veeartse op te lei alreeds teen hierdie tyd sterk op die voorgrond moes tree. So ver ek kan uitvind, blyk dit dat Viloen in akademise kringe, die eerste daadwerklike stap gedoen het in verband met 'n Fakulteit van Veeartsenykunde in ons land. Hy was professor in veeartsenykunde in die Landbou-fakulteit van die ou Transvaalse Universiteitskollege. In die Senaat van daardie voorganger van die Universiteit van Pretoria, het Viljoen gepleit vir die stigting van 'n Fakulteit van Veeartsenykunde. Uiteindelik is deur die Unie-Regering 'n kommissie benoem om op die saak in te gaan. Theiler was 'n lid van die kommissie wat die stigting van so 'n Fakulteit aanbeveel het. Die groot probleem egter was dat daar nie 'n Universiteit in ons land was wat oor die nodige fondse beskik het, om verantwoordelikheid vir so 'n Fakulteit te aanvaar nie. Uiteindelik het die Transvaalse Universiteitskollege ingewillig om so 'n Fakulteit akademies te akkommodeer mits dit nie van daardie inrigting verwag word om uit eie bronne fasiliteite te verskaf en 'n voltydse staf daar te stel en te besoldig nie.

Daar was toe alreeds op die navorsingstaf van Onderstepoort belowende, ywerige en entoesiastiese jong manne, wat besig was om vinnig in verskillende rigtings te spesialiseer. Theiler en die Departement van Landbou het toe ingestem om die staf te voorsien. 'n Ooreenkoms is getref tussen die Departement en die Transvaalse Universiteitskollege, waarvolgens die kollege verantwoordelik was vir alle akademiese aangeleenthede en B.V.Sc. en D.V.Sc.-grade in die Universiteit van Suid-Afrika sou uitreik. Die Departement sou die staf besoldig en fasiliteite op Onderstepoort vir die onderwys en opleiding verskaf. Die staf moes al die akademiese werk buite diensure doen, behalwe natuurlik die werklike kolleges, wat nie anders as gedurende diensure gegee kon word nie. 'n Aantal

akademiese departemente is geskep. Die professore en lektore was permanent maar deeltydse akademiese toelae van £200 vir 'n professor en £100 vir 'n lektor, voorwaar die goedkoopste Veterinêre Fakulteit in die moderne akademiese wêreld en wat vandag, 34 jaar na sy ontstaan, nie veel beter is nie. Die besoldiging vandag is £300 en £200, maar hierdie toelae is nie meer pensioenbaar nie.

Die Fakulteit is ingestel in 1920. Dit was en is nog 'n 5-jarige kursus. Die eerste kandidate het hulle graad ontvang in 1924. By hierdie geleentheid het Theiler, die eerste Dekaan van die Fakulteit, die konvokasie toegespreek.

Sy standpunt was dat die pasgestigte Fakulteit se onderwys en opleiding doelbewus ingestel moet word om graduandi te lewer wat so goed moontlik wetenskaplik toegerus sal wees om navorsingswerk te doen en om op te tree as staatsveeartse. Dit was feitlik die enigste rigtings waarin daar vooruitsigte vir werk was, want in daardie dae was die diere self sowel as hulle produkte se ekonomiese waarde maar gering. Die afstande was groot en soiets as privaat praktyk selfs vir die klein huisdiere het prakties nie bestaan nie. Die gevolg hiervan was dat in die onderwys besondere aandag bestee is aan vakke soos Patologie, Toksikologie, Parasitologie en infeksiesiektes, maar die fasiliteite vir die kliniese en toegepaste vakke kon heelwat beter gewees het.

Met die geweldige ontwikkeling van die motortransport, die styging in pryse van diere en hul produkte, het die privaat praktyk binne enkele jare so lonend geword, dat die regeringsdiens vandag nog mank gaan aan 'n chroniese staftekort.

Gelukkig het Fakulteit tred gehou met hierdie veranderende omstandighede. Die kliniese personeel is geleidelik versterk en aanstellings is gemaak en later akademiese departemente geskep in toegepaste vakke soos Vleis- en Melkhigiëne, Pluimveesiektes, Sootegnie en Voedingsleer. Dit is dan soos die Fakulteit vandag nog funksioneer in sy teenswoordige organisasie.

Die toekomstige ontwikkeling van die Fakulteit en wat die Fakulteit beteken vir die Veeartsenykunde en die Veeindustrie.

Die vraag mag nou hier gestel word: Wat van die toekoms? Ek dink of sal ek sê hoop u sal met my saamstem dat die Fakulteit in die verlede nogal goeie werk gedoen het. Van die stigterlede van die Fakulteit, ek bedoel die dosente wat die eerste groep studente hanteer het, bly nog net prof. Robinson en ek oor as lede van die Fakulteit. Die ander lede wat veeartse is, is egter graduandi van hierdie Fakulteit en baie van die ander graduandi is leiers op die gebied van navorsing, privaat praktyk, munisipale dienste en in die Staatsdiens. Ons studente wat oorsee gaan vergelyk goed met oorsese graduandi. Al het hierdie produkte van ons Fakulteit sulke goeie, ja selfs briljante werk gelewer, het dit gedurende die afgelope paar jare duidelik geword dat as gevolg van die dubbele kontrole, enersyds deur die Departement van Landbou en andersyds

deur die Universiteit en vir ander redes, die ou organisasie van die Fakulteit nie meer voldoen aan die vereistes van die goeie onderwys en opleiding nie. Die Fakulteit het gevolglik die Universiteit en die Departement meegedeel dat hy daarvan oortuig is dat die tyd alreeds aangebreek het dat Fakulteit in sy huidige organisasie ontbind behoort te word en dat in die plek daarvan ingestel moet word 'n gewone Fakulteit van die Universiteit van Pretoria. Die Fakulteit moet bestaan uit 'n aantal voltydse Universiteitsdepartemente en 'n aantal deeltydse Departemente, waarvoor die Universiteit volle finansiële verantwoordelikheid moet aanvaar.

Na 'n veelbewoë tyd van onsekerheid en besluitloosheid, het die teenswoordige Minister van Landbou uiteindelik die saak in eie hande geneem — dit is altans die indruk wat ek gekry het — en hy het 'n komitee benoem bestaande uit vooraanstaande lede van die Universiteit en van die Departement om op die saak in te gaan. Die rapport van hierdie komitee is nou in die hande van die Minister en alhoewel volledige details van die rapport nog nie bekend gemaak is nie, verstaan ons dat dit in aansienlike mate die Fakulteit se standpunt steun in verband met die ontbinding van die teenswoordige organisasie en die skepping van 'n gewone Fakulteit in die Universiteit van Pretoria en ons hoop dan om binnekort 'n beslissing te kry oor hierdie belangrike saak.

Wat ookal mag gebeur is ek daarvan oortuig dat dit baie belangrik is dat die Fakulteit in noue voeling moet wees met die veterinêre probleme van die veeindustrie in ons land en terwyl die Fakulteit geografies 'n deel van Onderstepoort is, moet daar die nouste en die hartlikste samewerking wees tussen Fakulteit en die Afdeling Veeartsenykunde.

Ek was gevra om ook iets te sê oor moontlike verdere ontwikkeling wat die Veterinêre Onderwys en opleiding mag raak. Party van hierdie moontlikhede is eintlik huishoudelike aangeleenthede vir die Fakulteit en die Universiteit. Al is dit die geval, is ek tog van opinie dat Fakulteit konstruktiewe kritiek deur die professie behoort te verwelkom. In die gees wil ek 'n paar persoonlike gesigpunte voorlê aan u wat in ieder geval meestal graduandi is uit die ou Tranvaalse Universiteitskollege, of uit die Pretoria se Universiteit.

1. *Eerstens wil ek die vraag stel*: *Moet die professie seggenskap hê oor Veterinêre Onderwys?*

Die Universiteit ken die graad toe, daarom behoort die Universiteit die liggaam te wees wat die vereistes vir daardie graad bepaal. Hierdie vereistes is dan ook neergelê eers in die regulasies van die Universiteit van Suid-Afrika toe die Fakulteit in 1920 gestig is en later in die regulasies van die Universiteit van Pretoria, wat op die oomblik die graad toeken.

In 1933, dit is 13 jaar na die stigting van die Fakulteit, is die Veearstwet van 1933 deur die Parlement goedgekeur. In die Wet word voorsiening gemaak vir die skepping van 'n Veeartsgraad, wat sou bestaan uit persone genomineer deur die Minister

van Landbou, deur die Universiteit en verdere lede gekies deur die Suid-Afrikaanse Veterinêr-Mediese Vereniging. Hierdie raad is deur die Minister van Landbou die wetlike gesag in ons land om persone te registreer en hulle sodoende toe te laat om as veeartse te praktiseer.

Dit is my opinie dat hierdie liggaam wel 'n mate van seggenskap oor die Veterinêre Onderwys behoort te hê. Op die oomblik het die Veeartsraad hoegenaamd geen seggenskap nie. Die raad beveel registrasie aan op goedertrou. Hy neem eenvoudig aan dat die Onderwys hier en oorsee van so 'n gehalte is dat die betrokke graduandi akademies behoorlik toegerus is om as veeartse te praktiseer. Ek glo die tyd het reeds aangebreek dat die veeartsraad die mag verleen moet word om hulle in die geleentheid te stel om te kan oordeel of die standaard van onderwys en opleiding sodanig is dat dit registrasie regverdig. Die enigste manier om die standaard te waardeer, is deur middel van eksamens. Die veeartsraad kan egter nie vir die eksamens verantwoordelik wees nie, dis die funksie van die Universiteit wat die graad toeken. Wat wel gedoen kan word is om die veeartsraad mag te verleen om persone te benoem, wat by die eksamens teenwoordig mag wees, sodat hulle aan die veeartsraad verslag kan doen oor die standaard van die opleiding.

2. *'n Veeartsadmissie-eksamen.*

Ek is van opinie dat so 'n eksamen 'n moontlike oplossing sal wees om 'n mate van beheer uit te oefen oor oorsese graduandi wat hulle hier wil kom vestig. Dit is die metode wat die wetsprofessie gebruik om sodanige graduandi te kontroleer. Hulle noem dit die advokaatsadmissie-eksamen. Die veeartsraad sou eintlik vir die eksamen verantwoordelik moet wees. As die eksamen dieselfde sou wees as ons finale B.V.Sc.-eksamen, sien ek geen beswaar dat die Fakulteit die eksamen hou, dieselfde tyd wanneer ons eie finale eksamens gehou word nie.

3. *Anatomie.*

Hier moet die wenslikheid oorweeg word of die tyd nie alreeds aangebreek het dat ons die Herkouer in plaas van die Perd moet gebruik in die onderwys van sistematiese anatomie nie. In party van die groot Amerikaanse universiteite word die hond alreeds hiervoor gebruik.

4. *Melkhigiëne.*

Die instelling van 'n melklaboratorium, waarin die roetien melkondersoek vir 'n munisipaliteit gemaak kan word. Die studente sou dan alreeds 'n kans kry om kennis te maak met die praktiese probleme van melkkontrole. Ek glo nie dat dit geregverdig sou wees om te sê dat dit alreeds te verregaande spesialisasie is, in die graadkursus nie.

5. *Die Kliniek.*

Dit moet uitgebrei word. Die deure van die Fakulteit moet wyd oop staan vir kliniese materiaal wat daardeur moet stroom. Dis miskien alreeds die geval met die klein huisdiere, maar die kliniese materiaal vir die Herkouer en die Vark laat heelwat te wense oor. Terwyls kwarantynregulasies op Onderstepoort kliniese materiaal vir hierdie diere beperk het, het ons dit probeer aanvul deur die instelling van ambulatoriese kliniek. Hopelik sal die kwarantynbepalings vir Onderstepoort opgehef word vir die geografiese Fakulteitseenheid wat in vooruitsig gestel word. In die geval hoop ek dat dit prakties sal wees om die kliniek vir die Herkouer en die Vark uit te brei. Dit is my oortuiging dat die hoogste roeping van die veearts vandag nog is om 'n diagnose te maak en studente kan alleen die nodige ervaring en ondervinding in die verband geleer word as die dosent oor voldoende kliniese materiaal beskik.

6. *Kapitaal Fonds en Fakulteit.*

Waar dit vandaan verkry sal word, weet ek nie, maar dit weet ek dat 'n Fakulteit wat nie alleen vir sy brood en botter, maar ook vir uitbreiding en navorsing afhanklik is van die gewone instansies, sy vet jare mag hê, maar ongetwyfeld baie maer jare sal ondervind. As hy sou beskik oor 'n voldoende kapitaal fonds, sal dit van groot betekenis wees om bestendigheid en stabiliteit te bewerkstellig.

Die Fakulteit moet ekonomies sodanig georganiseer wees, dat leiers in die professie, wat belangstel in akademiese aangeleenthede, volkome tuis sou wees as voltydse of deeltydse dosente in die Fakulteit. Die doseerwerk is 'n uiters belangrike plig van die dosent, maar ewe belangrik is die navorsingswerk wat die dosent moet doen, as hy nie in enkele jare 'n akademiese fossiel wil word nie.

My ander kollegas het hier vandag die woord gevoer oor die dak en die vertrekke van die gebou veeartsenykunde. In hierdie gebou is die Fakulteit die fondament. Die gehalte van die werk wat in die Fakulteit gedoen word sal in hoofsaak die kwaliteit van diens bepaal, wat tot die beskikking van die publiek en die veeindustrie sal wees, hetsy op die gebied van navorsing, veterinêre veld werk, munisipale werk of die privaat praktyk.

SYMPOSIUM ON BREEDING DISORDERS IN DOMESTIC ANIMALS

In introducing the subject, Dr. S. W. J. van Rensburg said that in the aetiology of herd infertility the infectious coital diseases played the most important part.

Infectious Epididymitis and vaginitis (epivag) was still a very serious breeding problem in the Union, and this disease was gradually spreading. It had now got as far down as the South Eastern Free State where a number of outbreaks have recently been diagnosed, and the Cape is the only Province in which it has not yet been diagnosed.

The presence of Vibrio fetus infection has now been established in all parts of the Union. Last year it had also been diagnosed in the Western Province, which had hitherto been considered free, and here it was regarded as the main cause of herd infertility. Insemination with semen from clean bulls had brought about a marked improvement in these herds since.

All the observations made both here and overseas confirm that vibriosis is frequently the cause of functional infertility characterised by marked irregularities of various types in the oestrous cycle.

It had been thought that the disease did not persist for any length of time, but he cited a case in Great Britain where it had now been present for 18 years and the conception rate was still very low. In another herd of 150 Ayrshire cows Vibrio fetus was introduced by a bull in 1948. The calving rate dropped from 80% to 30%, and was still very low.

In Holland where vibriosis was the most serious breeding disease a few years ago, it has now been largely eliminated by artificial insemination which was also practised by many of the stud breeds in order to keep their herds clean.

Dr. van Rensburg mentioned the value of the agglutination test using vaginal mucus for detecting the disease in cows and heifers. In all countries the need for a reliable test for bulls is emphasised. Workers in both Holland and Denmark consider that they will soon be in a position to publish details of tests which will fulfil this requirement. At Onderstepoort too encouraging results are being obtained by the inoculation of pregnant guinea pigs with suspected material and culturing the organisms from the foetal stomach contents.

As regards treatment the intra-uterine injection of Penicillin and Streptomycin was recommended. This is done during oestrus, and insemination can be carried out an hour before or after treatment or at the following oestrus.

In Holland uterine biopsy is now being used for the diagnosis of infection of the genital tract. A small portion of the uterine

mucosa is removed with a special instrument, and this is examined both histologically and bacteriologically. The work done up to now by Brus and Kampelmacher shows that a degree of endometritis is present in the great majority of sterile cows. This method shows up many cases of endometritis that cannot be detected by macroscopic or clinical examination.

Uterine biopsy may also be useful in detecting some forms of functional infertility by establishing the presence or absence of alkaline phosphatase and glycogen in the uterine mucosa. The presence of the former depends on the sex hormones, notably oestrogen. The significance of glycogen is not yet known, but it is found only in the superficial glands of the uterine mucosa, and in humans its absence is always evidence of sterility.

Many workers are of opinion that Vibrio fetus is dependent on the synergistic action of another agent probably a virus for producing infertility. Symptoms of this infection has been seen by many in young virgin heifers, but vibrio cannot be recovered from them. In some countries, notably Italy, it is considered that oestrogens in the green grass may be responsible for these symptoms.

Artificial insemination has made remarkable progress in all European countries. In research work very encouraging results are being obtained with the use of glycine as a diluent, and this may in the near future make it possible to preserve the full fertility of fresh semen for 7 or 8 days. Glycine has also now made it possible to dilute and store pig's semen. As a result of this an artificial insemination service for pigs has now been started at several centres in England.

Deep freezing of semen has now become an integral part of A.I. services on the Continent and in Britain. The frozen semen is used for supplying nominated services for those farmers and breeders who desire it, for storing the semen of outstanding proven bulls, for export, and for the progeny testing of bulls in the shortest possible time.

Progeny testing of bulls is now an important facet of breeding, and extensive testing of highly bred bulls has shown the unreliability of judging a bull's potentiality on the achievements of his ancestors. Greater significance is attached to the performance of his progeny than that of his parents.

DIE ROL VAN DIE PRIVAAT VEEARTS MET KUNSMATIGE BEVRUGTING

A. B. LE GRANGE,

Kempton Park.

(1) INLEIDING:

My bydrae hier is g'n wetenskaplike verhandeling nie, maar tog voel ek dat in ons professie daar soms situasies voorkom wat ons aandag behoort te geniet, en dat ons nalaat om dit te versorg en also eers wakker skrik as dit reeds te laat is. Aandagtig hieraan, het ek toe ek in Julie genader was oor 'n bydrae, geglo dat ek nouliks 'n beter onderwerp kan kies as bogenoemde om daarmee 'n definitiewe verhouding te probeer kry tussen die professie en Kunsmatige Inseminasie. Want dit is my besliste mening dat K.I. met al sy vertakkings primêr tuishoort in die hande van ons professie.

Met my aanstelling by die K.I. Koöperasie het dit heel gou vir my duidelik geword, dat dit die mees ideale toestand sal wees as die privaat praktisyns hulle dienste beskikbaar sal stel in hierdie verband. Ons is bewys daarvan dat kunsmatige bevrugting nooit geheel en al deur veeartse verrig kan word nie, maar dit is my oortuiging dat hulle veel meer daaraan kan doen as wat tans die geval is.

Indien die privaat praktisyns nie hulle heelhartige steun hieraan toesê nie, is my voorspelling dat ons eerlank sal vind dat nie alleen K.I. nie, maar ook heelwat verwante werk soos bv. dragtigheidsondersoeke, baarmoederbehandelings met antibiotika, inspuitings met hormone tydens inseminasies ens., in die hande moet kom van opgeleide inseminators, na wie toe ons noodwendig ons toevlug moet neem, om hierdie geweldige veld van werk gedek te kry. Daar is tans 'n akute tekort in beide die Bolandse and Transvaalse Koöperasies aan opgeleide inseminators en dit is na my mening juis hier waar die privaat professie na vore behoort te tree, veral in plekke waar geen bestaande diens is nie.

Hierin wil ek graag noem dat ons moet waak, veral in areas waar K.I. reeds 'n geruime tyd bedien word, om nie die kwessie van siektes te oor-aksentueer nie. Sulke kuddes en areas behoort en is by die tyd betreklik vry van enige van hierdie gevreesde kondisies. Hierdie boere verdien beslis vandag iets meer as blote vermaning teen geslagsiektes.

Aan hulle behoort m.i. 'n positiewe teelprogram voorgehou te word. Ek is bly om hierin te kan noem dat ons tans beskik oor twee uitstekende bulle: Olympus en De Hoep van die Departement, tesame met die ander wat reeds in gebruik is. Verblydend is ook die feit dat ons in September met melkkontrole-toetsings 'n begin gaan maak binne die raamwerk van die bestaande, soos dit deur

veeteelt toegepas word. Dit sal ongetwyfeld 'n ware bewys word van ons vooruitgang en verbetering op bestaande kuddes, asook die basis van nageslagsbepalings by bulle wat gebruik behoort te word.

(2) TOESTANDE IN ANDER LANDE:

Vergelykenderwys is dit interessant om te let op die groei van K.I. in Holland. Ek kies Holland omdat dit beskou kan word as die hoeksteen van Friesteling, also het K.I. die wind van voor gehad van hierdie verenigings, nog veel meer as by ons.

In 1947 as slegs 10% van koeie ge-insemineer, en hiervan was die konsepsie-persentasie slegs 40%. Dit was veral laag vanweë hulle sg. enzootiese steriliteit, wat later deur Drs. Stegenga en Terpstra gediagnoseer was as vibriose.

Laasjaar was 775,100 koeie gedoen, d.w.s. 50% van die totale koei-populasie, met 'n eerste konsepsie van 59.1% en 89.8% van drie inseminasies — voorwaar 'n trotse prestasie.

Volgens Professor van Rensburg beweer Dr. Stegenga dat die Hollandse Friesstapel oor die laaste 10 jaar groter vooruitgang gemaak het as oor die vorige 100 jaar.

In Britanje gaan die Melkbemarkingsraad van krag tot krag, also was op 31 Maart 1955 weer 'n nuwe rekord daargestel.

Die melkbemarkingsraad het	1,110,987	koeie gedoen,
Ander Verenigings	292,893	,, ,,
T'otaal	1,403,880	

Die melkbemarkingsraad se winste van K.I. alleen was £250,000 ondanks 'n vermindering van 5/- per K.I.

'n Mens is byna huiwerig om te moet sê dat Tvl. K.I.-Koöperasie se boekjaar wys dat 9,262 koeie ge-insemineer is.

(3) TOEKOMS:

Dog ek moet erken dat ek groot uitbreiding visualiseer vir Transvaal K.I. Koöperasie, veral vanweë die uiters simpatieke gesindheid en die ruim finansiële steun van die Regering. Die nuwe wyse van daarstelling van semen deur Sentrale Saadverskaffingskoöperasie Beperk, tesame met die besliste moontlikhede van beter bulle soos wat ons groei, en die moontlikheid van 'n Saadbank, gaan ook alles bydra tot ontwikkeling.

En dit is juis hierin dat ek my beroep op die privaat praktisyns wil doen, in 'n poging om hierdie diens binne die bereik van soveel boere as moontlik te bring. Daar is tans ses firmas wat ons help, tewete:

Drs. Boswell, Hempstead en Dickson	—	Sandown-Substasie
,, Botha en Howell	—	Benoni/Oosrand
Dr. Winterbach	—	Lyttelton
,, Stevens	—	Kroonstad
,, De Villiers	—	Klerksdorp
Drs. Hofmeyr, Le Roux en Craig	—	Pretoria

Kortliks wil ek die voordele aanstip wat daarin skuil vir:

(1) Tvl. K.I. Koöperasie,
(2) die boer wie die diens aanvra,
(3) die veearts self.

Vir Transvaal K.I. Koöperasie:

(1) Uit vergelykende syfers getrek uit ons resultate, sien ons dat ons die beste persentasie konsepsies kry waar veeartse die K.I.'s doen, en also vir ons Koöperasie en almal minder uitgawes meebring. So bv. was die eerste konsepsie persentasie 14% beter in 1953-54; en 7% beter in 1954-55.

Hierdie beter resultaat kan veral na my mening toegeskryf word daaraan dat die arts beter kan bepaal of die koeie werklik bronstig is of was, en of sy vry is van besmettings.

(2) Indien ons grootliks van veeartse gebruik sou kon maak, sou dit veel verligting bring op die veearts van die Koöperasie. Vandag is hy belas met kontrole oor al die inseminators in die veld, tesame met steriliteitswerk in al die areas waar die diens beskikbaar is. Indien veeartse die werk sou waarneem, kan ek slegs onderhandel met die kliënt se veearts oor die toestand van sy kudde, of tesame met die veearts in konsultasie gaan waar moeilikheid wel voorkom.

(3) Administratief pas die arts ook veel beter in ons hele stelsel van boekhouding, in so verre dat u rekening met soveel inseminasies gedebiteer word, hierteenoor word die krediet wat ons u toelaat per koei afgetrek en u suiwer slegs u maandstaat aan vir die verskil.

Voordele vir die Boer:

Oor die algemeen beskou, glo ek dat alle boere, as hulle 'n keuse sou hê om inseminasies of deur 'n veearts of deur 'n inseminator te laat doen, altyd die veearts sal verkies. Die rede hiervoor is dat die veearts na my mening meer vertroue inboesem en veral ook omdat die boer weet dat sy kennis verder strek as blote inseminasies. Also, tydens 'n inseminasie kan 'n veearts die toestand en abnormaliteite van die hele geslagsisteem vasstel. Ek kan net hierby terloops noem dat dit merkwaardig is oor watter vaardigheid en kennis die spesiaal-opgeleide inseminators wel beskik na jare in die veld.

Verdermeer is die blote feit dat 'n veearts gereeld sy plaas en kudde besoek van onskatbare waarde — want dis gewoonlik by sulke geleenthede dat u gevra sal word om na ander diere ook te kyk.

Voordele vir die Veearts self:

(1) Deur die verantwoordelikheid van inseminasies op u te neem sal u verseker dat die verwante werk daaraan verbonde in u hande bly, soos reeds genoem: dragtigheidsbepalings, sekere baarmoederinspuitings en hormooninspuitings. Ter verduideliking wil ek net sê dat ons kêrels besoek plase slegs as inseminators, maar weens die duisende baarmoeders wat hulle al gevoel het, kan hulle

heel maklik 'n swangerskap in die algemeen bepaal. Na my mening kan 'n mens dit as menslik aanvaar dat boere hier en daar vir inseminators sal vra of hierdie of daardie koei in kalf is al dan nie. Verdermeer: gestel ek besluit dat na my mening 'n spesifieke koei streptomysien 'n sekere tyd na 'n inseminasie behoort te kry, of 'n hormoon-inspuiting, kan u dit as onredelik en verkeerd bestempel as dit aan die inseminator opgedra word? Sal ons die boere so ver kry om 'n veearts myle ver te laat kom om 'n werk te kom verrig wat die inseminator met ewe veel behendigheid kan verrig?

(2) Dit is my besliste mening dat as u oor saad sou beskik, sal u met 'n groot gedeelte van die boere kontak maak en hulle koeie besoek waar u normaalweg sonder K.I. nie sou gekom het nie. Also word daar deur K.I. meer werk vir u daargestel.

(3) Uit ondervinding weet ek, deurdat u a.g.v. K.I. na 'n plaas gebring word, u aandag gevra word vir nie-akute kondisies waarvoor u nie normaalweg sou geroep gewees het nie. Tesame met punt nr. 2 bring K.I. dus vir u praktyk 'n verhoogde inkomste wat u normaalweg nie sou gehad het nie.

(4) Deur K.I. aan u praktyk te koppel skep u nie alleen meer werk, en 'n verhoogde omset nie, maar veral bring u daarmee 'n balans en totaliteit aan u praktyk, wat u sonder K.I. nie het nie.

Die feit dat al sou u reeds 'n groot en omvangryke praktyk hê en 'n uitgebreide area dek is m.i. nie 'n rede waarom u nie K.I. kan behartig nie.

Waar ek self 'n vennoot was in een van die grootste groot diere-praktyke in ons land, weet ek dit kom alles neer op vooruitbeplanende organisasie en interkommunikasies na die plekke waar u u gaan bevind. Uit die aard van die saak sal u vind dat u feitlik elke dag 'n groot gedeelte van daardie roete in elk geval sou moes ry na kliniese gevalle.

Ten slotte, waar ek hiermee 'n beroep op u doen om aan hierdie saak u ernstige oorweging te skenk, wil ek graag meld dat ek dit nie doen om kant te kies teen ons handjievol ge-inspireerde opgeleide inseminators nie. Hulle is vir ons onmisbaar, en met hulle onbaatsugtige dienste het hulle so ver die leeue aandeel in hierdie groot organisasie gehad, en sal dit seker in die toekoms ook nog doen.

Ek mag net noem dat besluit is dat semen beskikbaar is vir alle veeartse in Vrystaat en Transvaal, onder die volgende voorwaardes:

(1) Die versending daarheen moet wel binne ons bestaande raamwerk van treindienste val;
(2) u moet bewys lewer van minstens 300 koeie;
(3) die diens is beskikbaar aan alle lede van die Koöperasie binne 'n radius van 15 myl teen £1.15.0 per koei, drie inseminasies moet verskaf word, indien nodig;
(4) u vergoeding is £1 binne daardie radius;
(5) maandelikse vereffening van u state; en
(6) drie maande wedersydse kennisgewing op be-eindiging van dienste.

Jl. S.A.V.M.A. 26(3), 1955.

SOME OBSERVATIONS ON OVULATION IN DAIRY COWS

S. VAN HEERDEN,
Onderstepoort.

With the advent of artificial insemination, and the necessity for its successful practice, many investigators have studied the physiological processes of ovulation and its relationship to physical symptoms of oestrus. Since artificial insemination — and for that matter natural service — cannot effect fertilization of the ovum if the ovum has not been shed from the ovary at all, or if the ovum has not been shed several hours before and is no longer capable of being fertilized when the insemination is done, it follows that the time of ovulation has an important bearing on the best time to inseminate during the oestrus period. The optimum time of insemination depends on the relationship between the time of ovulation and the effective period of survival of spermatozoa in the female genital tract.

There is indeed much literature on this aspect of artificial breeding and many workers throughout the world, have endeavoured with zeal and determination to amass all the information that nature would yield, on this very interesting subject.

Hammond, in 1927 reported the oestrus period of cows to vary from 6 to 30 hours, with a mean of 19 hours. He also found that ovulation occurred 24 to 48 hours after the commencement of heat. Anderson (1936) reported that in Kenya, cows have shorter and less intense heat periods than the periods accepted in European countries. In our own country and particularly so in the case of the indigenous breeds, this has also been found to be the case. It is a well established fact today that while the control of the oestral cycle is hormonal, environmental factors such as light, nutrition and environmental temperature influence the occurrence of oestrus and affect the length of period thereof. It has alse been shown that oestrus in heifers is of shorter duration than in cows — approximately 1 to 3 hours on the average.

Another interesting observation is that cows tend to show oestrus in groups, although the explanation for this is not advanced.

Other workers have found that ovulation occurs, on the average 8 to 14 hours after the end of oestrus. It has also been found that when cows were bred very early in the oestral period, or very late after oestrus has passed over, the conception rates showed an appreciable drop. Trimberger (1948) reported that the best rates of conception were obtained in cows which were inseminated more than 6 hours but less than 24 hours before ovulation.

Since the period of viability of spermatozoa in the genital tract of the cow has been shown to be limited to between 24 and 30 hours — Laing (1945), Winters, Green and Comstock (1942) and

several other workers, this fact has been made use of by numerous investigators in controlling and checking ovulation time in relation to oestrus.

Aberrations, amongst others, anovulation, delayed ovulation, silent heats, missed "heats", smooth ovaries, persistent corpora lutea, appear to occur fairly frequently and result in lowering the breeding efficiency in many herds in large parts of our country. In order to counter and neutralise this effect, it is necessary

(1) to arrive at the norms for our country, and
(2) to investigate the relative incidence of these various conditions and the effects thereof on breeding efficiency.

The practice of artificial insemination lends itself to the application of an analytical study of some of these conditions. Some factors seem to operate to a larger extent in certain parts of the country at certain times (seasons).

In many instances, the reasons for failure to conceive subsequent to artificial insemination, can be traced to delayed ovulation or to anovulation. The incidence of failure of nidation with subsequent death and absorption or expulsion of the embryo, cannot be accurately assessed because of the lack of a reliable diagnostic test of pregnancy at three weeks.

Olds and Seath (1954) in Kentucky, U.S.A., made observations on 3,500 oestral cycles. In approximately half of these, no service was allowed and of the subsequent oestral cycles 26% were more than 25 days in length. In the other half, however, where service was allowed, 44% of the cows repeating, had oestral cycles in excess of 25 days. It is concluded that the difference of 18% can be accounted for by early foetal death and resorption or abortion of very young foetuses.

The examination of the ovaries of cows at the time of insemination — pro-oestrus, oestrus and met-oestrus — have revealed interesting features. It would appear that the sequence of changes in the ovary containing the mature follicle is something as follows:-

(1) The follicle is hard and thickwalled and varies in size from 0.7 cm. to 1 cm. This is the position at the beginning of "normal" oestrus.

(2) The follicle is somewhat larger usually and rather flabby but still thick walled. In this case the cow is bulling strongly and has probably been in season for a few hours.

(3) The follicle may have increased in size up to 1.5 cm., although the size of the follicle is not related to the stage of development as such, but varies with the particular cow. The follicle, however, has become thin walled and is still rather flabby. These are the findings towards the end of the oestrus period.

(4) In the final stage of the development of the follicle the wall is very thin and tense and the follicle very prominent above the surface of the ovary. Careless palpation of the ovary at this stage readily results in the rupture of the follicle. At this juncture the cow is usually no longer bulling and frequently the bulling string has been voided.

(5) Examination of the ovary within an hour of two of rupture of the follicle, reveals a definite crypt, with irregular edges. The crypt, however, soon becomes impalpable because of the formation of a blood clot therein. Six or eight hours after ovulation great difficulty is encountered in determining whether in fact or not, ovulation has occurred.

A retardation in the process of ripening will result in a thick-walled flabby follicle being found at the end of the oestrus period or, on occasions, after oestrus has ended. In the latter case an opinion of anovulatory oestrus would be warranted. In a large number of cases re-examination two days later has confirmed that ovulation has not occurred. The follicle has become somewhat smaller and the flabbyness to the feel has been replaced by firmness.

The incidence of delayed or anovulation would appear to be, not a herd problem, but associated with particular cows.

Many cows have been put into calf by delaying insemination in the third recurrent oestrus as late as 30 to 40 hours from the time the cow was first observed bulling. (The first and second inseminations having been done 6 to 15 to 20 hours from the time the cow was first seen bulling.)

It would appear that there is a tendency for such cows, to repeat the phenomenon after having calved down — a feature associated with a particular cow:—

Cow No. 1 — had 3 inseminations at 13½, 15 and 31 hours from the time seen bulling — the latter successful.

Cow No. 2 — first insemination at 15 hours and second at 26 hours put her in calf.

Cow No. 3 — first insemination at 17½ hours and second at 38 hours put her in calf.

Cow No. 4 — first insemination at 38 hours which was successful.

In another group of cows, distributed in several herds, the effect of hormonal stimulation with gonadotrophic hormones was observed. As soon as the cows were seen bulling, intravenous or intramuscular injections of 1,000 to 1,500 I.U. of chorionic gonadotrophic hormones were administered. Inseminations were performed several hours later. The larger percentage of these cows settled to the respective inseminations, having repeated from previous inseminations done at varying stages of the heat periods. Re-examination of many of these cows one or two days post-oestrus, revealed that all but one or two, had ovulated. It would appear that the use of chorionic gonadotrophins, used at the time of oestrus, eliminates or reduces to a great extent, the problem of cows having anovulatory oestrus or oestrus with delayed ovulation.

In another observation the times of insemination of approximately 900 cows, taken at random, and which had not settled to first services, were analysed. It was found that 51% had been inseminated less than 8 hours from the time they were first seen

bulling; 41% were inseminated 9 to 18 hours from the time seen bulling; 8% at 19 to 32 hours and 0.3% more than 32 hours.

The data of a random group of 200 cows which had conceived to first inseminations, were similarly analysed, and the figures obtained were:—

20% had conceived to insemination done within 8 hours of being seen bulling (as opposed to 51%).

61% had conceived when done at 9 to 18 hours (as opposed to 41%).

14% had held as a result of being inseminated at 19 to 32 hours (as opposed to 8%).

5% had held to inseminations done more than 32 hours from the time first seen bulling (as opposed to 0.3%).

Before drawing any conclusions from these figures I wish to emphasise two points.

(1) In the herds from which the cows on which these observations were made, were taken, the cows were observed twice daily for signs of oestrus.

(2) On most farms reliance is placed on native milk boys to pick out the cows bulling.

Since the viability of sperm within the cow is generally accepted to be in the proximity of 24 hours, an experiment was run by inseminating cows with semen of two breeds of bulls at ± 24 hours interval between the inseminations. In the majority of cows, which were Frieslands, Jersey semen was used for the first insemination, at times varying from 8 to 15 hours from the time they were first seen bulling. The next day or appromixately 24 hours later, the same cows were inseminated with Friesland semen. The cows were not specially selected, although preference was given to cows which had repeated to previous inseminations and where no apparent abnormalities could be found by the veterinary surgeon in charge of the herd. Due to incomplete returns by the farmers concerned, very few results were obtained. It would appear, however, that in this experiment, the greater proportion of cows conceived to the first inseminations done with the Jersey semen, since the resultant calves were crossbred Jersey-Friesland. A few calves, however, were of apparent pure Friesland blood, indicating conception to the second — Friesland insemination.

I am desirous of repeating this experiment on a large number of selected cows of selected farmers.

Having made these few remarks on some of the "abnormalities" encountered in ovarian cycle and ovarian changes during the period of oestrus, I trust that I have succeeded in presenting to you material which would lead to a fruitful and fertile discussion.

There are as yet, however, several facets of the physiological processes of reproduction in the female which are imperfectly understood. Concerted efforts, untiring endeavour and above all intelligent planning and analysis of observations should, however, bear results which would enable us to overcome many of the cases of "functional" infertility which are legion in our country.

SYMPOSIUM ON "RECENT ADVANCES IN ANIMAL NUTRITION"

PROGRESS IN APPLIED NUTRITION

J. W. GROENEWALD,

Onderstepoort.

Short supplies of cereal grains and protein rich feeds have led to a slow, steady increase in prices of these feedstuffs. For these reasons there has been an increased interest in *re-assessing the protein requirements and evaluating the nutrition capacity of feedstuffs* to meet the needs of farm animals.

Research has especially been concerned with the study of *ruminal flora, trace elements and fermentation by-products* such as the *antibiotics, amino acids, vitamins* and *hormones.*

The outcome of this work has been a wider acceptance of lower standards for protein, provided optimum conditions can be maintained in the intestinal mass of ruminants. In other animals a more complete supplementation of all nutrient requirements will also enable the total protein level to be reduced.

It has even been shown that plant proteins, fortified by products of the fermentation industry can now be used to substitute for animal proteins in certain rations. The close association between Vitamin B_{12} and Cobalt has enabled Andrews (1954) to suggest a practical field diagnosis for a Cobalt deficiency. In the feeding of ruminants a partial independence even of protein is gradually being achieved, as the conditions for its partial substitution by urea become better understood.

Certain classes of livestock, such as pigs and poultry, are still essentially dependent on cereal grains. Although cereals are primarily fed as a source of energy, they provide half or more of the protein intake of older non-ruminants and fattening animals. This is why great interest has been shown in the factors that may influence the composition of cereal grains.

Carpenter (1952) found that favourable climatic and soil conditions tend to increase yield, but lower the protein content unless the application of late nitrogenous fertilizers have been carried out. Remarkable results have been reported by Theron (1953) in the judicious fertilization of ordinary veld. Under favourable conditions the productivity was raised from less than a ton per morgen to over eight tons and the protein percentage raised from 6.02 to 12.12 per cent.

However, it is of interest to note that according to McElroy (1949) wide differences in protein content within grains such as barley, oats and wheat were not accompanied by consistent differ-

ences in the amino acid composition of the protein. The percentage of lycine tended to decrease as the protein content increased. This is substantiated by Mitchell (1952) who found that the proportions of tryptophane and lycine in the total proteins of maize decreased as the protein content increased. It was further shown that the proportion of zein in the total protein of maize increased linearly up to 14 per cent, but departed from linearity after that.

Amino acid imbalance has been further substantiated in experiments on animals. Bowland et al (1951) found that pigs fed oats and barley containing 15% protein did practically as well as when fed the conventional rations balanced with an animal protein. However, when pigs were fed on a high protein maize Eggert (1953) found that lycine and tryptophane proved deficient.

Although the average calcium : phosphorus ration in lucerne (1.47% Ca : 0.24% P) is frequently responsible for clinical symptoms of bone disease in equines, Van Gaderen (1950) experienced no difficulty in correcting the ratio by the application of phosphatic fertilizer to lucerne.

Grant (1954) showed that bow-leggedness of lambs on green oats was due to excess carotene.

Practical nutrition is concerned with the nutritive values of rations and not of the individual feeds. The inter-relationship of the various nutrients is deserving of attention, e.g. pyridoxine and amino acid metabolism, nicotine acid and tryptophane, tryptophane as precursor of niacin, Vitamin C and adrenal hormone and metabolism of aromatic amino acids, fats and carbohydrates, phosphatase enzymes in bone metabolism, anti Bio-Synthesis in inadequate ruminal function or incorrect blending of vitamins. It has been shown that the response is greater when certain essential amino acids are fed at the same feed than when fed at separate feeds.

It is most likely that a reason for the variable results often reported when supplementing urea to steers may be attributed to the basic ration used, or the blending of nutrients. For instance, the partial replacement of protein by urea in the rations of ruminants has become a successful farm practice in certain parts of the United States and South Africa. However, in the United Kingdom and Europe there is little experimental evidence that comparable use can be made of urea. This contrasting experience is probably due to the basic difference in rations commonly fed in these zones.

From experimental evidence it is gradually becoming clear what feeds to give ruminants to encourage micro-organisms to convert urea to protein. Such feeds must be low in those types of true protein that are accessible to micro-organisms, since nitrogen in this form is used in microbial synthesis in preference to simpler nitrogenous compounds. At the same time carbohydrates must be provided in forms that will liberate their energy at a parallel rate to the microbial use of urea. For instance, the two contrasting classes of carbohydrates, sugars and cellulose, may be of low value as energy sources to be used by the organisms in metabolizing urea.

Sugars disappear too rapidly from the rumen after ingestion and cellulose, may be hydrolysed too slowly, so that neither is likely to provide energy at an optimum rate to allow efficient conversion of urea by the micro-organisms. The protein provided in the ration should then be regarded primarily as a source of energy for the micro-flora and partly as a source of nitrogen from urea. This dual role could explain the micro-floral preference for true protein.

It is clear that considerable progress has been made towards a better understanding of the close dove-tailing and balance of the many nutritive factors essential for optimum enzynic function. In attaining the required results *skilled and experienced judgment* still remains one of the most important ingredients of any balanced ration.

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A FEW ASPECTS OF THE ROLE OF MAIZE IN ANIMAL NUTRITION IN THIS COUNTRY

P. K. van der MERWE, Nasfeeds, Johannesburg

In the sound and productive nutrition of farm animals and for that matter in the nutrition of all warm blooded animals including man, the first vital requirement is for an adequate intake of utilizable calories to maintain the integrity of the basic physiological processes which constitute life itself and in addition to meet the requirements of anabolism.

Of all natural foods, maize stands in a class by itself as a supplier of nett or productive energy, and in this respect we are fortunate indeed.

There is a vast difference between the function of maize in the basic nutrition of the ruminant and the non-ruminant. In the ruminant, feeding for rapid results measured in terms of growth, production, reproduction and sustained performance calls for maize as the carbohydrate of choice, both nutritionally and economically.

Molasses is a useful carbohydrate in effecting a state of maintenance or low production during times of nutritional stress and also serves a useful purpose as a sort of nutritional high octane in stimulating ruminal synthesis in conjunction with the feeding of non-protein nitrogenous compounds.

Unfortunately, the available supplies of molasses are inadequate to make a significant contribution towards the energy requirements in our livestock industry.

In the intensive feeding of ruminants, maize primarily serves the role of a supplier of energy and this function is more or less uncomplicated, in other words the feeding of maize does not necessarily disturb the nutritional balance sheet of the animal measured in terms of minerals, vitamins and the nitrogen pool, more specifically the amino-acid requirements.

In this process of feeding the most elementary text book on animal nutrition presents a pattern of supplementary feeding to augment the natural deficiencies of maize.

When we come to the nutrition of the non-ruminant, and man for that matter, a totally different state of affairs prevails as the feeding of maize drastically complicates the efficiency of the nutritional balance sheet. As our time is limited we will confine our discussion to the more interesting phase of maize in nutrition, i.e. the role of maize in the nutrition of the non-ruminant.

As a factor in the nutrition of non-ruminants maize is a product with multiple deficiencies. It must naturally be recognized that in animal nutrition the term "deficiency" is decidedly relative. With the possible exception of a specific milk for a specific animal for a short period of time only, there simply is no complete single good.

In the case of maize, however, the deficiency pattern is serious as it involves all the important aspects which constitute our concept of the state of a deficiency in a food. These aspects are briefly:—

(a) a quantitative deficiency;

(b) a qualitative deficiency;

and (c) an inherent nutritional structural weakness.

1. The quantitative deficiency pattern of maize involves:—

(a) a low total crude protein content.

(b) a poor mineral balance in which the macro-minerals calcium and sodium are practically absent and phosphorus is present in small concentrations in a magnesium-phytic acid combination which according to our experience is particularly refractory to intestinal cleavage by young chicks and pigs. The trace mineral pattern is poor with low concentrations of copper, cobalt and manganese. According to our experience the cobalt content of maize, although usually on the low side, may show wide variations, i.e. from 0.02 p.p.m., which is a low concentration for a natural feed, to 0.12 p.p.m., which, in terms of cobalt deficiency, is considered a "healthy" cobalt content.

We have found the copper and manganese content of maize to show a steady pattern, on the low side for copper 1 to 5 p.p.m., and extremely low for manganese 2.5 to 5.5 p.p.m.

A peculiarity of the maize plant is that the plant itself may absorb very high concentrations of trace minerals without passing them on to the berry itself. This is particularly true in the case of manganese. The low manganese content of maize needs particular attention in the nutrition of poultry where a deficiency of manganese shows up in the form of chondrodystrophic diseases, perosis, poor hatchability and eggshell quality.

Dr. Louw and his Onderstepoort co-workers are at present compiling a detailed structure of the trace mineral content of S.A. Feedstuffs and their work will give us a clear picture of the trace mineral status of S.A. Maize.

(c) the third group of quantitative deficient factors in maize involves the vitamins.

Yellow maize is a fair source of those carotenes which have pro-vitamin A activity and is an excellent source of vitamin B, (thiamin). The content of all the other vitamins in maize spells stark nutritional poverty. This is specially applicable to the members of the B2 group of vitamins such as riboflavin, pantothenic acid, nicotinic acid, choline, biotine, pyridoxine and folic acid with vitamin B12 entirely absent.

The low vitamin content of maize requires every attention in the feeding of poultry and pigs.

2. The second factor in the deficiency pattern of maize is the aspect of a qualitative deficiency involving the protein content of maize. Apart from the low total protein content, the protein con-

tained in maize has a poor amino-acid configuration being particularly poor in its content of the essential amino-acids lysine, tryptophane, valine, threonine, and to a lesser extent methionine and the semi-essential amino acid arginine. Poor as it is the amino acid picture of maize is still further impoverished by the process of degermination which under certain conditions introduces a nutritional menace, especially in our poultry industry.

3. The third aspect of the deficiency pattern of maize is what may be termed an inherent structural nutritional weakness, a factor which seems to be peculiar to the maize berry and which is absent in other cereal grains.

The significance of this inherent weakness of maize, still more or less obscure in animal nutrition, is clearly manifested in human nutrition in the incidence of Pellagra and to a lesser extent in Kwashiorkor.

Human Pellagra is endemic amongst the maize eaters of the world and it has been shown that a deficiency of nicotinic acid somehow lurks in the background of this distressing condition.

The peculiar fact is that the nicotinic acid content of maize is actually higher than that of rye, oats and polished rice which do not induce Pellagra in communities where it forms the staple of the diet.

In the second instance, human Pellagra is cured by the supplementary feeding of milk, milk powder, cheese and eggs, products which actually contain less nicotinic acid than maize.

The tremendous amount of work done in clearing up the problem of human Pellagra may be profitably applied to animal nutrition if we recognize four main factors, viz.:

i. Nicotinic acid is contained in maize in a form which is refractory to metabolism.
ii. Maize has a low content of tryptophane which acts as a nicotinic acid precursor.
iii. Maize has a low content of vitamin B6 (pyridoxine) which governs the conversion of tryptophane to nicotinic acid in the animal body.
iv. and maize contains a factor antagonistic to nicotinic acid.

The identity of this pellagragenic factor has not yet been established but it is thought to be identical and related to the plant auxin indole - 3 - acetic acid of which maize is a rich source.

SUPPLEMENTING THE MAIZE RATION.

With our knowledge of the empirical chemical composition of maize resolved into its nutritional merits and shortcomings it should be a simple problem to supplement a high maize diet with other natural feedstuffs and synthetic products to a ration which will enable a specific farm animal to perform near the maximum of its inherited capacity. This is by no means the case if the effort is based on the mathematics of nutritional requirements.

There is no need to dwell on the complex nutritional picture produced and imponderables introduced if maize is supplemented

with other natural feedstuffs and synthetic products. However, a few examples may be interesting to illustrate the peculiar nutritional character of maize.

As is the case with all cereals, lysine is one of the limiting amino acids in the protein structure of maize.

Early in this year Du Pont announced the large scale industrial synthesis of lysine. We were firmly convinced that this development will introduce a new era in the economical feeding of poultry and pigs through the partial lysine fortification of predominantly maize rations. On the contrary the lysine fortification of maize instead of promoting growth actually retards growth. One may advance the theory that apart from a lysine deficiency maize also has a fragile arginine, threonine and valine pattern and that the weakest amino-acid link still determines the strength of the protein chain. However, wheat and oats both with a lysine deficiency have an equally fragile arginine-threonine-valine pattern, but in the case of wheat and oats, lysine fortification stimulates growth, so much so that the lysine fortification of bread is already practised in America. In contrast, with our present knowledge, the lysine fortification of the maize staple of people in the lower income brackets, may lead to disaster.

There is the interesting case of folic acid. Maize is a poor source of folic acid. Fish meal is a reasonably good source. A mixture of fish meal and maize gives poor growth in the young chick which is powerfully stimulated by folic acid. On the other hand a mixture of kaffircorn meal and fish meal gives a fair growth in the chick which is not stimulated by folic acid supplementation although kaffir corn has a lower folic acid content than maize.

The case of the methionine-maize relationship is peculiar. If chickens are fed a maize ration containing low levels of fish meal, the supplementation of methionine does not stimulate growth. On the other hand the supplementary feeding of methionine does stimulate growth in a maize ration containing high levels of fish meal. It would appear that high concentrations of fish meal in a maize ration leads to partial protein putrefaction with the excessive formation of indole, a factor which not only retards growth in the young chick but which also apparently retards the production of free methionine from protein-bound methionine. If, however, wheat, oats or barley from the carbohydrate basis of the ration this phenomenon is not experienced.

THE DEGERMINATION OF MAIZE.

Maize is degerminated industrially for two reasons, namely:—

(a) to obtain a product with a better keeping quality, and a better taste and eye appeal, i.e. the modern trend in the refining of food, and

(b) maize is degerminated for oil reduction being a particularly rich source of oil containing 4% by weight of oil on the whole berry and up to 40% by weight on the germ fraction.

Where maize is degerminated followed by the removal of the oil from the germ there can be no nutritional objection provided naturally that the defatted germ fraction is passed back to the main body of the degermed product on a *quid pro quo* basis. This is generally speaking the basis of the industrial process, The second proviso to obviate an argument, on nutritional grounds, against the degermination of maize is that in the process of oil reduction the amino-acid and vitamin pattern of the germ must not be injured.

According to our experience a light mechanical pressing of the germ followed by solvent extraction does not injure the nutritional value of germ.

One aspect of the degermination of maize which we consider to be nutritionally disastrous is the general practice of poultrymen to feed degermed maize in the form of chicken grits or crushed maize to poultry.

The poultryman unfortunately measures the value of maize for his birds in terms of the absence of maize bran and germ, the more highly polished the grain the better it is received.

The maize berry may be separated mechanically into a number of fractions. For the purpose of this discussion the two important fractions are the germ and the endosperm.

Of importance is the fact that although the germ constitutes only ten per cent by weight of the berry it contains 20% of the total proteins and over 50% of the vitamins.

Maize contains principally two proteins, namely Prolamin (Zein), concentrated in the endosperm and Glutelin, concentrated in the germ. The difference between these two proteins is that Zein, the protein of the endosperm, is a very incomplete protein containing only traces of tryptophane. Glutelin, the protein of maize germ, is almost a complete protein. Mitchell has recently shown that maize germ has a biological value equal to that of pure beef muscle.

The degermination of maize thus obviously results in a product with a much lower nutritional value measured in terms of vitamins and amino acids.

A nutritional balance sheet reflecting the difference in composition between maize and degermed maize shows that on a percentage basis crushed maize contains on the average 50% less of the vital nutrients contained in whole maize.

The relative composition of whole maize and polished crushed maize is as follows:—

	Lysine	*Trypto-phane*	*Ribo-flavin*	*Panto Acid*	*Nico-tinic Acid*	*Thia-min*
	%	%	*Milligrams per 100 grams*			
Whole Maize	0.220	0.06	0.11	0.55	2.0	0.38
Crushed Maize	0.123	0.037	0.04	0.26	1.0	0.13
Percentage Loss	44	38	63	52	50	65

A lowering in the nutritional value, on a percentage basis, of a product which initially has a low nutritional value, may look impressive on paper but may not be significant in its practical application in nutrition. This is, however, not the case in the feeding of maize to poultry as we will endeavour to show.

The following formula represents a good poultry laying meal which conforms to the standard specifications of The Department of Agriculture and of The South African Bureau of Standards:—

FORMULA.

		Protein	Lysine	Trypto-phane	Ribo-flavin	Panto Acid
	lbs.	lbs.	lbs.	lbs.	mgrs.	mgrs.
Yellow m meal	44					
Wheaten Bran	20					
Lucerne meal	7					
Fish meal	12					
Oil cake meal	10					
Vitamin mixture	3					
Mineral mixture	4					
Total	100	20	1.03	0.226	173	854
Co-feeding 50% Maize		15	0.625	0.143	112	547
Co-feeding 50% Crushed maize		∓15	0.576	0.131	96	484
Percentage loss		—	7.7	8.0	14.3	11.5

By feeding crushed maize instead of whole maize the poultry farmer reduces the intake of vital essential amino acids and vitamins by his birds by 8 to 15% and into the bargain it is costing him money to the tune of approximately 10d. per hen per year or approximately ¾d. per dozen eggs produced.

In this estimation we have conservatively costed crushed maize at 33/- per 180 lbs. and full maize at 33/- per 200 lbs.

Actually farmers pay more for crushed maize and they can buy full maize at less than 33/- per bag.

If we further come to consider that in the above ration the 12% of fishmeal contributes 63% of the lysine and 44% of the tryptophane content of the ration, it is obvious how important the maize supplement becomes if the fish meal content of the ration is lowered.

THE HIGH MORTALITY RATE IN LAYING FLOCKS.

The mortality rate amongst heavy producers in our laying flocks is alarmingly high especially in our egg laying tests.

In all probability this condition has a nutritional background and we would venture to suggest that the finger of suspicion points to the high intake of maize.

Recently the S.A. Workers Brock, the Gillman Brothers and Walker reviewed the severe incidence of siderosis in the S.A.

Native, defining in a broad way, siderosis, to cover excess iron in a specific tissue or in the body generally, whether the iron present is demonstable by staining in histological techniques and whether the iron is extracellular or intracellular.

The terminology, siderosis, hemosiderosis, hemochromatosis and cytosiderosis, needs clarification as at present it is ill defined. Walker advanced the biochemical theory that siderosis in the S.A. Native is due to a dietary iron overload.

The Gillman brothers advanced the physiological pathological theory that the siderosis of the S.A. Native is a cytosiderosis caused by a disordered metabolism of the hepatic cell.

The biochemical and pathological theories of Walker and Gillman may converge if the co-existing malnutrition caused by a dietary overload of maize, is considered.

The deficiency in the diet of the maize eater of the lipotropic factors choline, methionine and vitamin B12 prevents the native from maintaining a normal liver morphology. In addition a deficiency of pyridoxine in the diet of the maize eater causes an abnormal absorption of iron.

Although we cannot see the same high intake of iron in poultry on high maize rations as is the case with the maize eating native, there is definitely the similarity of the action of lipotropic factors, maintaining normal liver function.

We have shown that if a high efficiency laying meal is fortified with the lipotropic factors, methionine, choline, vitamin B12, and vitamin K the mortality rate is drastically reduced. This field of nutrition offers interesting research for the veterinarian.

THE EFFECT OF MAIZE ON CARCASE QUALITY IN PIGS.

It is commonly held in swine nutrition that the feeding of rations containing high concentrations of maize produces soft carcases. Pig farmers will go to great trouble and cost to include in their rations feed ingredients known to produce a firm fat.

It is unfortunate that in our pig industry maize has been nutritionally slandered as a producer of soft pork. This is a damaging half truth. Damaging in the past to the economy of production and damaging in the future to the stability of our fickle maize industry.

The pig deposits both transport feed fat and metabolically produced fat. If the feed fat has a low degree of saturation and the pigs grows slowly, i.e. if the efficiency of conversion is poor, then obviously the rate of transport feed fat to manufactured fat in the carcase will be disproportionate and unsatisfactory viewed from the angle of quality.

If, however, the pig grows rapidly and the ration is arranged so that the pig is in a position to effect an efficient conversion of feed, the process of fat deposition is reversed.

On high energy rations containing up to 75% of maize, excellent carcases are produced if growth is rapid and the ration is well supplied with lipotropic factors.

It is today our considered opinion that the practice of drastically changing the nutritive ratio of the ration as the pig develops, is not conducive to average sound carcase quality if the rations in question are high energy, maize containing rations.

We experience better results in growth, development, quality and economy by feeding a "cradle to grave" high energy-low protein ration of a certain pattern.

We have noticed that young pigs with even the slightest anaemic pattern are simply non-starters on kick-off rations containing high concentrations of maize. In this connection a few words about the incidence of nutritional anaemia in pigs may be interesting.

THE PROBLEM OF ANAEMIA.

Anaemia, though not always recognized as such, has a wide incidence and is more prevalent in this country than generally considered. Anaemia strikes without warning and in the best of families. The onset of anaemia cannot be predicted. It is also extremely difficult to advance a bio-chemical reason why anaemia should develop in young pigs. The problem merits every attention and the prevention of anaemia is part and parcel of the problem of the economic feeding of pigs. The story starts with the pregnant sow. During the gestation period, especially during the last six weeks, the sow like all mammals, normally transmits the complete series of bloodforming factors (certain proteins, vitamins B2, B6, B12, folic acid, iron, copper, etc.) to the livers of the foetuses.

It is generally considered that the well-fed sow will produce a litter with the inherited capacity for rapid growth and development. This concept is basically sound, but unfortunately does not always hold true for the process of blood formation in the young pig after birth.

Several theories may be advanced why the well-fed sow should produce piglets with the inborn tendency to develop anaemia:

i. the sow's reserves of bloodforming factors have been depleted by previous litters to such an extent that during gestation her own depleted reserves are built up with the result that the transference to the foetus is inadequate. It is interesting to note in this connection that first litters rarely develop anaemia.

ii. some unknown factor or factors disturb the normal transference of bloodforming factors from sow to off-spring.

iii. the transference of hemapoietic factors does proceed normally from sow to foetus but the bloodforming factors are "tied up" or immobilized in the liver of the young pig and are not readily available for blood formation after birth.

Work carried out by us over a period of many years, seems to favour this latter explanation. We have found that the livers of young pigs suffering from anaemia contain a higher concentration of bloodforming factors than the livers of young pigs showing no signs of anaemia.

This immobilization of bloodforming factors in the liver of the anaemic pig is apparently not a manifestation of hemosiderosis as we found that the dehydrated pulverized livers of anaemic pigs will rapidly cure anaemia if fed to their anaemic litter mates.

Why the young pigs is at times incapable of mobilizing bloodforming factors from its liver reserves and is at the same time able to absorb bloodforming factors from the elementary tract, is a baffling problem.

Recently the American worker Bremer has shown that anaemia in young animals may be due to the presence of hemolysins in the milk, a situation which to a certain extent is comparable to the Rh factor in man. It is known that occasionally certain antibodies pass the placental barrier in domesticated mammals but ordinarily the simple placenta prevents such passage. It would appear that in swine, hemolysins cannot pass the placental barrier and they are effective in causing anaemia only when the newborn pig drinks colostrum within the first few hours of life. As is the case with other newborn animals, antibodies are destroyed in the digestive tract of young pigs a few hours after birth.

The solution to this interesting problem we must leave in the able hands of our veterinary colleagues.

Of importance is the fact that the development of anaemia in young pigs may be prevented completely by feeding certain bloodforming factors, preferably in conjunction with antibiotics. Of equal importance is the fact that if nothing is done about the condition the affected pig simply becomes a non-profit earning unit, especially on high maize rations.

It has been known for many years that the feeding of soil is a simple remedy for anaemia. Another method is the painting of the sow's teats with an iron, copper, cobalt solution.

We do not recommend these two methods for the prevention of anaemia as the results obtained are uncertain and erratic.

We have experienced most excellent results by dosing the young pigs from the fourth day to six weeks twice weekly with a compound containing trace minerals plus all the other known bloodforming factors plus an antibiotic. We found that this treatment completely eliminates scouring and induces the young pigs to take more readily to a creep feed before weaning. In addition, this treatment during the pre-weaning period precludes the onset of a very common condition, i.e. a break in the growth and development of pigs immediately after weaning.

SUMMARY.

In the feeding of poultry and pigs the structural weakness, peculiarities, nutritional poverty and multiple deficiencies of maize

must be clearly understood in order to change this wonderful energy feed into a balanced ration with a high efficiency rating in production.

With the newer knowledge of nutrition this is quite possible and veterinarians, nutritionists and biochemists should combine their research in the common cause of making available our rich maize heritage to the maximum benefit of our farm stock.

There is every indication that our maize industry is facing a new menace in the form of a reduced consumption of maize by members of the lower income groups.

A lower per capita intake of carboyhydrate calories is apparently a post war development in Western countries.

A reduced intake of maize calories by the masses is nutritionally sound, provided protective foods of non-ruminant origin are at the disposal of these people at a price which they can afford.

STANDARDIZATION OF FEEDSTUFFS

W. R. MOTTRAM,

Principal Technical Officer,

South African Bureau of Standards, Pretoria.

In the Standards Act, Act No. 24 of 1945, as amended, the promotion of standardization in Industry and Commerce is cited as the first of the objects for which the South African Bureau of Standards has been established in 1946. Nobody can deny that South Africa then had and today still has a great need for standardization, if only to raise the general quality of South African manufactured goods thereby.

Since a specification is probably the most common device for fostering standardization in industrial and commercial spheres, one of the main tasks of the Council of the South African Bureau of Standards is the framing of specifications. These are drafted by committees appointed by the Council of the South African Bureau of Standards. On such committees are represented the various government departments, consumer and other interested organizations and the industries concerned. Before a specification is finalized by the committee it is circulated for comment throughout South Africa and to all overseas standardizing bodies, interested organizations and individuals. After finalization it is approved by Council and published. A notice to this effect is published for general information and for the guidance of such producers, large purchasers and consumers as may wish to make use of it. Linked with the issue of a specification is the use of a mark, i.e. a symbol which, when applied to a commodity, will immediately indicate that the commodity complies with the requirements of the relevant specification.

The Standards Act gives the Council powers to issue permits for the use of its S.A.B.S. ellipse standardization mark, the principal condition being that the commodity on which the permit holder wishes to display the mark shall comply with the requirements of the relevant specification.

It may be an opportune moment to mention that some 360 specifications and codes (including those which are in course of publication) have been completed. A total of 355 permits have so far been issued to 218 permit holders, authorizing the use of the S.A.B.S. standardization mark on their products. The Bureau since 1946 has certainly progressed markedly in the field of standardization.

It was thus only natural that the balanced feed industry which was obviously in need of guidance and assistance should become the object of standardization.

In connection with the standardization of feedstuffs I should like to refer in the first place to:
Poultry Feeds.

I have mentioned above the procedure followed when specifications are prepared. The committee appointed to draft a specification for poultry feeds, however, came into being in a slightly different manner. The Department of Agriculture requested the Agricultural Standardizing Committee to draw up requirements for the various commodities covered by the regulations relating to the registration and sale of farm feeds and the registration of sterilizing plants under the Fertilizers, Farm Feeds, Seeds and Remedies Act of 1947. The South African Bureau of Standards was represented on this committee. The Council of the Bureau, when requested by various interested organizations to draft a quality specification for poultry feeds, proposed that the relevant sub-committee of the Agricultural Standardizing Committee should form the core of the committee for poultry feeds and that additional members should be appointed if deemed necessary. Thus the sub-committee of the Agricultural Standardizing Committee, after the incorporation of additional members, was eventually constituted a committee of the Council of the South African Bureau of Standards. This committee drafted the specification for poultry feeds, the requirements of which are based on those in the Regulations, but are more comprehensive. In Table I a list of the various types of poultry mashes and requirements for them as laid down in the S.A.B.S. specification are given:

TABLE I.

Type of mash	Specification requirements							
	Protein, per cent. minimum	Fibre, per cent. maximum	Calcium, per cent.	Phosphorus, per cent.	Manganese, parts per million minimum	Pantothenic acid, μg. per minimum	Riboflavin, μg. per minimum	Vitamin A, I.U per 100 g. minimum
1. Chicken and duckling mash	19.0	7.0	1.4—2.0	0.7—1.0	80	1,750	300	250
2. Maize-free chicken and duckling mash	30.0	11.5	2.8—4.0	1.1—1.7	160	2,500	500	500
3. All-mash growing ration for chickens, ducklings and poults	17.0	7.0	1.4—2.0	0.7—1.0	70	1,750	300	500
4. Maize-free all-mash growing ration for chickens, ducklings and poults	30.0	14.0	3.5—4.0	1.3—2.0	175	2,900	600	1,250
5. Laying Meal for fowls, ducks and turkeys	20.0	10.0	2.0—3.0	1.0—1.5	120	1,500	325	1,000
6. All-mash ration for fowls, ducks and turkeys	15.0	7.0	1.4—2.0	0.7—1.0	70	1,200	225	500
7. Maize-free laying meal for fowls, ducks and turkeys	30.0	17.0	4.0—6.0	1.7—2.7	240	2,000	540	1,300
8. Fattening mash for fowls	13.0	7.0	1.4—2.0	0.7—1.0	—	—	—	—
9. Turkey starting mash	23.0	7.0	1.6—2.0	0.8—1.0	80	1,750	300	700

Indications of the proportions in which the maize-free mashes should be mixed with maize and to which age-groups the various mashes should be fed are specified for each mash. If mashes are marketed as "battery" mashes the amount of Vitamin D_3 to be added is specified.

It should be noted that no specific formulae for the mashes are laid down. This gives a manufacturer full scope to make the best use of the raw materials available. However, a list of permitted ingredients is included in the specification as well as clauses restricting the use of certain ingredients. The physical state of the mashes, the types of containers and their marking, and the sampling of mashes for analysis are also dealt with.

The specification includes methods for (a) the chemical determination of the various ingredients, (b) the microbiological assay of the B-group vitamins, (c) the bone ash method for the determination of vitamin D_3 and (d) details of a chicken growth test for the biological evaluation of chicken mashes. By means of this growth test it is possible to determine the practical efficiency of chicken mashes. The reason for specifying the growth test is obvious. The Bureau found on several occasions that the growth obtained on chicken mashes which, upon analysis in the laboratory complied with all requirements, was unsatisfactory.

As they may be of interest, the details of the growth test are given here:—

White Leghorn setting eggs, supplied by a registered poultry farmer at intervals of four weeks, are hatched at the Bureau. The resulting chickens are divided into eight equal groups consisting of 40 to 50 chickens each. Approximately equal numbers of pullets and cockerels are present in each group. To each of seven of these groups is fed a chicken mash manufactured under the standardization mark scheme. The eighth group forms the control and to these chickens a standard ration is fed. As will be noted from its recipe this ration is devised as a standard of comparison for good average growth. The ration's composition is given in Table II.

TABLE II. — STANDARD RATION.

Ingredients	*Parts by weight*
White maize meal	40
Oatmeal (with hulls)	30
White fish meal (68 per cent protein)	12
Peanut cake meal	8
Wheat bran	5
Lucerne meal	2
Limestone flour	2
Bone meal	1.5
Salt	0.25
Manganese sulphate	0.02
Pantothenic acid	0.00044
Riboflavin	0.00015
Vitamin D_3	22,680 chick units per 100 lb. mash

The test period lasts for six weeks during which the various mashes are fed *ad lib.* At the end of this period the chickens are weighed individually and the average weight for each sex in the groups calculated. These weights are then compared with 90 per cent of the average weight recorded for the chickens kept on the standard ration. The chickens are housed in brooders under uniform conditions.

During the test period the chickens are carefully observed for any symptoms of deficiency diseases.

In connection with the growth test requirement for chicken mashes, I should like to express as my considered opinion that the specification for poultry feeds will not be complete until such time as other mashes, and especially laying mashes, can also be evaluated biologically.

The specification for poultry feeds, the requirements of which have been set out above, was approved by the Council of the Bureau on 26th June, 1950, and shortly after its publication the four largest groups of poultry feed producers in the Union of South Africa applied for permits to use the standardization mark on their poultry feeds. By the middle of 1951 permits were granted to these manufacturers, and standardization of poultry feeds became a reality. The present position is that the standardization mark is being used on 9 different brands of poultry feeds manufactured at 23 different factories. An application for a permit involving a further brand name and factory is still under consideration. A total of approximately 180,000 tons of poultry feed is manufactured annually under the S.A.B.S. standardization mark. This tonnage can be taken as constituting at least 90 per cent of the total annual production of commercially balanced poultry feeds.

It seems opportune to emphasize here that the specification is of a voluntary nature and that manufacturers have to apply to the Bureau for a permit to use the mark on their products.

When applying for a permit the manufacturer submits samples of his product for examination for compliance with the requirements of the specification. At this time a preliminary inspection of his factory is also conducted and attention is drawn to matters which should be put right. On assurance by the manufacturer that these matters have been attended to, the permit committee of the Council of the South African Bureau of Standards inspects the factory and if it is found to be in order and has the necessary testing facilities and if the samples submitted have been found to comply with the requirements of the specification, a permit is issued in favour of the manufacturer. It should be noted that in the case of poultry feeds, regular chemical control analyses by the manufacturer of his products and certain important raw materials are regarded as essential and to this end a suitable chemical laboratory in charge of a qualified analytical chemist is required at the factory. Alternatively, the chemical control may be exercised by the laboratory of a branch or an affiliated factory or an agreement may be concluded with an

independent laboratory or analyst for carrying out the necessary chemical control.

Once a permit has been granted it is required of a factory to exercise adequate chemical control of its products. This includes the determination of protein, fibre, calcium, phosphorus and manganese. The frequency of these analyses depends on the magnitude and intensity of production, although managements of factories are not required to perform the highly technical microbiological assays for riboflavin and pantothenic acid. Furthermore it is required that careful control be exercised over the mixing and labelling of the various mashes. The laboratory records and the data of the batch mixes and recipes used must be neatly tabulated and must be available for scrutiny by the Bureau's inspectors at any time.

Apart from control at the factory, the Bureau performs its own checking control which consists of the full analysis of at least one sample per month of every type of feed produced by each factory operating under the mark scheme. In this manner not less than about 1,200 samples of poultry feeds per annum are analysed by the Bureau's staff — a total of at least some 7,000 determinations in all. In addition riboflavin and pantothenic acid assays are performed on approximately 600 of these samples while some 90 are tested out biologically by means of the chicken growth test.

Judging from the analytical data accumulated during the past four years it is clear that the majority of the producers have solved their initial problems and only minor alterations in the formulations of the feed from time to time — depending on the raw materials — and a more stringent control over the mixing operations are now required. The improvement in the general quality of the South African product has been significant. In this connection it was a great pleasure to the Bureau when it received a letter from the Division of Veterinary Services in which it was stated: (I quote) "The standardization of poultry feeds has already proved of the greatest value to the farmer. You, of course, know that when the testing of feedstuffs started we often found unsatisfactory growth and even vitamin deficiencies in the chicks maintained on the Bureau's premises. Recently we have had uniformly good results and these substantiate the excellent results obtained by the farmers. I think that the improvements have been due very largely to the fact that the firms have now taken a much greater interest in the proper mixing of poultry feeds. To sum up, I think it is fair to say that the standardization of poultry feeds has been of inestimable value to the poultry industry and also to the manufacturers themselves," (unquote).

It is the Bureau's opinion that manufacturers have learnt the value of quality control and this in itself is a significant achievement.

Pigfeeds.

The specification for poultry feeds had hardly been printed and the mark scheme barely initiated when the Council of the Bureau of Standards received a letter from the Pig Development Associa-

tion of South Africa requesting that a specification for pigfeeds should be prepared. The following is an extract from this letter:— "In view of the frequent complaints from our members about the feeding efficiency of proprietary feeds when compared with the results obtained from the feeding of home-mixed rations to pigs, this Association would be pleased if you could arrange for this matter to be investigated by the Bureau of Standards with a view to the preparation of a specification for pigfeeds."

From this letter it would appear that the Pig Development Association of South Africa was of the opinion that standardization of pigfeeds was indeed necessary. The Association not only requested the Bureau to prepare a specification but also contributed a considerable sum of money towards defraying the cost of preparing it. The Council of the Bureau acceded to the request and steps were immediately taken to constitute a technical committee to which the task could be entrusted. This committee met for the first time on 8th July, 1952, and for three years did valuable work, the specification being finalized in June of this year. Some little trouble is, however, still being encountered in connection with certain aspects of the growth test method, especially the procedure to be followed and the statistical evaluation of the results. However, it is only a matter of time and these difficulties will be overcome. Thus the time is drawing near when a further stage in the standardization of feedstuffs — the administration of the S.A.B.S. mark scheme in relation to pigfeeds — will be launched.

The specification for pigfeeds covers requirements for three different meals, viz. pig starter meal for creep and weaner feeding, pig growth meal and pig fattening meal, as well as their maize-free equivalents. Requirements are specified for protein, fibre, fat, ash, salt, calcium, phosphorus, manganese, iron, copper, carotene (expressed as vitamin A), riboflavin, pantothenic acid, niacin, vitamin B12 and, in the case of the creep feed, vitamin D2. The necessary test methods are also set out in detail. For each of the three types of ration there is also a growth test requirement.

The intention is that the growth test will be performed in three different stages or possibly as three different tests on the three types of ration mentioned. The first stage or test will be concluded when the animals reach a weight of 70 $\pm$ 5 lb. and the second and final stages when the animals weigh 120 $\pm$ 5 lb. and 210 lb. $\pm$ 5 lb. respectively. During the entire test period the pigs will be housed and fed individually in such a way that they can see one another. It is also the intention to institute the self-feeding system. The pigs will be weighed weekly before the morning feed.

At the end of the final stage of the test all carcasses will be evaluated for quality. This evaluation will, *inter alia,* cover back fat thickness, softness of fat and size of eye muscle.

Details as to how many replicates per sex will be required per product — an equal number of tests with males and females will be performed — and how the findings (weights) can be assessed statistically, are still to be formulated.

Cattlefeeds.

Upon completion of the specification for pigfeeds it was possible to commence work on the preparation of a specification for cattlefeeds for which requests had been received from various bodies, including the South African Fresh Milk Producers' Association. The first draft of this specification will be discussed on 14th September, 1955, by the newly constituted committee for cattlefeeds. This draft deals with cattlefeeds for both dairy and beef cattle and covers some sixteen meals, including the maize-free meals. Requirements for the following meals will be proposed:- Milk substitute meal, calf starter meal, calf growth meal, growth meal, milk production meal, fattening meal, maintenance meal, ranch conditioning meal and bull meal. Except in the case of milk substitute meal it will not be necessary to consider specifying limits for the B-group vitamins as ruminants synthesize these themselves. Requirements will, however, have to be considered for protein, fibre, fat, calcium, phosphorus, magnesium, copper, cobalt, salt, fluorine and carotene expressed as vitamin A.

It is hoped that the specification will be completed early in 1957. It will indeed be a red letter day in the history of animal husbandry in South Africa when the entire balanced feed industry is in a position to subscribe to standards of quality on a voluntary basis.

South Africa has progressed steadily in the direction of standardization of feedstuffs and with very able men in the industry who are constantly keeping abreast of developments in the science of animal nutrition, further progress will undoubtedly be made. I think I may say that in future the Bureau of Standards will be called upon to take an even greater part in this field than it has taken in the past. The Bureau will do its utmost to assist the Industry in their genuine efforts to produce well-balanced feeds and to guarantee to the consumer the quality he has come to expect from a feedstuff sold under the S.A.B.S. standardization mark.

CARBOHYDRATE METABOLISM IN RUMINANTS WITH SPECIAL REFERENCE TO KETOSIS

Contributed by the Department of Physiology, Onderstepoort

R. CLARK and K. E. WEISS.

It is a well established fact that, in ruminants, by far the greater proportion of the dietary carbohydrate is absorbed as lower fatty acids and not as monosaccharides. It is estimated that in sheep on a normal diet not more than 4 gm. of monosaccharide per day is absorbed from the intestinal tract. The enzymic digestion of starch is very inefficient as shown by the loss of crushed grain and even meal in the faeces of cattle on a high starch diet. On a normal diet very little starch or sugar escapes fermentation in the rumen.

The main end products of carbohydrate fermentation, including that of cellulose, are acetic, propionic and butyric acids which together make up more than 85% of the total volatile fatty acids produced. Little is known of the other fractions and their possible significance cannot as yet be discussed. Of the three acids mentioned, acetic accounts for some 67%, propionic 19% and butyric 14% of the total. These acids are mainly absorbed, as their sodium salts, through the wall of the fore-stomachs, and their fate has become a major problem of ruminant physiology.

These facts alone indicate a specialized carbohydrate metabolism in ruminants but further peculiarities must also be mentioned.

The blood of ruminants contains only about half the amount of glucose found in most other animals and the regulation of the blood sugar level is relatively inefficient. When glucose is injected intravenously into ruminants, the duration of hyperglycaemia exhibited is comparable to that seen in a diabetic human. On the other hand, ruminants are exceedingly resistant to a low blood sugar, showing no symptoms at levels as low as 15 mg.%, a figure at which most species would show coma and death. Another peculiarity of ruminants is that their blood contains relatively large amounts of acetic acid derived from ruminal fermentation.

Despite the above facts, it is doubtful whether carbohydrate metabolism in ruminants is fundamentally different from that in other animals. The difference probably lies in a greater emphasis on alternate metabolic path-ways. The basic facts concerning carbohydrate metabolism and energy production will therefore be reviewed.

The blood glucose normally forms the major source of energy and its dissimilation is briefly as follows: By means of various enzyme systems the glucose is first converted to pyruvic acid. During further catabolism, in the Krebs citric acid cycle in which energy is released and CO_2 produced, acetic acid plays an important part.

In monogastric animals, acetic acid is mainly derived from pyruvic acid. If the acetic acid can be obtained from some other source, therefore, glucose will be spared. An alternative source of acetic acid units in all animals is from the breakdown of fat but the efficiency of this system depends on the simultaneous availability of an equal amount of pyruvic acid which is necessary for the introduction of acetic acid into the citric acid cycle. This then explains the old concept that "fat is burned in the flame of carbohydrate". In the absence of sufficient carbohydrate the excess acetic acid is converted into excess ketones which in themselves normally form a subsidiary source of energy.

It will therefore be seen that the acetate present in the blood of ruminants and derived directly from carbohydrate fermentation in the rumen can be used in this manner for energy production.

Acetate can also be utilised by some tissues directly and independently of the presence of glucose. This is exemplified by the fact that the isolated perfused rabbits heart can perform as well on acetate as on glucose. It would appear, however, that, in most animals, the nervous system can only utilise glucose. The resistance of ruminants to hypoglycaemia is probably partially explained by a greater ability of all tisseus, including those of the nervous system, to utilise acetate as an alternative to glucose. It must be remembered however, that this ability is only partial and prolonged hypoglycaemia produces permanent damage to the brain. This fact probably explains the failure of intravenous glucose sometimes encountered in the treatment of long established hypoglycaemia eg. Ketosis.

It can therefore be assumed that much of the acetate absorbed from the rumen is used as a direct source of energy. This is borne out by the fact that the dosing of acetate into the rumen causes no detectable change in the blood sugar and only a very slight rise in the Ketones.

Acetic acid can also be utilised for the synthesis of fat and it is of interest to note that the mammary glands of ruminants are particularly adapted to this process.

Butyrate.

When butyrate is dosed into the rumen there is a sharp rise in blood ketones and a drop in blood sugar. Pennington has shown that butyrate is converted to ketone bodies mainly by the epithelium of the rumen and reticulum and by the liver. The drop in blood sugar following butyrate dosing has not yet been explained.

Propionate.

The dosing of propionate causes a sharp rise in blood sugar, the conversion apparently taking place in the liver. Propionate probably forms the major source of the blood sugar in ruminants. When given with butyrate, propionate antagonises both the rise in blood ketones and the drop in sugar caused by butyrate alone.

It will therefore be seen that hypoglycaemia and ketonaemia in ruminants may theoretically arise in two different ways — viz.:

(i) A deficiency of glucogenic propionic acid and glucose sparing acetic acid derived from the rumen leading to a fall in blood sugar. This is then compensated for by the mobilisation of depot fat which, as already shown, can lead to ketonaemia. (i.e. Typical starvation ketonaemia).

(ii) An alternative aetiology would be an increase in the proportion of butyric acid over that of propionic acid produced in the rumen. (Digestive ketonaemia).

Before the latter possibility can be accepted as of practical importance, it must be demonstrated that such a disturbance can in fact occur.

The amounts of the three main volatile acids in the rumen have been determined on a wide variety of diets in many parts of the world and the results show a remarkable degree of uniformity. As will be explained later, this is probably due to the fact that in all such experiments the animals were fully adapted to the diet concerned.

Similar work has recently been started at Onderstepoort under Dr. Gilchrist and the results so far obtained are of interest.

Two groups of sheep were each given a ration of 400 gm. grass hay and 200 gm. crushed yellow mealies. In addition one group received 50 gm. of fish meal. After full adaptation, 60 days, the proportions of the volatile fatty acids in the ruminal fluid was found to be very similar in both groups.

The fish meal was then switched from the one group to the other. Within 24 hours there was a distinct change in both groups. In the sheep in which the protein intake was suddenly reduced there was a rise in butyric acid production and a fall in that of propionic acid, so that the propionic/butyric acid ratio fell to 1.2 and remained there for some 14 days. In the other group the reverse reaction occurred. Twenty four days later both groups again showed figures similar to those obtained before the switch in diets.

No significant blood changes or symptoms were encountered in any of the sheep but it must be remembered that the change in diet was not drastic and the variations in the proportions of propionic and butyric acids was evidently still within the adaptation powers of the body. These experiments are continuing.

The results so far obtained indicate two important possibilities.

(i) The ruminal flora can adapt itself to a relatively wide range of diets to produce an end result compatible with the complete health of the animal, and

(ii) Any sudden change in diet, even within the physiological range, may cause an upset leading to a variation in the relative and absolute amounts of volatile fatty acids produced. Such a disturbance, if severe enough, may well result in metabolic disturbances in the host animal. The period required for full adaptation of the flora to even a relatively minor change in diet would appear to be at least three to four weeks.

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When we review the two possible aetiological bases of ruminant ketosis and hypoglycaemia in the light of practical experience we find that there is considerable evidence for both of them. This can be summarised as follows:-

(i) Domsiekte can be produced by a sudden reduction in the diet of heavily pregnant ewes but *only in fat animals*. This indicates the role played by the mobilisation of fat.

(ii) The percentage of cases produced by the above method is greatly increased if the animals have been conditioned on a high protein diet.

This would suggest the contributing factor of a ruminal upset similar to that which occurred in the experiment just described.

Further work is required before the relative importance of the two processes can be assessed.

The Hormonal Control of Carbohydrate Metabolism.

The blood sugar level is mainly maintained by the antagonistic actions of insulin, which depresses it, on the one hand, and the glucogenic actions of adrenaline, pituitary and cortical hormones on the other. Adrenaline acts by stimulating glycogenolysis in the liver and is therefore of little value where the liver glycogen is already depleted. Cortical hormones act mainly by stimulating the formation of glucose from protein. The beneficial effects of A.C.T.H. and cortisone in the treatment of ruminant ketosis can be explained on this action. They also stimulate ketogenesis but this effect is probably more than counterbalanced by their facilitation of the use of the ketone bodies by the tissues.

Although A.C.T.H. and cortisone are of benefit in ruminant ketosis this is no proof that the condition is primarily a cortical deficiency. It must be remembered that many other diseases which show such a response (e.g. arthritis) are not associated with hypocorticism. In our opinion the basic cause of ketosis is dietary and hormonal therapy merely assists the body in its adaptation to a disturbed carbohydrate metabolism.

THE EFFECT OF STILBOESTROL ADMINISTRATION ON WEIGHT GAINS OF ANIMALS

(A summary of available knowledge)

I. VAN SCHALKWYK,

Johannesburg.

Nutritional research literature has in recent months given quite considerable prominence to reports dealing with the use of Stilboestrol as a growth promoting agent in certain domestic animals. Although the effect which this hormone-like chemical has upon the growth and liveweight gains of certain varieties of stock is not a new discovery, it is only in recent years that the nutritional application of this drug has received a measure of respectability and official recognition in certain parts of the world.

South African regulations guard against the unauthorised inclusion of Stilboestrol or affiliated substances. These regulations demand that the incorporation of "artificially prepared substances, chemical compounds of hormones" must be declared when submitting the formula of a feed, stock lick or farm remedy for registration. It is extremely doubtful whether any feed manufacturer e.g. would be permitted to incorporate such a substance at this time, and in view of the inadequate knowledge which exists today about certain effects which Stilbestrol feeding may have on animal and human health, this conservatism appears to be completely justified.

However, when the tremendous economic benefits which Stilboestrol feeding may confer on our beef industry are taken into consideration it becomes obvious that this new toy cannot be lightly disregarded by the custodians of human and animal health. Any device which assists our farmers to produce more meat, more quickly, with less feed and expense, warrants exhaustive investigation, and it may be timely therefore, to examine the progress now made in this new field of nutritional research.

Stilboestrol is the chemical counterpart of the natural oestrogen Œstradiol and has been used for many years in the treatment of certain disorders of the reproductive system. It first leapt into prominence in the nutritional field as a chemical agent for the caponisation of cockerels.

It's use has now spread as a growth promoting and fattening agent for sheep and cattle. Swine do not appear to benefit from it's administration.

A fairly comprehensive account of its effect on beef animals is given in a recent paper by Andrew, Beeson & Johnson, who describe the results of Stilboestrol implants on groups of yearling Hereford steers. During a test period of 182 days some groups

received a total of 60 mg. of Stilboestrol in five successive implants. Other groups received double this quantity. Both the treated groups made highly significant gains when compared with the controls and converted their feed with far greater economy. In these, and other tests, steers consistently averaged daily gains of approximately 0.5 lbs. more and used 10 per cent less feed than did the untreated controls.

On the debit side, however, came the results of carcass grading. Untreated controls in these and other experiments consistently averaged slightly higher grades, although no significant difference was reported in the dressing percentage. This is in conflict with many observations made on treated sheep carcasses where some decrease in the dressing percentage is noted with almost consistent regularity.

These workers also reported some of the anatomical and physiological side effects of Stilboestrol implanation. The steers in this experiment, from as early as the second week, took on the appearance of nymphomaniac cows, exhibiting oestrus behaviour and an uneven topline resulting from an elevated tail root. Mammary development was also reported, which, in this experiment seemed to be limited to an increase in teat length.

Side effects resulting from Stilboestrol treatment were reported as early as 1948 by Marshall and co-workers who observed that dairy cattle treated with Stilboestrol to induce lactation could in extreme cases develop locomotor difficulties in the hind legs. This manifestation was said to be the result of an excessive relaxation of the broad ligaments between the ischium and the sacrum which caused a partial dislocation of the ilio-sacral cartilage. However, in none of the experiments dealing with the growth promoting properties of Stilboestrol have such extreme symptoms been reported.

Mammary stimulation on the other hand is reported in varying degrees by other workers. Changes in teat length were among the lesser aberrations, but heifers were actually brought to lactation and even steers were found in some instances to have produced a considerable quantity of milk in well developed mammary glands. Such gross changes would presumably result from excessive dosages.

This excessive mammary stimulation was often seen when the treated animals were on spring and summer pasture and there is considerable support for the opinion that this type of pasture provided the test animals with a significant oestrogenic intake in addition to that received from the pellet implants.

The side effects described did not at any time present any problems of management during these experiments, and did not affect the feed consumption or ability to graze. In other experiments, reports are noted of the occurrence of vaginal and rectal prolapses. These manifestations were most frequently seen in sheep treated with Stilboestrol, particularly if they were on irrigated pasture, and were preceded by straining at micturition and defaecation. Preputial enlargement and perineal swellings were frequently noticed, and a fairly high death rate accompanied these symptoms.

These "urinary calculi like symptoms" are well known to Australian workers in their studies of the effect, which estrogenic material contained in subterranean clover, has upon the accessory sexual glands of sheep. They postulate that an infection occurs in these glands leading to necrosis, and an accumulation of cell debris which produces a mechanical obstruction in the urinary system. The prolapses are then due to the resultant straining.

In another experiment Clegg & Cole of the University of California used Stilbestrol implants on Hereford steers and heifers as well as castrate male and intact female lambs. The cattle were tested both on pasture, and under conditions of stall feeding. They reported that both heifers and steers on pasture without heavy supplementary feeding of concentrates, did not gain significantly more than the controls. When supplementary feeding was done, both on pasture, and in the feedlot, highly significant gains were produced. Here again, the best results were achieved with steers, who averaged some 0.5 lbs. more in their daily gains than did the controls. Heifers gained at an average of 0.08 lbs. per day more rapidly than the controls.

The sheep were tested on pasture only, and both wethers and ewes made more rapid gains than did the controls. These gains averaged 0.18 lbs. more per day for wethers and 0.12 lbs. more per day for ewe lambs. Feed utilisation again was markedly improved with a greatly increased rate of Nitrogen retention.

The grading of carcasses followed the established pattern, the higher grades being consistently found in the untreated controls.

Carcasses from the Stilboestrol implanted groups were described as having coarser muscle fibres of a darker red colour than normal. Marbling was far less distinct and both the visceral and subcutaneous fat deposition was considerably reduced. The carcass conformation too was different with heavier shoulders and leaner loins, a conformation which is normally associated with "stags" or partial castrates.

Attempts have been made by various workers to control the anatomical and physiological side effect with the simultaneous administration of Progesterone. A measure of success has been claimed by some workers but it is not clear to what degree these side effects can be controlled. In the experiment described, Progesterone was tried without any noticeable effect and the failure to achieve success was put down to the fact that Progesterone was either used at inadequate levels or that an improper Stilboestrol-Progesterone ration was used.

These workers also reported on the macroscopic and histological changes in the endocrine glands. Hypertrophy of the pituitaries and adrenals were observed. The thyroids appeared to be smaller than normal while the ovaries of treated heifers contained far fewer functional corpora-lutea. Histological observations indicated an increased activity of the glands as demonstrated by a heightened epithelium and enlarged cell nuclei.

Biological assays on the growth hormone content of the anterior-pituitary were of interest, in that these glands in heifers, contained approximately twice as much hormone as those of the heifer controls, while those of treated steers had slightly less than their controls. The writers had difficulty in explaining this observation in view of the greater growth response made by steers but suggested that the growth response may be connected with the secretory rate.

Differential bloodcounts revealed a sharp eosinopenic response in treated animals. It is known that a higher tempo of activity by the adrenal cortex is related to a depression of blood eosinophils and it would appear that Stilboestrol stimulates the ruminant pituitary to increase its A.C.T.H. output resulting in a heightened adrenal-cortical activity.

While the earlier work on this subject was done by studying the effect of Stilboestrol implantation, later work demonstrates the value of Stilboestrol when fed orally in a vehicle of concentrates. Burroughs and others, reported growth responses from this method without the development of undesirable side reactions. This observation was not confirmed by Perry and others who reported that pelvic and mammary changes were induced by the oral administration of 10 mg. daily of diethylstilboestrol, dienestrol-diacetate, or hexestrol. These changes could not have been of very great importance as little rference is made to them. While all the beneficial effects previously reported were confirmed by this test an additional observation emerges here, and that is that no significant oestrogenic activity was found in the meat of animals consuming this drug even if fed up to the day prior to slaughter.

This observation, while of paramount importance to the guardians of human health cannot be accepted without reservation, as the same workers had demonstrated in a previous paper that residual oestrogens were present in the meat of steers, wethers, and chickens which had received subcutaneous implants of Stilboestrol. Their method of assay had been proved to be extremely sensitive. Their results depended upon the uterine weights of ovariectomised mice fed on the meat of Stilboestrol treated carcasses and they have been able to determine with great accuracy how much residual oestrogen is present in such meat. It is not yet clear whether residual estrogens are present in the meat of animals treated with the implant method, and not in animals receiving Stilboestrol per os, and whether residual estrogens when detected are present at levels likely to affect human. health.

The maximum oestrogenic concentration they found in the various cuts tested was one micro-gram per gram of meat and while these workers admit that attempts to determine safe tolerance or exposure levels, for man are beyond the scope of their paper, they point out that 22 lbs. of cooked meat containing this concentration of 1 gamma per gram would have to be consumed daily by man to furnish the therapeutically typical dose of 1 m.gm. per day. (It

should be noted that Stilboestrol is extremely heat stable and is not affected by cooking).

These workers too, make reference to the extremely high tolerance which humans have exhibited to Stilboestrol and cite experimental work by Ferguson in which pregnant women who were dosed with Stilboestrol between the 10th and 30th weeks of pregnancy ultimately received as much as 137.5 m.gms. of Stilboestrol daily without any effect on the duration of gestation period, health of the mother, or the weight and survival of the child. This dose would be contained in approximately a ton and a half of Stilboestrol treated meat eaten daily.

They point out too that a large variety of natural feeds contain oestrogens. Amongst these are the subterranean clovers of Australia, and other pasture grasses of various types, oats, rhubarb leaves, while even maize has been shown to contain considerable quantities of oestrogens. It was found for example that the uterine weights of the mice used for assay were heaviest when they were fed on an all grain ration.

This observation should be of tremendous interest to the students of infertility problems of cattle and sheep and one wonders whether the oestrogenic activity of spring grazing with its effect on functional corpora-lutea is not Nature's way of preventing conception in the early spring and subsequent birth in the following winter.

However, from the point of view of this paper these observations are only important in that they demonstrate the degree of reserve required when considering the implications of proof that oestrogenic material may be present in Stilboestrol treated carcasses. Whether this is significant from the human health point of view is somewhat dubious, for if natural foodstuffs which are eaten daily by man contain a greater, or even an equal concentration of oestrogenic material than Stilboestrol treated meat, it becomes difficult to decide whether this growth promoting agent is in fact dangerous to man.

To summarise then —

1. It has been established that Stilboestrol at the rate of 10 m.gm.'s per day administered orally in the presence of adequate supplies of concentrates produces weight gains, and an increased economy of feed consumption which is of considerable economic importance.
2. A similar result is obtained by the periodic subcutanous implantation of Stilboestrol at a dose rate of one 12 m.gm. pellet every 30 days.
3. Undesirable side reactions include lower carcass grades from treated animals as well as changes in sexual behaviour. It is possible that these side reactions can be minimised or completely eradicated.
4. No conclusive evidence is available about the effects on man of the oestrogenic activity of the meat consumed from such

animals but available information indicates that little or no danger will result from this practice.

5. The feeding or implantation of Stilboestrol is strongly contra-indicated in breeding stock owing to its depressing effect on the fertility of the female.

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PROGRESS IN POULTRY NUTRITION

J. D. W. A. COLES,

Onderstepoort.

When I was asked to participate in this symposium, because of my interest in avian nutrition, I thought it would be a good idea to read again some of the chapters in some of my poultry books of 40 to 50 years ago. The evening was well spent. It was not uncommon then to give the hens different meals on different days of the week, and I suspect that the simplest menus were always reserved for Sundays — no doubt to compensate the harassed housewives and maids in some small measure for having to prepare the fantastic midday dinners that were then the vogue.

The manufacture of mammoth incubators after World War I, followed by the introduction of B.W.D. testing, completely changed the face of the poultry industry and new methods had to be devised for feeding not a hundred but thousands of chickens on a single farm. Progress since 1930 has been phenomenal and we have probably already won most of the more sensational victories. I need only refer to the discoveries of the significance of vitamins A, B1, D3, E, H, K, riboflavin, cobalamin, pantothenic acid, niacin, folacin, choline and pyridoxine, of the minerals calcium, phosphorus, copper, iron, iodine, potassium, magnesium and above all manganese, and of the essential amino-acids methionine, lysine, leucine, tryptophane, histidine, glycine, threonine, arginin, phenylalanine, isoleucine and valine. And lest the fact be forgotten, I should remind you of the great importance of these brilliant discoveries to the advancement of human medicine, and to a better understanding of the nutritional requirements of the domestic mammals.

If the biggest battles have been won, the mopping up operations are going to be very protracted and full of significance. There are obviously many vitamins still to be identified, that influence growth if nothing else, and endless work must yet be done on the inter-relationships of dietary factors. When we recall that calcium phosphorus, manganese, choline, biotin, folacin, niacin, vitamin E and the bird's own genes may be involved in the perosis syndrome, some idea will be formed of the complexity of this whole question of interrelationships. And in this connection we should remember that the diet of the hen has a profound influence on the subsequent needs of the chick.

The problem of the antimetabolites, such as avidin and anti-thiamin which neutralise biotin and B1 respectively, may be greater than is believed at present.

Although we know that mashes, coarse in texture, are preferred by chickens to those that are floury and that pelleted mash is more

economical to feed than ordinary mash, we need to ascertain more about the bird's likes and dislikes where flavour and colour are concerned. Palatability is governed to some extent by the moisture content of the diet, and it is possible that the figure of 11 or 12% aimed at by many overseas firms is not altogether correct.

We are still only at the beginning of the work on chemical preservatives, like the antioxidant diphenyl-paraphenylenediamine and there is good reason to suspect that sunlight means more to a chick than simply promoting the production of D3.

In a world of soaring labour bills and an ever increasing demand for extra supplies of meat at a reasonable cost, it is natural that our thoughts should turn to the medication of food or water to check a disease like coccidiosis. It is perfectly true that no antibiotic, drug or vaccine is a substitute for good hygiene, but if it is economically impossible to raise to still higher levels, the standard of hygiene which may be very good already, we have to do the next best thing and fall back on the various remedies. Provided drugs are used intelligently, that are efficacious and do not constitute a danger to man, I cannot see how we can decry their incorporation in animal feedstuffs.

The role of antibiotics in poultry nutrition is being investigated more assiduously than ever before. The poult benefits more than the chick, and the duckling virtually not at all. It is practically certain that micro-organisms which impair growth without eliciting definite signs of disease are widespread in nature. If the known antibiotics are able to keep some of these in check, even when fed at below ordinary therapeutic levels, are there not other germs that will go on impeding growth until further antibiotics or other compounds are discovered?

The fact that some investigators find the feeding of arsonic acid or arsanilic acid advantageous, while others do not, suggests that the fauna and flora of the chicks' body may vary from one laboratory to another. Maybe the dispute over the value of surfactants, or surface tension-reducing agents in the diet may have a similar explanation.

These few remarks will certainly dispel any idea that we know all the answers to our problems, but we can get along very well with the knowledge already amassed.

There is nothing static about the science of nutrition, if only because changing circumstances demand continuous adjustments. Manufacturing processes are always being improved, but these so-called improvements are often responsible for the byproducts being of poorer quality. What has happened to our wholesome pollard since our flour mills were re-equipped to mill our wheat? Now we have nothing but bran, and the example could be multiplied many times.

Alterations in the genetic constitution of our birds, particularly the broilers, due to improvements as a result of careful breeding, have created new problems for our feed mixers.

A rapidly growing cockerel that is going to weigh three pounds when two months old, cannot thrive on the protein, minerals, vitamins and calories that suffice for Leghorn pullets destined for the laying houses.

In the case of animals with simple stomachs like the pig and the fowl, the day of the farmer working out his own rations has certainly gone forever. Even when we present him with carefully compiled recipes he can do little, because it is almost invariably too difficult and too expensive for him to obtain all the necessary ingredients of the mashes. Our main concern as a profession is to see that the farmer can obtain balanced rations of excellent quality at the lowest possible prices, and in this connection both the South African Bureau of Standards and the feed firms themselves must be our allies.

If you are amazed at its artificial nature, please try to understand that poultry mashes always were composed largely of the by-products of various industries and that synthetic vitamins and other nutritional factors are often more readily available to the animal than those occurring in natural feedstuffs. Furthermore, to be quite candid, I doubt whether any combination of natural feedstuffs, irrespective of price, can produce such good results as the semi-synthetic rations that make old-fashioned nutritionists dissolve into tears.

At this stage I think I should give you some idea of what a record breaking broiler mash may be composed of. Here is the winner:

Yellow mealie meal	987.6	lbs.
Yellow grease, titre 37, stabilized	300.0	lbs.
Drackett assay protein. 90% prot.	310.0	lbs.
Fish meal, menhaden. 60% prot.	200.0	lbs.
Pfizer's fermentation product (Vigo)	5.0	lbs.
Dried brewer's yeast	100.0	lbs.
Dehydrated lucerne meal. 17% prot.	20.0	lbs.
DL-methionine	4.0	lbs.
Ground limestone	30.0	lbs.
Dicalcium phosphate (20% P, 24% Ca)	20.0	lbs.
Salt	10.0	lbs.
Trace mineral mix (Del-a-mix)	2.0	lbs.
Vitamins A & D mixture (4000 A — 750 D)	5.0	lbs.
Diphenylparaphenylenediamine	0.4	lb.
Arsanilic acid supplement. 20%	1.0	lb.
Choline chloride. 100%	4.0	lbs.
Procaine penicillin supplement. 4 gms/lb.	1.0	lb.
Riboflavin	6.0	grams
Niacin	40.0	grams
Calcium pantothenate	12.0	grams
Vitamin E acetate	5.0	grams
Vitamin K. Menadione	1.0	gram

Cobalamin	0.01	gram
Biotin	0.1	gram
Pyridoxine	3.2	grams
Folacin	0.7	gram

This ration contained 27.1% crude protein, 1240 calories per pound of productive energy, 1.38% calcium and 0.91% total phosphorus (0.67% available phosphorus). It incorporated sufficient of all eleven essential amino acids, apparently all minerals and vitamins, and for every 1% protein there were about 45 cals. per pound of productive energy. Antibiotic, arsanilic acid and antioxident completed the picture.

At the age of 52 days, Dark Cornish X New Hampshire crossbred cockerels weighed 3 pounds live weight, each having eaten a total of only 4.81 pounds of mash, probably a world record.

Admittedly this almost fearsome concoction of the research workers of the University of Maryland is not a practical broiler mash, but what is possible in the laboratory today will be commonplace in the field tomorrow. And at this very moment feed firms overseas are selling mashes that enable cockerels to weigh 3 pounds live weight at two months, after eating only about 6¾ pounds of food. Naturally, not only is the food excellent but the birds are also bred to make the most of it.

I think you will agree with me that in the broiler we have the most scientifically fed animal on earth and if the progress made during the past forty years is any criterion, great developments are still in store for us, and you will certainly have lots and lots of succulent and tasty chickens long after beef and mutton have to all intents and purposes been forgotten.

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SOME OBSERVATIONS ON THE CONTROL OF THE ITCH MITE OF SHEEP

(*Psorergates ovis* Womersley)

O. G. H. FIEDLER and R. DU TOIT

Attention has been drawn by the authors (1954) to the occurrence of the itch mite, *Psorergates ovis* Womersley, on Merino sheep in the Union of South Africa. This small ectoparasite, which is the causal agent of a persistant itchy irritation of the skin associated with a low grade dermatitis and a ragged appearance of the fleece, has been reported only from Australia and the United States of America up to the present. A recent survey has revealed, however, that the mite is widely distributed amongst the sheep population of Southern Africa, where it is responsible for great damage to the fine wool of Merinos.

The farming community in South Africa refers to this condition in sheep as Australian Itch (Australiese Jeuksiekte). For obvious reasons, and because a skin disease of horses also is known by this name, it is suggested that a more suitable popular name for the condition in sheep would be *Infectious Itch of Sheep* (Besmetlike Jeuksiekte van Skape).

Information supplied by veterinarians and flock owners seems to indicate that infectious itch has been present in the Union for at least the last twenty years. Several years after the last war, however, the disease gradually became more prevalent. The rate of infestation per flock has increased appreciably and recently an incidence of up to 95% infection was encountered in some flocks. In certain parts of the country about 40 per cent of all Merino flocks are infected with the mite. The general spread of the itch mite appears to have coincided with the ever increasing use of certain of the synthetic insecticides, especially B.H.C. and D.D.T., in the annual dipping procedure in vogue for the control of keds and lice.

Observations in the field have shown clearly that treatment with the conventional B.H.C. dips at correct strength does not eradicate *Psorergates* infestation. Confirmation of these observations has been obtained from a small scale dipping experiment conducted at Onderstepoort. Twelve confirmed cases of infectious itch, upon which biting lice (*Bovicola ovis* L.) and keds (*Melophagus ovinus* L.) were found to be confusing the clinical manifestations of the disease, were subjected to a single dipping in a suspension of Lindane at a concentration of 100 ppm. After the elapse of 48 hours numerous living and apparently unaffected mites together with immature stages were found in scrapings, whereas complete eradication of both the keds and lice had been achieved. The contention of many farmers, who hold that the general use of the

ordinary B.H.C. preparations has in no way retarded the dispersion of infectious itch appears, therefore, to be true, and is now supported by direct experimental evidence.

A review of the literature reveals that comparatively little work has been done in finding an effective means for the control and possible extermination of this parasite. Graham (1943) reported from Australia that dips containing sodium arsenite and derris extracts are capable of reducing the mite population but not eradicating it. These results indicate that old types of arsenical and "quick-acting" sheep dips exert a limited beneficial effect and render the disease less apparent. The condition, however, persists and smoulders among the flock, constitutes a constant source of reinfection and can be introduced unintentially into clean flocks by superficially healthy looking animals. Field experiments with the so-called "quick-acting dips" in the Karoo area have shown them to be ineffective against *Psorergates* mite infestation.

Furthermore, it is maintained by the same Australian worker that the only effective cure for infectious itch is the thorough application of lime-sulphur dips, which at the recommended concentration of one per cent, weight/volume of polysulphide sulphur, will eliminate the parasite in a single dipping. Similar results, however, were not achieved under South African conditions. Field tests have revealed that a single dipping in lime-sulphur, even at a concentration of 1.23 per cent, was by no means capable of curing advanced cases. A second dipping applied several weeks later, in one instance achieved a doubtful result only.

A reliable cure for infectious itch to satisfy the insistent demands of the sheep farmer was urgently required and extensive research designed to discover an effective remedy has been undertaken at Onderstepoort.

A screening method has been evolved to determine the efficacy of insecticides. It was found that certain parasitic mites, such as *Psoroptes* and *Demodex,* remain alive and active for up to three days when submerged in liquid paraffin, which was used as the vehicle for the skin scrapings, and that *Psorergates* mites could stand the oily medium for at least eight hours. This finding was utilized in a series of in-vitro tests. Solutions containing the active ingredient of a large number of the synthetic insecticides at varying concentrations were made in liquid paraffin. A drop of each solution was placed on a microscopic slide into which a number of mites were transferred from fresh scrapings by means of a needle and the preparation then observed under the microscope. The insecticides were applied at the fairly high concentration of 0.5 per cent of the active ingredient to start with in order to demonstrate clearly any effect possessed by the less active compounds. The period between the immersion in the insecticidal solution until an effect was noticeable or until all movements had ceased, was taken as the standard of the efficacy of the compound. The observations were not continued beyond six hours and all insecticides which did not produce

complete immobility in the mites during this period, were regarded as ineffective.

Special attention was paid in these tests to the determination of the acaricidal properties of B.H.C. on *Psorergates ovis*. It is a well established fact that the gamma isomer of B.H.C. is the most active of the isomers of this compound and that it overshadows the insecticidal properties of all the other isomers combined to such an extent that the effective strength of any B.H.C. preparation is expressed in terms of this isomer alone. In practice gamma B.H.C. has been found to be very effective against *Psoroptes* and *Sarcoptes* mites, whereas certain other parasitic mites such as *Demodex* species are not affected by it at all. To elucidate the position regarding the itch mite of sheep, the different isomers of B.H.C. were tested separately.

The results of all the experiments conducted are set out in table I.

TABLE I.

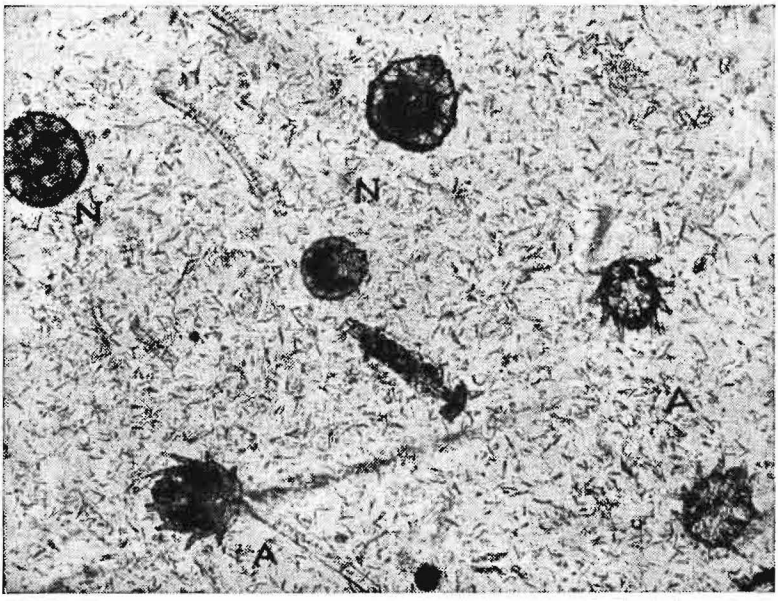
Average periods during which *Psorergates ovis* mites are affected and immobilised by certain insecticides at a concentration of 0.5 per cent of their active ingredient dissolved in liquid paraffin.

	Compound	Effect on Mite	
		Affected	Immobile
Group I	Chlorthion	1 min.	2 min.
	delta B.H.C.	4 min.	10 min.
	Parathion	5 min.	20 min.
	Bayer L 13/59	12 min.	45 min.
	epsilon B.H.C.	30 min.	1 hr.
	Malathion	1½ hrs.	2½ hrs.
	Endrin†	2½ hrs.	4 hrs.
Group II	Bayer 21/199†	2½ hrs.	Not within six hours
	Diazinon	2½ hrs.	
	Toxaphene	2¾ hrs.	
	Isodrin	5 hrs.	
Group III	Aldrin Dieldrin Chlordane Strobane D.D.T. alpha B.H.C. beta B.H.C.† gamma B.H.C. (Lindane)	Not within six hours	

† Not completely dissolved in the oil.

From the results of the in-vitro experiments the compounds under test can be divided into three groups, according to their parasiticidal efficacy. Group III, which contains otherwise potent

insecticides like gamma B.H.C., Aldrin, Dieldrin, Chlordane, Strobane and D.D.T., did not exert the slightest effect on *Psorergates* even at this very high concentration. A certain effect was noticeable in the case of the four compounds in group II, comprising Isodrin, Toxaphene, Diazinon and Bayer 21/199. Their lethal properties, however, were not sufficient to cause immobilisation within the period of observation. The seven compounds in Group I alone were capable of producing a lethal effect in the time specified and, therefore, at least some of them can be regarded as sufficiently potent to produce total mortality at the lower concentrations at which it will be possible to apply them in the dipping tank.



Photomicrograph of *Psorergates ovis* in various stages of development as seen in scrapings from heavily infested sheep.
N — nymphs A — adults

Four of the active compounds are organic phosphates viz., Chlorthion, Parathion, Bayer L13/59, and Malathion. The other three are chlorinated hydrocarbons viz., delta B.H.C., epsilon B.H.C., and Endrin. Of the phosphorus compounds, Chlorthion and Parathion, are not suitable for use on woolled sheep as they are inclined to stain the wool, and, furthermore, Parathion is too toxic to warm-blooded animals to even contemplate its use. Endrin also has a deleterious effect on the wool fibres, as shown by Du Toit and Fiedler (1953). The remaining compounds viz., delta and epsilon B.H.C., Bayer L13/59, and Malathion, appear to constitute the most promising insecticides tested for the control of the itch mite of sheep.

The discovery of the potent acaricidal property of the delta isomer of benzene hexachloride against *Psorergates ovis* is of the

greatest significance. Up to the present this isomer appears to have been regarded simply as an undesirable but inevitable by-product in the synthesis of B.H.C. On account of its unpleasant odour and deleterious effects upon plant growth it had to be eliminated from the B.H.C. complex to permit the use of this insecticide in certain fields of horticultural insect control. The tendency to exclude all inactive and harmless ingredients from the B.H.C. complex has finally led to the production of the pure gamma isomer which has been designated Lindane. The present investigations have demonstrated beyond doubt that *Psorergates ovis* is unaffected by the gamma isomer but that it is highly susceptible to the delta and, to a lesser extent, to the epsilon isomers. Preliminary tests with *Demodex canis* Leyding, have shown that this mite, which is related to *Psorergates,* possesses a similar pattern of susceptibility.

The results recorded in this paper, it is believed, may serve to alter the present conception of the insecticidal value of the different isomers of B.H.C., as the delta isomer, so far regarded as insecticidally inferior has been shown to be a very effective acaricide.

A number of dipping experiments with several preparations containing delta B.H.C. or Malathion have been conducted recently on Merino flocks infested with the itch mite in different parts of the Union. The final results will be reported in due course. It can be stated at the moment, however, that both compounds have given good results at the correct concentrations of 0.1% in the case of delta B.H.C. and 0.2% for Malathion and appear to be capable of curing *Psorergates ovis* infestations with a single dipping.

The preparation of the pure delta isomer of B.H.C. for large scale use presents serious difficulties from the point of view of costs, nor does this seem to be desirable as some type of "all purpose" dip is required which would prove effective both for the itch mite as well as the other external parasites, such as lice, keds and ticks.

In the course of the work under review a distinct antagonistic effect between the gamma and delta isomers upon *Psorergates* was noted whereby in the presence of the gamma isomer the effectiveness of the delta isomer was reduced.

This presents no insurmountable obstacle, however, and investigation into what might be termed the optimum proportions of the two isomers so as to combat the external parasites usually encountered upon sheep is proceeding.

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NOTICE

"This Co-operative (Transvaal Artificial Insemination Co-operative Limited), would be pleased to despatch bovine semen regularly, railage paid, to veterinarians in the Transvaal and Orange Free State who wish to commence A.I. Services on behalf of this Co-operative, on the following conditions :

(1) remuneration to the veterinarian of £1.0.0 per 1st insemination performed,

(2) prospective members of this Co-operative be enrolled for such A.I. Services with between them a minimum of 300 cows for A.I. Services within a radius of 15 miles,

(3) where less than 300 cows are available for the required service, the veterinarian will bear all the costs of supply of semen [cost of semen (at approximately 2/- at present supplied per dose) railage on semen and also empty boxes returned, etc.]"

KENNISGEWING

„Hierdie Koöperasie (Transvaalse Kunsmatige Inseminasie-Koöperasie Beperk) sal bly wees om gereelde aflewerings bulsaad te versend na veeartse in die Transvaal en die Oranje Vrystaat, wie verlang om Kunsmatige Bevrugtingsdienste ten behoewe van die Koöperasie te doen, op die volgende voorwaardes :

(1) vergoeding aan die veearts van £1.0.0 per 1ste inseminasie gedoen,

(2) aspirant-lede van hierdie Koöperasie vir Kunsmatige inseminasiedienste ingeskryf word, besittende onder hulle altesaam 'n minimum van 300 koeie binne 'n radius van 15 myl, vir Kunsmatige inseminasiedienste,

(3) waar minder as 300 koeie vir Kunsmatige inseminasiedienste aangebied word, egter, die veearts dan persoonlik alle onkoste verbonde aan die verskaffing van die bulsaad, dra [koopprys van bulsaad (tans 2/- per dosis verskaf) spoorvrag op bulsaad en leë houers terug, ens.]"

LETTER TO THE EDITOR

P.O. Box 70,
Kitwe,
Northern Rhodesia,
19th September, 1955.

The Editor,
Journal of the S.A.V.M.A.,
P.O. Onderstepoort.
Dear Sir,

Veterinary Surgeon — Kitwe, Northern Rhodesia.

My Council have been discussing for some while the need for the services in Kitwe of a qualified veterinary surgeon, and at a recent meeting it was decided to write to Editors of appropriate professional periodicals connected with veterinary services, advising that Kitwe and the adjacent township of Nkana offer admirable facilities for the establishment of a practice by a veterinary surgeon.

In the circumstances, my Council wondered whether mention could be made by you in your Journal of the position obtaining here.

For your information, Kitwe and Nkana are situated on the Copperbelt in Northern Rhodesia, and have between them a European population of approximately 9,000. No qualified veterinary surgeon is in practice here.

Yours faithfully,

S. W. COLEMAN,
Town Clerk.

BOOK REVIEWS

Veterinary Pathology and Bacteriology (Gaiger and Davies).
G. O. Davies, Balliere, Tindall and Cox, London, 1955.

The fourth edition of this very useful handbook has now appeared. As stated by the author in his preface, the book is in the nature of an interim edition to meet students' needs and not very much in the way of new subject matter has been added. A few additions have been made more particularly in relation to recent observations in virus disease research, for instance the use of unweaned mice in foot and mouth disease work and of the complement fixation test in diagnosis. The reviewer has used this book now for some years as the main text book for teaching bacteriology in the veterinary faculty and has found it very useful. We are promised another edition in which the book will be entirely recast to give a new approach to the subject and we look forward to it with great interest.

E.M.R.

MOSQUITOES: THEIR BIONOMICS AND RELATION TO DISEASE.

By William R. Horsfall. Publ. The Ronald Press Co., New York, 1955.

For the student, the research worker and sanitarian interested in the bionomics, collection and study of mosquitoes, the publication is of outstanding significance. It represents one of the most useful works of a comparative nature on the biological relationships of mosquitoes of the world to their environment and the diseases transmitted by them which has appeared in recent times.

The various groups and families are arranged in accordance with the latest accepted systematic classifications but no attempt is made to deal with morphology on which copious published data is available elsewhere.

Terms commonly employed in biological research form a separate section and obviate the confusion which frequently exists on their interpretation. A section devoted to the techniques used in working with the various stages of mosquitoes is supported by a most comprehensive list of references and a bibliographical index of 78 pages provides references to the literature on the subject which is more complete than is normally possible for any research worker to accumulate.

In the general index the genera and species are arranged alphabetically for easy reference and concludes a volume which can be recommended with confidence.

R. du T.

Maybaker (S.A.) (Pty.) Ltd. announce that "Embazin" brand Sulphaquinoxaline is now available as a 22.5% premix as well as the existing solution. The new presentation is intended primarily for poultry breeders employing automatic watering systems where the use of medicated water would be inconvenient. For flock medication 4 ozs. of "Embazin" premix should be mixed thoroughly with 1 cwt. of mash and the medicated mash should be fed for a period of 4-5 days.

"Embazin" premix may also be used for preventive purposes. There are two methods. (1) Continuous method: for the first eight weeks of life birds should receive no feed other than mash medicated with "Embazin" premix at a level of 1 oz. to each 1 cwt. mash. (2) Intermittent method: mash containing 4 ozs. "Embazin" premix to each 1 cwt. should be fed for two days out of each five days over a total period of four weeks. This method should be started immediately before birds are exposed to the risk of infection.

"Embazin" premix is available in cartons of 4 x 2 oz. containers. The cost to the veterinary profession is 23s. 5d. 2½ lb. cartons of premix are now available.

JOINT CCTA/WHO TRAINING COURSE ON RABIES

During the period July 11th-26th, 1955, the above Course took place at the laboratories of the East Africa Veterinary Research Organisation at Muguga in Kenya.

The Interafrican Advisory Committee on Epizootic Diseases (I.A.C.E.D.) recommended that such a course to be held in Africa would serve a very useful purpose and negotiations commenced by the Interafrican Bureau of Epizootic Diseases (I.B.E.D.) in 1953 and approved by the Commission for Technical Co-operation in Africa (C.C.T.A.) resulted in acceptance by the World Health Organisation (W.H.O.) of the application to participate by providing the discussion leaders.

The discussion leaders were Dr. M. M. Kaplan, Chief Veterinary Public Health Officer, WHO, Geneva, who directed the Course, Prof. Pierre LEPINE, Chief, Virus Section, Pasteur Institute, Paris; Dr. Karl HABEL, of the National Microbiological Institute, Bethesda, U.S.A.; Dr. Hilary KOPROWSKI, of the Lederle Laboratories, New York; Dr. A. KOMAROV, Director of the Government Veterinary Laboratories, Haifa, Israel; and Dr. Perez GALLARDO, of the School of Public Health, Madrid.

Thirty-eight veterinarians and medical officers were nominated by the Governments of the British, French and Portuguese territories in East and West Africa, the Belgian Congo, the Union of South Africa, the Federation of Rhodesia and Nyasaland, Egypt, Ethiopia, Lebanon and the Sudan. An English/French Interpreter was provided by C.C.T.A.

The Course was essentially a practical one in the latest laboratory techniques as applied to Rabies and the manual instruction was interspersed with frequent group discussions and lectures.

A short period of a few days towards the end of the course was devoted more particularly to Field Control.

A symposium on Virus Diseases to which many local biological research workers were invited was held on one afternoon during the course.

At a public ceremony, the course was opened by the Administrator of the East Africa High Commission.

I.B.E.D.

SOUTH AFRICAN VETERINARY MEDICAL ASSOCIATION COUNCIL MATTERS

A meeting of the Council was held on Friday, August 19th, 1955.

The final arrangements and the programme for the Jubilee Congress were approved of. It was decided that all the papers read at the Congress should be published in one special number of the journal and that the message from the Prime Minister and his speech at the opening of the Congress should be included as well as the message from Dr. P. J. du Toit as president of the Scientific Council of Africa south of the Sahara.

A letter had been received from the Provincial Secretary informing Council that it's representation that the licence fees for spayed bitches should be reduced had been turned down.

Telephone services for veterinarians. Information had been received from the Postmaster-General that there is no objection to publishing special lists of veterinarians provided that the prescribed fees for such additional entries are paid. Such entries should be made through the Association and all the practitioners in a particular area should be included.

Veterinary Board. Drs. H. P. Steyn and C. F. B. Hofmeyr have been elected in the place of Dr. G. Pfaff and A. D. Thomas whose terms of office have expired.

Council 1955/56. President, Dr. A. M. Diesel, Vice-President, Dr. P. S. Snyman, Hon. Sec., Dr. K. E. Weiss, Hon. Treasurer, Dr. G. D. Sutton.

Members 1955/57. Drs. R. Alexander, M. de Lange, R. du Toit, C. F. B. Hofmeyr.

Sitting Members 1954/56. Drs. A. D. Thomas, S. W. J. van Rensburg, R. Clark and L. W. v.d. Heever.

Editor. E. M. Robinson.

Standing Committees 1955/56:

Finance: Drs. S. W. J. van Rensburg (Chairman convenor), R. Alexander, M. de Lange, C. F. B. Hofmeyr and G. D. Sutton (Hon. Treasurer).

Editorial: Drs. E. M. Robinson (Chairman convenor), R. Clark, W. D. Malherbe, L. W. v.d. Heever, W. J. Wheeler and H. P. A. de Boom.

Library: Drs. T. F. Adelaar (Chairman convenor), W. D. Malherbe, R. du Toit, G D. Sutton and a cadet member to be nominated by the students.

General Purposes: Drs. R. Clark (Chairman convenor), W. D. Malherbe and P. S. Snyman.

Book Fund: Drs. G. D. Sutton (Chairman convenor), M. de Lange and A. D. Thomas.

Resolutions: Drs. W. D. Malherbe and E. M. Robinson.

Council recommended as an unopposed motion for the General Meeting that Dr. R. Alexander be awarded a Life Vice-Presidentship.

Representative of Council on the Pharmaceutical Committee of the S.A. Bureau of Standards in place of the late M. H. V. Brown. Dr. H. P. Steyn was nominated with Dr. van Backström as alternative.

Co-operative Employment: A committee was appointed consisting of Drs. Diesel, S. W. J. van Rensburg and A. C. Kirkpatrick, with powers to co-opt, to investigate problems connected with the employment of veterinarians by Co-operative Societies, the committee to report back to the Council for the information of the Annual Congress in 1956.

Representation of branches at Council Meetings: It was decided that, with effect from next year, representatives from the various branches of the S.A.V.M.A. would be given the opportunity of sending representatives to discuss matters of policy at the Council Meeting immediately preceding the Annual Congress.

THE PROBLEM OF BOVINE TUBERCULOSIS IN THE UNION OF SOUTH AFRICA

P. S. SNYMAN.

(PAPER READ AT THE JUBILEE CONGRESS)

INTRODUCTION

In the Union of South Africa with its large and extensive pastoral areas, the economic importance of an insidious disease like Bovine Tuberculosis in our herds is not fully realised, because this disease is generally associated with cows kept under intensive systems such as commercial dairies situated on the outskirts of our large cities. Cattle kept under semi-intensive or ranching conditions are comparatively free from disease.

It was only as recently as 1930 when an eradication campaign was conducted within the Borough of Durban that the high incidence of tuberculosis was brought to light. Out of 2,500 animals tested almost 1,000 reacted to the double intradermal test using crude tuberculin produced by the Royal Veterinary College, London. The greater shock, however, came when out of 2,300 cows tested for replacement purposes and which originated from the country areas, 3.2% gave positive reactions. This was the first time that the intradermal test was employed in this country on a large scale. Previously the subcutaneous method was used.

Up to this time only a few herds, mostly those at Agricultural Colleges, were tested annually and even then not at regular intervals.

In 1929 the writer employed the double intradermal test on a commercial dairy herd which had been subjected to annual testing by the subcutaneous method for the previous five or six years, and one which was presumed to be free from tuberculosis, as freedom from tuberculosis was a condition of the contract for supplying a large hospital with milk and cream.

When out of the first batch of 250 cows tested 97 reactors were marked, the owner decided to stop further testing and lose his contract. On post-mortem, tuberculosis with generalised lesions, including infection of the udder was found in a large number of the animals slaughtered.

At about the same time a Voluntary Accredited Herd Scheme was formulated, the main object being eradication of tuberculosis in stud and self-contained herds with a view to building up a source from which replacements could readily be drawn, so as to avoid a temporary shortage of milk in case of another campaign. One

The Incidence of Tuberculosis.

The followig schedule reveals the incidence of tuberculosis of herds tested under the two schemes and tests for other purposes:

PERIOD	ACCREDITED HERDS			INTERIM SCHEME			IMPORT		EXPORT		MISCELLANEOUS	
	No. of Herds	No. of Cattle	Positive Reactors	No. of Herds	No. of Cattle	Positive Reactors	No. of Cattle	Positive Reactors	No. of Cattle	Positive Reactors	No. of Cattle	Positive Reactors
1948/49	118	16,046	278	—	—	—	—	—	—	—	—	—
1949/50	119	15,962	85	—	—	—	—	—	—	—	—	—
1950/51	125	15,788	101	—	8,679	537	102	—	1,178	6	238	9
1951/52	135	18,777	24 (Herds)	—	14,806	571	205	1	2,578	10	221	8
1952/53	156	22,587	21 (Herds)	329	14,105	302	180	—	2,778	10	1,032	71
1953/54	211	22,763	24 (Herds)	580	20,291	557	438	—	2,754	5	2,242	16
	863	111,923		909	57,881	1,967	925	1	9,288	31	3,711	104

Total cattle tested .... = 71,805
No. of Positive Reactors .... = 2,103
Percentage of Positive Reactors = approx. 3%

of the conditions of this scheme was the slaughter of all reacting animals without compensation.

Progress was very slow. Farmers were reluctant to enter into such a contract when not knowing beforehand what their losses would be.

In 1949 the Interim Scheme was launched. This scheme allows for a pilot test and the branding of any reactors and of their disposal without compulsory slaughter. Accreditation becomes possible after the incidence of tuberculosis in the herd has been reduced to less than 5%. No assistance is given by the State as is the case with accreditation, where all costs of testing, etc. are borne by the State.

Progress up to date has been very slow. It is true from the figures given below that the Interim Scheme has been responsible for a steady increase in the number of herds accepted for accreditation during the past five years. The heavy cost of having herds tested and the potential loss in the value of the branded animal contribute to the disinterest of stock owners in cutting their losses from tuberculosis.

Please refer to Table on previous page.

The following schedule reveals the incidence of bovine tuberculosis in some dairy and ranching herds:

Date of Test	Locality	No. Tested	No. Pos.	%age Pos.	Type of Herd
13. 3.52	Alexander Bay	243	112	46.09	Dairy
26.10.53	An Ixopo Farm	99	60	65.65	,,
Feb. 1954	A Rustenburg Farm	39	32	82.05	,,
15. 4.54	An Estate in Springs	250	36	20.4	,,
22. 5.54	A property at Barberton	148	59	39.86	,,
10–20. 8.54	A Zululand farm	391	72	18.4	Ranch
	Another Zululand farm	359	80	22.2	,,
	Another Zululand farm	309	60	19.4	,,
	Another Zululand farm	224	4	1.7	,,
	Another Zululand farm	422	14	3.3	,,

In contrast to this may be mentioned that for the 8 months preceding June 1955 the returns show that there were 114 herds consisting of 4,520 head of cattle in which no reactors were found.

FUTURE POLICY.

The incidence of tuberculosis in both dairy and ranching herds, in some areas at least is very high. It is evident that the time is long overdue whereby a more positive approach is given to the problem of tuberculosis.

A policy whereby ultimate eradication is aimed at, as is the case in the United States of America and the United Kingdom,

would be ideal, but the conditions under which animal husbandry is at present practised in the Union make such a policy impracticable. There are many farms on which both pedigree or high grade stock are run in close association with scrub stock belonging to native squatters. In other instances again, a highly pedigreed herd would be surrounded by large herds of scrub stock belonging to cattle speculators.

There are not many areas in the Union where all the herds are of a sufficiently high standard or value so as to warrant bringing them all under accreditation.

The next best policy to be followed would be one that aims at control safeguarding individual herds or small groups of herds in a very limited area.

Eradication or control depends on an accurate diagnosis seeking out the reacting animal, which should at all times be looked upon as an infected animal capable of spreading tuberculosis, and coupled with this, should come appropriate hygienic measures.

The disposal of the reacting animal is a problem and so would that of replacements be until a good source of supply has been built up.

It is abundantly clear that no effective scheme could be launched without the necessary funds for compensating owners for the loss of stock or to assist farmers in the purchase of replacements or to induce a farmer to maintain an accredited herd.

In launching a scheme as is envisaged, first consideration will have to be given to the creation of a source of supply for replacements. For this purpose stock owners with self-contained herds, i.e. those owners who rear all their heifer calves except culls should receive priority. They should be fully compensated for the loss of breeding stock or receive a bonus on the milk and other dairy products produced.

In the case of the first alternative, the farmer who is not solely dependent upon the production of milk and with a high incidence of tuberculosis in his herd, would most likely seize the opportunity to purchase a smaller number of animals but of such a standard as to improve his herd.

The owner with less than 5 or 10 per cent of reactors would probably find it more advantageous to select the second alternative.

Ranchers would, unfortunately, be limited in their choice to the first alternative only, or unless provision is made as is the case in the United Kingdom, where a bonus is paid for every female over the age of two years. Here, of course, the privileges of the scheme should be confined to the breeder of stud-beef-cattle, for the purpose of creating a source from which other breeders could supplement their herds.

Once a good source of supply replacements has been built up,

assistance in the form of short term loans from the Land & Agricultural Bank may be made available to stock farmers as an inducement to establish accredited herds for the benefits derived from possessing such a herd.

In conclusion it need not be stressed that once stock owners have become conscious of the value of the eradication of tuberculosis they will also improve the general hygiene of their herds by controlling or eradicating other erosion diseases like mastitis and those causing infertility, etc. They would demand sales at which cattle from accredited herds only would be auctioned, and that milk recording be run in conjunction with the tuberculosis eradication programme, etc.

The general health of our cattle population would improve, the production per animal would be increased on account of longer life, thus reducing the cost of production of both milk and meat, and finally, once the general public understands that the control of tuberculosis in our herds as envisaged with all the benefits derived from it, is a matter of national economy, it would be not too much to expect that the funds required for the scheme shall come out of public funds.

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PROBLEMS IN CONNECTION WITH THE INAUGURATION OF A NATIONAL SCHEME FOR THE CONTROL AND ERADICATION OF BOVINE TUBERCULOSIS IN SOUTH AFRICA

M. C. LAMBRECHTS

(PAPER READ AT THE JUBILEE CONGRESS)

The control and ultimate eradication of Bovine Tuberculosis in South Africa is a problem which has occupied the attention of the Division of Veterinary Services since some years before 1930. That the disease should be eliminated from our cattle herds as expeditiously as possible has never been debated in any quarter. The means of achieving this object has presented some rather difficult problems.

During 1930/31 a start was made in testing dairy cows in the borough of Durban. Some 2,500 animals were tested revealing nearly 40% of reactors. The project was abandoned after approximately one year.

In 1931 the Voluntary Accredited Herd Scheme was commenced.

A scheme of control submitted by the Director of Veterinary Services, and accepted in principle by the Department in 1929, never came to anything as a result of the advent of the Second World War.

The next move was in 1949 when the so-called Interim Scheme was launched. This undertaking provided useful information with regard to the probable incidence of tuberculosis in cattle in the country and assisted in a number of herds becoming accredited. It also served to kindle interest in testing for the disease. It has, however, served its purpose.

The total efforts in testing up to the present time have failed to accredit more than 30,000 head of cattle and many of those are in herds belonging to the State. When it is considered that there are 11,565,198* head of cattle in the Union, the progress made is negligible. There are 6,828,534 head of European-owned as well as 1,378,721 head of Native-owned cattle on European farms. All cattle on a farm usually make contact in some way, so that 8,207,254 head of cattle are primarily concerned in a tuberculosis eradication scheme.

In the Native Reserves isolation is, as yet, more or less out

* 1951 Census.

of the question and cattle in those areas can only be considered in the later stages of a campaign.

Judging from figures available at this stage, the probable average incidence of the disease in the Union is in the neighbourhood of 3%. This figure was gleaned from just over 70,000 head of cattle tested, throughout the country, under the Interim Scheme. The incidence of infection in individual herds was as high as 82%. It was also established that heavy infection existed in some ranch herds.

Although it would appear that South Africa is fortunate in not having gross infection of herds in general, it is nevertheless clear that not much time should be lost in dealing with this problem.

The more urgent problems in the inauguration of a scheme of control and eradication of the disease are to be found in the matters of staff, finance, the shape of the plan itself and diagnosis.

STAFF.

The problem in this respect resolves itself into the question of available veterinary man-power. In the State Service there are only 35 filled posts and the subjoined table reflects the position in regard to Municipal and practising Veterinarians.

From these figures it is obvious that veterinarians, not in the employ of the State, will have to play a very important part in any scheme planned on a national basis. In fact, no such scheme will be possible without the assistance of the entire veterinary profession.

European-owned cattle are given in the last column of the table.

Province	Private Practitioners	Municipals	State Vets.	Eur.-owned cattle
Natal	30	2	8	911,460
Transvaal	53	10	12	2,232,008
O.F.S.	12	1	4	1,664,296
Cape East	12	—	6	2,020,770
Cape West	29	2	5	
	136	15	35	6,828,534

FINANCE.

A national scheme for the control and eradication of tuberculosis will cost money for testing, compensation, inducements to farmers as well as Departmental adjustments and supplementation of staff and facilities. Expenditure to be incurred will be sustained for many years and will probably be fairly heavy for at least part

of that time. In the United States of America under more or less ideal conditions and with a sufficiency of staff and funds, over twenty years elapsed before near eradication of the disease was achieved. The process is likely to last much longer in this country.

Any such scheme will obviously have to be financed by the State. Various bodies concerned with the cattle and dairy industries could make important contributions. Local authorities will be able to assist in many ways.

THE SHAPE OF THE PLAN.

This is all-important. It can only be formulated after careful consideration of the many factors which are likely to influence it and after consultation with interested bodies and persons.

The cattle and dairy industry in general and cattle owners in particular, must be convinced that the scheme will serve their best interests. In submitting the plan to the Department it must be possible to indicate the probable continuity and expansion of the campaign and that ultimate success is a practical possibility. Unless the plan can be seen in this light, it would be wrong to even contemplate its initiation. The campaign will have to be initiated in a small way, commensurate with our present means, yet planned to allow of rapid expansion.

Dr. A. M. Diesel, Deputy Director of Veterinary Services, recently compiled a memorandum proposing a scheme for the control of Bovine Tuberculosis. The memorandum was circulated amongst veterinarians and interested persons and criticism and comments invited.

The proposed scheme is fundamentally realistic in its approach and scope. Its essential features are quoted here to make possible further discussion on this occasion.

The plan briefly embraces the following:—

(a) That approximately 150,000 head of cattle be tested per annum for the first two or three years and that this would yield an accreditation gain of 10,000 head per year.

(b) That testing be

  (i) voluntary in the shape of "Initial & Progressive" and "Accreditation" tests and

  (ii) compulsory in terms of Section 10 of Act 14 of 1911 and when 75% of herds are tuberculosis-free in a pre-determined area. The latter activity to be in relation to Tuberculosis Protected Areas.

(c) Initial and Progressive testing to be undertaken on written application by the stock owner to the veterinarian. The bulk

of this work would be done by practitioners. Reactors are to be branded and ear-tagged with State brands and tags, to be removed from the herd within two years, moved on permit and for slaughter only.

(d) Accreditation testing to remain as at present and to be carried out by State Veterinarians and veterinarians approved by the Director of Veterinary Services.

(e) A Supplementary Accredited Herd Register is suggested for Municipalities to accommodate herds without proper isolation.

(f) Tuberculin issues to be controlled by the Sub-Director of Veterinary Services to whom full particulars of the test, including agreements by the stock owner, must be submitted. The free issue of tuberculin for certain purposes is suggested.

(g) Test results recorded on U.A.D.340 are to be submitted to the Sub-Director of Veterinary Services.

(h) The State Veterinarian to be informed of test dates to enable him to arrange for branding and ear-tagging of reactors.

(i) State Veterinarians to arrange testing programmes within their areas to ensure planned testing.

(j) The Veterinary Profession to be approached to decide on testing and mileage fees.

(k) Priority testing to be arranged in the order of

(i) Pedigree herds.

(ii) Areas where milk recording schemes are in progerss.

(iii) Farms and dairies obtaining Municipal licences to supply accredited raw milk.

(iv) Herds in Municipal areas applying for supplementary accreditation.

(v) Herds building up in determined areas for the purpose of classification as tuberculosis protected areas.

(l) It is accepted that owners with up to 5 per cent of reactors, following the three tests required for accreditation, will bear the cost of disposal of reactors themselves.

(m) Compensation to be paid to owners with an unusual number of reactors (over 5 per cent) to assist in their disposal without financial embarrassment to themselves, and provided reactors are slaughtered at an approved place within one year.

(n) The amount of compensation to be £15 for adult and mature stock and one quarter of the commercial value of immature stock with a maximum of £15, in terms of the fifth schedule of the Diseases of Stock Act. The owner is to receive in addi-

tion the realisation value of the stock when slaughtered, the latter value to be estimated by the State Veterinarian or by a valuation board, as provided for in the Act, when the stock owner so elects.

(o) A bonus of 1½d. to 2d. per gallon is suggested for milk and the proportionate amount for cream. The payment to be arranged by the Dairy Board.

(p) Compensation for slaughter of reactors to be paid for from a central fund equally contributed by the State, the Livestock and Meat Industries Control Board and the Dairy Industries Control Board. The sum of £30,000 per annum is envisaged and is calculated to pay for 4,500 reactors.

(q) Special sales or sections of sales are advocated for tuberculosis-free cattle only.

(r) It is proposed that the laboratory aspects of the work be carried out at five centres.

(s) Departmental Staff adjustments are to be made to ensure that—

(i) the inspectorate staff relieve State Veterinarians of certain routine duties;

(ii) sufficient clerical assistance is available at the various centres;

(iii) that the laboratories are suitably staffed where required; and

(iv) that problem testing be attended to by a Senior State Veterinarian in each Sub-Director's area with a Senior State Veterinarian, Tuberculosis Control, Pretoria.

(t) National and Inter-Departmental control to be exercised by a permanent sub-committee with representatives from the Divisions of Animal Husbandry and Veterinary Services, Livestock and Meat Industry Control Board, the Dairy Industries Control Board, Stud Book Advisory Board and Agricultural Advisory Council.

It is certain that no pre-conceived plan could possibly cover all aspects of a campaign of the nature of the one contemplated. It is, therefore, natural that a certain amount of criticism will be levelled at the proposed scheme and it will be said that certain details were omitted. Some of these criticisms and comments may be briefly discussed:

Administration :

It was suggested that control should be decentralized and recording of tests and reports on tests be simplified. This aspect of control can be amended according to needs in an extended campaign.

Compensation :

The suggested compensation was considered inadequate and the contemplated bonus on milk and cream likely to have only small merit.

The slaughter value of reactors can accrue to the owner in all instances provided he elects to accept the value estimated by the State Veterinarian or the Valuation Board. If the carcase is condemned in these circumstances the loss will be borne by the State. This will adversely affect available funds but the stock owner will be assured of £15 to £25. This aspect could also be covered if the Meat Board should decide to compensate for breeding stock condemned for tuberculosis. Should this eventuate the burden of compensation will be distributed over a greater field and greater progress will be possible each year. In this way an average compensation of approximately £30 to £35 should be available for the average dairy cow. If it is not complete compensation, it is a substantial contribution towards the replacement of diseased animals.

Valuable blood stock should not be destroyed as a matter of policy but rather be dealt with on the isolation system.

Inducements are important especially to the commercial dairyman. If he is assisted financially to eliminate reactors from his herd the suggested bonus should prove attractive. Breeders of valuable stock may find most compensation in the fact that the health of their animals is assured and can therefore demand the best selling prices.

Disposal of Reactors :

Concern has been expressed at retaining reactors in herds for periods of one to two years — also the effect of this policy on the sale of milk from such herds. In addition there must be the problem of compensation for reactors when these cannot be properly isolated during the interim period. Isolation is likely to be possible in rare instances only. It is clear that this aspect will have to be worked out in greater detail and a modus operandi found which will safeguard the interests of both the stock owner and the State. It will be necessary to consult with Health and Local Authorities on this subject.

This period of grace in regard to the elimination of reactors appears important. It will allow of financial adjustments, continuity of production of dairy products and the solution of the problem of replacements. On the other hand the practice will necessitate numerous retests and check tests and will therefore be a brake on progress apart from other complications. It is to be hoped that findings in practice will make possible the gradual elimination of this need.

Identification of Animals :

It will be necessary to decide on standards of identification for each type of test.

Control of the Scheme :

The suggestion was made that the Department of Health and Municipal Veterinarians be represented on the permanent sub-Committee of Control. This suggestion should be acted on.

Diagnosis :

The Single Intradermal Tuberculin Test has been accepted as the official test in South Africa. P.P.D. tuberculin prepared and standardized in a uniform manner is used.

Because of the problems which have been encountered elsewhere, and also in this country, it is intended to discuss briefly the routine test under this heading.

The tuberculin test is as efficient as it is applied and interpreted. The site, its preparation, the dose of tuberculin, the mode of application of the tuberculin and the evaluation of results are all important. Equipment must be of the correct type and antisepsis observed.

The optimum site is taken to be a region of the cutis where it is relatively thin, loose and vascular. In addition it is necessary to select an area which is likely to be most sensitive to tuberculin in the infected subject. It is generally considered that the middle third of the neck, at least four inches from the crest, answers these requirements.

In certain indigenous cattle and in bulls, the skin is very thick in this region and it may be necessary to select a site nearer to the shoulder or to use the caudal fold as an additional site. Interpretation of a reaction can be difficult when the skin is very thick.

In the instance of a retest it is best to use the opposite side of the neck to that used on the previous occasion. Buxton and Glover have found that an intradermal injection of tuberculin desensitizes a varying area of skin 2 to 4 weeks later. Reactivity returns after six weeks. The only preparation of the site that is needed is to clip an area of approximately two square inches and remove dust by thorough wiping. Care should be taken to avoid wounding the skin. The use of disinfectants is not recommended. The dose of tuberculin is 0.1 ml, to be deposited in the deeper layers of the skin. A superficial injection may result in a hard circumscribed swelling. The injection is made after calliper measurements have been taken of a normal fold of skin. To obtain uniform results it is necessary to apply a uniform dose of tuberculin. Although a double dose may increase the resultant reaction by only

16 to 20%, this may be of considerable importance when executing a comparative test and using the British standards of interpretation. Skin measurements as well as the nature of the reaction at the site of injection are carefully recorded after 72 hours have elapsed. Elsewhere the interval may vary from 48 to 96 to 120 hours. It has been stated that the optimum reaction to avian tuberculin is evident after 98 hours.

In Britain increases in skin measurements are interpreted as follows:

1 to 2 mms. — negative,
3 to 4 mms. — doubtful, and
more than 4 mms. — positive.

The nature of the swelling is, however, of prime importance.

A proper evaluation of the test can only be made when it is remembered that a negative reaction can be encountered in an infected subject, and likewise a positive or doubtful reaction in an individual not infected with tuberculosis, and consideration is given to the known factors which may influence test findings.

It is necessary to have as wide an understanding as possible of the factors which may have an influence in these intances. Consideration should be given to the pathogenesis of tuberculosis and the nature of the allergic reaction.

The infected animal may fail to react for various known reasons and possibly others which are not clearly understood. Certain individuals are naturally less sensitive to the test than others. The stage of the disease, the degree and mode of infection will have an influence. The animal may be in the pre-allergic stage. Allergy develops only 18 to 36 days after infection by inhalation and 8 to 51 days after ingestion of infection. It has been stated that this period may be as long as eighteen months.

It is contended that a state of anergism is found in old age and in cachectic conditions in general.

Kerr and his co-workers found that some 35% of cows do not react immediately after calving and that others showed decreased reactions. Reactivity returns after 6 weeks. It has been thought that animals with tuberculosis of the udder often do not react.

Fevered conditions have been found to cause a loss of reactivity in humans. In how far this will be true in cattle is not known.

Repeated injections of tuberculin will desensitize a subject to the stage when it will no longer react. It is for this reason that a certain period must elapse between tests. In South Africa this period has been set at 90 days.

An insufficient dose of tuberculin in an animal of low reactivity may result in no response being found.

It is known that climate, season, diet, hereditary factors etc., may play a role in causing allergy. In how far these factors may influence reactions has not been established.

Animals with advanced generalized tuberculosis often do not react to tuberculin.

Certain drugs, e.g. A.C.T.H. and Cortisone have a depressing effect on local tissue reactivity.

Non-specific positive and doubtful reactions, on the other hand, have been ascribed to a variety of causes. The no-visible-lesion reactor (NVL) is always somewhat of a problem in tuberculin testing. This problem becomes more pertinent when progress is made in the eradication of the disease. Often these findings are associated with one of the following:

(a) infection with the human strain of M. tuberculosis;

(b) infection with the avian strain;

(c) infection with M. johnei;

(d) infection with other acid fast bacteria, and

(e) other conditions in which infection with acid fast bacteria do not play a role: Brucellosis, Actinomycosis, Actinobacillosis, "heat", pregnancy, Fasciolasis, etc.

Reactions to the homologous tuberculin are usually strongest. In this way it is as a rule fairly easy to differentiate avian infection and Johne's disease by means of a comparative test using avian and mammalian tuberculins. It has been shown that johnin has no more value than avian tuberculin for the detection of Johne's disease.

Infection with the human type of bacillus in bovines results in sensitization which may last six months to two years and even four years. The reactions are usually somewhat smaller than in bovine infection and may differ in character. They disappear or become smaller, as a rule, on retest. In these instances the herd history is obviously important. It has also been stated that few animals so infected will react to the subcutaneous test.

The most important condition associated with infection with sapraphytic acid fast bacteria is the so-called "Skin Lesion", also called "Dermatitis Nodosa" and "Unterhaut-tuberkulose". It was first described in the United States of America in which country it appears to be one of the most important causes of difficulty in interpreting the tuberculin test. Since then it has been described in several countries.

The infective agent has been cultured and biologically trans-

mitted in isolated instances only. From provisional observations it would appear that the condition is widespread in South Africa and is therefore likely to have a considerable nuisance value in an extended testing campaign. It is also well to remember that Skin Lesions are not always readily visible or detectable. Animals so infected may react for 1 to 2 years. In the comparative test the result tends to non-specificity. The reaction due to skin lesion infection is usually smaller than that resulting from "bovine" infection although large reactions may be found. Increases in skin measurements of 10 mms and more may be found and the reaction may be of the positive type. Some workers have found that animals suffering from this type of infection do not react to the subcutaneous test. In fact, it has been stated that intradermal tests, in general, are more prone to give non-specific findings.

Other saprophytic acid fast bacteria like M. phlei and M. butyricum have been proved to sensitize to tuberculin.

Many of the agents responsible for non-specific reactions do not evoke such reactions with regularity. When the single intradermal tuberculin test is interpreted it should in preference be done on a herd basis. The history of the herd and especially the knowledge of the presence of bovine infection is of extreme importance. When such knowledge is lacking an effort should be made, as a last resort, to establish the presence or absence of bovine infection even by means of slaughter of a reactor. Before this is done, however, the various available means of diagnosis by means of tests should be resorted to.

In making use of the specific value of the homologous tuberculin it should be remembered that a wide range in the quality and size of specific reactions is possible.

Finally it should be kept in mind that specific bovine and non-specific infection can occur in the same subject, and test results will tend to be non-specific.

The comparative test, using mammalian and avian tuberculins, has been found to be of considerable assistance in interpretation of non-specific test results.

It is, therefore, clear that the intradermal tuberculin test should be carried out in a precise and responsible manner. A clear knowledge of its limitations will enable a high percentage of correct judgments to be obtained.

In conclusion a plea is made for a realistic approach to the whole problem of eradication of Bovine Tuberculosis. This will apply pertinently when considering standards of isolation and hygiene for purposes of accreditation. Consideration should also be given to supplementary accreditation as an interim measure to achieve area eradication.

The campaign should be on a scale that will ensure that interest is maintained and that ultimate success remains a practical possibility. More or less rapid progress in the creation of protected areas will eliminate effort wasted in endless check tests, introduction tests, etc., and will generally facilitate consolidation of progress.

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TUBERCULOSIS IN PIGS

E. M. ROBINSON

(PAPER READ AT THE JUBILEE CONGRESS)

INTRODUCTION

Tuberculosis in pigs may be a very important problem when a campaign against the disease in cattle is being undertaken. Although the disease in pigs may become generalized especially if caused by the bovine organism, it is a common finding in most countries that lesions are confined to the submaxillary glands as a rule in pigs examined at abattoirs.

Since 1936, more particularly in the Scandinavian countries, corynebacteria have often been isolated from cases where lymphatic glands in pigs showed lesions resembling those of tuberculosis but in which tubercle bacilli could not be found. In South Australia Woodroffe (1950), isolated corynebacteria from submaxillary glands of pigs, showing lesions resembling tuberculosis. Ginsberg and Fitzpatrick (1950) found C. pyogenes in one-third of all tuberculosis like lesions in pigs which they examined. Tammemagi (1953) in an article on tuberculosis-like lesions in the submaxillary lymph nodes of pigs in Queensland states that in the examination of 65 diseased submaxillary glands of pigs and 75 apparently normal ones, 36 of 38 nodes which were like tuberculosis showed C. equi. In 14 of these it was the only organism found. Of 15 nodes diagnosed as tuberculosis by meat inspectors, tubercle bacilli were isolated from 8, all bovine in type. C. equi was isolated from 7 nodes including 3 where there was a mixed infection.

Lesions due to C. equi were different from tuberculous ones in that they were spherical or oval, encapsulated and easily enucleated. Histological examination was of little value in distinguishing tuberculosis from corynebacterium infection but in the latter the lesion usually showed a fibrous capsule surrounding it. Corynebacteria were found in 22 of 75 apparently normal glands and in two of 12 showing a net-like mottling in part of a normal gland. Tammemagi also mentions having confirmed the partial acid-fastness of C. equi, the type he found in the lesions.

In South Africa tuberculosis in pigs has not received much attention until recently, although it was known from abattoir statistics that it must be fairly widespread. A few specimens had been typed but no systematic work has been done on pig material. During 1953 the writer examined a number of specimens from the Durban abattoir from pigs showing lesions, mainly in submaxillary glands, diagnosed as being tuberculous. Acid-fast bacteria were

found in 36 out of 42 specimens sent in. They were very frequent in some, a small number in others and very few in the rest. The absence of acid-fast bacteria is not necessarily an indication that the lesion is not tuberculous. It is well known that a biological test will frequently demonstrate tuberculosis where the organisms can not be found after a prolonged search. At the time no systematic examination for C. pyogenes was made as it was felt that if acid-fast bacilli were present the lesions must be tuberculous. Cultures for C. pyogenes were made from a few specimens with negative results. Ten strains of M. tuberculosis were isolated, all bovine in type. A number of specimens showing acid-fast organisms gave negative results in biological tests which suggested that the organisms were not viable.

In view of the possibility of the recommencement of an anti-tuberculosis campaign in cattle it was decided to undertake the examination of a large number of specimens from pigs condemned for tuberculosis, at the Pretoria and Johannesburg abattoirs. The material would in this case be reasonably fresh. Isolation and typing of strains of M. tuberculosis from these specimens was commenced early in 1954 and in all 108 infected glands were examined, almost entirely submaxillary glands. From Pretoria abattoir 40 specimens were obtained but information as to the origin of the pigs was not available. In the case of the Johannesburg ones, however, 68 specimens, it was. The pigs came from widely separated areas, mainly from the Witwatersrand area and the Orange Free State but also from the Eastern, Western and Southern Transvaal, even as far as Bechuanaland, but not from the Northern. It is probable that Pretoria abattoir took most of the pigs from the latter area. In some cases a few specimens were obtained from pigs from the same farm at different times. In the case of the Durban abattoir specimens the pigs came from widely separated areas and one may safely assume that tuberculosis in pigs is widespread in the Union of South Africa.

Pathological changes in the glands

Only macroscopical changes will be referred to as the histological examinations have not yet been completed. Of the glands examined, all except two were submaxillary ones, the others being one pharyngeal and one mesenteric. There was a great similarity between the majority of the lesions examined. The great majority showed whitish semi-calcareous centres varying up to about one cm. in diameter, but in some cases the material was just caseous. Sometimes there were several lesions in one gland, varying in size from about two mm. up to one cm. in diameter. Occasionally the greater part of the gland was occupied by whitish semi-calcareous material. In a number of cases there were from one to several very small whitish semi-calcareous centres deeply embedded in the substance of the gland and sometimes they could be easily enucleated. It was not possible to differentiate the lesions in which corynebacteria were

found from those showing the presence of tubercle bacilli, in fact the infections were often mixed. Tubercle bacilli were found in all the different types of lesions examined. According to Tammemagi (1953) it is difficult to differentiate corynebacterial lesions from those of true tuberculosis in the pig. It is, therefore, not possible at present at abattoirs to pass any head showing lesions resembling those of tuberculosis as being purely corynebacterial ones.

Typing of strains

In all the specimens from the two abattoirs, an examination was made for acid-fast bacteria in the material in the lesions and a search was made for at least ten minutes before the smear was considered negative. Cultures were made from all specimens on Löwenstein Jensen medium after treatment of the material with 6 per cent KOH and in some cases cultures were made for corynebacteria. Biological tests were carried out on all except 25 of the specimens in order to try to obtain as many strains as possible for typing. Acid-fast bacteria were found in 75 of the specimens and in seven cases the biological test was positive although no acid-fast bacteria were found in smears. In a few cases no acid-fast bacteria were isolated and the biological test was negative but corynebacteria were isolated. It was found that in about 50 per cent of the specimens corynebacterium could be isolated whether tubercle bacilli were present or not and it seems probably that a mixed infection is common as might be expected.

Altogether 49 strains of M. tuberculosis were obtained for typing, either by direct culture or by isolation from animals in the biological tests. In some cases where acid-fasts were present, usually rare, the organisms could not be isolated ,and may not have been viable. On Löwenstein Jensen medium all the strains produced the same type of growth. They had the smooth appearance which one associates with the bovine organism. No glycerine was used in the medium for fear of suppressing the bovine strains.

For typing, cultures on serum agar were used after two to three weeks incubation. Rabbits and guinea-pigs were used, also pigeons. The rabbits received .01 mg. intravenously, the guinea-pigs 1 mg. subcutaneously and the pigeons 1 mg. intramuscularly according to the recommendations of S. Griffith.

Of the strains typed so far, 30 are definitely bovine. Of the remainder, some are still being typed and 7 have been subjected, to retying on account of the rabbits showing no or very few lesions, which would suggest a human origin. So far no definite human or avian strains have been encountered.

A peculiarity of the disease in pigs which seems to have been observed in many countries is the restriction of lesions to the submaxillary glands. Dosing by the mouth with 3 mg. of a bovine strain produces generalized tuberculosis but it is possible lower

doses might produce localized infection. Experiments are being carried out to see if 1 mg. per os would infect pigs or 3 mg. intranasally. In addition human infection has been given in a dose of 3 mg. per os. These experiments have only recently been commenced so no results are available yet.

The work on typing of strains from pigs is, being continued and much more information should be available later.

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INSECT VECTORS AND VIRUS DISEASES

R. DU TOIT
Onderstepoort

(PAPER READ AT THE JUBILEE CONGRESS)

According to Rivers (1948) the filterable virus era may be said to have commenced about 1898 by the rediscovery of the fact that the tobacco-mosaic virus could pass through earthenware filters impermeable to bacteria. To Iwanowski (1898) goes the credit of actually having discovered this virus by filtration methods — an event which, at the time, did not elicit the response which its subsequent rediscovery evoked.

It was in 1897 that Loeffler and Frosch discovered the virus of Foot and Mouth disease and advanced workable theories as to the nature of viruses. Beijerinck (1898) came forward with his "contagium vivum fluidum" idea regarding the nature of viruses which he had deduced from his filtration of the tobacco-mosaic virus. The discovery of Yellow Fever virus by Reed *et al,* in 1901, which followed the actual transmission of the disease by mosquitoes, carried out by Finlay in 1881 as recorded by Hirsch (1881) was, in turn, followed by the finding of a host of other viruses in plants, the lower animals and man and, in fact, the tempo of demonstrating the presence of these infectious agents from a very great number of hosts, either as living viruses or by virtue of the immunity response which they provoke in such hosts, has by no means slowed down today and is actually accelerating. It would appear, therefore, that the complications which already exist in sorting out, studying and classifying the mass of evidence accumulated to date represent only a foretaste of what the future holds in store.

The role played by insects and other arthropods in the transmission of virus diseases was without doubt suspected for many years but it was not until Reed and Carroll in 1902 established the transmissibility of Yellow Fever by the mosquito, *Aëdes* (*Stegomyia*) *aegypti* that the realization of the importance of the arthropod vectors in human and animal welfare, so far as the virus diseases were concerned, seems to have been fully appreciated and stimulated the vast amount of intensive study in recent years of the conditions under which these diseases occur.

Yellow Fever, mentioned as far back as 1635 by Du Terre of Guadaloupe was, we know today, responsible for the heavy losses sustained amongst the sailors of Drake and Carleill in 1585 after leaving the island of St. Thomas. Three hundred died at sea under conditions which could not be accounted for but which, in

the light of present day knowledge, can be attributed to Yellow Fever and its transmission by the mosquitoes breeding in the open casks in which fresh water was transported in those days. In this way the disease was transported to many parts of the world but it was not until 1933 when Jungle Yellow Fever was described in Brazil by Soper, Penna and their co-workers in the absence of *Aëdes aegypti* that the role played by other efficient mosquito vectors was appreciated. This discovery led to the modern concept of the cycle which exists in nature between purely sylvatic species of mosquitoes and certain vertebrate hosts in which man plays no part in maintaining the endemicity of the disease and may be said to become infected fortuitously when his activities cause him to enter into the domain of these natural hosts of the virus. From here the infected individual may come into contact with and infect a species of mosquito which is domestic in its feeding habits and thus give rise to an epidemic the limits of which will depend upon the abundance and distribution of the vector insects within a susceptible human population.

To the stimulus provided by the study of Yellow Fever and the ecology and distribution of its hosts both vertebrate and invertebrate may be attributed many of the modern methods in technique employed in virus research today. Theiler (1930) demonstrated the capacity possessed by the virus of developing neurotropically in mice and elaborated a mouse protection test which made possible the titration of sera from the field by which means the presence or absence of many diseases caused by viruses have been established.

A host of mosquitoes falling within a number of genera the habits of which have been studied in great detail, have been incriminated in the transmission of Yellow Fever and it is in respect of the habits of the sylvatic species in particular that it has been possible to find an explanation for the endemic occurrence of the disease in many areas. The application of the modern methods of titrating virus in laboratory animals has made it possible to differentiate between efficient and inefficient transmitters and served to short cut investigations which otherwise might have taken years to complete.

Mosquitoes play an all important part in the transmission of virus diseases of which Dengue Fever, the encephalitis viruses, which show a predilection for nervous tissue, such as the Eastern and Western strains of Equine Encephalomyelitis, St. Louis Encephalitis, etc., and Rift Valley Fever form classical examples. Their potentialities as virus vectors, however, have been only partially investigated as is evidenced, on the one hand, by the number of viruses which have been isolated from them, such as Semliki Forest virus, Bunyamwera virus (Smithburn) Anopheles A and B, Wyeomyia virus (Roca-Garcia 1944), Ilheus virus of Brazil from Aëdes and *Psorophora* spp. (Laemmert and Hughes, 1947), the virus of Hammon and Reeves from *Aëdes dorsalis* and *Culex*

tarsalis from the San Joaquin valley of California, of which, as excitants of disease in man or animals time and opportunity have as yet not permitted a comprehensive study. On the other hand a number of viruses have been isolated from vertebrates, or evidence of their presence obtained by means of serum neutralisation tests, in which mosquitoes may possibly be found to play a part as transmitters. In this respect such viruses as Bwamba Fever (Smithburn), Rift Valley B, the latter responsible for abortions in sheep and possibly in cattle in South Africa, Lumpy Skin Disease and Three-day Stiffsickness and others have been isolated.

Before leaving the question of virus transmission by mosquitoes it would be advisable to mention the value a thorough knowledge of the biology of a mosquito species may have in elucidating the epizootology of a disease. Rift Valley Fever in the Union has been found to be transmitted by at least one of the purely sylvatic or field species of Aëdes viz., *A. (Ochlerotatus) caballus*. The breeding habits of this mosquito were shown to be extremely specific to certain conditions during investigations into the transmission of Horsesickness conducted in the summer season of 1932-33 by Nieschulz, Bedford and du Toit. It was found that *A. caballus* breeds only in grass-covered depressions or areas which are subject to periodic flooding during the heavy summer storms typical of this country, and will make no use of permanent or stagnant water. It has adapted itself, therefore, to the periodic droughts which occur between rainstorms in our summer rainfall areas and a period of desiccation of the eggs of at lest two weeks and up to several months during the winter is necessary before these eggs will hatch. In the severe though restricted outbreak of Rift Valley Fever investigated in 1952 in the Luckhoff area it was significant that whereas evidence of the breeding of *A. caballus* in the pans on the infected farms could not be obtained, abundant breeding occurred in those areas surrounding the pans which were subject to inundation when these pans overflowed. This would account for the absence of disease epizootics, from the point of view of vector prevalence, in normal summer seasons when rainfall is not sufficient to cause the pans to overflow and the occurrence of such epizootics in abnormally wet seasons or in areas of limited extent in which local exceptionally heavy rainfall has occurred.

An interesting observation concerning the peculiar adaptation of *A. caballus* to conditions of periodic flooding of its breeding grounds has been made in the Knysna area where serum neutralization tests of cattle sera have shown that both Rift Valley Fever and Rift Valley B appear to have been enzootic for a considerable period. *A. caballus* has been found to be very prevalent on the upper reaches of the Knysna river at intervals of about one month (Steyn, personal communication) and this does not appear to be correlated with rainfall. A possible explanation may be found in the flooding of marginal marshy areas, above normal tide level, along the river by the spring tides which occur at 28 day cycles where

the admixture of fresh water reduces the salinity of sea-water to an extent which the insect can tolerate and the intervening period between spring tides is sufficient to allow the degree of desiccation of the ova to permit maturation and subsequent hatching at the next flooding. In East Africa other mosquito species notably Eretmapodites spp. have been incriminated in the transmission of Rift Valley Fever and as our knowledge increases other vectors will no doubt be brought to light which will probably profoundly affect the epizootology of the disease.

A number of virus diseases are dependent upon ticks for their transmission amongst which should be mentioned the encephalitis producing types such as Russian Far East Encephalitis, a disease of an occupational nature occurring principally amongst wood cutters and people working in the open where contact with ticks, particularly *Ixodes persulcatus,* is likely to occur. Louping Ill of sheep, transmitted by *Ixodes ricinus,* is particularly prevalent in the summer months in Scotland where Pool, Brownlee and Wilson demonstrated the virus in 1930. Man is frequently attacked and both clinically and serologically, the disease bears a close affinity to the Russian disease. Horses have been shown to develop a viremia with Louping Ill and cattle may contract the disease on infected pastures thus serving as a possible source of infection to ticks which have been shown to pass on the infection from one generation to the next by transovarian passage.

Nairobi Sheep Disease described by Montgomery as far back as 1917 is a systemic infection of sheep which was shown to be transmitted by ticks of the genera *Rhipicephalus* and *Amblyomma,* and *R. appendiculatus* was shown by Daubney and Hudson in 1934 to be the chief vector in which the virus passes from generation to generation through the egg, whereas transovarian passage does not occur in the case of *Amblyomma variegatum.*

Recently Neitz has demonstrated the role played by *Hyalomma transiens* in the transmission of Sweating Sickness to cattle and has shown further that both sheep and pigs are susceptible. The viral nature of the causative agent has as yet not been demonstrated but clinically the evidence points to the cause being a virus and this is supported to some extent by the demonstration of a solid immunity in a large percentage of sheep from the Karroo which failed to react to tick infection by ticks known to produce the condition in susceptible animals. Once infected the subsequent generations deriving from the original transmitter remain infected by passage of the infecting agent through the egg.

The tick genus *Dermacentor* has been incriminated in America in the transmission of Colorado Tick Fever a non-fatal human systemic infection encountered chiefly in the Rocky Mountain Region where it is limited to the distribution of the wood tick, *D. andersoni.* The dog tick, *D. variabilis,* apparently plays some part in the transmission of strains of the virus which has been isolated from dogs

on Long Island in the east of Florio, Miller and Mugrage in 1950, where, however, human cases have not been reported and where dogs show viremia only without clinical symptoms.

The small Nematocera or midges of which the sand flies, *Phlebotomus,* are perhaps the best known have long been associated with the transmission of the virus disease Sand Fly or Threeday Fever which is known in many parts of the world under many names of which Pappataci and Phlebotomus Fever should also be mentioned.

Fairly accurate descriptions date back as far as 1799 but it was not until 1908 that Taussig associated it with *Phlebotomus pappataci.* It is particularly prevalent in the Mediterranean region where it has constituted grave problems during campaigns when large numbers of susceptible troops have had to operate in endemic areas. During the second world war the casualty rate was particularly high on account of the minute size of the insects and their nocturnal habits it was found extremely difficult to protect individuals effectively, as the usual mosquito net is by no means adequate.

Phlebotomus spp. breed in moist situations such as drains, sewers, caves and water holes especially where an abundance of organic matter is present upon which the minute wormlike larvae feed. The location of such breeding sites frequently causes great difficulty but from the point of view of effective control treatment of breeding sites usually offers the best solution. Fortunately the flight range is very limited and use can be made of this fact if the breeding localities can be found.

The family *Chironomidae* which contains the genus *Culicoides* of which some 20 species have been described from Onderstepoort alone play a particularly important part in this country in the transmission of the virus diseases Horsesickness and Bluetongue of sheep of which the transmission was demonstrated in 1944 (du Toit).

These two diseases which were previously thought to be confined to Africa have subsequently been shown to occur, at any rate in epizootic form in the case of Horsesickness, in Palestine occasionally and in the case of Bluetongue, this disease appears to have established itself on the island of Cyprus according to Neitz (1944) and in the southern and western portions of North America as reported by Alexander (1952).

Although a cyclical type of transmission with an extrinsic incubation period in the insect of about 10 days has been demonstrated, little is as yet known as to the source from which the insects acquire their infection, nor has an explanation been found for the fact that the diseases make their appearance in epizootic form invariably during the late summer months.

It is believed that a field cycle exists quite independent of the horse and sheep in respect of both diseases but, although Bluetongue virus has been recovered on occasions from certain field rodents

captured in their natural habitat, proof is lacking that these rodents, e.g. the African Water Rat (*Otomys irroratus*) and the multimammate mouse (*Mastomys coucha*) play any part in acting as virus reservoirs. Cattle are known to harbour the virus of Bluetongue for short periods during the epizootic period of the year and this viremia, which appears to be intermittent in nature and even under insect free conditions where no possibility of re-infection exists, is not associated as far as has been observed with any symptoms clinically detectable. It is through the medium of cattle that the disease Bluetongue may have been introduced into the United States where it appears to have established itself and been present, although undiagnosed as such until a few years ago, for approximately a decade.

Evidence of the presence of a natural field cycle in the case of a number of viruses is accumulating steadily in respect of many diseases and the outbreaks of infection in man or his domestic stock which happen to be susceptible to a particular virus is in a sense fortuitous and accidental. Equine encephalomyelitis, which has already been mentioned, of the United States, affords a very good example where intensive research has demonstrated the part played by a variety of arthropod intermediate hosts in ensuring the continuance of the cycle and the survival of the virus entity. Thus birds of various species have been shown to harbour the virus in the form of a viremia and considerable evidence has been produced to demonstrate that not only mosquitoes, which also serve as the link between birds and mammals in producing infection in the latter, but other ectoparasites specific to birds, such as mites and lice, play an essential role in maintaining the cycle of infection in birds.

A very serious obstacle in arriving at a solution of the epizootological problems associated with Horsesickness, and Bluetongue in the Union may be found in the multiplicity of strains, antigenically distinct, which exist and which enormously complicate serological determination of virus reservoirs in nature.

In conclusion I would like to emphasize the close association which, it must be obvious, must exist between the virologist, immunologist and entomologist in investigating disease transmission by means of arthropod intermediate hosts especially in dealing with disease producing entities such as the viruses, where indirect means of establishing their presence in the case of animals or arthropods, which show little or no clinical response, must be used.

HORSESICKNESS ANTIBODIES IN THE SERA OF DOGS IN ENZOOTIC AREAS

B. M. McINTOSH

A recent study of all horsesickness virus strains available at this Institute has shown that these viruses can be grouped by means of a neutralization test into seven different immunological types (McIntosh, 1955). If these types constitute the complete antigenic range of all horsesickness virus strains this finding means that a method is now available for the systematic examination of sera from various animals for the presence of antibodies against horsesickness viruses. Hence, from these sera the susceptibility and frequency of infection of any species of animal can be ascertained. Prior to this study negative tests for antibody in sera were inconclusive owing to the possibility that the sera may have contained antibody against virus strains of a type not included in the tests.

While the presence of serum antibody merely signifies that the animal has previously been infected the value of this method of approach is that antibody, unlike virus, is usually persistent and leaves durable evidence of past infection. Furthermore, antibodies in most virus infections are produced irrespective of the severity of the infection so that past attacks can be detected as easily in those animals which suffer only a clinically inapparent infection as in those more severely affected. The significance of this is obvious where a search is being made for possible virus reservoirs amongst animals which harbour virus for short periods only during which no symptoms are shown.

Although the susceptibility of the dog has been known for some time (Theiler, 1906), outbreaks of infection have been reported on only three occasions. Bevan (1911), Piercy (1951) and McIntosh, Haig and Hempstead (1955) reported outbreaks in hounds fed meat from horses which had apparently died from horsesickness. In these outbreaks the effects of the disease were severe and a mortality of approximately 20 per cent occurred. Apart from these outbreaks of meat-borne disease there have been no reports of horsesickness in dogs caused by insect-borne virus. Occasionally private practitioners have submitted material to Onderstepoort from dogs suspected to be suffering from horsesickness but no virus has been isolated from these specimens. These negative findings do not mean that their suspicions were unfounded as the period of viraemia in the dog is usually short and isolation of virus in mice from dogs may fail owing to a low virus content in the

blood. It was thought that scarcity of reports of the disease in dogs may possibly be the result of difficulty in diagnosis. To examine this contention sera from several dogs in a horsesickness area were tested for horsesickness antibodies.

As each serum had to be tested against seven virus strains the number of sera tested was necessarily limited and only 13 dogs were examined. However, as these dogs came from a severe horsesickness area it is believed that the results obtained are significant. Seven of the serum donors were dogs attending the clinic at Onderstepoort. The owners were resident in the semi-built up areas around Onderstepoort and in the town of Pretoria North. The other six donors were owned by the manager of the Institute's farm, Kaalplaas. These were typical farm dogs which remained outside in the yard at night and probably often wandered some distance from the homestead. The ages of the donors are not known but no young dogs were included. Two of the dogs on Kaalplaas were aged and had probably been on the farm for ten years.

Methods and Materials

Virus Strains :

Each strain of virus used in the tests was representative of a different immunological type (McIntosh, 1955). The strains were fully mouse-adapted and were used at approximately the 100th passage level.

Sera :

After separation of the clot the sera were heated at 56°C for 30 minutes and stored in small volumes at −20°C until used.

Control Serum :

Included in the tests with each virus was a serum sample collected from a dog into which a viscerotropic Type 7 virus had been injected. A prebleed serum was available from this dog and the post-inoculation serum was collected two months after the injection. This serum was included to demonstrate the development of type specific antibodies following infection.

Neutralization Test :

This has been described (McIntosh, 1955). Fivefold dilutions of serum, viz. 1/5 and 1/25, were tested against 100LD50 of virus. Each serum-virus mixture was injected into groups of six adult mice.

Results

The results of the neutralization tests are summarized in Table I from which it can be seen that only one serum was positive, apart from the serum included as a positive control. The single positive was obtained from one of the dogs on the farm Kaalplaas.

TABLE I.

Results of neutralization tests with dog sera and heterotypic Horsesickness viruses.

Virus strain	Immunol. type of virus	Ratio of dogs positive to negative
A501	1	0/14*
OD	2	0/14
L	3	1/13
VRY	4	0/14
VH	5	0/14
114	6	0/14
Karen	7	1/13†

* Number of dogs positive/number of dogs negative.

† Positive control dog.

DISCUSSION

As the number of sera tested is small some caution is indicated in the interpretation of these results. Despite this deficiency it is perhaps significant that of the Kaalplaas dogs only one showed evidence of past infection with horsesickness. In view of the severity of the disease amongst horses on this farm this result is somewhat surprising. The sera from the Kaalplaas dogs were collected on 16.10.54, six months after an extremely severe outbreak of horsesickness in horses on the farm, hence it is unlikely that the negative results are due to the disappearance of antibody. It appears rather that the dog is not frequently infected and the inference is that the vector which infects the horse does not readily feed upon, or while feeding upon the dog does not as readily infect this species. The ease with which dogs can be infected artificially or by ingestion of infected meat suggests that the explanation is that the vector does not feed as often on dogs. The tendency of dogs to remain close to buildings during the night possibly serves to lessen the chances of attack by infected insects.

As some horses have died from horsesickness on Kaalplaas the possibility cannot be excluded that the dog showing Type 3 antibodies contracted the disease from eating infected horse meat.

The conclusion seems justified that the source of infection for the horse is not as great a hazard for the dog and that this species probably plays a minor part in the spread of the disease. Otherwise it would be surprising that epizootics in horses had not also been accompanied by cases of the disease amongst the canine population.

SUMMARY

Sera from 13 dogs in an enzootic horsesickness area were tested for neutralizing antibodies against horsesickness. One dog showed antibodies against a Type 3 strain only. It was concluded that the dog is not an important host in insect-borne horsesickness.

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AN INVESTIGATION INTO CATTLE FERTILITY RATES IN THE IXOPO VETERINARY DIVISION — A PRELIMINARY REPORT

G. L. MULLER
Ixopo

Introduction

The purpose of this investigation is to ascertain why the fertility rates of both dairy and beef herds in the Ixopo Veterinary Division are so low in comparison with the accepted rates for good husbandry throughout the world.

The Ixopo Veterinary Division comprises the magisterial districts of Alfred, Highflats, Polela, Ixopo and Underberg, and for the purposes of this survey only the European-owned herds have been investigated.

The topography of this area varies from the high altitude mountainous terrain (altitude 5,000 feet above sea level and higher) of Underberg down to the semi-coastal areas of Alfred and Highflats. The type of farming varies in the different districts and is described in the Agro-Economic Survey of the Union (IV) — Subregions E2, E3 and E6 (1).

Statistics :

This survey was started during June, 1953, and a comprehensive census was carried out for the two years July 1st, 1953 to June 30th, 1955.

Some 502 herds in 1953-54 and 483 herds in 1954-55 were investigated (see Table 1) involving 54,472 females during 1953-54 and 56,621 during 1954-55 (see Tables 2a and 2b).

Table 1: 1953-54

District	Number of Herds 1953-54	Number of Herds 1954-55	Type of Farming Operations
Alfred	63	60	Mixed dairy and beef.
Highflats	63	61	Predominantly dairy.
Ixopo	146	145	Predominantly dairy.
Polela	114	109	Predominantly dairy.
Underberg	116	108	Predominantly dairy.
	502	483	

TABLE 2a.

Period: 1.7.53 — 30.6.54.

District	A	B	C	D	E	F	G	H
Alfred	909	1,178	3,748	5,730	1,101	243	33	7
Highflats	1,180	1,504	5,101	7,785	2,709	196	110	37
Ixopo	2,983	2,786	12,779	18,548	5,019	538	1,016	80
Polela	890	934	3,514	5,338	1,494	210	108	26
Underberg	3,201	3,732	10,262	17,071	6,095	189	299	135
TOTAL	9,163	10,134	35,404	54,472	15,788	1,376	1,566	285

TABLE 2b.

Period: 1.7.54 — 30.6.55.

District	A	B	C	D	E	F	G	H
Alfred	889	984	3,302	5,175	1,479	159	10	51
Highflats	1,368	1,513	4,764	7,645	2,432	282	183	27
Ixopo	2,249	2,595	10,128	14,972	4,713	611	840	34
Polela	1,969	2,030	8,616	12,615	4,271	472	547	64
Underberg	2,885	4,119	10,265	16,214	5,537	63	76	54
TOTAL	9,360	11,241	37,075	56,621	18,432	987	1,656	230

Key to Tables 2a and 2b:

(a) Number of heifers under 12 months of age.
(b) Number of heifers between 12 and 24 months.
(c) Number of females over 24 months.
(d) Potential Breeding Stock.
(e) Number of calves born between 1.7.53 and 30.6.54 and 1.7.54 and 30.6.55 respectively.
(f) Number of calves which died as a result of disease or other causes during respective years 1st July to 30th June.
(g) Number of calves slaughtered or despatched to abattoirs for each period.
(h) Number of still-born calves or abortions.

TABLE 3.

District	Percentage calves born 1953-54 : 1954-55		Percentage calves died 1953-54 : 1954-55	
Alfred	29.90	44.82	22.07	10.7
Highflats	40.75	51.49	9.42	11.2
Ixopo	39.20	46.53	10.72	12.9
Polela	42.20	49.47	14.05	11.0
Underberg	59.39	53.94	3.10	1.1

On examination of the returns for each individual farm for the year 1954-55 it was found that the percentage of calves born varied in each district as follows:-

Alfred	19 — 200%
Highflats	15 — 108%
Ixopo	0 — 153%
Polela	7 — 171%
Underberg	5 — 184%

The percentage grouping of individual herds and the number of cows involved in each percentage group is shown in Table 4.

TABLE 4.

Period 1954-1955.

Percentage Calving	No. of Herds	No. of Females
0 — 20	29	2,119
21 — 30	69	6,015
31 — 40	71	5,917
41 — 50	88	7,166
51 — 60	64	5,056
61 — 70	66	4,821
71 — 80	45	3,319
81 — 90	19	1,279
91 — 100	14	548
101 — 120	9	515
121 — 140	3	146
141 — 160	3	102
161 — 180	1	21
181 — 200	2	52

Discussion :

It is suggested that those herds with a calving percentage of 100% and higher either obtain two calves within 12 months and/or allow heifers to calve down under 24 months although the accepted age for calving is 24 months and over.

The percentage calving is obtained by dividing the number of calves born into the total breeding stock over 24 months of age. Two years is taken as the normal age when a cow can be bred and give birth to a viable calf.

Where breeding percentages of over 100% were given, the findings have been that in all cases the bull has been allowed to run with the females so that a service to the first heat after parturition is the normal occurrence, so that in a number of herds the owner will report the birth of two calves at a ten-month interval within the one calendar year. It is in these herds that breeding percentages of up to 200% are recorded.

Fertility Rate :

From the figures for the year 1954-55 it is clear that the greater number of herds, involving by far the majority of cows, fall into the calving percentage groups 21 to 70 with the majority of herds below 60%. Thus the average fertility rates, as indicated for each district, are shockingly low, involving both dairy and beef herds.

This low fertility rate does not augur well for continued replacements, while there can be little hope for the establishment of a reservoir of surplus breeding stock for purchase by outside dairymen.

Calf Mortality :

The relatively high calf losses experienced by the dairy herds coupled with the low fertility rates, substantiates the dismal conclusion drawn viz. that the dairy herds in particular are barely holding their numbers constant, in fact, certain areas e.g. Creighton, Polela, have in the past made extensive purchases of females for dairying in East Griqualand. The mortality rates of beef herd calves, present a brighter picture, and in Underberg one can state that the husbandry of calf rearing through the practice of beef breeding is easier and causes less concern than the conditions pertaining in the dairy areas.

Summary :

The breeding rates of some 483 dairy and beef herds involving 37,075 cows and heifers of breeding age are tabulated and the findings indicate that approximately 68.5% of the herds and some 70% of the females have a breeding rate of 60% and under, while the calf mortality rates in the majority of dairy herds is over 10%.

The Director of Veterinary Services is thanked for permission to utilise and publish the data obtained through the organisation of the Division of Veterinary Services.

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NEPHROPEXY IN A CASE OF RECURRENT REFLEX NEUROGENIC ILEUS IN A DOG

C. F. B. HOFMEYR
Pretoria

RESUMÉ

(1) A case of reflex neurogenic ileus is reported in the dog possibly for the first time.

(2) The remedial operation of nephropexy is described.

(3) The case is briefly discussed.

Happily, in the dog, ileus from any cause is uncommon, the usual type being paralytic. No mention of reflex paralytic ileus has ever been encountered in veterinary literature.

In man this form of ileus is well recognized as often associated with renal colic. There are numerous references to this phenomenon in medical writings.

Subject

The subject of this report was a nine year old Boxer type dog belonging to a woman who was extremely fond of him.

History

The owner stated that the dog's periodic indisposition occurred over about a year. During an attack his abdomen became distended and as hard as a board. This usually lasted for about three days. Whenever he scratched himself during this time, fluid could be heard shaking about inside him. The gurgling of borborygmi was more evident during such an attack. At the same time the animal showed the usual signs of indisposition such as listlessness, anorexia, etc. Improvement always set in gradually and was accompanied by the passing of a great deal of flatus and liquid faeces. This picture is in accordance with that in man. The interval between attacks averaged about a week, but varied from three days to about a fortnight.

Clinical Examination

This was negative in all respects, except that there was right nephroptosis. The kidney could be moved about from the epigastric region to the pelvic inlet.

Diagnosis

Because the dog was specially brought in from a city some distance away, repeated examinations were impossible. The owner was informed that the floating kidney appeared to be the likely cause, a nephropexy was suggested and agreed to. The case was admitted to hospital and the abdomen prepared to be operated on the next day.

The Operation

Flocks and Culp (1954) describe six techniques for the operation in man, but all through the lumbodorsal extraperitoneal approach, which was regarded as unsuitable for the dog. The author decided to devise his own method.

With the patient under general anaesthesia and after the usual surgical routine, a right paramedian incision was made about four inches (10 cm.) long and with the centre opposite the umbilicus. The gloved hand was introduced, the right kidney located and brought out through the wound. The abdominal organs covering the normal renal site were packed out of the way. A bite was now taken through the lumbodorsal tissues at this site with a roundbodied needle threaded with No. 2 chromic catgut. The needle was then passed through the dorsal surface of the anterior renal pole, care being taken to secure the fibrous capsule with as little damage to the cortex as possible. This procedure was repeated twice so that the three sutures formed an equilateral triangle with sides about ½ inch (1.5 cm.). An attempt was made to insert similar sutures into the posterior pole, but the kidney was found to be so firmly in place that it was impossible. Thick catgut was used and multiple knots were made to encourage the formation of adhesions between kidney and lumbar region.

As soon as the patient recovered from anaesthesia, the client insisted on taking him home. Haematuria occurred during the first day or two after the operation as a result of slight trauma to the kidney by the suture needle. On the fifth post-operative day the dog developed biliary fever (Babesia canis infection). He recovered quickly and had a fight on the ninth day as a result of which he was stiff for a few days. He was attended on these occasions by one of the colleagues practising in that city.

The dog never had an attack of paralytic ileus after operation, according to the owner, until his death by euthanasia from an unrelated cause six months later.

Discussion

The pathogenesis of the reflex paralytic ileus is open to speculation. The non-occurrence of the ileus after the nephropexy, especially in view of such a long history of repeated illness, strongly supports the diagnosis incriminating renal colic. The very extensive

mobility of the floating kidney probably allowed it to drift into positions, where fairly prolonged kinking of the ureter took place with urinary back pressure into the renal pelvis. It is conceivable that, even after movement of the kidney allowed straightening of the ureter, oedema at the site of the bend would prolong the obstruction for some time. Eventually, with patency gradually re-established, normal mobility of the paralyzed bowel segment would supervene.

A very interesting finding in man is that the ileus is often confined to a portion of the bowel only. The unaffected loops often show hyperperistalsis. From the very clear history it must be assumed that the case under discussion was affected likewise.

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FLOCKS, R. H. and CULP, D. (1954): Surgical Urology. The Year Book Publications Inc., Chicago. pp. 68-74.

NEW DRUGS

Maybaker (S.A.) (Pty.) Ltd. announce the introduction of two new preparations:

Thiasolucin Intramammary Injection is a 45% solution of the neutral soluble derivative of sulphathiazole, each 10 c.c. being equivalent to 2 gms. sulphathiazole. For the treatment of bovine mastitis, Thiasolucin provides a powerful antibacterial action, capable of clearing cases which are insensitive to penicillin and other forms of therapy. The preparation is rapidly and effectively brought into contact with infected mammary tissue, and where induration has been associated with streptococcal and staphylococcal mastitis, there have been cases in which softening of the quarter was observed as early as twenty-four hours after treatment. No special storage conditions are necessary. Thiasolucin Intramammary Injection is available in boxes of ten collapsible tubes, each of which contains 10 c.c., and the cost to the Public is 22/6 per box.

Following its successful applications in human medicine, "Largactil" brand chlorpromazine hydrochloride is now available as a veterinary product. "Largactil" has a wide range of central and peripheral actions, including a marked central sedative action, an effect of potentiating the action of barbiturates and volatile anaesthetics upon higher centres, and an anti-adrenalin effect. For premedication in anaesthesia, the quantities of general anaesthetics normally required are significantly reduced when "Largactil" has been administered previously. This applies both to intravenous barbiturates, where a reduction of 30-40% is to be expected, and to volatile and gaseous anaesthetics. The drug is of particlar value in toxic animals and others which are poor operative risks. Its other indications include: (a) relief of pain; (b) sedation in hysteria; (c) pruritis; (d) control of vomiting; (e) in conjunction with specific therapy in the control of tetanus. "Largactil" is issued as a 2.5% solution in boxes of 10 x 1 c.c. ampoules at a cost to the Public of 13/-; as tablets in containers of 50 x 10 mgms. (9/9), 500 x 10 mgms. (85/-), 50 x 25 mgms. (14/6), and 500 x 25 mgms. (127/6).

GAME FENCES: A GENERAL SURVEY

T. G. NEL,
Biologist, National Parks Board of Trustees;

M. J. N. MEESER,
State Veterinarian, Lydenburg;

H. P. van der SCHYFF,
Assistant Biologist, National Parks Board of Trustess.

At the request of the Trustees of the National Parks Board of South Africa the authors prepared a review of possible game fences or game barriers. They were enjoined to apply this review with special reference to that portion of the western boundary of the Kruger National Park situated between the Sabie and Olifants rivers in the district of Pilgrims Rest.

A review was made of the value of plants and shrubs as fences, of bush fences, wire fences, electrical fences and the settlement of native locations on the boundaries of game areas or reserves. The following is a brief précis of the report:-

1. Plants and Shrubs as Fences or Barriers.

Both exogenous and endogenous plants were considered. The endogenous plants were subdivided into those plants not growing in the Kruger National Park and those plants common to the Park flora.

A. *Endogenous Plants or Shrubs :*

As there are only two endogenous plants not common to the Kruger National Park and as they are of little importance only some of those plants and shrubs common to the Park flora will be discussed.

(a) *Euphorbia tiraculli.* This is the rubber euphorbia. This plant is found throughout the Kruger National Park. It is a shrub or tree which can reach a height of 12 to 15 feet. The Director of the Royal National Parks, Kenya, states that it is a plant which seems to prefer poor soil, can thrive in wet or dry conditions, is almost fire-resistant, and the plant can become very sturdy and permanent. Codd[1] states that the broken stems exude a white latex extremely irritating to the skin. This irritant prevents people and animals becoming too free with the plant.

(b) *Acacia ataxacantha.* This is the wag-'n-bietjie or flame

thorn tree. The plant is a thorny climber or straggly shrub often making dense thickets. Small hook thorns are situated along the branches. This plant has possibilities in river beds and hollows.

(c) *Acacia pennata.* According to Codd[1] this is a straggly shrub or woody climber. The leafy branches are not eaten by animals. Because of this, the plant might become a pest. Like A. ataxacantha this plant has possibilities as a barrier if planted in river beds and hollows.

B. *Exogenous plants* considered were:-

(a) Rosa multiflora — the tea rose

(b) Agave sp. — the sisal plant

(c) Bougainvillea sp.

(a) *Rosa multiflora* — the tea or polyantha rose — is used successfully in the United States of America[2] as a means of erecting a barrier fence. At present it is used on a large scale in that country. In 1953 at least 4,450 miles of Rosa multiflora were planted in hedges. The tea rose is a strong shrub attaining a height of 10 or more feet and a depth of growth of at least 8 feet. Judicious pruning assists in making this plant a dense thicket.[3] Climatic conditions on the western boundary of the Kruger National Park, however, are not suitable for the cultivation of Rosa multiflora. This plant, therefore, cannot be considered either as a means of or an aid to fencing.

(b) *Agave species* — the sisal plant. This is a well known plant and needs no description. Characteristic of this plant are the long, strong, swordlike leaves ending in a sharp spine and rising rosette-like from the root. It is these leaves which, when plants are put in close together, are of value as a barrier.

The Prisons Department at Barberton has extensive plantings of sisal. There it found that the plants are fairly rapid growers reaching a height of 4½ feet to 5½ feet and a plant diameter of 3½ feet within two years. Maximum height is determined by soil and climatic factors. Maximum growth is reached in 7 to 9 years at which stage the stem and flowers appear and the plant dies. Although sisal is drought resistant a rainfall of not less than 20 inches per annum is considered necessary for the successful propagation of the plant. Although sisal offers a large measure of resistance to frost the best results are obtained in frost-free areas. The Lowveld of the Eastern Transvaal is thus a suitable area. Frost hardens the leaf and spine thus making the plant more suitable as a barrier. Sisal is not fire-resistant and burns fairly easily.

Sisal plantings are to be found in the Changoni, Skukuza, Crocodile Bridge and Pretoriuskop areas of the Kruger National Park. In considering the value of sisal as a game barrier a précis

of the opinion expressed by the Director of Wild Life Conservation in Natal[4] and the Director of the Royal National Parks in Kenya[5] is given.

The Director of Wild Life Conservation in Natal state:—

"Sisal fences used in the Hluhluwe Game Reserve have been in existence for 7 to 8 years and prove a most satisfactory aid to keeping larger animals within bounds.

"The sisal fence is placed immediately inside of an existing 5 strand barb wire fence so as to ensure protection at any point where for any reason the sisal plant do not thrive; where sisal grows satisfactorily the wire fence cannot be reached by animals from inside the Reserve.

"Depending to some extent upon the size of the plants put in it may be said that approximately three years elapse before the barrier is effective.

"Where sisal fences are satisfactorily established none of our big game species, not even rhino and buffalo, have been known to go through them from choice.

"Other advantages are that the plants are easily grown from suckers and seeds, and that the hedge spreads itself into an impenetrable barrier by throwing off suckers from the main plants. The sisal hedge is also a good firebelt along which to burn protective breakers and itself prevents fires from spreading. In winter it affords protection against cold wind. Sisal appear to harbour no pests."

The Director of the Royal National Parks, Kenya, disapproves of sisal on the following grounds:-

"For a few years the plant itself grows on very poor soil and forms a reasonable hedge but once it sends up a pole or flower the plant deteriorates. Thus after about 7 years the original sisal dilapidates and regeneration takes place from suckers thrown down from the flower which takes root and it springs up again. In this way the hedge tends to spread and many gaps form and it is ugly and ineffective. Our main objections here are, firstly, that it is not fire-resisting and burns quite easily and, secondly, that elephants relish it and regard it as a special kind of asparagus. Thirdly, it only has limited life."

The Assistant Biologist to the Kruger National Park is of the opinion that degeneration of the mother plant will not adversely affect the growth of the young suckers.

Although the Uganda Game preservationists agree with Kenya that elephant eat sisal, experience in the Kruger National Park tends to the opposite. This observation was made at a popular water-hole near Crocodile Bridge where there has been a luxuriant growth of sisal for years.

(c) *Bougainvillea species* appear to hold possibilities as a hedge, especially in regard to kudu.

2. Bush Fences.

Bush fences erected to combat the spread of Rinderpest[6]:-

To prevent the southward spread of rinderpest from the Rukwa area of Tanganyika, a bush fence, 25 miles in length, was erected at a cost of £40 per mile. The fence consisted of pairs of upright poles planted into the ground to a depth of 2 feet and at intervals of 5 to 10 feet. Logs were stacked horizontally between the uprights and held by them at the ends; poles and thinner branches were stacked to a height of 8 to 10 feet between the uprights. As stacking progressed the uprights were lashed together once or twice with bark or with wire when this was procurable. Forked poles to act as props were placed at frequent intervals on both sides.

There is ample evidence that such a fence, when built with care and properly maintained, is effective in preventing the passage of game from one side to another. The disadvantage of such a fence is its exposure to fire, termites and disentegration. Such a fence must be continually patrolled so that any gaps can be closed before game can get through. The life of such a fence could be as much as three years. When building such a fence knowledge of the topography of the country and seasonal movements of game is essential.

A similar type of fence was also erected on the Tunduma-Saia river-Kalambo Falls area on the Northern Rhodesia-Tanganyika border.

3. Wire Fences.

(a) During the building of the Northern Rhodesia-Tanganyika bush fence, scarcity of wood compelled the authorities to erect wire fences. This fence was seven feet high with a ditch six feet broad and four feet deep on either side. This proved a failure because during the rainy season the sides of the ditches caved in, the ditches tended to become raging torrents and the lower portions silted up.

(b) *The Pilgrims Rest Foot and Mouth Fence*: In Southern Africa game are considered to be the primary carriers of foot and mouth disease. To prevent cattle grazing amongst game from coming into contact with cattle in essentially farming areas the Division of Veterinary Services in South Africa erected a wire fence in the Pilgrims Rest district. The fence, with an overall length of some 83 miles, extends from the Sabie river to the Olifants river. The fence is situated west of the western boundary of the Kruger National Park.

The farms situated adjacent to the western boundaries of the

Kruger National Park are game farms running only a limited number of cattle. Locally these farms are known as "shooting boxes". The fence erected by the Division separates these farms from the true farming areas further west. In enclosing all the "shooting boxes", the fence, of necessity, was not built in a straight line.

Preliminaries to the erection of the fence were the proclamation of the area as a compulsory fencing area; contacting owners to have boundary lines surveyed and cut open; arranging for a supply of fencing poles and hangers. The expense of fencing material and the costs of erection were borne by the Division.

In erecting the fence, poles were planted 20 yards apart. The fencing poles used had a minimum thickness of 4 inches. Five strands of barbed wire were drawn. In some instances insufficient barbed wire was available so smooth wire had to be made use of. Between each pair of fencing poles 4 hangers were attached to the wire. Where Provincial or essential roads crossed the fence, gaps were left but no gates were attached.

An Assistant Stock Inspector and a gang of natives were employed to do the work. They were provided with suitable transport and all the paraphernalia necessary to the erection of a barbed wire fence. In addition to fence building this gang had to clear the bush for at least 15 feet on either side of the fence and they had to build a patrolling road along the fence. Fencing material, transport, salaries and native rations gave a total erection cost of £14,000.

To keep the fence in order a gang of 10 natives, working in pairs, are placed at strategic points. It is their duty to repair all fence breaks, keep the road in order and to prevent the bush from encroaching on the fence. These rangers make daily patrols.

At the time of writing the fence has proved itself markedly successful. The aim of the Division, i.e., the separation of game areas, was achieved. Proof of this was obtained in the 1951 outbreak of foot and mouth disease when the initial westward spread of the disease was effectively checked by the fence.

(c) *The Hippopotamus Fence of Mr. L. A. Wiid*: This fence has been accepted as the basic type of fence for the Crocodile river or southern boundary of the Kruger National Park. This fence is built as follows:- fencing poles 6 inches thick are placed 30 feet apart; 5 hangers, each two inches thick, are placed between each pair of fencing poles. The six strands of barbed wire used are placed in the following order:- a single strand at the bottom, close to the ground, then two lots of two strands close together and a single strand at the top. This type of fence has been most successful against hippo and buffalo.

(d) *The Addo Park Elephant Fence*: After various experi-

mental sections were tried out the fence as described below was erected and is proving most successful in keeping elephant within the confines of the Addo Park.

Railway or tramrails, 14 feet in length, are sunk six feet into the ground. They are planted at 24 foot intervals. Between rails three lengths of lift cables are placed at intervals of 2 feet, 4 feet and 6 feet 9 inches from the ground. For additional strength, strong, creosoted wooden poles and droppers are attached at regular intervals to the cables between the rails. To prevent elephant destroying the wooden poles all points of the strong binding wire used were placed on the elephant side of the fence. Sharp pointed nails, protruding from the poles, also acted as a further deterrent to wilful or playful destruction.

4. Electric Fences.

In general, electric fences are not considered to be suitable game barriers. They have many disadvantages. The high current necessary as an effective deterrent constitutes a danger to human life. It would appear that where game is abundant and wanders about in large herds and is exposed to human and predator disturbance, electric fences are of little value. Exceptions would appear to be:-

(a) The elephant fence of the King George V National Park in Malaya. Here a 70% success has been obtained in confining elephant to the Park. As the Director points out this is undoubtedly due to the fact that the Indian elephant is reasonably tame and wanders about in small groups only.

(b) In some American National Parks, where small numbers of pronghorn antelope, bear, deer and bison were reasonably successfully controlled.

5. Settlement of Native Reserves on the Boundaries of Game Reserves.

When considering the erection of the Veterinary Protective fence in the Pilgrims Rest district the Division of Veterinary Services in South Africa was aware of the fact that the presence of native locations on the boundaries of game reserves acted as an efficient barrier to penetration of game outside the confines of the reserve. It was for this reason that the fence was not erected down the western boundary of the Kruger National Park in the White River area. Along this section the White River Native Reserve abuts on to the whole length of the Park boundary. The lack of game on this section obviated the necessity of a fence. T. G. Nel,[7] Biologist to the Kruger National Park in Park Bulletin No. 11 of 1951 discusses the influence of native life on adjacent game population. He came to the same conclusions.

Conclusions :

In their conclusions the authors state:—

(1) that the ultimate aim of a fence on the western boundary is to:-

(a) successfully fulfil the articles of the National Parks Act in relation to the protection of fauna within the Park, and

(b) by means of controlled experimentation to contribute to the wellbeing of National Parks.

(2) that the basic barrier is the barbed wire type of fence as used in the Pilgrims Rest Foot and Mouth fence.

(3) that the barbed wire fence should be supported by the planting of suitable shrubs along the fence so as to enhance its effectivity.

(4) that where plants are used as a supportive barrier care must be taken that they do not become pests.

(5) that it is essential that such a fence or barrier be under daily supervision.

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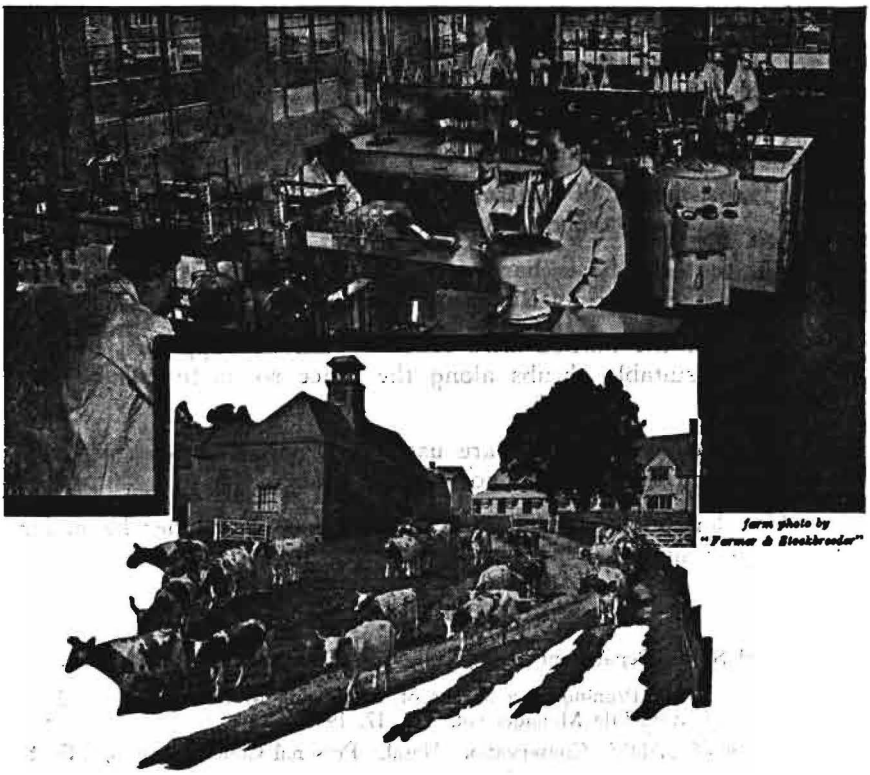

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ACTINOBACILLOSIS, THE CAUSE OF A NON-SPECIFIC REACTION TO THE INTRADERMAL TUBERCULIN TEST, BUT A NEGATIVE SHORT THERMAL TUBERCULIN TEST

P. J. J. FOURIE

It is known that human and avian tubercle bacilli can produce sensitization to tuberculin in the bovine. It is not surprising that this is the case, since these organisms are tubercle bacilli.

Fourie (1952) gave details of two animals which reacted positively to the intradermal tuberculin test, but which on post mortem examination were found to be infected with actinomycosis but no lesions of tuberculosis were observed. The one animal also gave a positive subcutaneous test and the other a positive short thermal test (Gregory).

During 1954, one of the experimental animals at Onderstepoort No. 5440 was seen to have a swelling below and caudal to the angle of the lower jaw. The pus which was obtained by means of a needle was examined and the actinobacillus was identified.

In order to find out what the state of sensitization to tuberculin is in the case of an animal infected with actinobacillosis, the single intradermal tuberculin test was applied on the 25th of May, 1954.

The readings were 9.5 and 14.5. The swelling was diffuse and this reaction was regarded as very suspicious if not positive. (See photo on next page).

Since the animals with actinomycosis referred to by Fourie (1952) gave positive subcutaneous tests, it was decided to submit this animal as well to the short thermal test.

The recorded results are:-

9 a.m.	11 a.m.	1 p.m.	3 p.m.	4 p.m.	5 p.m.
101.5	101.4	101.6	101.4	101.6	101.8

If all animals infected with actinobacillosis should give such negative short thermal tests, this test would be valuable to differentiate this condition from tuberculosis in those problem cases where very suspicious or even positive intradermal reactions are present.

In order to make certain if the sensitization to tuberculin in this animal was due to the actinobacillosis and nothing else, the animal was successfully treated for the condition by penicillin and sodium iodide intravenously. Three months later it gave a com-

pletely negative intradermal test. This shows conclusively that the sensitization was due to actinobacillosis and disappeared when the animal was successfully treated.

This case is reported with the hope that other workers who come across similar cases, would try the short thermal tests as a

Fig. 1.

Bovine 5440 infected with Actinobacillosis and showing a very suspicious intradermal tuberculin reaction.

check test, then treat for actinobacillosis to make sure if the sensitization disappears with successful treatment. Only in this way can a sufficient number of cases be dealt with to satisfy statistical requirements in order to determine the value of the short thermal tuberculin test as a check test in problem herds where actinobacillosis is responsible for non-specific reactions.

Summary

A case is reported of a bovine with actinobacillosis, giving a very suspicious intradermal tuberculin reaction, but a negative short thermal tuberculin test. When the animal was successfully treated, sensitization to tuberculin disappeared completely. If all or a high percentage of actinobacillosis cases should react in a similar manner, the short thermal tuberculin test may be a valuable check test in some problem herds.

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VEEARTSENYDIENSTE IN DIE SUIWELBEDRYF

P. L. NUTT

Hoofbestuurder van die Tweespruit Ko-operatiewe Suiwelfabrieke

Teneinde die tekort aan Veeartse in die Oostelike Vrystaat aan te vul het die Tweespruit Ko-operatiewe Suiwelfabrieke aan die end van 1953 sy eerste amptelike Veearts te Excelsior aangestel. Die eksperiment was so suksesvol dat 'n tweede Veearts in Maart 1955 te Zastron aangestel is. Laasgenoemde diens is ook van 'n eksperimentele aard en word na verloop van 'n jaar hersien, maar sal beslis voortgesit word indien die gebruik daarvan gemaak en die ondersteuning van boere ontvang, dit regverdig. Hoewel geen wins deur die Maatskappy in die vooruitsig gestel word nie, word nietemin beoog dat die diens sover moontlik selfstandig moet wees.

By die instelling van hierdie uiters waardevolle ko-operatiewe diens het die Tweespruit Ko-operatiewe Suiwelfabrieke uitgegaan van die standpunt dat hoewel Veeartse hoofsaaklik vir diens in die platteland opgelei word — en dit teen hoë koste vir die student sowel as die staat — hulle dienste uiteindelik vir die platteland verlore is, aangesien sommige boere traag of nie in staat is hulle rekenings stiptelik te betaal en Veeartse beswaarlik 'n bestaan kan maak en mettertyd verplig is hulle heil in die groter stede te soek.

'n Suiwel-organisasie soos Tweespruit Ko-operatiewe Suiwelfabrieke is in die voordelige posisie dat dit aan die end van elke maand betaling aan boere moet maak vir melk of room deur hulle gelewer. Die kostes van enige Veeartsenydienste wat gelewer is kan derhalwe gemaklik aan die end van die maand van die boer se melk- of roomtjek afgetrek word. Dit geskied sonder ongerief of nadeel tot die boer wat hierdie prosedure verwelkom en die betaling geensins voel nie.

Aan die anderkant bestaan die verdere voordeel dat daar geen slegte skulde is nie. Alle rekenings word stiptelik vereffen sonder verleentheid tot die boer of die Veearts. Daar is geen noodsaaklikheid vir aanmanings of ander meer drastiese stappe om uitstaande skulde in te vorder nie. Aangesien die boer sy verpligtinge nagekom het aarsel hy nie wanneer nodig om die Veearts weereens in te roep nie.

Die sielkundige uitwerking hiervan op beide die boer sowel as op die Veearts is besonder belangrik. In die eerste plek het die boer die vrymoedigheid en skoon gewete om oor en oor van die Veearts se dienste gebruik te maak tot sy eie voordeel. Op hierdie wyse ontstaan daar 'n toenemende aanvraag om die Veearts se dienste en word hy meer en meer onmisbaar vir die samelewing. Ten tweede het dit 'n heilsame uitwerking op die Veearts wat nie gebukkend

gaan onder die las van onbetaalde rekenings en slegte skulde nie. Hy ontvang 'n gereelde maandelikse besoldiging en dra geen kommer of sy inkomste voldoende sal wees om aan die end van die maand sy eie verpligtings na te kom nie. Deurdat die Veearts geen finansiële las dra nie, kan hy hom met 'n geruste gemoed aan sy werksaamhede toewy en hom ten volle uitleef in die beroep waarvoor hy spesiaal opgelei is. Bo alles besef die Veearts in sy onder bewussyn dat sy dienste wel benodig is en dat hy 'n belangrike rol in die samelewing speel.

Op hierdie wyse is daar 'n uitbreiding in plaas van inkorting van die Veearts se dienste. Alles gaan om die betaling van skulde en rekenings. Waar dit vertraag word is daar 'n skuldige gewete aan beide kante. Die boer het nie die vrymoedigheid om weereens die Veearts in te roep nie en laasgenoemde huiwer om sy dienste beskikbaar te stel indien hy weet dat betaling daarvoor onseker of onwaarskynlik is. In laasgenoemde geval bestaan daar onwillekeurig 'n slegte verstandhouding tussen die Veearts en sy klient. Indien die Veearts nie drasties op tree nie, gaan hy na onder — tree hy te drasties op gaan hy in elk geval ten gronde, want langsamerhand word minder en minder gebruik van sy dienste gemaak totdat sy inkomste so laag is dat hy geen selfstandige bestaan kan maak nie.

Suiwelfabrieke kan dus veel bydra om veeartsenydienste in die platteland te behou, aan te moedig en uit te brei ten voordele van die boer, die veearts sowel as die suiwelbedryf. Dit is 'n samesnoering van kragte en met die heelhartige samewerking tussen die fabriek, Veearts en die boer is daar feitlik geen einde aan wat werklik verrig kan word nie.

Die stelsel wat gevolg word is heel eenvoudig. Die Veearts word aangestel op 'n salaris gelykstaande aan dié, deur die Staatsdiens aangebied insluitende lewenskoste toelae wat òf deel van die basiese salaris uitmaak òf afsonderlik betaal word. Deelname aan 'n Pensioenfonds is verpligtend en 30 dae verlof op volle betaling word jaarliks toegestaan. Die Veearts voorsien alle instrumente wat vir sy werk benodig is. Sodanige instrumente bly sy uitsluitlike eiendom en moet deur hom in goeie orde en werkende toestand gehou word. Hiervoor ontvang hy jaarliks 'n toelaag van 10 persent bereken op die oorspronklike waarde van die instrumente. Alle medisyne en veeartesny-middels word beskikbaar gestel deur die Maatskappy wat ook 'n voertuig voorsien en alle kostes daaraan verbonde dra teneinde die Veearts instaat te stel sy werksaamhede sonder oponthoud of onderbreking voort te sit.

Rekenings vir dienste deur die Veearts aan enige boer gelewer bestaan uit drie dele nml.

(1) *Professionele Dienste* wat gelykstaan aan die tariewe soos deur die Veeartseny Raad neergelê.

(2) *Medisyne gebruik* wat teen gewone kleinhandelspryse uitgereik word.

(3) *Vervoer na plaas* bereken teen 1/- per myl. Hierdie item is die belangrikste en is die beperkende faktor wat betref die gebruik wat van die Veearts se dienste gemaak word. Deur die tarief so laag moontlik te hou word die dienste aangemoedig.

Waar die boer 'n verskaffer of lid van die Suiwelfabriek is word die rekening stiptelik aan die end van die maand van sy melk of roomtjek afgetrek. Non-lede of non-verskaffers word teen dieselfde tariewe bedien maar moet kontant betaal by datum van die diens.

Die dienste van die Veearts is in die eerste plek bedoel vir lede of aandeelhouers van die Suiwelfabriek, maar waar omstandighede dit toelaat en sy tyd nie deur lede in beslag geneem word nie, word sy dienste ook aan non-lede op 'n kontant basis beskikbaar gestel.

Die ondervinding tot hiertoe opgedoen dui aan dat die diens selfstandig is en op eie voet kan staan sonder die noodsaaklikheid om gesubsidieër te word. Boere word meer en meer bewus van die waarde van die Veeartsenydienste wat langsamerhand meer en meer onmisbaar word. Dit dien as 'n versekering teen verliese op duur koeie en bulle. Sodoene word boere aangemoedig om op hulle suiwelkuddes en melkopbrengs per koei te verbeter. Behalwe die bestryding van siektes onder suiwelkuddes is daar natuurlik ander belangrike aspekte wat ook aandag geniet soos voeding, versorging van kalwers, suiwel higiëne, ens.

Onder die stelsel soos hierbo uiteengesit word geen beperkings op die Veearts geplaas nie. Hoewel hy vir 'n salaris werk is hy nogtans selfstandig en ontvang alle aanmoediging om hom aan sy lewenstaak toe te wy en die boeregemeenskap te bedien.

SECOND WORLD CONGRESS ON FERTILITY AND STERILITY

The XIIth Section regards entirely:
Problems on Animal Reproduction

From May 18th to May 26th, 1956, there will be held in Naples (Italy) the SECOND WORLD CONGRESS ON FERTILITY AND STERILITY.

The Congress is sponsored by the International Fertility Association and is composed by the following 12 sections:

I — Endocrine and metabolic factors in fertility and sterility.
II — Professional (occupational) and toxic factors in relation with fertility.
III — New methods on diagnosis and treatment of male sterility.
IV — New methods on diagnosis and treatment of female sterility.
V — Diagnosis of ovulation and its disorders.
VI — Diagnosis of spermatogenesis and its disorders.
VII — Treatment of disorders of ovulation.
VIII — Treatment of disorders of spermatogenesis.
IX — Surgery of male sterility.
X — Surgery of female sterility.
XI — Experimental investigation in fertility and sterility.
XII — Problems in animal reproduction (veterinary).

Prof. Edmundo G. Murray is the Chairman of the World Program Committee. Prof. G. Tesauro of the University of Naples is named President of the Organising Committee co-operated by scientists from various countries. Prof. T. Bonadonna of the Universities of Camerino and Milan, as Co-Chairman of the World Program Committee has been charged with the organization of the XIIth section (veterinary).

This section assumes great interest and significance because it includes 3 Major Papers and 5 Minor Papers which are read by leading specialists from various countries.

Besides this a General Lecture will be held by Prof. Nils Lagerlöf from the Royal Veterinary School in Stockholm on the subject "Biological aspects of male infertility".

There is already guaranteed a remarkable participation at the Congress of physicians and veterinarians from all countries.

Veterinarians and zootechnics are invited to take part most

numerously in the Congress for the importance and actuality of technical and scientific problems which will be discussed and particularly by the XIIth Section and for showing their solidarity to the International Fertility Association who wanted to have a special section dedicated to problems on animal reproduction.

TIMETABLE.

Expiry date for reception of *titles* of scientific papers: 30 *October*, 1955.

Expiry date for reception of *typed summaries* (10-20 lines) of scientific papers: 30 *November*, 1955.

Expiry date for reception of *six full copies* of each scientific paper: 31 *January*, 1956.

All remittances have to be addressed to:

Prof. Edmundo G. Murray, Ayacucho 1375, *Buenos Aires* (*Argentine*).

PAPERS.

The speakers of the *Major Papers* have at their disposal 15 *minutes* and the text must *not exceed* 20 *pages*. *Contributions* to these subjects: 10 *pages* — 8 *minutes*.

The speakers of the *Minor Papers* have at their disposal 10 *minutes* and the text must *not exceed* 12 *pages*. Contributions to these subjects: 10 *pages* — 8 *minutes*.

Those invited to *open discussion* have at their disposal 10 *minutes*.

The *authors of Major and Minor Papers* are invited to send a copy of their paper to their discussants *before January* 31*st*, 1956.

Discussants have one month to prepare their participation and have to send 6 full copies of their discussion to Prof. E. G. Murray, Ayacucho 1375, Buenos Aires, *before February* 1*st*, 1956.

A *scientific exhibit* and a *exhibit of books and films on Fertility and Sterility* are organized contemporaneously with the Congress. Those interested to participate at these exhibits are asked to address too to Prof. E. G. Murray.

PROGRAMME OF XIITH SECTION.

Problems on animal reproduction

MAJOR PAPERS.

1. "Hereditary and congenital factors of male infertility" — R. Gòtze (Germany). *Discussant*: V. Calisti (Italy).

   Contributions:

   (a) "Influence of old ageing on products of conception" — W. Baier (Germany).

   (b) "Fertility as it relates to genetic improvement" — R. H. Foote (U.S.A.).

2. "Biochemistry of semen" — T. Mann (England). *Discussants*: J. Anderson (Kenya), J. Yamane (Japan), J. Moustgaard (Denmark).

   Contribution:

   (a) "Metabolism and mortality of sperms" — H. Simonnet (France).

3. "Early embrionic vitality in domestic animals" — M. Chueh Chang (U.S.A.). *Discussants*: A. Corrias (Italy), J. A. Laing (England).

   Contribution:

   (a) "Frequency of estrous suspension in cows normally or artificially inseminated" — A. De Vuyst (Belgium).

MINOR PAPERS.

1. "Infertility in animals due to infection" — S. W. van Rensburg (South Africa). *Discussants*: M. Addis (Italy), E. Hess (Switzerland).

   Contributions:

   (a) "Influence of non-genital infections on fertility in male animals" — C. De Cuenca (Spain).

   (b) "Influence of non-genital infections on fertility in female animals" — W. Hofmann (Switzerland).

   (c) "Neurogenic factors affecting ovulation in animals" — H. William Hansel (U.S.A.).

2. "Longevity of the sperms in the different parts of the female genital tract" — N. L. Vandemark (U.S.A.). *Discussants*: I. Peli (Italy), M. Dauzier (France).

3. "The climate and fertility" — E. S. E. Hafez (Egypt). *Discussants*: P. Bhattacharya (India), J. Velasquez (Colombia).

   Contribution:

   (a) "The influence and the length of light on spermiogenesis in domestic animals" — R. Ortavant (France).

4. "The cytomorphology of spermiogenesis" — O. Knudsen (Sweden). *Discussant*: W. W. Williams (U.S.A.).

   Contributions:

   (a) "Structure and formation of galea capitis" — W. Karras (Germany).

   (b) "Some histochemical characteristics of the protoplasmatic drop" — G. C. Pozzi (Italy).

5. "The limit of value in using hormones in the treament of infertility in domestic animals" — S. Sartoris (Italy). *Discussants*: S. A. Asdell (U.S.A.), W. Koch (Germany).

Contributions:

(a) "Present status of Vit. E, A and C in animal infertility" — I. Likar (Jugoslavie).

(b) "Associations of seric and urinary gonadotrophins in ovary stimulation" — E. Rowes (England).

(c) "Functional cytology of the bovine adenohypophysis in relation to cystic ovaries" — McEntee, Kenneth, Jubb, K. V. (U.S.A.).

(d) "Effect of Vit. A deficiency on reproduction and growth in farm and laboratory animals" — G. E. Lamming (England).

(e) "The influence of seric and urinary gonadotrophins in ovary stimulation and limits in their employing" — P. Ajello (Italy).

(f) "The action of sexual hormones on gonads and on the genital tract in peculiar metabolic conditions" — F. Usuelli, G. Piana, C. Baldissera Nordio, B. Mainardi (Italy).

(g) "The action of progesterons on spermiogenesis" — C. Baldissera Nordio (Italy).

(h) "Alterations of gonads of male pig in avitaminose E" — G. M. Curto (Italy).

CASE REPORT

VERTEBRAL OSTITIS IN A CALF DUE TO SALMONELLA DUBLIN

L. W. van den HEEVER,
Germiston.

A three months old grade Friesland calf was presented showing difficulty in getting up and lying down, but with the habitus otherwise excellent. Later the animal could not rise on its own, and gradually, in the course of three weeks, the paresis developed into an almost complete paraplegia. There was however, some evidence of sensation to pain stimuli, and feeble voluntary muscular movements were seen. Defaecation and urination took place normally, and the animal continued to exhibit a good appetite and a bright eye. There was no pyrexia.

A tentative diagnosis of pressure on the spinal cord in the lumbar region due to a developing abscess was made, and a five day course of sulfapyridine instituted. After a further week there was no indication of improvement, and the animal was slaughtered.

At a post mortem examination no pathological changes or abnormality of the body or organs was noted other than the lesion in the vertebral column. The body of the second lumbar vertebra was enlarged and raised above the level of the adjoining vertebra. On longitudinal section it was noted that the spongiosum had been converted into a large thin-walled cavity containing a small quantity of a thick cream-coloured bloodstreaked pus with crumbly particles therein. The cavity was by no means filled with material but the wall was exerting pressure on the spinal cord to the extent of compressing it to less than half its normal diameter. The intervertebral cartilages and the other soft tissues around the affected vertebra were hyperaemic and of a gelatinous nature.

As the aetiology of the condition was unknown, glycerine and formalin specimens were forwarded to the Director of Veterinary Services at Onderstepoort for examination. In due course the following reports were received:-

1. From Professor M. W. Henning, who reported that Salmonella dublin had been isolated from the bone lesion.
2. From Professor K. Schulz, who reported that he found a softening and demyelinisation of the spinal cord, and a purulent ostitis with a partial fracture of the vertebra. A number of colonies of micro-organisms were found in the periphery of the lesion.

It is perhaps interesting to note that although approximately 100 calves are raised annually on the particular farm, no clinical cases of paratyphoid have been encountered since farming operations were commenced 4 years ago. Inoculation of calves or pregnant cows was therefore never practised. Subsequently a paracute cases of paratyphoid was established from specimens examined by Professor Henning.

Summary:

A case of ostitis of the body of a vertebra of a three months old calf due to Salmonella dublin infection is recorded, the clinical and post-mortem symptoms are described, and a report on the pathological findings is included.

Acknowledgements:

The author is indebted to Prof. M. W. Henning and Prof. K. Schulz for undertaking the bacteriological and histo-pathological examination of the material.

OBITUARY

J. NICOL (1887 - 1955)

The late Dr. J. Nicol came to South Africa in 1910 to join the Field Department of the Union Veterinary Services and was stationed at Cape Town for a short while under the Senior Veterinary Officer of the Cape Province, Mr. R. W. Dixon. He was soon moved to the Transkei but early in 1912 he was transferred to King Williams Town on East Coast Fever control work. During the 1914-18 war he joined the South African Forces and served as a major in the Veterinary Corps. On his return to civilian life he went back to the Eastern Province and was engaged on East Coast Fever work as the disease had broken out again. In 1919 he took over the veterinary control of the East London district but later was transferred to Umtata where he served until he was promoted to Senior Veterinary Officer and in 1933 took over control of the Eastern Province of the Cape. In that post he remained until he retired in June, 1947. After his retirement he was re-employed as a temporary state veterinarian to organize the examination of smears by the lay smear examiners, finally retiring in December, 1949.

Dr. Nicol was a very good judge of men and his staff always held him in very high esteem. He interested himself particularly in newly appointed state veterinarians and guided them in every way in their duties. He made a particular contribution towards the eradication of East Coast Fever and sheep scab in the Transkei and Eastern Province. He was kind and thoroughly honest in all he did and never forgot to reciprocate any kindness done to him.

He leaves a son who is a great sportsman and runs a sports business in East London.

A.M.D.
A.C.K.

CASE REPORT

THE USE OF CHLORPROMAZINE HYDROCHLORIDE ("LARGACTIL" — MAYBAKER) IN AN EQUINE CASE OF TETANUS

L. W. van den HEEVER,
Germiston.

Summary:

A case of tetanus in a horse, in which "Largactil" (Chloropromazine hcl.) was used in conjunction with standard antibiotic and antitoxin therapy, giving details of the beneficial effects of the drug, is described.

Case Report:

A medium draft horse, gelded, approximately 9 years old (Clydesdale type) and weighing about 1,200 lbs., was first seen with a second degree harness gall just posterior to the withers. The usual wound dressing (Sulfanilamide and Iodoform) was applied.

A week later the animal was presented with typical symptoms of tetanus including stiffness of gait, erect ears, extension of head, neck and tail, protrusion of the membrana nictitans upon elevation of the head, and muscular spasms. The animal was, however, still able to eat and drink fairly well. One litre of horse serum containing 400 units of tetanus antitoxin per c.c. was administered intravenously, and the animal was placed in a quiet loose box.

Twenty-four hours later the symptoms were extremely exaggerated: The animal was anxious and tense, went into a violent muscular spasm at a clap of the hands, respirations were fast and shallow with nostrils widely dilated, and the horse was unable to eat or drink, only lateral movement of the mandible being possible. 500 mgm. of "Largactil" as a 5% solution was given intramuscularly, and three hours later the animal was again observed. It presented a vastly different picture: Head, ears and tail were down, eyelids almost completely covered the eyes, the penis extended four inches beyond the preputial orifice, and the muscles were soft and flaccid. There was no response to sound or touch, and for all intents and purposes the horse was in a state of sedation similar to that obtained with chloral or barbiturates.

By the next morning at 8 a.m. the extreme effects of the drug had worn off, and there was a partial return of most of the symptoms. The horse could however open its jaws some 1½ inches and could eat and drink reasonably well.

Thereafter 250 mgm. of "Largactil" was given every 12 hours and this maintained a state of relaxation which allowed natural feeding, drinking and defaecation and made administration of nutrient fluids and laxatives unnecessary. Reaction to sounds was also minimal and did not result in severe spasms. The expression of anxiety and the general muscular tension was considerably relieved.

"Largactil" and 3,000,000 units of Penicillin in oil per day were administered for 7 days. Withdrawal of the chlorpromazine resulted in a return of the symptoms as noted at the onset of the case, although in a much milder degree. Administration of "Largactil" was therefore resumed, maintained for a further 3 days, and then terminated. Throughout, only green fodder and water ad lib were given, and the animal was eventually also given access to a quiet paddock after 4 p.m. where it roamed around, but never lay down.

Three weeks after the disease was first diagnosed the horse still had a slightly stiff gait and held its head rather erect, but was otherwise normal and even gambolled around in its paddock.

The "Largactil" was made available as a 5% trial solution. The material proved to be somewhat irritating to the musculature; a hard tender swelling developed at the site of injection, and blood stained serum-like fluid could be obtained from these swellings by needle puncture. After ten days of three I.M. injections per day, the large muscle groups of all four limbs were fairly tender, but this condition passed off in a week or so and no permanent effect was noted. The horse was eventually put back to slow work four weeks after the disease was first diagnosed, the only permanent effect of the disease being that the head was carried slightly higher than usual.

Discussion:

It is well known that antitoxin has no neutralising effect on toxin already fixed by the nervous system, consequently its use is confined to circulating toxin not yet absorbed by nervous tissue. Due to the serum being homologous, prolonged effect may be expected from a single administration. The fact that the horse's condition was so much worse 24 hours after administration is no reflection upon the value of the use of antitoxin, and it must be accepted it has considerable value in preventing the further absorption of toxin and consequently further nervous tissue damage.

Administration of antibiotics in large quantities over a prolonged period is also standard procedure in preventing the formation of further toxin at the site of infection and in dealing with accompanying staphylococcal and other infections.

The lesion caused by defective harness was the only one that could be detected, and it is therefore assumed that toxin emanated

from infection of it. The lesion eventually healed without special attention.

"Largactil" is known to possess marked sedative properties. The compound has an analgaesic action to some degree, and relaxation of muscular tonus has been noted. The effect of the "Largactil" in this case was to minimise tension, anxiety, general muscle tone and the violent spasms resulting from external stimuli such as sound, and movements. To my mind the drug contributed very materially to the satisfactory outcome of the disease by allowing the animal to feed, drink and defaecate normally. The intense and continuous muscular contractions place a severe strain on the animal's reserves, so that a valuable contribution was made to the patient's chances of recovery through the use of this drug.

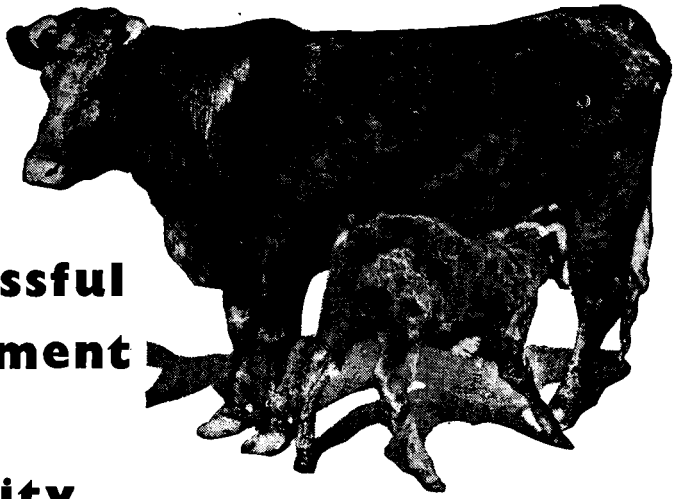
Conclusion:

Although a single case does not warrant any firm conclusions, it would appear that Chlorpromazine hydrochloride ("Largactil", Maybaker), used in conjunction with antitoxin and antibiotic therapy, is of commendable value in the treatment of tetanus in equines.

Acknowledgments:

I wish to thank Dr. J. H. Mason of the S.A.I.M.R. Serum Institute, as well as Prof. W. D. Malherbe, of Onderstepoort, for suggesting the use of "Largactil" and for advice on treatment of the case. Dr. Mason also kindly provided the antitoxin.

To Mr. Holmshaw, of Messrs. Maybaker (S.A.) (Pty.) Ltd., I am indebted for placing at my disposal the 5% Veterinary Trial solution of "Largactil".



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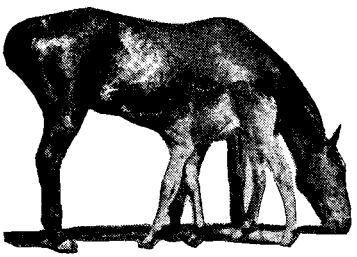

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LETTER TO THE EDITOR

G. E. LAY,
Veterinary Surgeon,

P.O. Box 241,
Gatooma, S.R.,
21.9.55.

Dr. Malherbe,
Dept. of Medicine,
Onderstepoort.

Dear Dr. Malherbe,

I recently had a case of Hypertrophic Pulmonary osteo-arthropathy in a dog and as it is fairly rare in dogs, I thought you may be interested to hear about it.

The patient was a seven year old bitch bred from a Bulldog-bullmastiff cross mother and a Fox-terrier cross father.

The history showed the bitch had an abscess in the prescapular gland about the size of a tennis ball which burst by itself. Six months later she had a litter of puppies (her first litter) and about a month after that she was brought to me showing stiffness in the joints. During the next week her legs swelled quickly and according to the owner, reached a certain size in a week and then did not swell any more. The lesions on the bones are larger than those shown in the photo in Brown's article, page 35, number 1, Vol. XXV, S.A.V.M.A. Journal, March 1954.

Apart from the abscess the bitch had never had any illness or deviated from the normal in any way. She had had one litter of pups. The post mortem apart from the leg bones was completely negative.

Yours faithfully,

(Sgd.) G. E. LAY.

BOOK REVIEW

VETERINARY REVIEWS AND ANNOTATIONS

Prepared by the Commonwealth Bureau of Animal Health,
and
Published half-yearly by the Commonwealth Agricultural Bureau, Farnham, Royal, England. Price 25s.

In the field of Animal Health the Commonwealth Agricultural Bureaux have provided the Veterinarian with two publications viz. the Veterinary Bulletin and the Index Veterinarius, which have become completely indispensable to any worker who wishes to keep abreast with the progress of Veterinary Science.

But in spite of the very great value of these abstracts in focussing attention to publications on a particular subject, the reader is often handicapped when he is not in a position to consult the original article. Veterinary Reviews and Annotations now provide him with a succinct but comprehensive collation of the information available on different subjects on animal health.

In the first part of volume I the subjects reviewed and the authors have been well-chosen. There are three contributions in Part I:

(1) *Intestinal Disease of young animals with special reference to infection with Bacterium coli,* by Professor R. Lovell of the Royal Veterinary College, University of London.

(2) *Coccidial and other forms of parasitism in their relation to poultry husbandry,* by Dr. C. Horton-Smith of the Poultry Research Station, Animal Health Trust.

(3) *Euthanasia,* by Dr. Phyllis G. Craft, Group Laboratory, Mill End Hospital, London.

The Publishers must be congratulated on the excellent standard of the contributions in Part I of Volume I. If the same standard can be maintained the future of this new publication will be assured.

It is hoped that such intestinal diseases of calves as paratyphoid and coccidiosis which play havoc among calves in many countries will in due course form the subject of further reviews.

M. W. HENNING.

"The Physiology of Domestic Animals". 7th Edition. By H. H. Dukes. Comstock Publishing Associates, Ithaca, New York; p.p. 1020. Illustrations 238. Price

The new edition of this well known book is a great advance on its predecessors. Not only has much of its old text been revised but the inclusion of two new chapters, one on "Intermediary Metabolism" by J. A. Dye and the other on "Water, Electrolytes and Acid — Base Balance" by M. R. Kare, has brought the book right up to date in these important fields. The chapters dealing with the circulatory and respiratory systems and digestion in ruminants and equines have been extensively revised. The references have been brought up to date and include many papers dated 1954. In short, the appearance of this edition has made its older editions appear completely out of date and its acquisition can be recommended to all veterinarians who wish to keep abreast of modern advances in physiology.

R.C.

for MASTITIS

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SOUTH AFRICAN VETERINARY MEDICAL ASSOCIATION

The Golden Jubilee Congress of the Association was held at Onderstepoort from August 29th to September 2nd, 1955.

On Monday, August 29th an "Open Day" was arranged by the Division of Veterinary Services, the Faculty of Veterinary Science and the S.A.V.M.A. Numerous exhibits were open to the public and various films of veterinary interest were shown. The Minister of Lands, the Hon. P. O. Sauer, conducted the opening ceremony. It was estimated that approximately 500 people attended during the day.

The following part of the Congress was held from Tuesday, August 30th to Friday, September 2nd.

The following members attended the Congress during the four days:-

L. Abrahams, T. Adelaar, R. A. Alexander, N. Barrie, J. G. Bekker, R. D. Bigalke, J. H. R. Bisschop, L. C. Blomefield, J. Bosch, J. G. Boswell, H. J. W. Botes, H. N. Botha, J. M. M. Brown, P. H. Brown, B. J. Brummer, W. H. B. Buhr, J. D. Coles, C. L. Craig, R. B. Cumming, H. P. D. Dames, M. de Lange, H. P. A. de Boom, P. de la Harpe, O. T. de Villiers, S. W. de Villiers, J. M. de Wet, P. D. de Wet, C. Dickson, J. L. Dickson, A. M. Diesel, J. L. Dore, J. S. Dovey, F. W. B. du Casse, J. F. du Plooy, P. J. du Toit, R. du Toit, L. T. Edwards, J. M. Erasmus, J. Fick, H. O. Flanagan, C. H. Flight, P. J. Fourie, J. R. Frean, M. M. Greathead, H. Graf, J. Grobler, J. W. Groenewald, J. F. W. Grosskopf, D. Haig, L. L. Hansmeyer, F. J. D. Hempstead, M. W. Henning, W. B. Hobbs, C. F. B. Hofmeyr, H. E. G. Holtz, C. J. Howell, P. P. Hugo, P. G. Howell, L. R. Hurter, J. H. Huyser, D. H. G. Irwin, C. Jackson, J. Jackson, B. C. Jansen, Z. Kempster, A. C. Kirkpatrick, E. B. Kluge, G. Kronsbein, D. Kulenkampff, A. B. le Grange, M. C. Lambrechts, F. W. Langbridge, E. Langen, D. A. Lawrence, D. J. le Roux, P. H. le Roux, J. M. W. le Roux, J. Louw, J. J. Louw, P. L. Louw, T. A. T. Louw, I. S. McFarlane, B. M. McIntosh, W. D. Malherbe, P. R. Mansvelt, C. Maree, M. J. N. Meeser, B. Moring, Major D. D. Morton, R. W. Muir, G. L. Muller, T. W. Naude, W. O. Neitz, J. J. Oberholster, S. V. O'Brien, J. J. Oosthuizen, R. J. Ortlepp, R. B. Osrin, B. H. Pappin, H. S. Purchase, M. S. Reichert, R. K. Reinecke, E. M. Robinson, L. W. Rossiter, W. J. Ryksen, D. J. Schneider, E. Zschokke, K. Schulz, P. J. Schutte, J. D. Smit, T. Smuts, A. J. Snyders, S. L. Snyders, J. H. D. Snyman, P. S. Snyman, S. Solomon, R. A. Solomon, N. C. Starke, L. G. Steel, N. C. F. Steenekamp, G. J. H. Stevens, J. L. Stewart, D. G. Steyn, H. P. Steyn, L. Stonier, H. F. Strydom, G. D. Sutton, A. F. Tarr, H. J. Terblanche, G. Theiler, A. D. Thomas, J. A. Thorburn, C. J. V. Trichard, D. E. Truter, S. G. Turner, R. C. Tustin, W. P. van Aardt, N. T. van der Linde, G. F. van der Merwe, J. P. van der Merwe, G. C. van Drimmelen, A. van Heerden, J. S. van Heerden, C. H. van Niekerk, G. F. J. van Rensburg, S. W. J. van Rensburg, I. van Schalkwyk, C. van Wyk, F. J. Feldman, J. H. B. Viljoen, P. R. Viljoen, W. C. Viljoen, A. J. Vlok, L. von Maltitz, D. C. L. Wacher, H. G. Wallace, D. M. Walters, W. E. J. Warnes, G. Watt, K. E. Weiss, T. C. W. Wessels, J. G. Williams, P. B. Winterbach, J. Zwarenstein.

Local Health Authorities were represented by: Drs. W. J. Wheeler, P. L. Uys (Pretoria): C. C. Wessels (Durban); B. M. Horwitz (Cape Town); A. J. Louw (Bloemfontein); L. W. van den Heever (Germiston); E. J. Pullinger, M. C. Robinson, P. J. Meara and I. Mowat (Johannesburg).

The following visitors attended the Congress: Dr. D. Lawrence (member), President S. Rhodesia Vet. Assoc.; Dr. Reichert (member), representing Dr. Roe from Bechuanaland; Mr. G. S. Ferguson from Edinburgh, representing British Veterinary Association; Dr. Paver from Edinburgh; Mr. M. Perek from Israel; Dr. Lumpo-Serra from Portuguese East Africa; Miss A. J. Wells (S. Rhodesia); Dr. C. Tokarnio (Brazil); Dr. B. M. Clark (Union Department of Health); Mr. W. R. Mottram (S.A. Bureau of Standards); Mr. R. Knobel (National Parks Board); Dr. de Leeuw (Peri-Urban Health Board); Dr. G. H. Oosthuysen (Assoc. of Balanced Feed Manufacturers); Messrs. J. A. van der Merwe, H. M. Schwartz, E. van Manen, Y. Zway, J. Procos, Miss L. Salisbury, Mrs. A. McFarlane.

TUESDAY, AUGUST 30th.

8.45 a.m.: Convocation of Meeting.

The President welcomed the visitors, and also the following members specially: Drs. P. J. du Toit, P. R. Viljoen, D. Lawrence, D. G. Steyn, J. L. Stewart, B. J. Brummer and Reichert. Mention was made of Col. J. Irvine-Smith, the first President of the Transvaal Veterinary Association, and Dr. P. J. du Toit, who sent a special message.

Congratulatory messages were also received from various members and Associations in neighbouring territories and overseas countries. The full list will be acknowledged in the Journal.

The President then thanked the National Parks Board, the S.P.C.A., The Wild Life Protection Society, and the Medical Exhibitors Association for their contribution on the "open day".

Obituaries — During the year Drs. M. H. V. Brown and J. G. Brandsen passed away. Tribute was also paid to the late Mrs. P. J. du Toit who passed away during the year. The Meeting stood as a token of respect.

Presidential Address. Dr. Diesel then delivered his address.

Notification of Election of Council for 1955-56. The Following office bearers were elected:-

President: A. M. Diesel.

Vice-President: P. S. Snyman.

Hon. Secretary: K. E. Weiss.

Hon. Treasurer: G. D. Sutton.

Editor: E. M. Robinson.

Members 1955-57: R. A. Alexander, M. de Lange, R. du Toit, C. F. B. Hofmeyr.

For the information of members:

Sitting Members 1954-56: A. D. Thomas, S. W. J. van Rensburg, R. Clark, L. W. van den Heever.

Hon. Life Vice-Presidents: Drs. P. J. du Toit, A. C. Kirkpatrick, Col. C. J. van Heerden, and Col. J. Irvine-Smith.

Hon. Life Vice-Presidentship-award: The President informed the meeting that Council proposed as an unopposed motion that an Hon. Life Vice-Presidentship be conferred on Dr. R. A. Alexander, as a recognition of signal services rendered to the veterinary profession. This was passed unanimously. Dr. Alexander replied suitably.

Election of new members: The following new members were recommended for acceptance by Council:-

Drs. D. Kulenkampff, A. N. S. Abrey, P. Anderson, D. C. Wright, J. R. Philip, P. N. Collier, Z. P. Kempster, P. Bisschop, P. A. Basson, M. Smuts, J. D. le Roux, T. W. Naude, R. Wege, L. van Wyk, C. L. Craig, N. D. P. Dames, A. J. D. Williamson, C. J. Howell, S. Solomon, R. Stampa and Dr. C. C. Blumer of Australia in the place of Dr. H. G. Belschner. Acceptance proposed by Dr. P. J. Fourie, seconded by Dr. Osrin — unanimously elected. They were welcomed by the President.

Opening of Trade Exhibits: The President welcomed the representatives of the 22 exhibiting firms. The President of the Medical Exhibitors Association, Mr. Taylor, replied suitably.

Apologies: Apologies for non-attendance were received from the following:-

The Minister of Agriculture, the Hon. S. P. le Roux.
The Minister of Lands, the Hon. P. O. Sauer.
Mr. J. H. Moolman, Chairman of the Wool Board.
Mr. J. Ritchie, Director S.A. Bureau of Standards.
Dr. G. J. Rossouw, President S.A. Agricultural Union.
Mr. De la Harpe de Villiers, President O.F.S. Agricultural Union.
Dr. A. W. S. Sichel, Chairman Federal Council, S.A. Medical Association.
Mr. G. Hibbert, Chairman Egg Control Board.
Mr. R. Heimann, President S. A. Pharmaceutical Manufacturers' Association.
The Acting Medical Officer of Health, Cape Town.
Dr. H. Muller, Mayor of Pretoria.
Dr. R. Druet, Director of Veterinary Services, Belgian Congo.
Dr. J. F. Filmer, Director Animal Res. Div., Dept. of Agriculture, New Zealand.
Dr. R. N. Wardle, Director of Veterinary Hygiene, Australia.
Dr. K. F. Wells, Veterinary Director General, Canada.
Director of Veterinary Services, Nyasaland.
Dr. J. N. Ritchie, Animal Health Div. Ministry of Agriculture, Fisheries and Food, England.
Dr. H. R. Binns, Director East African Vet. Res. Organization, Kenya.
Director of Veterinary Services, Holland.
Dr. K. D. MacOwen, Director of Vet. Services, Kabete.

Members Apologies:

Dr. J. E. R. Roe (D.V.S. Bechuanaland Protectorate).
Dr. M. Bergh.
Dr. R. E. Hartig.
Dr. K. van der Walt.
Dr. W. M. McHardy.
Dr. N. F. Viljoen.
Dr. H. C. Watson.
Dr. J. E. Dorrington.
Dr. Martinoglia.
Dr. D. J. Louw.
Dr. D. K. Shone (S. Rhodesia).

Official Opening: At approximately 10 a.m., the Prime Minister of the Union of South Africa, the Hon. J. G. Strijdom, opened the Jubilee Congress.

The rest of the day as well as Wednesday, 31st August, Thursday, 1st September and Friday morning, 2nd September, was devoted to the symposia, clinical papers and demonstrations and the discussion of these. On Wednesday afternoon, 31st August, Dr. Kokernot of the Rockefeller Foundation showed an interesting

film on a virus study expedition into Tongaland. The film and the commentary were appreciated by members and the President thanked Dr. Kokernot and also Dr. Smithburn for their kind co-operation.

FRIDAY, 2nd SEPTEMBER — 1.30 p.m.

Minutes of Meeting of Members.

Apology for non-attendance from Prof. D. G. Steyn.

(a) *Minutes of the previous business meeting* 1954:
These had been published in the Journal and were taken as read. Adopted.

(b) *Matters arising from these minutes*:

(i) Notice of motion of alteration to the Constitution, *Section 5 —Resignation*:

Proposed alteration to the last sentence " . . . such resignation shall be dealt with by Council whose decision (action) shall be reported to the next General Meeting".

Proposed by Prof. J. H. R. Bisschop. Alteration unanimously adopted by meeting.

(ii) *Publication of minutes of Council Meetings*:

The President reported that the matter was fully discussed by Council who decided not to publish a full report of Council proceedings but a digest under the heading "Council Matters". Council's decision approved of by meeting as proposed by Prof. W. D. Malherbe. Dr. van Drimmelen voted against.

(iii) *Co-operative Employment of Veterinarians*:

Instruction by last General Meeting that Council should intimate to the Veterinary Board that the meeting disapproved of employment of veterinarians by Co-operatives, to do clinical work. This was passed on to the Veterinary Board.

The President explained that as a result of a request by representatives of the S.A. Agricultural Union, who felt that co-operative employment was doing a lot of good in providing veterinary services for the rural areas, a committee of Council, consisting of Drs. S. W. J. van Rensburg, A. C. Kirkpatrick and A. M. Diesel, with powers to co-opt, was appointed. The committee was instructed to interview the various parties concerned, in order to remove the present feeling of discontent and to promote better mutual understanding. The committee to report back to Council for the information of the next General Meeting.

Dr. Lawrence briefly sketched the position in Southern Rhodesia, where Animal Health Associations exist.

After much discussion as to whether a private practitioner should be appointed on the committee, Dr. Zwarenstein moved that the committee should remain as it was appointed by Council, since the committee had the power to co-opt. Agreed.

On the request of Dr. van der Linde the resolution of the O.F.S., Northern Cape and Basutoland Branch on Co-operative employment, was read. Council's reply also read.

(iv) *Resolutions* 1954:

1. The resolution dealing with the proposed conference between State Departments and interested bodies to review the whole question of

ante and post mortem examination of animals slaughtered for human consumption.

The President explained that Council referred this matter to the Veterinary Public Health Group.

2. Resolution re formal recognition of the Veterinary Public Health Group within the framework of the S.A.V.M.A.

The President reported that this had been brought about by the formation of an ordinary branch.

(c) *Resignations*:

Dr. H. G. Belschner of Australia resigned in favour of Dr. C. C. Blumer, the new Chief of the Division of Animal Industry. Approved.

(d) *Reports of Standing Committees*:

(i) 1. *Financial Report.*

The Balance Sheets had been circularized to members. The Hon. Treasurer reported that the Balance Sheet and Auditor's Report had been scrutinized by Council. He further reported on and discussed the Balance Sheet and pointed out that the Association was in a healthy financial position.

Dr. Rossiter enquired what the outstanding amount of £910 was for. The Treasurer explained that the amount represented arrear subscriptions of which a large proportion had since been collected.

Dr. van Drimmelen thanked the Hon. Treasurer and Council for the excellent way in which the finances of the Association were managed.

Financial Report adopted unanimously. Proposed by Prof. Henning and seconded Dr. H. P. Steyn.

2. *Removal of names of members from membership list.*

The Hon. Treasurer proposed that the names of the following members who are in arrears with subscriptions be removed from the membership list:

T. B. Nel — 6 years in arrear — £17.17.0.

G. J. J. du Preez — 5 years in arrear — £15.15.0 owing.

The removal of their names unanimously approved of.

(ii) *Editorial Committee.*

Dr. E. M. Robinson made a plea for more contributions to the Journal, especially from private practitioners. Articles, case reports and letters to the Editor could be submitted.

He also suggested that the material for the Jubilee number should be published in the next two Journals. After discussion it was decided to leave the matter in the hands of the Editor.

(iii) *General Purposes Committee.*

In the absence of Dr. Clark the President reported on the draft "Veterinary Health Certificates" drawn up by the General Purposes Committee and published in the June number of the Journal. He asked for criticisms and suggestions as to the form in which they should appear.

The meeting approved of the following alterations to the certificates:-

(1) Proposed by Dr. H. P. Steyn and seconded by Dr. A. F. Tarr: That the heading for the health certificates of the horse should read "Veterinary Certificate of Health and/or Soundness". The heading as published did not meet the requirements of a certificate of soundness.

(2) As suggested by Dr. H. P. Steyn: Certificate for Horses, paragraph (5), under (1) Mares, the sentence should read "The above mare was examined clinically *by me* for pregnancy on . . . "

(3) As suggested by Dr. H. P. Steyn: Certificates for Cows and Bulls, paragraph (6) Iniculatios performed, senteces should read: "The Animal was inoculated *by me* against the following diseases on the dates indicated'.

Certificate for Horses, paragraph (6) Inoculations performed, sentence should read: "This horse was inoculated *by me* against horsesickness."

Certificates for all animals except cattle and horses, paragraph (6) Inoculations performed, sentence should read: "The above animal/s was/were inoculated *by me* against . . . . "

In the case of all certificates, if inoculations were performed by Stock Inspector, etc., a footnote to that effect could be put in, i.e. "To my personal knowledge this animal was inoculated by ..... against ..... on .....

General Purposes Committee to consider the latter addition.

The General Purposes Committee to consider the printing of outlines of right and left sides and front view of animals on back of certificates in order to facilitate identification. Proposed by Dr. Ryksen, seconded by Dr. Tarr.

After much discussion the meeting decided that the certificates should appear in perforated book form and be sold to the profession. As far as cost and financial arrangements were concerned the meeting decided to abide by whatever decisions the Treasurer and Finance Committee should make.

(iv) *Standing Committees for the year* 1955-56.

The President announced the Standing Committees appointed by Council for the ensuing year and at the same time welcomed Drs. R. du Toit and C. F. B. Hofmeyr as new members of Council.

The Standing Committees as follows:

Finance: S. W. J. van Rensburg (Chairman-convenor)
C. F. B. Hofmeyr
R. A. Alexander
M. de Lange
G. D. Sutton (Hon. Treasurer)

Editorial: E. M. Robinson (Chairman-convenor)
R. Clark
W. D. Malherbe
L. W. van den Heever
W. J. Wheeler
H. P. A. de Boom.

Library: T. F. Adelaar (Chairman-convenor)
R. du Toit
W. D. Malherbe
G. D. Sutton
Cadet member (nominated by students).

General Purposes: R. Clark (Chairman-convenor)
W. D. Malherbe
P. S. Snyman.

Book Fund: G. D. Sutton (Chairman-convenor)
M. de Lange
A. D. Thomas.

Resolutions: W. D. Malherbe
E. M. Robinson.

(e) *General.*

(i) Dr. van Drimmelen suggested the establishment of a Trust Fund, to be administered by a Board of Trustees consisting of members of the Asso-

ciation and donors. This was necessary since the Association could not accept donations from Control Boards, Farmers' Associations or the State. Such a Trust Fund would foster the development of Veterinary Science and Veterinary research in this Country. As suggested by the President it was decided to refer the matter to Council for consideration.

(ii) Dr. P. S. Snyman mentioned that requests for address lists were being received by his office. The Hon. Treasurer asked that these requests be referred to the S.A.V.M.A. Address lists are sold for £1.1.0 on behalf of the Benevolent Fund.

(iii) The Hon. Secretary informed the meeting of the arrangements for publishing a list of names of Veterinarians in the telephone directory.

(iv) Dr. W. D. Malherbe mentioned that he received a letter from the Australian Veterinary Association congratulating the S.A.V.M.A. on its 50th Anniversary. To be published with other congratulatory messages.

(v) Prof. M. W. Henning said that the arrangements for the Congress were perfect except for the fact that non-veterinarian professional officers at Onderstepoort felt that they were not officially invited to attend the Congress. The President pointed out that an official invitation for all professional officers was sent to the Director of Veterinary Services.

(vi) Dr. Blomefield raised the question of publication of Veterinary Board deliberations in the Journal. After discussion it was decided to leave the matter as it is.

(vii) Dr. P. L. Uys suggested a Bisley on the sports afternoon during Congress if members were interested. He promised to present a trophy for such a competition and to undertake the organization. Ten members of those present signified their willingness to participate.

(viii) Dr. D. C. Wacher drew attention to the long delay in dealing with matters by the Veterinary Board. He wrote a letter on 18.5.54 and received a reply on 20.8.55. He appealed to the Association members on the Board to expedite the handling of matters by the Veterinary Board. Dr. Diesel undertook to investigate the matter as a member of the Board.

(f) *Resolutions.*

(i) "This Jubilee Congress of the South African Veterinary Medical Association resolves that the provision of adequate veterinary services to the stock farmers of the Union should be and could be greatly improved by the following measures:

(1) Making the state service more attractive to veterinarians by, amongst other matters, improvement of emoluments, automatic progression to the senior grade, reduction of purely routine administrative and supervisional work and the provision of more acceptable transport arrangements.

(2) By the appointment of part-time State Veterinarians to supplement the work of the present wholly inadequate staff in providing for better coverage of the rural areas.

(3) By the establishment of a number of regional diagnostic laboratories or investigation centres."

Proposed by Dr. J. S. van Heerden, seconded by Dr. J. D. Smit. Carried unanimously.

(ii) "This Jubilee Congress of the South African Veterinary Medical Association resolves that the best interests of Veterinary research would be served by its removal from the control of the Public Service Commission and the institution of a governing body responsible directly to the Cabinet".

Proposed by Dr. J. S. van Heerden, seconded by Prof. M. W. Henning. Voting 53 for and 12 against.

(iii) "This Jubilee Congress of the South African Veterinary Medical Association resolves that to preserve a high standard of training of Veterinarians the profession, through the Veterinary Board, should have the power to scrutinize the curriculum and to be represented at any examination at their discretion."

Proposed by Dr. J. S. van Heerden, seconded by Prof. M. W. Henning on condition that the wording be changed when considered by Council, in order to convey the proper meaning.

Prof. P. J. Fourie suggested an amendment to the effect that the scrutinizing of the curriculum, which is unnecessary, should be left out but the rest retained. Dr. Fourie's amendment carried unanimously.

(iv) "This Jubilee Congress of the South African Veterinary Medical Association resolves that since the present shortage of teaching staff is detrimental to the training of veterinarians, the separation of Faculty teachers from the Department of Agriculture should take place without any further delay."

Proposed by Dr. J. S. van Heerden, seconded by Dr. A. B. le Grange. Prof. P. J. Fourie proposed an additional sentence namely: "The Faculty should become an ordinary Faculty of the University of Pretoria." Carried unanimously.

It was decided that Council should consider the above resolutions and act at its discretion or report back to the next General Meeting.

(v) This Golden Jubilee Congress of the South African Veterinary Medical Association of South Africa affirms its belief in the essential unity of all veterinary endeavour. In furtherance of this belief and in order to facilitate the maximum use of the veterinary potential to the advantage of our country, Council is requested to investigate the feasibility of and to take further steps concerning the integration of private practitioners, and in certain cases Municipal veterinarians into the State service on a part time basis.

Proposed by Dr. A. F. Tarr, seconded by Dr. C. F. B. Hofmeyr. Carried unanimously.

(vi) This Jubilee Meeting of the South African Veterinary Medical Association resolves that the genital disease of cattle known as "epivaginitis" should no longer be recognised as a separate entity, for the reason that no real evidence has been produced clinically or in a laboratory, that it is different from the known non-specific genital infection causing sterility.

Proposed by Dr. H. P. Steyn, seconded by Dr. R. du Toit. Resolution *not* passed by meeting.

(vii) This Golden Jubilee Congress of the South African Veterinary Medical Association considers that it has proved of infinite value to the profession in its internal and external relations. Council of the S.A.V.M.A. is therefore requested to organize a Congress of the same magnitude every five years.

„Die Goue Jubileumkongres van die Suid-Afrikaanse Veterinêr Mediese Vereniging is van die opinie dat hierdie Kongres van groot waarde is vir die professie in sy interne en buite verhoudings. Aan die Raad van die S.A.V.M.V. word dus opgedra om elke vyfde jaar die Jaarkongres so te reël dat dit in omvang en beplanning aan die huidige Kongress nie ondergeskik sal wees nie."

Proposed by Dr. C. F. B. Hofmeyr, seconded by Dr. H. Graf. Carried unanimously.

(g) *Adjournment.*

Dr. Ryksen proposed a vote of thanks to the President, the Committee and everybody concerned, who were responsible for making this Congress the most memorable meeting ever held. He also thanked those responsible for organizing the "open day".

Prof. M. W. Henning proposed a vote of thanks to the Chair.

The President thanked Prof. Henning and Dr. Ryksen for their kind words. He also thanked the ladies who organized the social functions, and the two ladies, Mrs. Weiss and Mrs. van Rensbrug, who were responsible for the registration.

The meeting finally adjourned at 3.50 p.m.

OBITUARY

R. E. HARTIG (1884 - 1956)

The late Dr. Hartig qualified as a veterinarian at the Veterinary High School in Dresden in 1906. Shortly afterwards he was awarded his doctorate in veterinary medicine by the University of Zurich. In 1906 he was a veterinarian with the German army in the war against the Herreros in South-West Africa. From 1908 to 1919 he was superintendent of a German Farming organization in South-West Africa, a daughter company of Liebigs Extract of Meat Company, which possessed 13,000 cattle, 11,000 sheep and 600 horses and mules. In this position he had a unique opportunity of studying the animal husbandry and veterinary problems of South-West Africa. In 1919 he started his own laboratory at Stellenbosch to study lamsiekte in cattle. As a result of his publications on this disease he came into a violent clash with Sir Arnold Theiler.

He was in Germany from 1922 to 1928 engaged on problems in connection with veterinary aspects of the breeding of fur-bearing animals but he yearned to return to Africa and settled in South-West Africa where he developed a dairy and a cheese factory. As a result of the depression 1929 to 1932 he gave up farming and started veterinary practice. He established himself in Cape Town but soon moved to Paarl where he developed an extensive cattle practice. He was interned in 1940 and on his release in 1943 moved to Pretoria where he practised for some years but moved to Koppies in the Orange Free State in 1953. The following year he decided to devote himself to locum tenens work. It was in this capacity that he was working at Marandellas in Southern Rhodesia when he passed away following an attack of coronary thrombosis.

Dr. Hartig was a man of great vitality and was not easily discouraged in the face of continual setbacks. He had a wide practical experience which his clients took full advantage of.

To his widow, son and daughter we extend our deepest sympathy in their sad loss.

E.M.R.

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