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Contents continued

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EDITORIAL

ANTIBIOTICS, ANIMALS AND MAN

Man and his domestic animals have undoubtedly benefitted enormously from the therapeutic use of antimicrobial drugs and will no doubt continue to do so. It is also well established that the use of these drugs at low levels in animal feed, particularly poultry and pig rations, leads to increased weight gains and improved feed conversion rates; in some cases it affords a modicum of protection against certain bacterial diseases, e.g. necrotic entertis in chickens. Notwithstanding these considerable benefits, it is also clear that the injudicious and careless use of antimicrobial drugs is fraught with many hazards and dangers, both to man and animals.

The harmful effects of drug residues in food of animal origin is a factor of great importance to man. Residue problems can, fortunately, largely be eliminated by the intelligent application of certain basic principles.

However, the problem of bacterial resistance to antimicrobial drugs has in no way been eliminated. Since the discovery of the phenomenon of infective or transmissible bacterial resistance amongst the Enterobacteriaceae and the fact that it is not only the directly exposed bacterial population which can become resistant — frequently to a series of unrelated compounds — an urgent need arose for reappraisal of the use of antibacterial drugs.

In 1966 the Director of Veterinary Services was instrumental in obtaining the support of the pharmaceutical and feed compounding industries of South Africa for a policy which permitted only those drugs, such as zinc bacitracin, which are not used therapeutically in human or veterinary medicine, being registered for addition to feeds as growth stimulants. Accordingly, the penicillins, tetracyclines, macrolides, sulphas and most nitrofurans may only be used for short periods in feed and water, and then only at therapeutic levels, wheras zinc bacitracin may be used on a continuous basis.

This step eliminated the continuous use of compounds containing sulpha drugs as coccidiostats, but still allowed their use for treatment of outbreaks of coccidiosis. Despite these accepted principles, the Farm Feeds, Fertilizers and Stock Remedies Act of 1947, still provides for registration of a large number of antimicrobials as stock remedies. These are accordingly available to stock owners without a veterinary prescription. This latter fact undeniably detracts from the value of a most commendable approach, which had in mind the limitation of opportunities for the emergence of infective drug resistance in farm animal populations exposed to such antibiotics.

In 1969 the British Government appointed Prof. M. M. Swann to head an expert committee to investigate the use of antibiotics in animal husbandry and veterinary medicine, with particular reference to infective drug resistance and the implications thereof for human and animal health. The Report of the Swann Committee has just appeared (Sept. 1969). Its findings and recommendations are strikingly similar to our own 1966 policy, and has more than justified our conservative approach to the inclusion of antimicrobials at subtherapeutic levels in feeds for promotion of growth and control of "stress". The Report has been accepted by the British Government and is likely to have far-reaching effects when its recommendations are implemented. These recommendations warrant careful study and consideration. They include, *inter alia*, the recommendations that:-

(1) Only drugs which are of proven economic value as feed additives, have no therapeutic application in both man and animals, and will not impair efficacy of therapeutic drugs through development of resistant strains of organisms, should be used and supplied without prescription;

(2) "Feed antibiotics" be used at levels not exceeding 100 ppm for calves up to 3 months, as well as growing pigs and poultry, but not be used in laying poultry and any species of adult breeding stock;

(3) Therapeutic drugs i.e. those not classed under (1) as feed additive antibiotics, should be available for use in animals only under prescription of a veterianarian who has the animals under his care;

(4) Penicillin, tetracyclines, tylosin, sulphonamides, nitrofurans (except nitrofuran derivatives satisfying the requirements for "feed antibiotics"), should be available on veterinary prescription only;

(5) That chloramphenicol be used only by veterinarians, and then under special and monitored conditions.

The Swann Committee makes several other statements, including one which refutes the concept that antibiotics are of value in the treatment of "stress", particularly when given in doses below those normally considered to be of therapeutic value against specific diseases.

Whereas the Swann Committee has obviously considered conditions pertaining to the United Kingdom, there may well be justification for saying that all their findings are not necessarily applicable to South Africa. Nevertheless, our present legislation (Act 36/1947), which makes many of these potentially harmful drugs directly available to farmers and laymen for the treatment of animal disease, certainly requires review and reconsideration in the light of the findings of the Swann Committee. At the same time it increases the obvious responsibility of every veterinarian to ensure that any antibiotics, etc. that he prescribes or recommends, are not used in a way likely to result in man toppling from his tortured balancing act between poisoning and prosperity.

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PRESIDENTIAL ADDRESS

DR. A. F. TARR.

With the constant demand to increase the supply of food to satisfy the requirements of a rapidly increasing human population, a few observations of a general nature on some aspects which obtain in the Republic of South Africa are worthy of mention. To deal with the subject in detail is not possible or desirable on an occasion such as this, and it is for this reason that reference is made to cattle, sheep and goats only. In order to complete the picture however, cognizance must be taken of pigs, poultry, fish and game.

The total cattle population of the Republic is approximately 13 million and that of sheep and goats about 45 million. On an average about 7% of the cattle and about 9% of the sheep and goats die every year as a result of infectious diseases, verminosis, nonspecific diseases, infertility, mineral deficiencies, starvation and so on. In other words about one million cattle and over three million sheep and goats are lost every year in this manner. This number is equivalent to more than half the total number of corresponding animals slaughtered per annum at the various abattoirs. The direct loss is conservatively estimated at R100,000,000 and could be much higher. The actual overall loss is incalculable. This is a very sad state of affairs especially when one realises that most of the above conditions are preventable.

Theoretically, if most of these losses could be eliminated then the requirements of the anticipated increase in the human population over the next ten years could be satisfied. Therefore, before embarking upon expansionist programmes let us ensure that every effort is made to maintain and preserve the existing potential.

We now come to a consideration of some of the methods by which this can be achieved.

The first and most important step is the education of the stockowner, both white and non-white, not only in connection with stock management, but with all phases of farming activity. There should be a systematic evaluation of every farm and reserve. In other words, linear programming should be practised more extensively, in order to ensure a less haphazard approach to farming. Farming is often described as a way of life and this is unfortunate. Farming is a scientific business undertaking requiring heavy capital investment and calling for sound managerial practices. We as veterinarians are directly and indirectly involved and should be more closely integrated with all farming activity. The services of authorities on farm planning, crop production, agricultural economics, animal management and so forth should be used more extensively.

We now come to a consideration of the establishment of fodder banks. Perhaps this is an impossible ideal, but in a country such as ours, blessed with prosperity and plenty, animals should not be allowed to die of starvation. There can surely be no more distressing sight, in the animal world, than to see poverty stricken animals wandering aimlessly in search of food. With forethought and planning it should be possible to provide fodder banks at strategic points.

We as veterinary surgeons have a direct and vital role to play in preventing excessive mortality in stock. One of our essential priorities is to concentrate on the socalled erosion diseases because herein lies the insidious killer with devastating effects. These conditions are insidious and relentless in their approach and impact. They are not dramatic and are accordingly often relegated to the background while attention is focussed on the spectacular and glamorous developments.

In this regard it is of tremendous significance that inoculation against bovine brucellosis is now compulsory. There is no need to dilate on the obvious benefits this scheme will bring about.

Presented to the 64th Annual Congress of the SAVMA held in Cape Town, September 1969.

Equally significant is the part-time employment of private practitioners in the tuberculosis eradication scheme. This I regard as one of the most important developments within our profession. Not only will it enable progress to be made in the eradication of tuberculosis but it also bridges the gap between the two largest sections of our profession. There is a tendency for different branches of the profession to isolate themselves and this inevitably leads to a lack of understanding and co-operation to the detriment of the profession as a whole and the role we are expected to play in particular

If this arrangement proves successful, and I am sure that it will, it could prove to be the forerunner to a much broader acceptance of the services of veterinarians outside the State Service without unduly encroaching upon the freedom and enterprise of the individual or the authority and obligations of the state. This scheme, whilst affording wider avenues of activity for private practitioners, ensures a greater measure of control by the state whilst at the same time providing the state with a more reliable yardstick in determining future policy, and in time, a choice in the selection of part time personnel.

Our greatest handicap is a tremendous dearth of manpower. In a prosperous and rapidly developing country this is not unusual and it applies to all professions. We have the added disadvantage of being numerically small at the outset. It is not generally appreciated or accepted that in the whole of the Republic there are only about five hundred veterinarians actively pursuing their chosen profession. A tremendous responsibility is placed upon each one of us and any major scheme embarked upon will fail if we do not provide the necessary manpower. We all know how costly failure can be and the wellnigh insurmountable difficulties encountered in restarting programmes. We need more veterinary surgeons urgently and if Onderstepoort cannot produce them then let us have more faculties. Finance should not be the limiting factor. Whatever the price it will prove to be cheap insurance in the long run.

Veterinarians around the World 6

Die Veearts. Wèreldbeeld 6

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A CASE OF ADENOCARCINOMA OF THE OLFACTORY MUCOSA IN A SHEEP OF POSSIBLE INFECTIOUS ORIGIN

E. E. McConnell [1], I. B. J. van Rensburg [2], and J. A. van Wyk [3].

SUMMARY

Bilateral tumours of the ethmoturbinates in a 6 year old Dorper ewe are described. These neoplasms were comparable with those reported in Europe and the United States where they occur as an endemic disease of low morbidity in selected flocks. It is felt that this disease could be present to a limited degree in sheep of Southern Africa, although this is the first case to be described here.

INTRODUCTION

Cases of infectious adenocarcinoma of the olfactory mucous membrane of sheep have been reported in Europe [1, 2, 3, 5] and the United States of America [4, 7]. To date this entity has not been recognized on the African continent. The following case report is of a tumour which was morphologically comparable with the above cases.

CASE HISTORY

A 6 year old Dorper ewe (Sheep 16406) from an experimental flock of the Helminthology Section, Onderstepoort Veterinary Research Institute, was presented for post mortem examination on 7th July, 1969. The ewe had been in this flock since birth and had had a total of 5 lambs, one of which (a 1½ year old wether) is still in the same flock. Before 1967 the ewe was infested with *Calicophoron* for use as a donor of this fluke.

The attending history was that of progressive respiratory distress over the previous 2 months. The first signs observed were a copious mucous to muco-purulent, green-tinged, bilateral nasal discharge and laboured respiration. The possibility of a severe *Oestrus ovis* infestation with blockage of the nasal passages was considered and therefore the ewe was treated with Neguvon A* *per os* approximately one month prior to death.

Relief was not effected by this treatment and respiratory distress progressed, but still without loss of appetite and condition. The nasal exudate became more purulent and seemed to contain pieces of ruminal ingesta. When the animal was excited, the dyspnoea became exaggerated and accompanied by stertorous sounds. Expiration was diphasic. At times the sheep made grunting noises, but clinically there was no evidence of pneumonia. Pinching of the larynx and trachea at the base of the neck had very little effect on the severity of the dyspnoea.

It was decided to kill the sheep because treatment appeared to be impossible and the animal was suffering markedly.

There are 22 animals in the flock and to to this date no other animals showed signs of respiratory distress.

POST MORTEM FINDINGS

A mature Dorper ewe in fair condition was presented for post mortem examination. A cursory examination of the nares and oral cavity did not reveal any new findings. The animal was killed by electrocution.

After removal of the brain the head was cut longitudinally along the midline. Bilateral ovoid tumours were observed in the posterior nares involving the ethmoturbinates. They extended from a wide base in a rostral direction in the common *meatus nasi* for a distance of 4.0 cm on the right and 7.5 cm on the left side. The tumour on the left side (Fig. 1 & 2) extended through the middle meatus and rostrally lateral to the ventral turbinate, but no destruction of the malar or lachrymal bones was observed The medial septum was intact as were the turbinates other than the ethmoturbinates from which the tumour appeared to originate. There was

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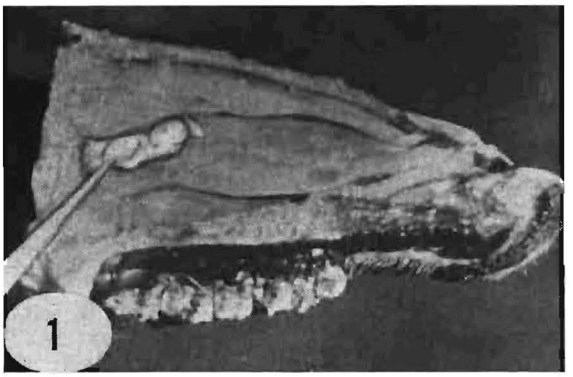
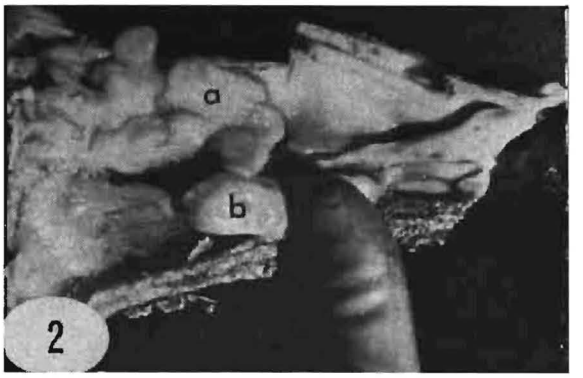
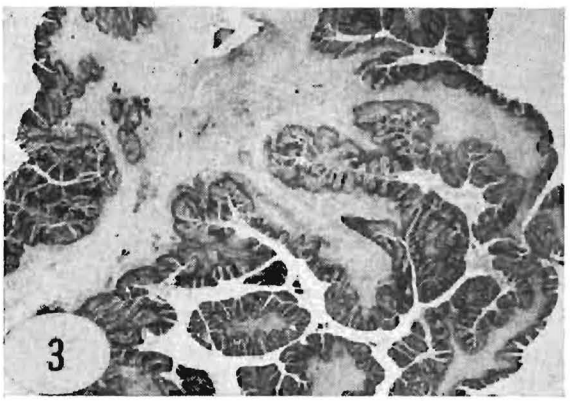
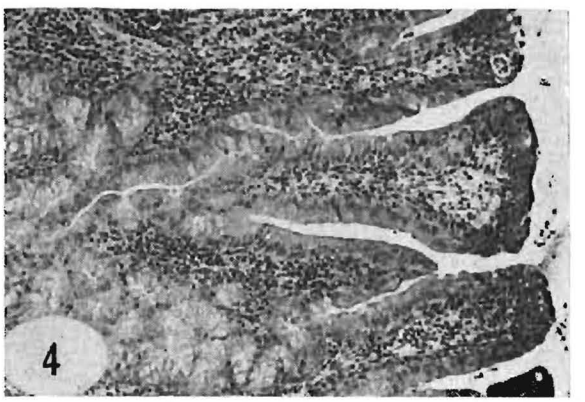
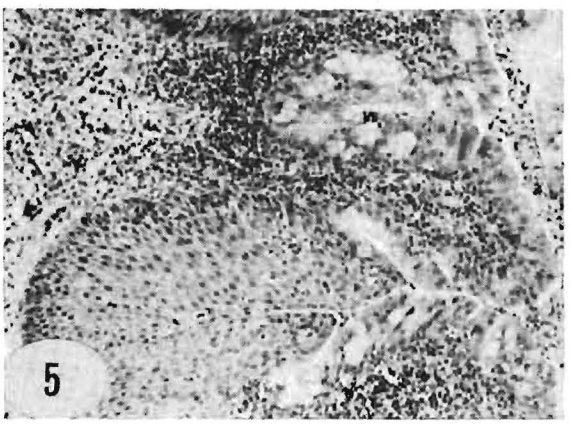
* Bayer Agro-Chem.

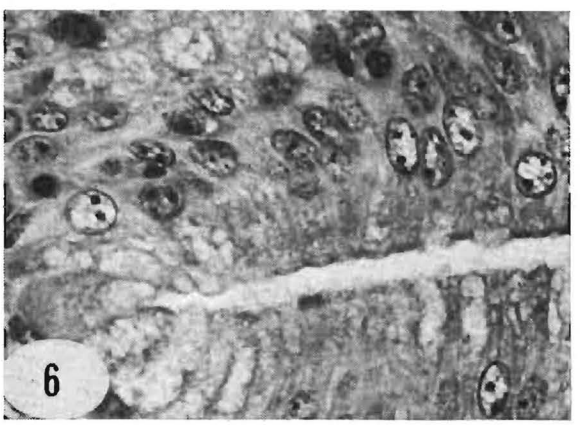


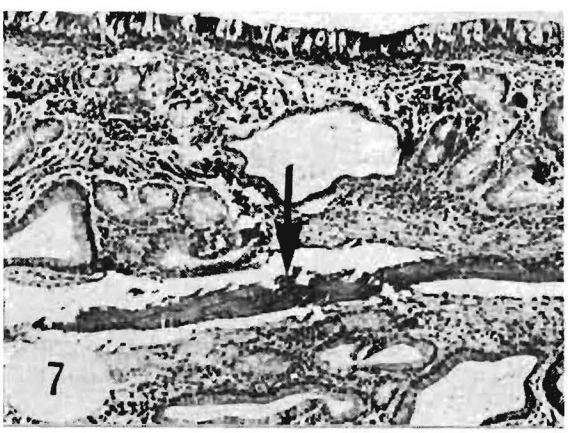


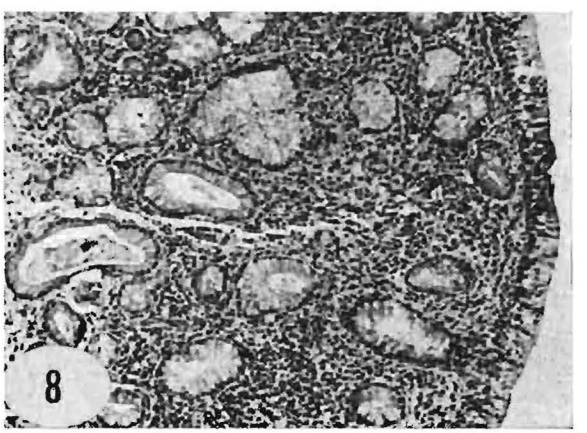












no involvement of the sinuses or pharynx, and no extension through the cribriform plate.

The tumours were covered by greenish mucopurulent exudate. After removing the exudate the tumours were polypoid near their attachments and had a glistening mucous surface. They were soft, friable, cut easily, and on cut surface were greyish-white with no evidence of haemorrhage. The texture was mucofibrinous and quite uniform throughout the mass.

There was no evidence of metastasis to the regional lymph nodes or to other organs of the body. There was also no evidence of pneumonia. A single *Oestrus ovis* larva was found in the left naris. No other significant lesions referable to the tumour were observed.

HISTOPATHOLOGY

Microscopic examination of haematoxylin and eosin stained sections of the tumour revealed a fungiform mass (Fig. 3) composed of papilliferous fronds of mature fibrovascular connective tissue covered by epithelium reminiscent of olfactory mucous membrane. Each major projection in turn had several smaller villous-like fronds radiating from it (Fig. 4). The epithelium was of a pseudostratified columnar type, well differentiated, and for the most part non-ciliated (Fig. 4—6). The nuclei were oval and open-faced with a scattering of finely reticulated chromatin. Each nucleus contained 2 to 3 small but prominent basophilic nucleoli (Fig. 6). Mucous producing cells, which were found occasionally along the terminal portions of the projections, increased in proportion toward the base until at the base they were the predominant cell (Fig 6). This latter area was very reminiscent of the submucosal glands of the nasal mucosa. The space between the projections was filled with mucous and cellular debris. In a few scattered areas the epithelium showed metaplasia to the stratified squamous type (Fig. 5) with definite intercellular bridges, but no keratin pearl formation. The basement membrane was well developed with no evidence of invasion by the epithelium. Also, there was no evidence of vascular invasion by the tumour cells. In those areas near bone, the growth was expansive in nature and never invaded the bone although there appeared to have been pressure necrosis of subjacent osseous tissues.

As noted above the stroma was well developed. The areas adjacent to the epithelium were of special interest. These contained a very prominent mononuclear infiltrate, almost exclusively plasma cells and lymphocytes, which gave a basophilic rim-like pattern to the epithelium (Fig. 4 & 5). The stroma of the secondary fronds was composed almost entirely of these cells (Fig. 4).

The origin of the tumour was in the region of the ethmoturbinates. Progressing from the normal tissue, the first indication of the lesion was the presence of mononuclear cells in the submucosal interglandular connective tissue (Fig. 7). This cell infiltrate increased toward the tumour mass and was accompanied by hyperplasia of the submucosal glands (Fig. 8) until it became so prominent as to be classified as neoplasia.

DISCUSSION

This neoplasm of the olfactory mucosa was closely comparable to those documented in Europe and the United States. Clinically, the common signs of all reported cases were laboured respiration, often accompanied by stertorous sounds. Various breeds, both sexes, and animals of any age appeared to be

FIGURES

Fig. 1. Tumour in the left posterior naris (end of pointer).
Fig. 2. View of tumour (a) after removal of the dorsal turbinate and a portion of the nasal bone. The ventral turbinate (b) has been reflected ventrally.
Fig. 3. Fungiform appearance of the tumour. Notice the well developed stroma. X12 H. & E.
Fig. 4. Villous arrangement of the epithelium with glandular appearance near the base of the villi. Notice the intense mononuclear infiltrate in the stroma. X75 H. & E.
Fig. 5. Area of epithelium which has undergone squamous metaplasia. X75 H. & E.
Fig. 6. Higher magnification of the base of a villous showing the typical pseudostratified columnar epithelium with numerous mucous producing cells. X500 H. & E.
Fig.7. Section of ethmoturbinate near the base of the tumour. Notice the normal appearance except for hypercellularity of the interglandular connective tissue. Arrow is pointing to the turbinate bone. X75 H. & E.
Fig. 8. Section of mucosa nearer the tumour. Notice that the epithelium is relatively normal, however, the submucosal glands are more numerous and the connective tissues very hypercellular. X75 H. & E.

susceptible although most cases were from purebred or highly inbred flocks. It appeared to be an endemic disease of low morbidity. The highest incidence was 15% in one flock in Germany[2], however usually it was much lower than this (less than 2%).

The tumour can be either unilateral or bilateral but all reports were uniform as to the origin being from the mucosa of the ethmoturbinate region. In some cases the neoplasm had grown into the pharynx, maxillary and frontal sinuses or through the cribiform plate into the brain. It was felt that expansion to this extent did not occur in this case because the animal was sacrificed before the mass reached this stage. This may also account for the good condition of the carcass. Those animals that died spontaneously from this neoplasm were reported to be emaciated with the explanation that interference with breathing prevented proper nutrition.

Histologically, the overall appearance is comparable with the previously reported cases with the exception that we did not observe mineralization of the stroma as has been seen in a few cases[2]. This tumour was well differentiated as were most of those previously described. However, the acinar production was not as prominent as those described by Young, Lovelace, Hawkins and Catlin[7]. It should be stressed that our case was comparable only on a morphologic basis since transmission studies were not attempted to date.

The aetiology of this condition is still dubious, notwithstanding Cohrs' work[2] of reproducing the condition both with tumour cell suspensions and cell free filtrates of tumour tissue, because Duncan *et al*[4] were unable to duplicate his studies. A genetic factor has been postulated and may still play a role since all cases reported to date have been found in purebred or highly inbred flocks. A reasonable explanation would be that an infectious agent is responsible for the tumours but that it requires a genetic predisposition for its manifestation. It should be noted that a case which probably fits this category of neoplasms was found in a group of sheep exposed to aflotoxin[6]. However, this was probably a coincidental finding.

This entity could be more widespread than previously reported. An explanation for this is that the turbinate region is frequently omitted in routine post mortem examinations of sheep. It would be appropriate to examine this area in any sheep which shows clinical signs as described in this case, and especially if pulmonary lesions are not observed.

ACKNOWLEDGEMENTS

The authors would like to thank Dr. P. Decorso, visiting scientist from Brazil, for his assistance in the diagnosis of this case.

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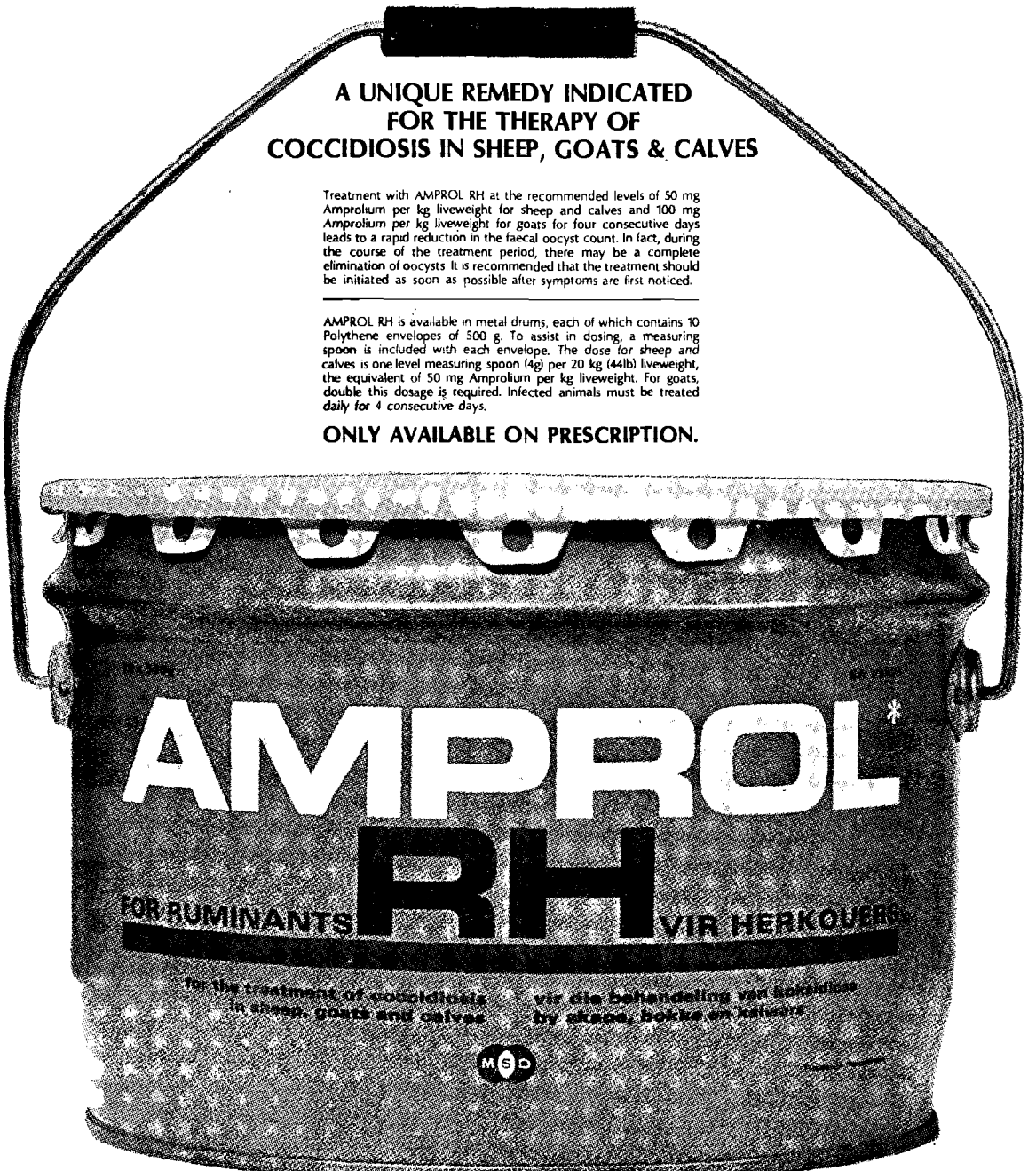

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TWO NEW SALMONELLA SEROTYPES:

13,22 : Z_{39} : 1, 5(7) and 56:d:-.

C. M. Cameron and W. J. P. Fuls*

A *Salmonella* culture which had been isolated from a sample of bovine bile at an abattoir at Gabarones, Botswana was submitted to this laboratory for serotyping.

By means of slide agglutination tests with monospecific sera the organism was found to possess O antigens 13 and 22, but despite examination for H antigens it could not be identified as one of the currently recognised sero-types.

The culture was therefore sent to Dr. Joan Taylor of the Central Public Health Laboratory, London, for further examination. Her findings were confirmed by Professor L. Le Minor of the International Salmonella Centre, Paris. They reported that the organism has the antigenic formula 13,22:Z_{39}:1, 5(7). The organism thus belongs to subgenus II. As organisms in this subgenus are subject to considerable variation, this new serotype will not be named. This is in accordance with international procedure.

The second strain was isolated from the livers of guinea pigs which had died during an outbreak of salmonellosis in the small animal colony of the Veterinary Institute. We were able to determine the prescence of O antigen 56 in this isolate but our results with H antigen typing sera were inconclusive. The organism was kindly examined by Dr. Joan Taylor who found it to have the antigenic formula 56 : d :-. As it also belongs to subgenus II, it will not be named. A similar organism in which we were also able to identify O antigen 56 has been isolated from the livers of ferrets at this Institute.

* Dept. Bacteriology, Veterinary Research Institute, P.O. Onderstepoort.

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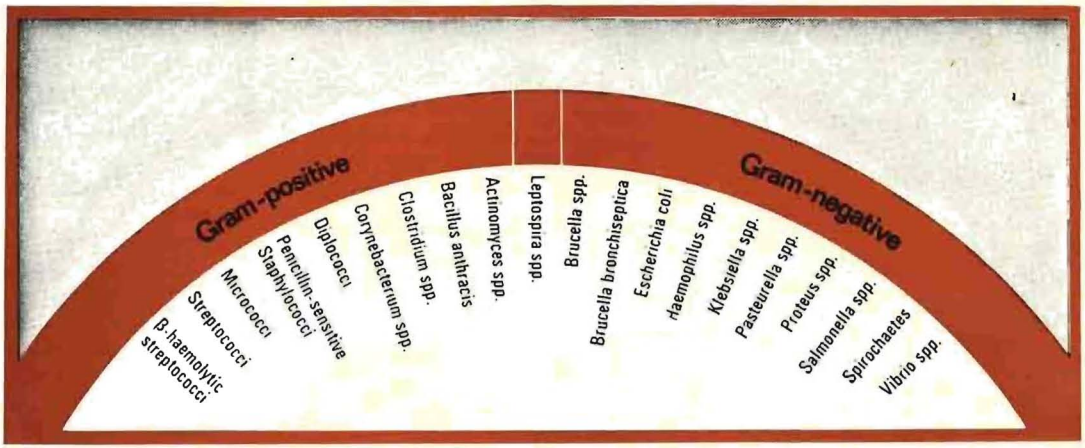

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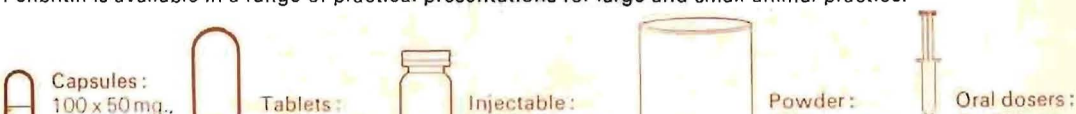

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ADAPTATION TO SOLAR RADIATION BY AFRICAN LARGE HERBIVORES

A preliminary report

A. M. HARTHOORN*, VIRGINIA FINCH*, D. HOPCRAFT* AND S. M. MCGINNIS**.

SUMMARY

The impact of solar radiation on African large wild herbivores is being studied. Deep body temperature, respiration and heart rate have been monitored on a continuous basis over several days by radiotelemetry and by hand measurements. Currently body temperature from several sites in the body is transmitted simultaneously.

Wide nyctohemeral fluctations in the body temperature have been observed with comparable variations in the respirations and heart rates. Panting bears little relationship to deep body temperature, nor does the heart rate necessarily follow the respiratory activity in all animals.

Considerable differences in temperature fluctuations are seen between the principal animals monitored, i.e. eland and hartebeest. The difference however, is, due mostly to a fall during the night rather than the rise during the day.

INTRODUCTION

Fluctuation in the deep body temperature of non-dehydrated African large wild and domestic herbivores was observed by Bligh & Harthoorn [1, 2] using a system of radiotelemetric thermometry on animals in areas where they are normally found and husbanded. Similar fluctuations, although of a greater extent, were obtained by Harthoorn, Kanwisher & Tomkins [3] working on animals such as the eland and hartebeest at an altitude of 5,000 feet as compared to nearly 8,000 feet at which many of the experiments cited earlier were conducted.

The work undertaken to date has sought to determine the effect of environment stresses on the behaviour and physiological adaptation of two species of herbivores — eland and hartebeest. Comparisons have been made with Boran cattle. Day and night fluctations in the environmental temperature and relative humidity were recorded as well as solar radiation. The effect of these environmental factors on the animals has been determined, particularly as regards the deep body temperature and respiration rates in hydrated and dehydrated animals. Other measurements have included the heart rate.

MATERIALS AND METHODS

Readings have been made by means of radiotelemetric monitoring [3] and by direct measurements on trained animals over periods of 3 to 4 days. More recently, all measurements have been made by radiotelemetry using a blocking oscilator circuit as described by McGinnis [4]. The unit incorporating this system measures approximately 9 x 25 mm with battery when coated with Silastic and beeswax and weighs 8 g. Several of these units may be incorporated in the body tissues to relay information from different localities, such as the deep muscle, vagina, and subcutaneous tissue temperatures. Temperature information is transmitted as static clicks per unit of time; these may be received on the standard A.M. frequency band. When coupled with a Belltone B13 1.4 v. mercury battery, the unit has a life of several months to one year depending on the gain of the transistor. Transmission from these units is for a distance of a few feet only. The signals are relayed by booster units which transmit on specific frequencies between 88 and 108 Mc. The booster system weighs 250 g with a bat-

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tery load for a week. Several of these may be fitted on a simple harness made from bicycle inner tubing, which is fitted round the animal in the region of the heart girth. It is also possible to use one booster unit to relay two or more signals at greatly differing click rates which may be recognised and counted individually.

The animals used were confined to one acre paddocks containing natural shade, or were allowed free range. Comparisons were made with animals dehydrated up to 15% of their body weight. Eland, hartebeest, and Boran cattle were used in the series of experiments.

RESULTS

Graphical representations of the reaction to solar radiation and environmental temperatures are given in the accompanying figures. Separate experiments are shown for the hydrated and dehydrated animals.

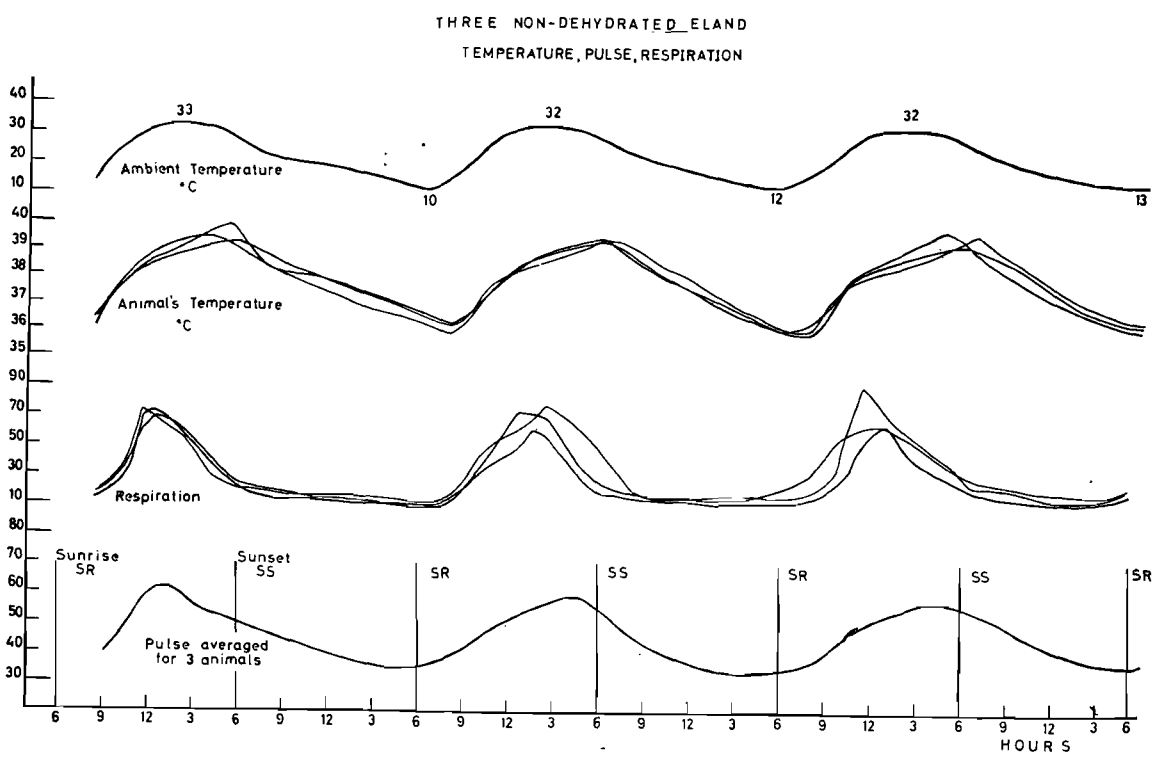
a) Temperature:

The results indicate that there is a steep temperature rise commencing shortly after sunrise and continuing throughout the day. In some cases the temperature gain appeared to extend beyond sunset.

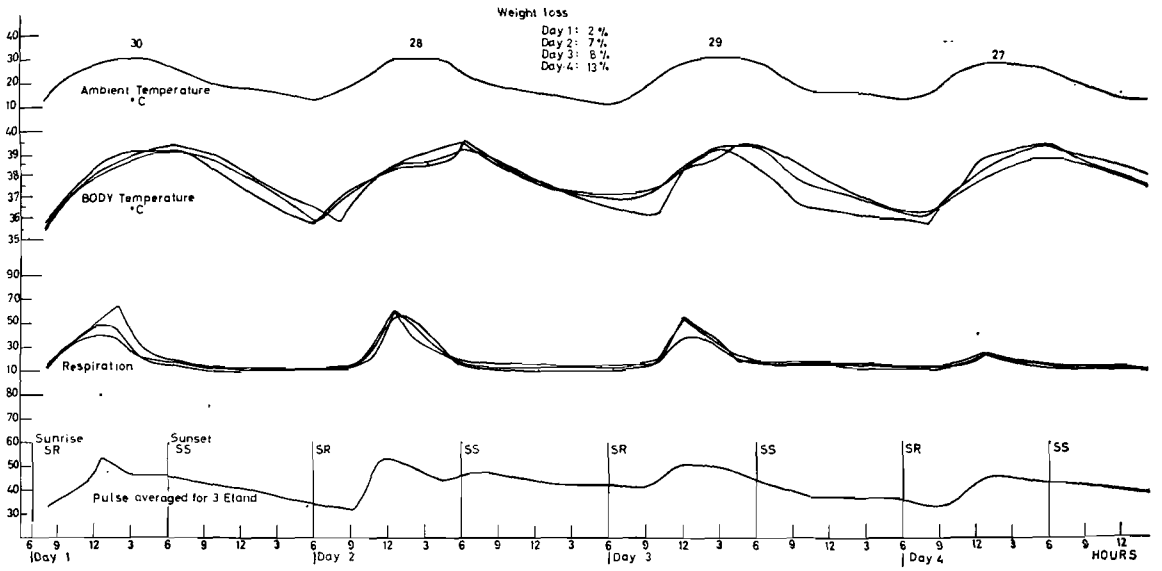
Considerable shade was usually available in the paddock used after midday, and the wild animals tended to make use of this to a much greater extent than did the Boran cattle. The residual radiation remained intense, so that heat would be absorbed in spite of the reduced direct solar radiation, or use of shade. Shade exclusion practised in a small proportion of the experiments appear to make little difference to the heat gained, but increased panting. Animals out at range made less use of shade than those monitored in paddocks. There was less shade available to the former, and during much of the day those animals were occupied in foraging for food.

The temperature fluctuations were more marked in the eland and hartebeest than in the Boran cattle, in spite of the habit of the hydrated cattle to lie in the full sunshine. From previous experiments (see above) this wide fluctuation in body temperature should also be manifested in other wild animals such as wildebeest, buffalo, oryx, and rhinoceros to the same or a greater degree as that seen for eland or hartebeest.

A fall in temperature has been noticed to continue throughout the night. In some cases the fall continued into the day until 8.00 or 9.00 o'clock, in spite of a rise in ambient temperature.



VARIATIONS OF BODY TEMPERATURE, RESPIRATION, AND
PULSE OF THREE DEHYDRATED ELAND



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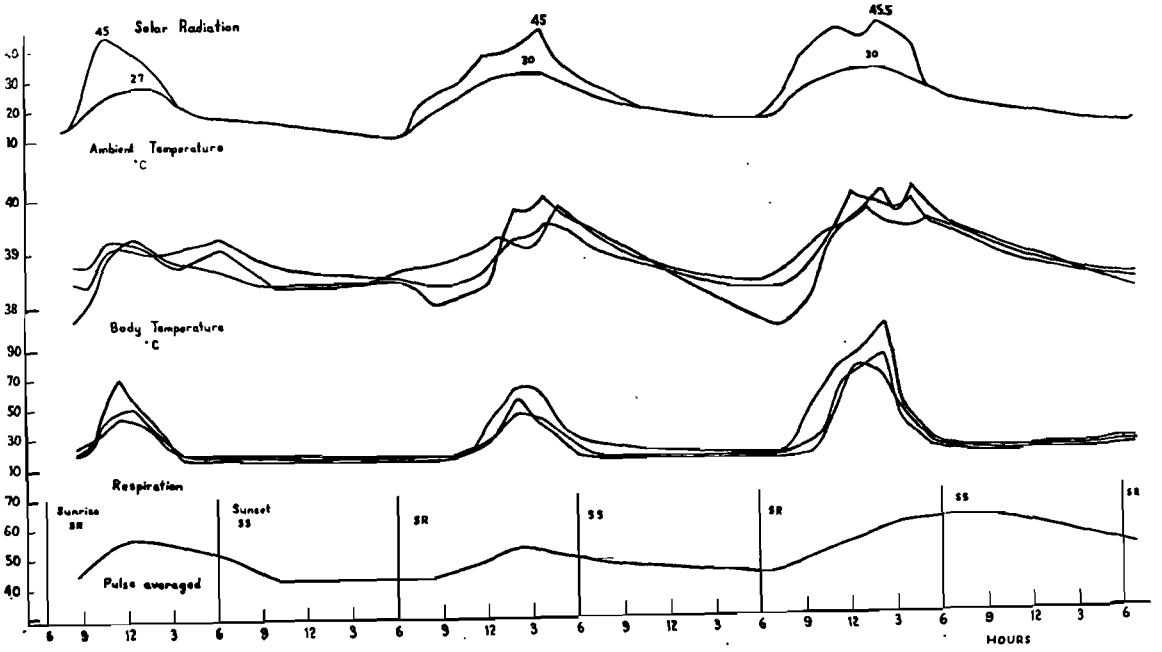

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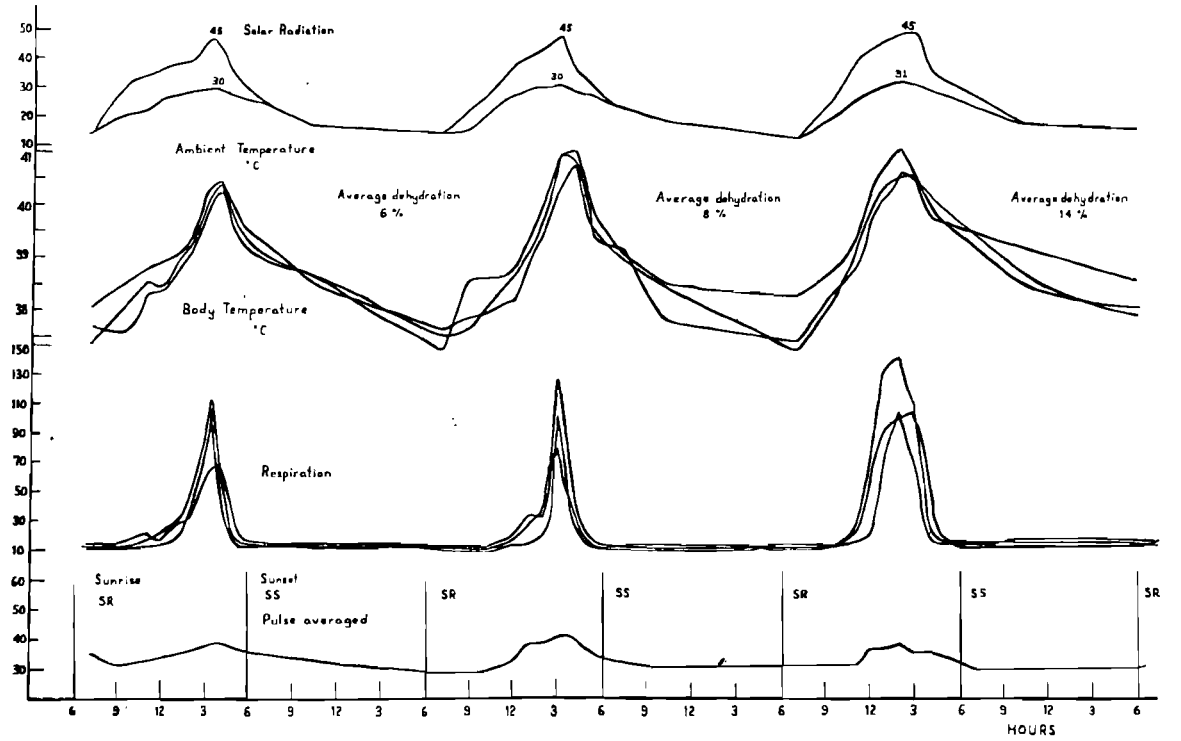
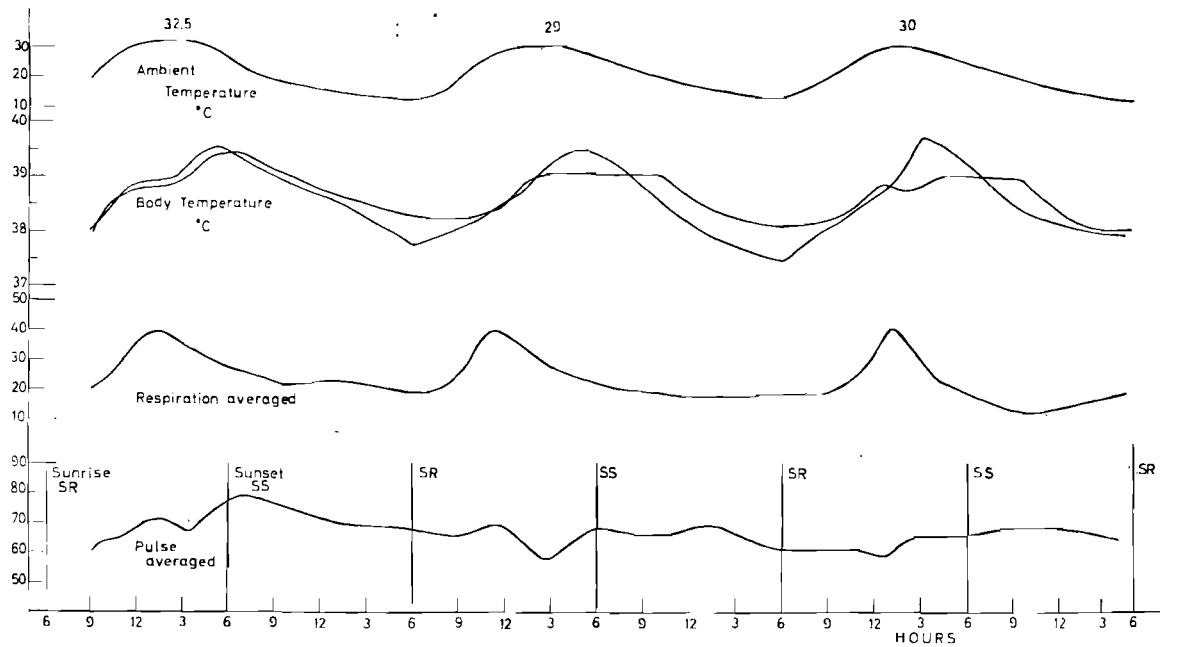


VARIATION OF TEMPERATURE, RESPIRATION, AND
PULSE OF TWO HYDRATED BORAN CATTLE

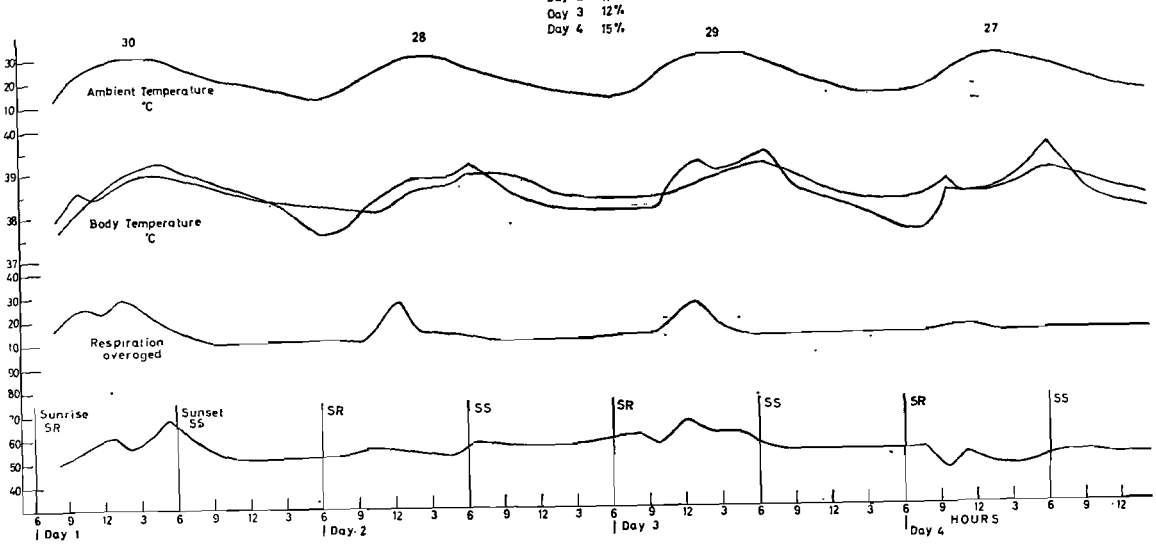


VARIATIONS OF TEMPERATURE, RESPIRATION, AND PULSE

IN TWO DEHYDRATED BORAN CATTLE

WEIGHT LOSS

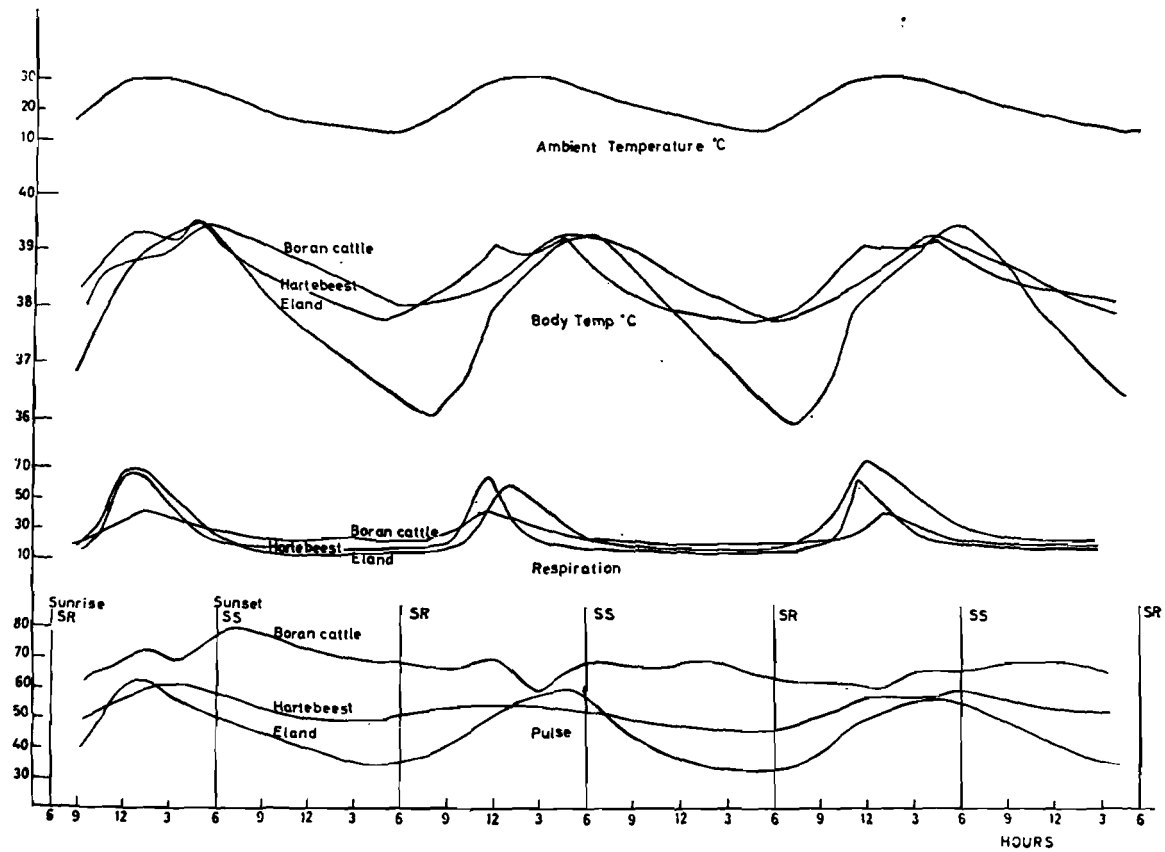
Day 1 7%
Day 2 11%
Day 3 12%
Day 4 15%



VARIATIONS OF TEMPERATURE, PULSE, AND RESPIRATION

BORAN CATTLE, HARTEBEEST, AND ELAND

Each line represents an average for three animals



b) Respiration:

The respiratory rate showed a steep rise about midday when the direct effect of the solar radiation was greatest. Throughout the period of these experiments the cooling power of the wind was considerable, and extreme conditions of heat were not experienced. Soon after midday the panting ceased, although the body temperature continued to rise. In fact, very little evidence of distress as a result of this rise in body temperature could be observed. Respiration appeared to be more closely related and dependent on solar radiation than on environmental temperature. The high respiratory rate of those animals standing in the sun would fall rapidly when moved into the shade.

The panting reactions of the Boran cattle were markedly less than those of the eland and hartebeest; on the other hand, a marked dampness of the skin of the cattle (not so evident in the wild stock) was observed, currently this is being checked by systematic measurements. The presence of strong winds already mentioned and an ability to sweat would permit the cattle to show a smaller panting reaction, (and temperature rise), in spite of their inclination to lie in the sun rather than in the shade.

c) Heartrate:

An increase in the heart rate occurred at the same time as the increase in respiration. It may well be associated with the latter as a result of muscular activity. Considerable fluctuations occurred in the heart rate of the cattle, which could not be correlated with muscular activity. In some instances, a high heart rate was observed when the respirations were normal, but the body temperature was high. This occurred in the evening after dusk. The possibility that this may be associated with peripheral vasodilation must await further investigation.

d) Behaviour:

The Boran cattle did not seek shade (except when dehydrated) but tended to lie down in the heat of the day, so reducing their surface area exposed to radiation. Eland and hartebeest remained on their feet, but sought shade when in the paddock. When in the open, they continued to browse or graze, although occasional individuals sought shade. The pattern suggests that the wild animal is less prone to expend water to reduce body temperature and will not seek shade if this is available; the drive to eating is not dominant.

e) Dehydrations:

Dehydration up to 15% of the body rate resulted in steeper and wider temperature fluctuations. Statistical analysis of the effect of dehydration on hartebeest on respiratory rates revealed a significant increase in panting during the process of dehydration in these experiments.

DISCUSSION

Temperature control and thermoregulatory responses have generally been thought to be a hypothalamic function, although an extra hypothalamic sensory mechanism has been postulated in the skin and elsewhere [5]. Supplementary superficial thermoreceptors have been described as well as thermosensitive structures situated in the spine [10, 11]. Bligh [6] proposed cold sensitive elements in the walls of the larger veins. The probability of heat sensitive receptors situated in veins that drain the skin is an interesting possibility that might account for the panting reactions seen in these animals at midday, although this would postulate a greater heating of the skin and blood at that time than occurred subsequently during the gain in overall body temperature. Kappey & Albers (1964) suggested, however. that panting in dogs can be correlated with skin temperature only when ambient temperature is increased rapidly.

The experiments described here are clearly incomplete without measurements of the sweating reaction yet no way of subjecting this to telemetric monitoring has been devised. We may assume that the water loss by panting bears a relation to the respiratory rate, but the loss through sweating is an unknown factor except for sporadic sampling. The mechanism whereby the various species sweat is subject to considerable differences [8] and this may make accurate comparisons more difficult.

The amount of water that a species is able or ready to lose either by panting or more especially in the grosser form by sweating, must bear a relationship to its adaptation to arid environments. The rise in body temperature shown by the eland and hartebeest (and the other animals reported previously) must lower the heat gradient between the body and the environment, so lowering the necessity for cooling measures. The fall in

'n besondere vooruitgang in die beheer van mastitis

Die waarde van droë-koei behandeling is nou duidelik vasgestel. Orbenin (Droë Koei) is spesiaal vir hierdie roetine ontwikkel en geformuleer en is hoogs suksesvol in die praktyk bewys.

Terwyl 'n groot gedeelte van koeie in die gemiddelde kudde subklinies besmet is, is dit noodsaaklik dat hierdie las verminder moet word, indien mastitis beheer wil word.

Orbenin het bakteriedodende werking teen penisillien-weerstandbiedende en sesitiewe stafilokokke en streptokokke en C. pyogenes.

Orbenin (Droë Koei) sal in die uier aktief bly vir ongeveer vier weke en sal meehelp om nuwe besmettings gedurende die droë periode te voorkom, asook om bestaande infeksies met afdroging, te verminder.

Orbenin Droë Koei

VOORDELE

- ☐ Geen finansiële verlies deur melk wat weggegooi word nie.
- ☐ Tyd vir herstel van afskeidingsweefsels.
- ☐ Minder mastitis in die vroeë stadium van laktasie wanneer opbrengs op sy hoogste is.
- ☐ Verbeterde kuddegesondheid—verhoogde winsgewendheid.

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KOP KOP VET

temperature during the night is likely to be an adaptative measure to reduce the need for cooling during the day[9]. The continued drop in temperature when the ambient temperature started to rise may be further adaptation associated with loss through peripheral vasodilation; this also needs further investigation.

The coat colour and texture of the two animals principally monitored here (eland and hartebeest) are similar although the eland has a thinner coat and visibly better developed skin vessels. Relatively large fluctuations obtained previously in buffalo are likely to be associated with a darker skin and sparse coat with consequently greater absorption of radiation. This is now being investigated.

ACKNOWLEDGEMENTS

This work is supported by grants from the Royal Society (through O.D.M.), the Wellcome Trust, and the African Wildlife Leadership Foundation, who also contributed to the cost of funds for the journey from Nairobi.

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Jl S. Afr. vet. med. Ass. 41 (1): 27-30 1970

BRUCELLA INFECTION IN DAIRY CATTLE AND MILK SUPPLIES

M. M. GREATHEAD* AND K. W. KATZ*.

SUMMARY

The incidence of brucellosis in dairy herds supplying milk to Johannesburg and other parts of the country is discussed in relation to the risk of infection of human beings consuming contaminated milk.

It is suggested that the State Veterinary Service actively encourage farmers with known infected herds to eradicate the disease in conjunction with compulsory calfhood brucellosis inoculation of heifers.

INTRODUCTION

The purpose of this short paper is to stimulate discussion on aspects of the control of brucellosis in dairy herds and on the public health importance of brucella organisms in milk.

INOCULATION OF HEIFER CALVES

In December 1968 inoculation of all heifer calves between the ages 3 and 10 months was made compulsory [1]. The notice concerned prohibits the inoculation of adult cows without the permission of a State Veterinarian. Permission will apparently only be granted in herds experiencing an abortion storm.

The Johannesburg City Council's Milk By-laws, which have been in force since 1964, require compulsory heifer inoculation and inoculation of adult cows which are not known to have been inoculated as heifers. Inoculation of adult animals was required to protect susceptible cattle in infected herds or to safeguard them from infected animals introduced into the commercial herds producing milk for the City.

Prohibition of adult inoculation may expose to infection susceptible cattle which have never been immunized as heifers with the possible spread of the disease to uninfected herds. At least two years will elapse before inoculated heifers can be used for replacements in commercial herds. Even then, it is unlikely that all cows will have been immunized as heifers.

INCIDENCE OF BRUCELLA IN RAW HERD MILK SAMPLES IN JOHANNESBURG

For many years the raw milk supplies to Johannesburg have been tested for the presence of brucella organisms. This is done by screening samples taken from the milk supplies by means of the Milk Ring Test (MRT). Samples are then tested biologically and agglutination tests for brucellosis are made on the blood serum of the guinea pigs inoculated with MRT positive milk.

Samples producing a positive guinea pig serum agglutination test are considered to be contaminated with viable *Brucella* organisms. These positive tests reflect the number of

Table I

Year	No. of MRT	Positive	Aggl. Test	Positive
1959	1836	655 (35%)	561	72 (12%)
1960	1968	680 (34.5%)	624	84 (13.4%)
1961	2041	542 (26.5%)	485	45 (9.2%)
1962	1911	812 (42%)	714	92 (12.8%)
1963	1825	752 (39.8%)	682	106 (15.5%)
1964	1974	641 (32.4%)	578	95 (16.4%)
1965	2151	648 (30%)	619	105 (17%)
1966	2155	476 (22%)	462	102 (22%)
1967	2058	455 (22%)	424	97 (22.8%)
1968	2144	452 (21%)	452	138 (30.5%)

Paper delivered at 64th Annual Congress of the S.A. Veterinary Medical Association, Cape Town, September, 1969

* Abattoir & Livestock Market, P.O. Box 1620, Johannesburg.

infected herds from which the samples were derived. Since 1962 there has been a steady increase in the percentage of positive samples.

INCIDENCE OF BOVINE BRUCELLOSIS IN OTHER PARTS OF SOUTH AFRICA.

The Johannesburg milk supply is derived from dairy farms in the Southern, South Eastern and South Western Transvaal and the Northern Orange Free State. Infected herds have been found in many districts in these areas.

The disease has been notified in many districts throughout South Africa. Milk used in rural as well as in urban areas of the country is likely to be contaminated with viable *Brucella abortus*.

MRT ANTIGEN

(i) The reliability of the Onderstepoort MRT antigen issued up to 1968 was tested by means of serum agglutination tests on guinea pigs inoculated with 300 bulk milk samples as shown in Table II.

Table II

MRT	Samples Tested	Agglutination Positive	Agglutination Negative
Positive	116	12 (4.0%)	104
Negative	184	4 (1.3%)	180
Total:	300	16 (5.3%)	284

Table II B

MRT	Samples Tested	Agglutination Positive	Agglutination Negative
Positive	59	14 (14.7%)	45
Negative	36	0	36
Total:	95	14 (14.7%)	81

Four samples (1.3 per cent) giving a negative ring test gave positive serum agglutination test results. This represented 25 per cent of all agglutination positive samples. Some *Brucella* contaminated bulk milk samples were therefore incorrectly recorded as negative when using this antigen for screening purposes.

(ii) In 1969 an improved ring test antigen[3] was used although it is not recommended for use on bulk milk samples. Only a limited number of tests similar to that in (i) have been performed; a direct comparison of the reliability of the two antigens cannot be made. Results are summarised in Table IIb.

Table III indicates that the number of MRT positive samples on which the guinea pig serum agglutination tests were done in 1969 increased greatly over those in 1968, thereby demonstrating that the new antigen is more sensitive than the old and also more reliable for bulk milk testing.

THE IMPORTANCE OF BRUCELLA IN MILK.

Human brucellosis has been caused by the consumption of unpasteurised unfermented milk and milk products[4]. In a few instances *Brucella* organisms have been isolated from dairy products that have been soured and matured over long periods.

A review[5] of human brucellosis diagnosed from specimens of blood or serum at the Johannesburg laboratories of the South African Institute for Medical Research between 1956 and 1959 indicated that the disease is endemic in the Eastern Transvaal and South West Africa. It is of interest to note that of the 70 cases in people unrelated to occupational exposure to the disease, 33 were under 20 years of age and 40 were non-white. It was not possible to identify the source of infection although at least three patients living in Johannesburg had consumed raw milk in the Nelspruit area a few weeks before becoming ill.

It appears that relatively very few cases of human brucellosis are detected serologically at the Johannesburg laboratories of the Institute at the present time and the history of these cases is unknown so that no conclusions can be drawn.

In Johannesburg pasteurisation of all but certified milk is compulsory. Brucellas are destroyed in the heating process and therefore milk-borne *Brucella* should not endanger the health of the citizens of this city. Nevertheless, some are likely to be exposed to in-

Table III

Year	Milk Samples Tested	Agglutination Tests + Samples	Agglutination + Samples	Percentage of Total
1968	2144	452	138	6.4
1969	2347	1268	180	7.6

fection when visiting areas where infected milk is not pasteurised. The aim of health authorities is to ensure that milk supplies are free from pathogenic organisms.

CONCLUSION

Provided that the milk supply is pasteurised there is little danger that consumers will contract milk borne brucellosis. Pasteurisation of milk is applied in most of the cities and many large towns in the country, but in the rural areas raw brucella contaminated milk may be consumed with a possible hazard to human health. Eradication of human brucellosis can only be achieved when animal brucellosis has been effectively controlled.

Compulsory inoculation of heifer calves is the first stage of brucellosis control in the country's cattle population, but it will have to be applied for several years before active eradication of the disease can be undertaken. However, in the course of control of their milk supplies over many years, some local authorities have collected data on brucella-infected herds in their milk sheds. Such herds are regularly reported to the State Veterinary service and it is recommended that this information be used to greater advantage by encouraging and assisting farmers with known infected herds to eradicate the disease from their herds.

ACKNOWLEDGEMENT

The Director, Abattoir and Livestock Market Department, City Council of Johannesburg is thanked for permission to present this paper.

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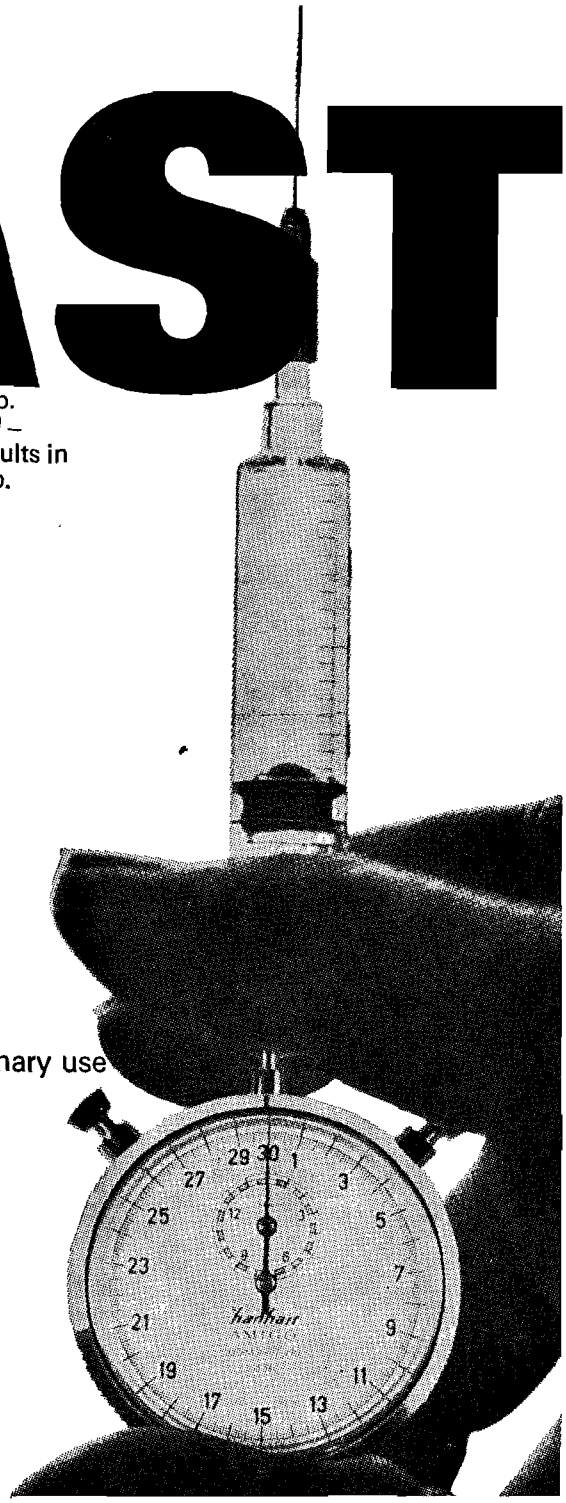

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Jl S. Afr. vet. med. Ass. 41 (1): 33-37 1970

A STUDY OF GENETIC BLOOD VARIANTS IN AFRICAN BUFFALO

D. R. OSTERHOFF*, E. YOUNG** AND I. S. WARD-COX*.

SUMMARY

Starch gel electrophoretic patterns of blood from 191 African buffaloes (*Syncerus caffer caffer* Sparrman) from the Kruger National Park disclosed the same haemoglobin, transferrin and albumin types in all animals. The fact that no genetic variation was found in any of the herds studied indicates a high degree of inbreeding in at least some of the buffalo herds in the Kruger National Park.

INTRODUCTION

During a biological and veterinary survey of African buffaloes in the Kruger National Park a number of these animals were immobilized, killed and their carcasses evaluated[1]. After an initial attempt by Osterhoff & Young[2] at the classification of buffaloes with respect to their immuno-haematological characteristics, further material has become available for similar studies.

MATERIALS AND METHODS

Blood samples of 67 animals investigated in 1966[2] originated from the buffalo population of the Crocodile Bridge section of the Park and their results are included in the present paper. During June 1968 another 45 blood samples also originating from the Crocodile Bridge section, were investigated at the Skukuza laboratory.

In May 1969 the remaining 79 serum samples originating from herds of the Tshokwane section of the Park were analysed using the technique of starch gel electrophoresis. The detailed description of the technique is given by Osterhoff[3].

RESULTS

Haemoglobin determination could be performed on 151 blood samples. With the exception of four samples obtained from young buffalo calves showing foetal haemoglobins, all samples possessed two haemoglobin fractions similar to the haemoglobins in horses. One of these fractions had exactly the same migration rate as the cattle A-band and the other seemed to have the same migration rate as the D-band in cattle as described by Efremov and Braend[4]. No genetic variation could be established.

For the transferrin determination all 191 samples could be used and all showed only one pattern, this being identical to cattle transferrin type AA. In Fig. 1, eight buffalo samples are, for reasons of comparison, depicted together with a serum sample of cattle transferrin type A and a sample of the brindled gnu. Results obtained are very similar to those of Braend and Stormont[5] who also found only one haemoglobin and transferrin type in American buffaloes.

Albumin types were also investigated in 191 samples and here again, all animals possessed only one type expressing itself in one single band migrating considerably slower than the corresponding albumin B-band in cattle.

Blood group tests could be performed on only 77 samples because only fresh erythrocytes can be used in the standard haemolytic test for blood group determinations.

For various reasons the tests could not be performed by the same person at Skukuza and the same cattle blood grouping reagents were not always used. Of 40 cattle reagents used, 16 reacted with cells of buffalo, but no clear pattern could be obtained of the antigenic substances present on the buffalo red cells. However, cross reactions of buffalo cells with cattle antibodies, mainly with those detecting antigens in the A and B cattle blood group systems, could be established.

DISCUSSION

Polymorphic variants have been described in haemoglobins of Indian water

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** Veterinary Investigation Centre, Kruger National Park.

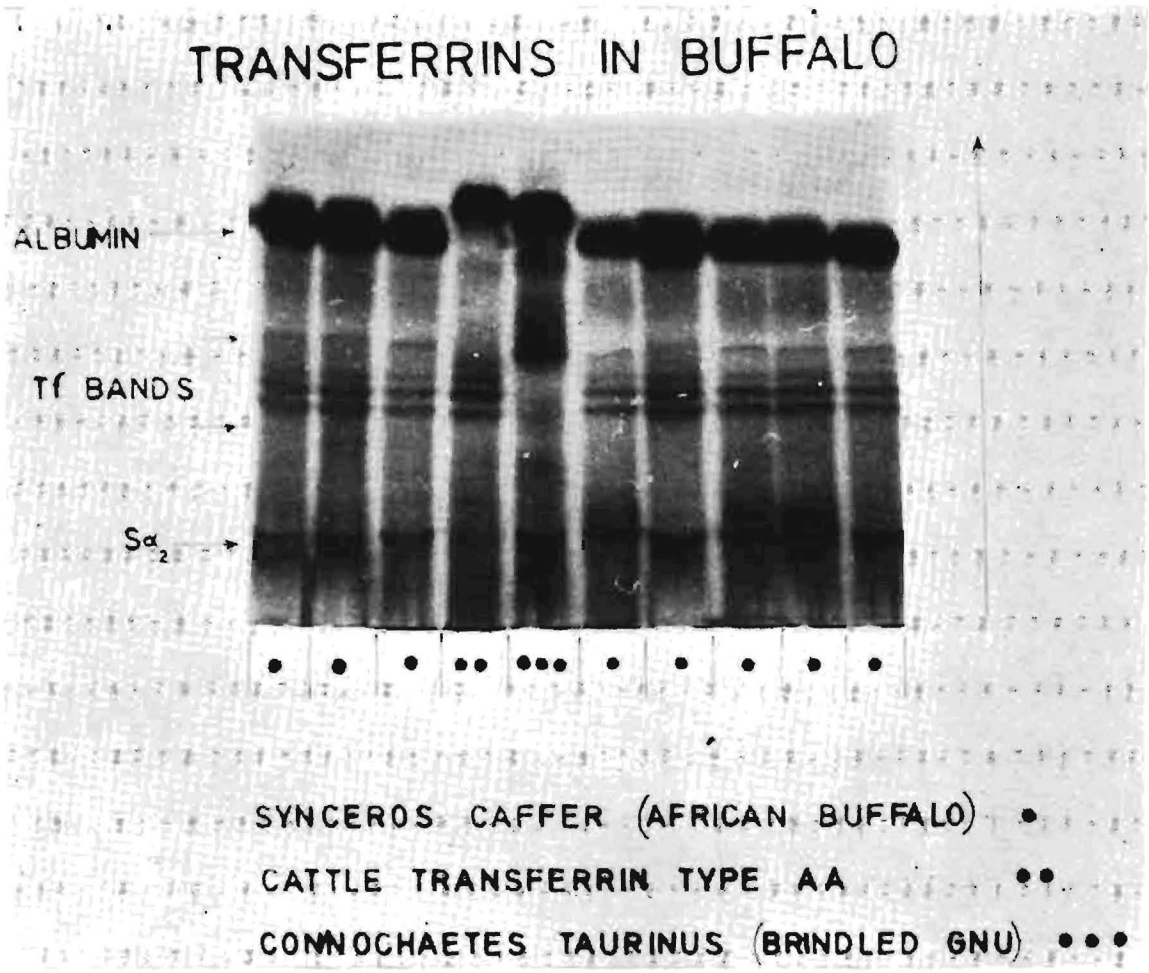

Fig. 1. Transferrins in African buffaloes.

buffalo[6], and in the albumns and transferrins of Bulgarian water buffalo[7], whilst the presence of erythrocyte antigens have been studied by means of cattle reagents in Bulgarian water buffalo[7] and also Indian water buffalo[8]. These variants are to a great extent in agreement with the results given, but in the material investigated here it appears that serum type variations are non-existent in these animals. Only one type of haemoglobin, transferrin and albumin was found throughout, indicating a high degree of inbreeding in the buffalo herds studied.

Another indication of this high degree of inbreeding is the condition, known as "wry-tail", which occurrs commonly in these herds. A photograph of typical wry-tail in buffalo is presented in Fig. 2.

Inbreeding in cattle is frequently associated with an increased frequency of wry-tail and other deleterious conditions like sloped rump and screw tail which also prevails in the studied buffalo populations. Although no direct studies of inbreeding have been performed in buffaloes, it would not be surprising to find homologies or near homologies of genetic traits in both species, especially in highly inbred groups of animals. Furthermore, it is well known that close inbreeding in cattle and other domesticated

species is nearly always accompanied by lowered fertility, reduction of libido, increase in embryonic mortality, reduction in the viability of the newborn as well as an increase in genital malformations [9].

Pienaar[1] discussed the high mortality amongst buffalo calves and estimated that only 37.5 per cent of all newborn calves reach reproductive maturity. The mortality rate amongst young calves is appreciably higher in years of low rainfall than during favourable seasons.

Apparently the fertility and embryonic mortality of buffalo has not yet reached the critical stage, as numbers are still increasing and a game cropping campaign had to be initiated to decrease the numbers of animals in different herds. However, the semilethal and undesirable traits are probably increasing and it seems reasonable to estimate the frequency of the genes responsible for these traits being between 0.05 and 0.2. Since no selection against these undesirable traits takes place in wild animals one could expect the frequency to increase rather rapidly in accordance with the rate of increase of homozygosity. This increase is dependant not only on the closeness of relationship of the mated individuals, but also on the herd size and number of bulls in the herd. Male buffaloes usually mature at $2\frac{1}{2}$—3 years of age but are rarely, if ever, allowed to take part in breeding activity by the older herd bulls until they are at least 7—8 years of age [1]. If one considers the order of dominance on reproduction based on the physical aggressiveness or sexual precedence it is possible that the frequency of harmful genes can be automatically increased by a carrier bull which incidently controls the mating of a great part of the herd. Then too, a fraction, albeit small, of the normal alleles is continually mutating to pathological forms. Thus, in the absence of any form of counter-selection, the pool of

Fig. 2. Example of wry-tail in African buffalo

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pathological genes tends to maintain itself if not actually increased.

To summarize, one should recommend less random culling because of the expected lowering of fertility. With more selective culling of the sick and the old and of animals showing obvious conformational defects and with the possible introduction of "new blood", the general health status of the buffalo populations in the Kruger National Park should be improved and the development of undesirable effects due to inbreeding be reduced.

ACKNOWLEDGEMENTS

The authors are indebted to Mr. A. M. Brynard, Nature Conservator and Dr. U. de V. Pienaar, Chief Biologist of the Kruger National Park for their co-operation. They wish to thank Mr. N. Prinsloo and Mr. L. Wagener of the Veterinary Investigation Centre, Skukuza, for their assistance.

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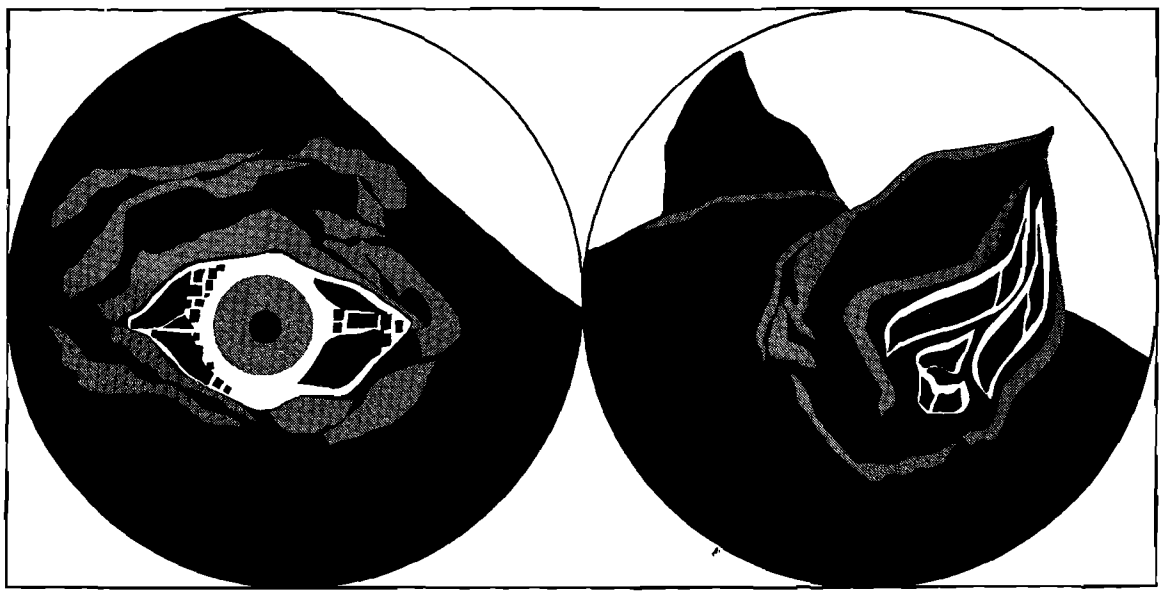

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Jl S. Afr. vet. med. Ass. 41 (1): 39-43 1970

POST PARTUM SYNCHRONIZATION OF THE OESTROUS PERIOD OF LACTATING FRIESLAND COWS WITH 6-METHYL, 17-ACETOXY-PROGESTERONE (MAP)* AND PMSG.

I. The distribution of oestrus and ovulation

C. H. VAN NIEKERK, P. C. BELONJE AND E. B. SPREETH**.

SUMMARY

1. The oestrous periods of 19 lactating Friesland cows were synchronized by means of MAP and PMSG.
2. Synchronization of oestrous and ovulation was very effective.
3. When treatment commenced before the eleventh day of the oestrous cycle, very high conception rates were obtained, whereas when treatment commenced after the eleventh day of the oestrous cycle large abnormal follicles developed. This explains the overall low conception results obtained with synchronization.
4. The regularity of the response to treatment enables inseminations to be performed at specific times after treatment without examining for signs of heat.

INTRODUCTION

The oestrous periods of a group of cows can be effectively synchronized by administering progesterone, or related compounds, for a certain period and then abruptly withdrawing medication. However, most workers report a conception rate of less than 50% after such treatment. Furthermore, even more disappointing results are obtained when cows are treated early in lactation [1]. During a recent experiment on Friesland cows, for example, only 55% of the lactating animals actually exhibited oestrous and of these only 24% conceived; a total conception rate of a mere 14% [2]. Further evidence was obtained in Afrikaner cows, where only 25% of the lactating cows, which were inseminated, conceived compared with 50% of the dry cows. However, during a further experiment 1500 i.u. PMSG was administered to the Afrikaner cows 16 hours after the final progesterone injection. This additional treatment increased the conception rate of the lactating cows to 58% but had no added advantage in the dry cows [3].

Nevertheless, all these results fall short of the nominal standard that 67% of normal untreated animals should be pregnant one month after insemination [4]. This experiment was, therefore, designed to study the effect of synchronization, on lactating Friesland cows, with a progestogen, in the form of MAP, and PMSG.

MATERIALS AND METHODS

A group of 19 lactating Friesland cows was treated by administering, to each animal, 6g of Repromix *per os* per day for 17 days, followed by an intramuscular injection of 1500 i.u. PMSG 16 hours after the final MAP administration. The animals were kept under constant observation from 5 a.m. to 8 p.m. daily throughout the whole experiment, while rectal examinations of the ovaries were performed immediately after the final MAP treatment and repeated every six hours until each animal had ovulated.

During the course of these rectal examinations, it was found that six cows had ovaries which were considered normal, while the other 13 each had at least one peculiar large cystic follicle. These follicles were considered to be degenerate and were later proved to be so. Scrutiny of the records revealed that in the group of six normal animals, treatment had commenced before the eleventh day after their last ovulation, while in the remaining 13, treatment had commenced after this time. It was decided to allow the animals to pass through this first synchronized oestrous period and recommence treatment

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with all the animals being in the first half of the oestrous cycle. This treatment consisted of daily administrations of MAP for 16 days followed by an injection of PMSG 16 hours later.

Regular rectal examinations of the ovaries were performed during this second synchronization period but once MAP treatment ceased, six hourly examinations were performed until each animal ovulated. Each cow was inseminated 12—20 hours after the first signs of oestrus were noticed and reinseminated 12 hours later if ovulation had not occurred. During the following two months the animals were kept under observation for any signs of heat and at the end of this period they were examined for pregnancy. Pregnancy was reconfirmed at three months.

RESULTS

First synchronization period

(a) *Rectal examinations*

Sixteen hours after the final administration of MAP, but immediately before the PMSG injection, rectal examinations revealed a marked difference in the ovaries between the cows. The six cows where MAP treatment had commenced during the first 11 days of the normal cycle had ovaries of medium size — five of the animals' ovaries had firm thick walled follicles which ranged from a few millimeters to 1 cm, while the sixth had no palpable follicular development. On the other hand, each of the 13 cows, where treatment began after the eleventh day, had at least one very large thin walled fluctuating follicle of approximately 2.5—3 cm in diameter. These have since been shown to be abnormal.

(b) *Distribution of oestrus and ovulation*

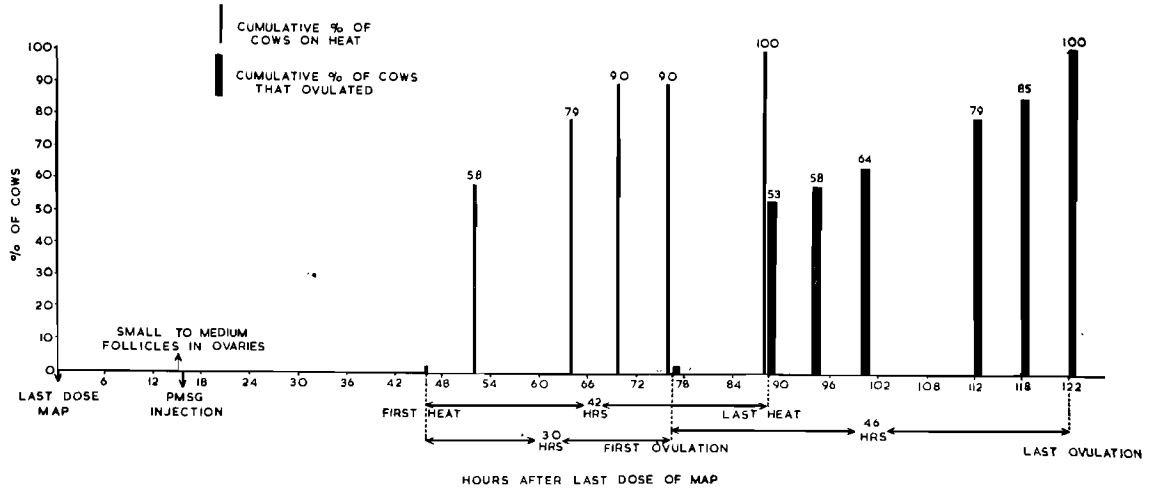
After the final administration of MAP (Hour 0) the first cow showed signs of oestrus at Hour 42 and within the following 24 hours all the animals had followed suite. Furthermore, all the cows ovulated between 30 and 38 hours (average 36) after coming into oestrus. There were no differences in these parameters between the two groups mentioned in (a) above.

Second synchronization period

(a) *Rectal examinations and distribution of oestrus and ovulation (see graph)*

Eight days after this treatment commenced, large thick walled, fluctuating corpora lutea of 2.5 to 3.5 cm diameter were found in all 19 cows at the site of the previous ovulation. However, four days later these bodies were about 1—2 cm in diameter and much firmer. This trend continued and by the seventeenth day i.e. 16 hours after the last administration of MAP (Hour 0) the corpora lutea were only 0.5—1 cm large and hard. At this time, small to medium follicles of less than 1 cm in diameter could be palpated in all cases. These latter findings agree with the ovarian development of the six animals in the first synchronization period which had received MAP for the first time during the first half of their oestrous cycles.

After the PMSG injection at Hour 16, these follicles developed rapidly and at Hour 46 the first cow showed signs of oestrus. By



The distribution of Oestrous and Ovulation after the MAP and PMSG treatment.

Hour 48, 58% of the cows each had a large follicle of about 1.5 cm diameter, while the rest had medium follicles.

During the six hour period, Hours 46—52, 58% and during the twenty-four hour period, Hours 46—70, 90% of the animals came on heat. By Hour 88 all the animals had shown signs of oestrus, hence a total oestrus synchronization period of 42 hours.

The first ovulation occurred at Hour 76, 30 hours after the first cow came on heat, while the last ovulation took palce 34 hours after the last cow had come on heat, hence a total ovulation synchronization period of 46 hours. No cases of multiovulation were detected.

(b) *Conception rate*

Two months after insemination, 79% of the cows were found to be pregnant — this figure was reconfirmed a month later.

DISCUSSION

It is apparent from the results that MAP and PMSG are very effective in the synchronization of oestrus in lactating Friesland cows. Moreover, a very high conception rate can be expected if the treatment commences before the eleventh day of the oestrous cycle. However, should treatment commence later than the eleventh day this leads to the formation of large abnormal follicles housing degenerating ova[5]. As any random group of cows would invariably be divided into some which are in the early part of their cycle and others in the later part, we feel that these findings explain the very low conception rate obtained after synchronization in cattle. In order to circumvent this problem either cows which are only in the early part of the oestrous cycle should be considered for synchronization or, one would have to resort to a primary synchronization followed about four to six days after ovulation by a second period of treatment as occurred in this experiment. A more practical approach, which is being investigated, is perhaps primary synchronization with a single injection, long term progestogen.

The regularity of the response to the treatment is of such a nature that, should semen remain biologically viable in the cow for at least 24 hours, all cows can be inseminated at 75 hours and again at 100 hours after the final MAP treatment without observing for signs of heat. As an alternative one merely records the time that the first animal comes on heat and the animals are all inseminated 24 hours later and again after a further 24 hours.

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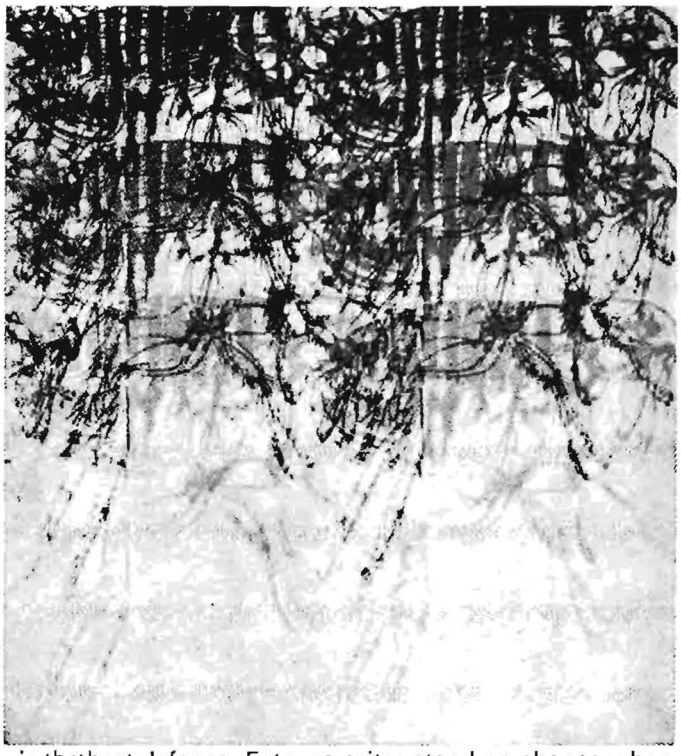

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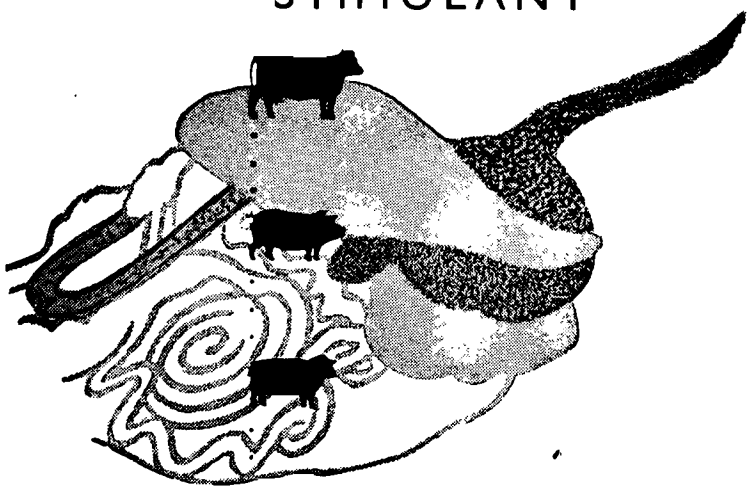

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POST PARTUM SYNCHRONIZATION OF THE OESTROUS PERIOD OF LACTATING FRIESLAND COWS WITH 6-METHYL, 17-ACETOXY-PROGESTERONE (MAP)* AND PMSG.

II. Observations on ovarian abnormalities

C. H. VAN NIEKERK AND P. C. BELONJE**.

SUMMARY

1. Four normal Friesland cows were employed.
2. When the 16 day MAP treatment commenced on the fourth day of the oestrous cycle, a follicle and ovum, indistinguishable from the normal, developed after the cessation of treatment.
3. When MAP treatment commenced on the fourteenth day of the oestrous cycle, an abnormal, degenerating follicle housing a degenerating ovum developed.
4. Large cystic corpora lutea developed when MAP treatment commenced during the luteal phase of the oestrous cycle. However, these atrophied during the course of the treatment.

INTRODUCTION

During the course of an experiment to investigate the efficiency of MAP and PMSG for the synchronization of oestrus in cows, it was found that, when treatment commenced during the latter half of the oestrous cycle, large thin walled fluctuating follicles developed. Furthermore, during a second period of synchronization soon after the first synchronized ovulation, it was found that, irrespective of the type of follicle which had ovulated, large corpora lutea developed which degenerated rapidly during the MAP treatment [1].

The object of this experiment was to investigate the nature of both the large follicles and the large corpora lutea.

MATERIALS AND METHODS

Four normal Friesland cows were treated as follows:

Cow 1: was regarded as the control. No treatment was administered and she was slaughtered during the early part of oestrus period.

Cow 2: received 6g of Repromix daily, from the fourth day after ovulation, for 17 days and was slaughtered 40 hours after the final administration, early in the oestrous period.

Cow 3: received 6g of Repromix daily, from the fourteenth day after ovulation, for 17 days and was slaughtered 40 hours after the final administration, early in the oestrous period.

Cow 4: received 6g of Repromix daily, from the fourth day after ovulation, for six days when she was slaughtered.

Regular rectal examinations of the ovaries were performed during the experimental period. After slaughtering each cow the ovaries were removed and the follicles (Cows 1, 2 and 3) and corpus luteum (Cow 4) were measured for size and fluid content and then sectioned for histological examination. Moreover, ova from these follicles were recovered and examined microscopically.

RESULTS

Cow 1. The follicle, 1.6 cm in diameter containing 1.9 ml of fluid, and ovum of this untreated control animal were normal in all respects.

Cow 2. A normal-sized follicle, 1.8 cm in diameter containing 2.1 ml of fluid was present in the right ovary (Fig. 1)[2]. When sectioned it had a normal reddish colour with a fine network of blood vessels. Histological examination of the follicular wall revealed the typical normal layers (Fig. 2)[3]. The stratum granulosum was 5—10 cell layers thick and the nuclei were spherical and hyperchromatic. Furthermore, the basement membrane was well defined and immediately below it numerous blood vessels could be seen.

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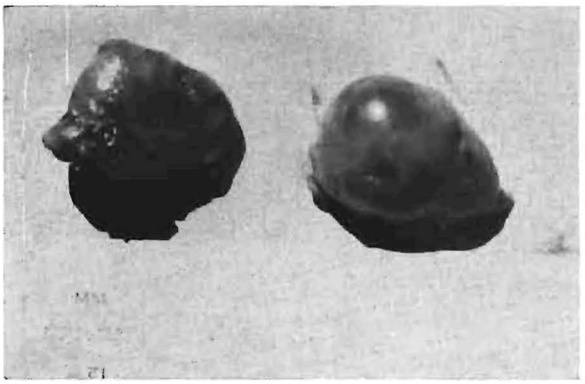
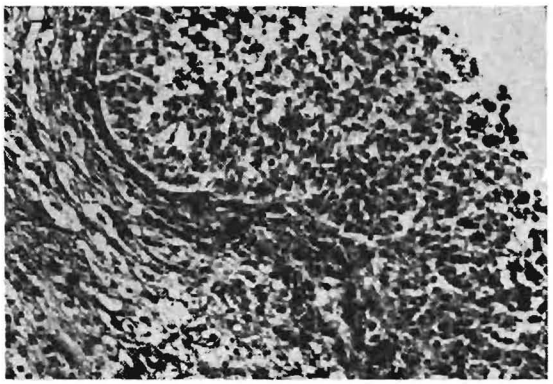
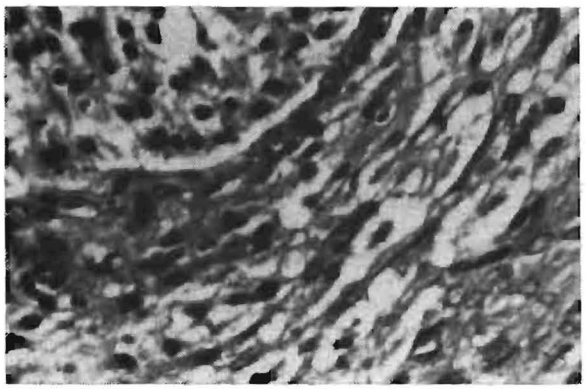
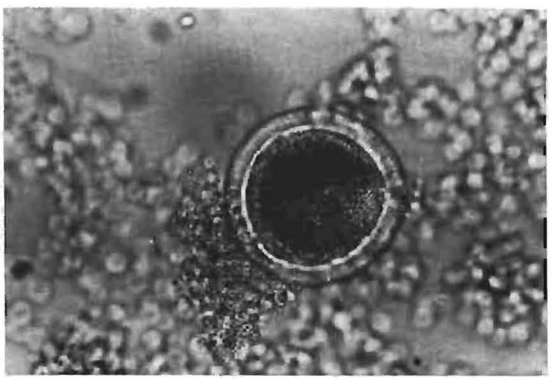
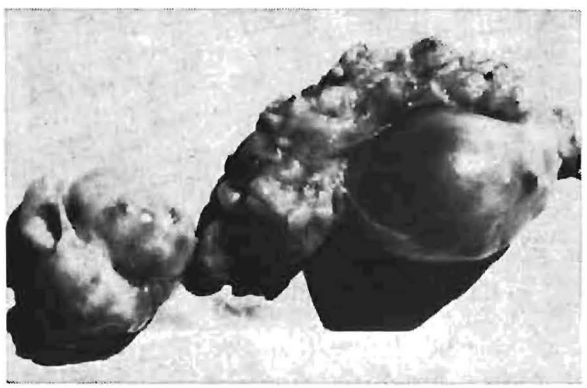
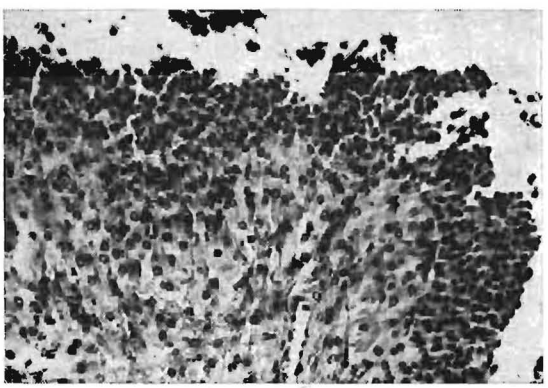






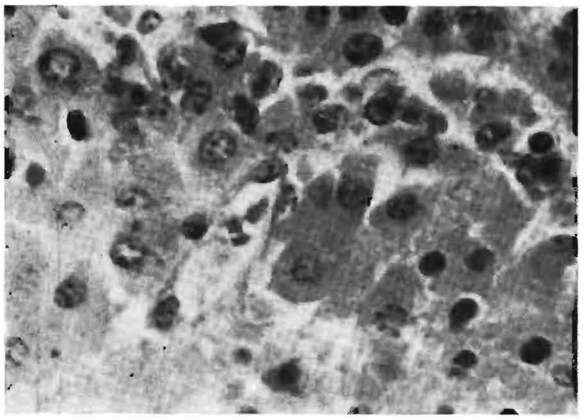


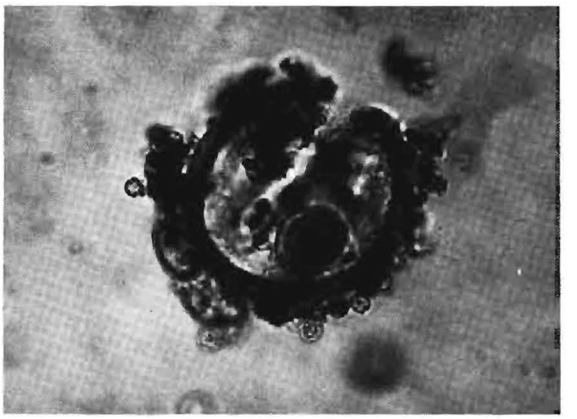




LEGENDS TO FIGURES

FIG. 1. The normal follicle in the right ovary of Cow 2 in which MAP treatment commenced early in the oestrous cycle.
FIG. 2. Photomicrograph of the follicular wall of Cow 2 showing the normal distribution of the cell layers.
FIG. 3. A higher magnification of Fig. 2 showing particularly the elongated form of the theca interna cells.
FIG. 4. Photomicrograph of the normal ovum recovered from Cow 2.
FIG. 5. The abnormally large follicle in the right ovary of Cow 3 in which MAP treatment commenced during the latter half of the oestrous cycle.
FIG. 6. Photomicrograph of the follicular wall of Cow 3 showing the disorientation and sloughing of the membrana granulosa, the loss of basement membrane and the rounding up of the theca interna cells.





In addition, the cells of the theca interna had oval nuclei and poorly staining cytoplasms, while numerous fibroblasts were present between these cells (Fig 3). The ovum was also normal (Fig. 4) and contained a granular deutoplasm surrounded by a vitelline membrane and perivitelline space with a polar body.

Cow 3. A very large follicle, measuring 3.5 cm and containing 9 ml of fluid, was present in the right ovary (Fig. 5). In contrast to the normal follicles of Cows 1 and 2, the inner wall was pale and no blood vessels could be seen. Histological examination confirmed that the follicle was degenerating

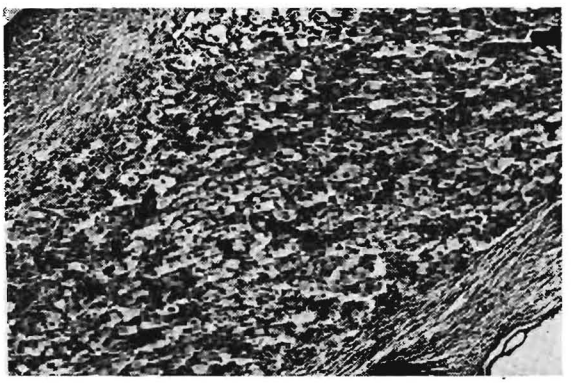


FIG. 7. A higher magnification of Fig. 6 showing the rounding up and apparent luteinization of the theca interna cells.

FIG. 8. Photomicrograph of the abnormal ovum recovered from Cow 4. Note particularly the condensation of the deutoplasm seen as a compact mass in the lower portion of the ovum.

FIG. 9. The abnormally large corpus luteum in the right ovary of Cow 4 in which MAP treatment commenced during the luteal phase of the oestrous cycle.

FIG. 10. Showing the cystic nature of the corpus luteum of Cow 4.

FIG. 11. Photomicrograph of the wall of the corpus luteum showing the inner and outer connective tissue layers enclosing luteal tissue.

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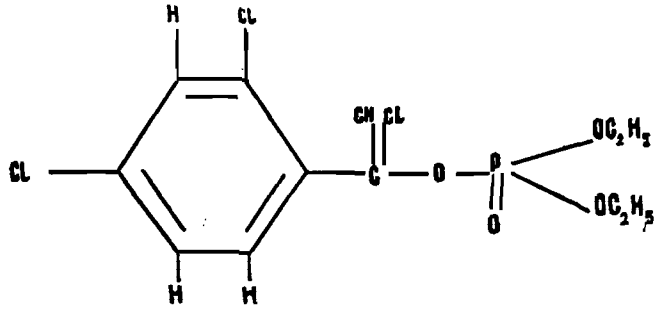

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(Fig. 6) [3]. The stratum granulosum was only a few layers thick and the nuclei of these cells were pyknotic. The upper layers of the stratum granulosum had sloughed off into the follicular fluid as atretic bodies. Moreover, the basal layer of the stratum granulosum had lost its orientation and the basement membrane and blood vessels had disappeared. In addition, the theca interna cells had rounded up, their nuclei were vesicular and the cytoplasm darker staining and apparently luteinized (Fig. 7).

The ovum from this follicle also showed typical signs of degeneration (Fig. 8) [4], namely a condensation of the deutoplasm to a compact mass, with a large perivitelline space.

Cow 4. A corpus luteum 3 cm in diameter was found in the right ovary (Fig. 9); it fluctuated on palpation and the surface had fairly well defined blood vessels. When this gland was sectioned it was found to be hollow (Fig. 10), the wall was fairly thick and was a light orange-yellow colour, and the cavity contained straw coloured fluid. Histologically the wall consisted of an inner and an outer layer of connective tissue enclosing a core of luteinized cells (Fig. 11).

DISCUSSION

It is evident from our previous clinical studies [1] and the present histological evidence that, although MAP is effective in synchronizing oestrus in a group of cows the time of commencement of treatment is most important. Should treatment commence during the first half of the oestrous cycle, a normal follicle developes and ovulates during the post synchronization oestrus. On the other hand, if treatment is initiated during the latter half of the period, the follicular development is apparently not completely arrested and this leads to the formation of large, cystic partially luteinized follicles, and although these do ovulate, the ova degenerate and cannot be fertilized.

A further observation of interest is that large cystic corpora lutea formed when MAP treatment commenced during the luteal phase of the cycle. During the 16 days of MAP treatment, however, they regressed completely, and evidently did not interfere with subsequent follicular development.

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A NOTE ON THE RESULTS OF A SURVEY OF THE CONCENTRATION OF INSECTICIDES IN CATTLE DIPS IN THE NATAL MIDLANDS

C. A. WILKINS*

During a relatively dry year some 25 farmers reported inefficiency of dipping procedures due to so-called insecticide resistant ticks. Two hundred samples of dipping fluid were obtained at random and examined to establish whether the insecticides were present in the recommended concentration.

Mr. J. R. Malan of the Veterinary Research Institute at Onderstepoort kindly undertook the examination of DDT washes, whilst other samples were tested for toxaphene, arsenic, BHC and combinations of these insecticides at the laboratory of the State Veterinarian at Greytown, Natal. The standard test units supplied by the firms marketing the dips were used; the tests being based on paraffin absorption. Dips containing more than one insecticide were examined for the main component only.

Distribution of the types of dip washes and the results of the survey are summarised as follows:-

Insecticide	No. of samples	Recommended Concentration		
		Above	On	Below
Arsenic	46	12	3	31
DDT	51	9	1	41
Toxaphene	78	12	2	64
BHC	4	—	1	3
BHC + Diaznone	19	2	—	17
Delnav	2	—	—	2
Totals	200	35 (17.5%)	7 (3.5%)	158 (79%)

The samples represent dip washes used under field conditions. Most samples were extremely heavily contaminated with decaying organic and other material. (In one instance live tadpoles were found in the sample 24 hours after arrival at the laboratory). Ten samples yielded an average of 700 ml of fluid on filtration of one litre samples.

On suggestions received from Mr. J. R. Malan, DDT dip washes were examined in a petridish. Examinations with a hand lens revealed fairly fine to coarse crystals in 36 out of 60 such samples showing that a breakdown in the emulsion had taken place.

Of the 25 cases of reported resistance of ticks to insecticidal dip washes, only one instance was proved to be resistant to toxaphene by Miss Baker of the Veterinary Investigation Laboratory at Allerton. Three other instances were suspected but not proved. In all the other cases dipping techniques were faulty or the concentration of insecticide in the dipping fluid was inadequate (below recommended strength). There were strangely few complaints of ineffective dips from farmers using the numerous dip washes which were found to be below strength, mainly due to lack of interest.

The purpose of this communication is to draw attention to the fact that without frequent control and testing and without the interested co-operation of the farmer, tick control must be expected to be an erratic and unpredictable procedure.

Poor results should not be ascribed to tick resistance without proper investigation.

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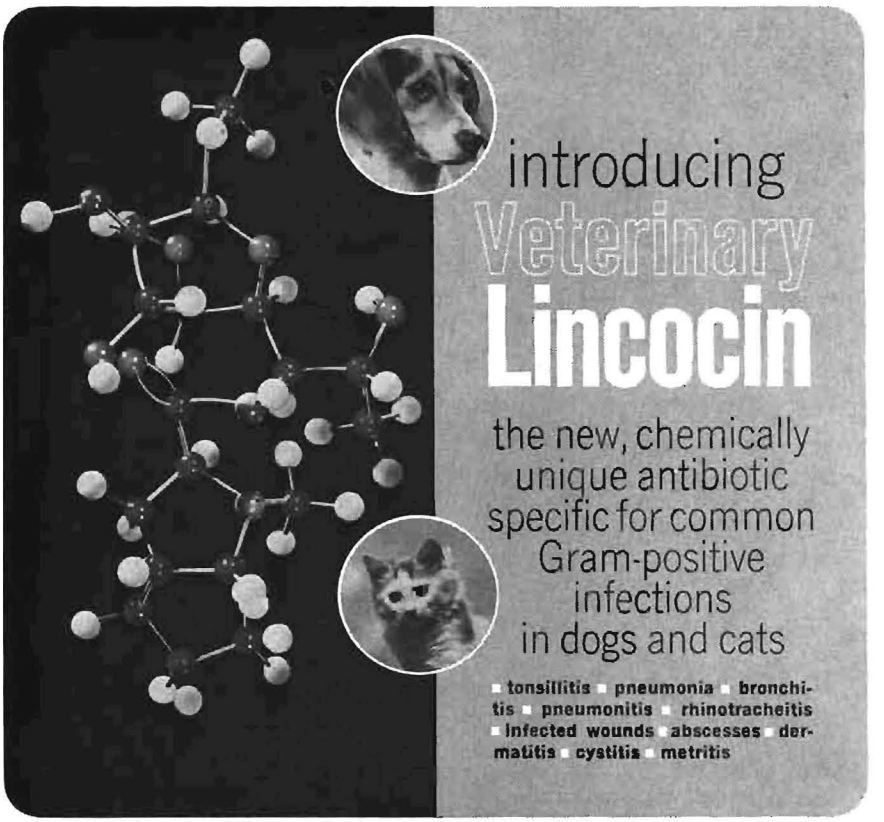

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Jl S. Afr. vet. med. Ass. 41 (1): 55-58 1970

DIE ISOLASIE VAN *HAEMOPHILUS GALLINARUM*

S. B. Buys*.

SUMMARY

By using sinus exudate as inoculum for culture media and infection of susceptible fowls, it was possible to isolate *Haemophilus gallinarum* for periods up to 14 days after experimental infection, from all 96 untreated and 35 treated birds.

INLEIDING

Haemophilus gallinarum, wat aansteeklike verkoue in pluimvee veroorsaak, was in Suid-Afrika meestal slegs op grond van die kliniese simptome en die episoötiologie gediagnoseer.

H. gallinarum, 'n Gram-negatiewe kort stafie of kokkebasil wat enkel, in pare of in rye van drie of meer lê, was die eerste keer deur de Blieck [1] in Europa, en deur Nelson [2] in die V.S.A. geïsoleer. Verskeie isolasiemetodes is deur die jare gebruik.

De Blieck sowel as Nelson het neusslym op verskeie vaste media uitgestryk met variënde sukses. Later het Nelson kweking op geseëlde plate onderneem en het so beter kolonievorming begin kry. Hierdie metode om neusslym vir die ent van kweekbodems te gebruik, werk goed solank die hoender nog 'n neusuitloopsel het. Dit gebeur egter dikwels dat hoenders vir slegs 'n dag of twee aan 'n neusuitloopsel ly, en daarom was hierdie metode nie geskik vir roetine diagnostiek nie.

Schalm en Beach [3, 4, 5]; Delaplane, Erwin en Stuart [6, 7]; Gregory [8], en Bornstein en Samberg [9] het almal edeemvog van die gesig vir kweekbodem-enting gebruik. Hulle het ook hul isolate in 'n atmosfeer van *c* 10% CO_2 begin kweek. Delaplane, Erwin en Stuart kon *H. gallinarum* vanaf edeemvog in veldgevalle van slegs een uit tien veldgevalle isoleer. Na kunsmatige besmetting met edeemvog is *H. gallinarum* uit edeemvog van agt van die nege gevalle geïsoleer. In verdere eksperimentele gevalle kon hulle *H. gallinarum* uit vyf van die ses hoenders isoleer gedurende die eerste 24 uur, en slegs uit een van die ses nadat 48 uur na die aanvang van simptome verloop het. Bornstein en Samberg het met edeemvog as entmiddel *H. gallinarum* uit vyf van ses uitgesoekte gevalle geïsoleer. Hulle beskou drie dae na die aanvang van simptome as die langste tydperk waartydens *H. gallinarum* nog suksesvol uit edeemvog geïoleer kan word. Deur edeemvog te gebruik is die tydsverloop van die siekte dus weer 'n beperkende faktor. Die voordeel is egter dat kwekings van 'n lewende hoender gemaak kan word, en dat dit meer as eenkeer van dieselfde hoender onderneem kan word.

Clark en Godfrey [10], Page [11], Yamamoto en Somersett [12], Sato en Shifrine [13] en Hanley, Davis en Sunka [14] het almal sinusslym of trageaslym op bloedagar of bloedtriptose-agar uitgestryk. Vir demonstrasie van satellisme is *Staphylococcus epidermidis, Streptococcus faecalis* var. *liquefaciens* of 'n *Pseudomonas* gebruik. Geeneen van laasgenoemde werkers het van die tydsduur van die siekte as 'n beperkende faktor vir die neem van monsters melding gemaak nie.

Die doel van hierdie artikel is om eerstens 'n suksesvolle en betroubare bakteriologiese tegniek te beskryf wat toegepas kan word vir roetine diagnostiek, sonder die beperking opgelê deur die stadium van die patogenese van *H. gallinarum*-besmetting; en tweedens, om aan te dui hoe vatbare hoenders gebruik kan word om 'n vroeë voorlopige diagnose by sekere gevalle te bekom.

MATERIAAL EN METODES

Monsters vir die isolasie van *H. gallinarum* is geneem van lewende siek hoenders, of van hoenders wat pas dood is. Die tegniek is uitgevoer op 96 hoenders met simptome maar wat nie terapeuties behandel was nie, asook 35 hoenders met simptome waar terapie alreeds 'n aanvang geneem het. Monsters is geneem van die hoenders op die 1ste,

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3de, 6de, 10de en 14de dag na besmetting.

Hoenders is doodgemaak deur die nek te breek. Besoedeling van die vel oor die sinusoppervlaktes is vermy deur sorg te dra dat kropinhoud nie deur die neus of bek uitloop nie. Na ontsmetting van die sinusoppervlaktes met metielalkohol is die infra-orbitale sinus oopgesny en sinusslym op bloed-triptose-agar uitgestryk. Normaalweg was daar genoeg kontaminante in die sinusslym teenwoordig om as voedingverryking te dien. Sekerheidshalwe is *Staphylococcus epidermides* (Page) in een of twee strepe dwars oor die vorige strepe gestryk om sodoende satellisme te verseker. Dieselfde prosedure is met die ander sinus gevolg. Bloed-triptose-agar (BTA) (beesbloed, 10%), vooraf tot 37°C in die broeikas verhit, is deurgaans as vaste medium gebruik. Die kweekbodems is in 'n anaërobiese of 'n wyebek-glasfles met 'n skroefdeksel en gomlastiekdigting geplaas, tesame met 'n brandende kers. Die flesse is so gou moontlik daarna in die broeikas by 37°C geplaas.

Die volgende dag is die kweekbodems ondersoek vir groei. Gewoonlik was 'n baie fyn groeisel met die blote oog reeds waarneembaar. Hulle is vir 'n verdere dag of twee gebroei al na gelang van die groei. As daar geen groei na drie dae was nie, is die plaat as negatief beskou. As daar groei op die BTA-plate was, is enkel kolonies op twee BTA-plate uitgestryk; een van hierdie plate is sonder satellitiese voedingverryking gelaat.

Smere is óf van die oorspronklike kweking, óf van die rein afkwekings gemaak. Die smere is met hitte gefikseer, en gekleur volgens Gram se kleurmetode.

Ten tye van die maak van die oorspronklike BTA-kultuur van die sinusslym (direkte metode), is die slym met 'n steriele spuit opgesuig en gemeng met 1—2 ml van 0.85% NaCl-oplossing (Yoder[15]). Hiervan is *c* 0.5 ml in die infra-orbitale sinus van 'n vatbare hoender, verkieslik ouer as agt weke, gespuit (indirekte metode).

RESULTATE

Op die oorspronklike en die afkwekingsplate is tipiese fyn, deurskynende doudruppelkolonies gesien. 'n Opvallende verskynsel by die oorspronklike kweking is dat die Haemofilus-kolonies naby die verskafte voedingverrykende kolonies weelderiger gegroei het as die verder afgeleë kolonies. Die reinkultuur wat gemaak was sonder satellitiese voedingverryking het in die geval van *H. gallinarum* omtrent nie gegroei nie. By kulture wat 24—48 uur oud was het die skrywer soms bipolêre kleuring, nes Schalm en Beach[5], waargeneem. *H. gallinarum* is deurgaans met gemak geïsoleer uit meeste van die monsters geneem op die genoemde dae na besmetting. Slegs in enkele gevalle het die direkte metode nie gewerk nie, maar in genoemde gevalle was die indirekte metode deurgaans suksesvol.

Die kombinasie van suksesvolle bakteriologiese isolasietegnieke en siekteverwekking met sinusslym het in alle gevalle positiewe resultate gelewer. Die gemiddelde inkubasieperiode, na besmetting van vatbare hoenders met sinusslym, was 18—48 uur.

Hoenders met kroniese asemhalingsiekte (Mikoplasmose) se sinusslym kon nie in vatbare hoenders die akute swelsel van die sinusse binne 18—48 uur verwek nie.

BESPREKING

Gedurende die beginstadium van die werk is neusslym en edeemvog vir kweekbodementing gebruik. Deurdat resultate nie baie bevredigend was nie, is die werk daarna hoofsaaklik toegespits op sinusslym as kultuurinokulum. Die redes vir die swakker resultate met neusslym en edeemvog is in die inleiding genoem.

Die doel van die oorspuiting van sinusslym was tweërlei van aard:

(1) deurdat simptome gewoonlik binne 18 uur verskyn het, is dit as 'n indikatorsisteem gebruik om 'n vroeë voorlopige diagnose te kan maak;

(2) as die direkte kwekings van die oorspronklike geval nie goed gegroei het nie (direkte metode), kon die organisme weer uit die kunsmatigbesmette hoender geïsoleer word (indirekte metode).

Die groot sukses waarmee die tegniek toegepas is, maak dit klaarblyklik 'n handige metode om aansteeklike verkoue van die belangrikste ander soortgelyke siektes soos kroniese asemhalingsiekte (mikoplasmose), hoenderpokkies en kroniese cholera te onderskei. Die onderskeid is belangrik, veral in 'n land wat 'n aktiewe uitroeiskema van kroniese asemhalingsiekte toepas.

Alhoewel die tipiese simptome van aansteeklike verkoue toegeskryf word aan *H. gal-*

linarum, moet dit steeds in gedagte gehou word dat gemengde besmettings van die asemhalingstelsel dikwels voorkom.

DANKBETUIGING

Dr. L. Coetzee word bedank vir sy advies by die opstelling van hierdie artikel.

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ANTHELMINTIC EFFICACY OF PARBENDAZOLE, A NEW BROAD SPECTRUM ANTHELMINTIC.

D. K. SHONE, D. SAAYMAN, F. ERASMUS, J. R. PHILIP*.

SUMMARY

Parbendazole is a highly effective anthelmintic against the larval and adult forms of the most important helminth species of sheep.

At a dose rate of 30 mg/kg an efficacy of over 99% was obtained against L_4 larvae and adult forms of *Haemonchus contortus*, *Ostertagia circumcincta* and *O. trifurcata*, *Trichostrongylus colubriformis*, *Gaigeria pachyscelis*, *Nematodirus spathiger* and *Chabertia ovina* and the adult forms of *Oesophagostomum columbianum* in Merino lambs. An efficacy of 84.6% of L_4 larvae of *O. columbianum* and 66.6% of adult forms of *Trichuris globulosa* was recorded at the same dose rate.

A dose rate of 15 mg/kg parbendazole brought about reductions of 61.8% and 25.0% in two trials and a dose rate of 22.5 mg/kg, a reduction of 63% in the total number of larval and adult forms of *N. spathiger*.

A dose rate of 44.5 mg/kg thiabendazole brought about a reduction of 83.7% in the total number of larval and adult forms of *N. spathiger*.

An apparent reduction in efficacy was observed in two trials when the slaughter of treated sheep was delayed by 4 days.

INTRODUCTION

Parbendazole, the generic name for methyl-5, (6)-butyl-2-benzimidazole carbamate is an amorphous white powder available as a 9% w/v suspesion** for drenching to animals. Actor *et al*[1] reported that parbendazole had a high degree of activity against gastro-intestinal nematodes of mice, sheep and pigs.

In this work artificial infestations were used to study the efficacy of parbendazole against larval and adult forms of gastro-intestinal nematodes of sheep.

MATERIALS AND METHODS

The first two trials were undertaken to determine the dosage level at which parbendazole was effective against L_4 larvae of *N. spathiger* when compared with thiabendazole at 44 mg/kg. Trials 3 and 4 were undertaken to establish anthelmintic efficacy against adult and larval stages of other nematodes.

Merino lambs were reared free of natural infestations except for *Trichuris globulosa* where infestation was believed to have taken

Table 1: EXPERIMENTAL DESIGN (TRIALS 1 AND 2)

Day	Number of infective larvae per sheep	
	TRIAL 1	TRIAL 2
− 17		300
− 15		300
− 13		300
− 11		300
− 9		300
− 8	360	
− 7		300
− 5	296	300
− 3	70	150
− 2	100	150
− 1	50	225
Total	876	2625
0	All control lambs slaughtered, all other lambs treated	
+ 2	Lambs treated with 15 and 22.5 mg/kg barbendazole slaugtered	
+ 6		Lambs treated with 15 and 30 mg/kg parbendazole slaughtered.
+ 7		Lambs treated with 45 mg/kg perbendazole and 45 mg/kg thiabendazole slaughtered.

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** Helmatac — S.K.F. Laboratories (Pty.) Ltd., P.O. Box 38, Isando, Transvaal.

place through the feed. Infective larvae were harvested from faecal cultures obtained from donors harbouring single pure infestations of each nematode species except in the case of *Ostertagia* where a mixed infestation with *O. circumcincta* and *O. trifurcata* was present.

Following enumeration, the larvae were taken up on filter paper and administered orally in gelatin capsules. *Gaigeria pachyscelis* larvae were applied percutaneously to the dorsal surface of the neck.

The experimental design for each trial is presented in detail in Tables 1 and 2. The programme of artificial infestation followed in trials 3 and 4 was designed to ensure that L_4 larvae of *G. pachyscelis* would be present in the lambs in trial 4 and that adult *G. pachyscelis* would be present in lambs in trial 3 at the time of treatment. Infestation with *Ostertagia sp.* larvae in trial 4 was designed to ensure that the lambs would be harbouring large numbers of L_4 larvae at the time of treatment.

Administration of the anthelmintics:

All doses were based upon exact body-weights and the anthelmintics were administered into the rumen by stomach tube.

Recovery and identification of helminths:

Nematodes were recovered at autopsy by the waterbath method described by Shone & Philip [2] and Reinecke [3]. Nematodes occurring in the wall of the gastro-intestinal tract were recovered by digestion in pepsin and hydrochloric acid solutions. Sieves with 37 micron apertures were used to recover the worms. Total counts were made of the numbers of

Table 2: EXPERIMENTAL DESIGN (TRIALS 3 AND 4). NUMBER OF INFECTIVE LARVAE PER SHEEP

	TRIAL 3				TRIAL 4			
Day	H. contortus	T. colubriformis	G. pachyscelis	O. columbianum	O. circumcincta O. trifurcata	G. pachyscelis	N. spathiger	C. ovina
−35			200	60				60
−32				60				60
−30				60				60
−29				60				
−28								60
−26								60
−25	500	500			500			
−24					500			60
−23	500	500		60		200		
−20	500	500		60	500		160	60
−19	500	500						
−18					500		80	60
−17				60				
−16	500	500			500		80	60
−15				60				
−14				60	500		200	
−13	500	500		60				60
−12				60	500		150	
−11	500	500		60	500		150	60
−10				60	500			
− 9	500	500		60	500			60
− 8	500	500		120	500		90	
− 7	500	500		60	500		80	60
− 6				60	500		40	
− 5	500				500			
Total	6 000	5 500	200	1 080	7 500	200	1 040	840

0 All controls in Trial 3 and 4 slaughtered. All other lambs treated.
+ 7 All treated lambs slaughtered.

nematodes present in each specimen with the aid of a stereo-microscope. The first 150 adult and 150 larval forms encountered in each specimen were removed and identified under the compound microscope. Identification of larval stages was based upon the descriptions of Douvres [4, 5, 6], Kates and Turner [7], Ortlepp [8], Threlkeld [9] and Veglia [10].

RESULTS AND DISCUSSION

Detailed results of the four anthelmintic trials are presented in Tables 4, 5 and 6. The anthelmintic efficacy of parbendazole was calculated as the mean percentage reduction in the number of helminths recovered from the treated lambs relative to the number of helminths recovered from the untreated lambs. This data is presented in Table 3.

It will be noted from Table 3 that at a dose rate of 30 mg/kg, parbendazole was highly effective against both larval and adult forms of *H. contortus, O. circumcincta, O. trifurcata, T. colubriformis, G. pachyschelis, N. spathiger, C. ovina* and adult *O. columbianum.* Efficacy against L_4 larvae of *O. columbianum* and adult *T. globulosa* was lower at this dose rate.

Activity against the larval and adult stages of *N. spathiger* was erratic at dosage rates of 15 mg/kg and 22.5 mg/kg.

Table 3: THE ANTHELMINTIC EFFICACY OF PARBENDAZOLE EXPRESSED AS A PERCENTAGE REDUCTION IN THE NUMBER OF HELMINTHS

	Percentage, reduction			
	Larvae		Adults	Larvae and Adults
	L_3	L_4		
Parbendazole 15 mg/kg.				
Nematodirus spathiger (1)*	48.8	65.4		25.0
Nematodirus spathiger (2)				
Parbendazole 22.5 mg/kg.				
Nematodirus spathiger (1)	47.1	67.2		
Parbendazole 30.0 mg/kg.				
Haemonchus contortus (3)		100	100	
Ostertagia circumcincta and (4) O. trifurcata		99.9	99.9	
Trichostrongylus colubriformis (3)		100	99.9	
Nematodirus spathiger (2)		—	—	93.4
Nematodirus spathiger (4)		99.9	99.9	
Gaigeria pachyscelis (3)(4)		100	100	
Oesophagostomum columbianum (3)		84.6	100	
Chabertia ovina (4)		99.9	100	
Trichuris globulosa (3)				66.6
Parbendazole 45 mg/kg.				
Nematodirus spathiger (2)				94.6
Thiabendazole 44.5 mg/kg.				
Nematodirus spathiger (2)				83.7

* Figures in parenthesis denotes Trial.

Table 4: THE NUMBER OF ADULTS AND LARVAL STAGES OF **N. SPATHIGER** RECOVERED FROM UNTREATED MERINO LAMS AND LAMBS TREATED WITH PARBENDAZOLE AND THIABENDAZOLE (TRIALS 1 AND 2)

			Nematodirus spathiger			
Group	No. of lambs		3rd Stage	4th Stage	Adults	Totals
TRIAL 1						
Controls	4	Range	58—115	303—425	0	361—530
		Mean	80	341		416
Parbendazole 15 mg/kg.	4	Range	21— 64	41—179	0	77—243
		Mean	41	118		159
	Percentage reduction		48.8	65.4		61.8
Parbendazole 22.5 mg/kg.	4	Range	9— 82	5—205	0	14—287
		Mean	38	112		154
	Percentage reduction.		47.1	67.2		63.0
Total	12					
TRIAL 2						
Controls	5	Range	30— 87	347—660	10—187	500—740
		Mean	61	445	100	606
Parbendazole 15 mg/kg.	5	Range	0	210—387	10—350	307—694
		Mean		293	162	455
	Percentage reduction					25.0
Parbendazole 30 mg/kg.	5	Range	0	3— 63	0— 63	10—126
		Mean		21	19	40
	Percentage reduction					93.4
Parbendazole 45 mg/kg.	4	Range	0	4— 84	0— 18	4—102
		Mean		26	7	33
	Percentage reduction					94.6
Thiabendazole 44.5 mg/kg.	5	Range	0			
		Mean		7—153	0—117	7—270
				60	37	99
	Percentage reduction					83.7
Total	24					

In three of the trials, the slaughter of the sheep was delayed until the 6th and 7th day after treatment, while in the first trial the sheep were slaughtered on the 2nd day after treatment, Tables 1 and 2. The change in procedure resulted from suggestions that the full anthelmintic effect of parbendazole may only be apparent several days after administration, but in these trials, the effect appeared to be the reverse. In Trial 1 efficacy at 15 mg/kg was 61.8% while in Trial 2, where slaughter of the treated sheep was delayed, the efficacy was 25.0% against *N. spathiger*. The delay of 4 days in slaughter only served to confuse matters as will be observed from Table 4 where the *N. spathiger* larvae which surviving treatment continued to develop and more adults were recovered from the treated sheep than from the controls.

Where parbendazole was used at the highly effective dose rate of 30 mg/kg (Trials 3 and 4) this problem did not arise, as the number of surviving larvae in the treated sheep was too small to influence the percentage reduction figure. The wide variation in efficacy obtained with the same dose rate of parbendazole against *N. spathiger* in Trials 1 and 2, would suggest that activity at this dosage level is highly erratic.

Table 5: PARASITIC NEMATODES RECOVERED FROM UNTREATED LAMBS AND LAMBS TREATED WITH WITH 30 mg/kg PARBENDAZOLE (TRIAL 3)

		H. contortus		T. colubriformis			G. pachyscelis	O. columbianum		T. globulosa
Group	Sheep No.	4th	Adult	3rd	4th	Adult	Adult	4th	Adult	Adult
Controls	1392	1 421	2 085	0	1 156	1 599	67	185	169	8
	1377	1 273	2 059	7	915	1 902	31	188	228	7
	1359	1 566	1 970	16	997	1 897	72	159	218	10
	1395	1 516	2 229	21	1 061	2 028	52	221	182	10
	1380	1 036	1 969	9	1 179	1 835	15	235	137	11
	1374	1 740	1 503	0	1 123	1 700	52	248	212	6
	1389	1 740	1 985	0	896	2 140	29	169	184	2
	1396	1 285	2 226	0	509	988	26	204	175	9
	TOTALS	11 577	16 026	53	7 836	14 089	344	1 609	1 505	63
	MEAN	1 447	2 003	7	979	1 761	43	201	188	8
Parbenda-zole 30 mg/kg.	1391	0	0	0	0	0	0	18	0	2
	1361	0	0	0	0	0	0	63	0	5
	1385	0	0	0	0	0	0	38	0	0
	1372	0	0	0	0	0	0	39	0	6
	1378	0	0	0	0	0	0	34	0	5
	1369	0	0	0	0	0	0	24	0	3
	1394	0	0	0	0	2	0	2	0	0
	TOTALS	0	0	0	0	2	0	218	0	21
	MEAN	0	0	0	0	0	0	31	0	3
PERCENT REDUCTION		100	100	—	100	99.9	100	84.6	100	66.6

Table 6: PARASITIC NEMATODES RECOVERED FROM UNTREATED LAMBS AND LAMBS TREATED WITH 30 mg/kg PARBENDAZOLE (TRIAL 4)

		O. circumcincta and O. trifurcata		N. spathiger		G. pachyscelis		C. ovina	
Group	Sheep No.	3rd	4th	Adult	4th	Adult	4th	4th	Adult
Controls	1340	149	1 974	514	67	0	21	198	7
	1318	50	1 584	541	200	32	17	197	21
	1353	78	1 841	564	483	7	63	257	85
	1356	108	1 504	769	334	5	23	284	29
	1354	177	2 293	1 256	414	27	22	173	67
	1314	57	1 825	1 294	386	0	15	191	55
	1332	175	2 330	1 283	268	85	11	96	81
	1310	60	1 776	1 195	501	22	19	150	78
	TOTALS	854	15 127	7 416	2653	178	191	1 546	423
	MEAN	107	1 891	927	332	22	24	193	53
Parbendazole 30 mg/kg.	1344	0	0	1	0	1	0	2	0
	1322	0	0	0	0	0	0	0	0
	1325	0	0	0	0	0	0	0	0
	1338	0	0	0	0	0	0	1	0
	1346	0	2	0	0	0	0	2	0
	1352	0	4	3	4	0	0	0	0
	1334	0	0	0	0	0	0	1	0
	1357	0	0	3	0	0	0	0	0
	TOTALS	0	6		4	1	0	6	0
	MEAN	0	1		0.5	0	0	1	0
PERCENT REDUCTION		100	99.9		99.9	99.9	100	99.9	100

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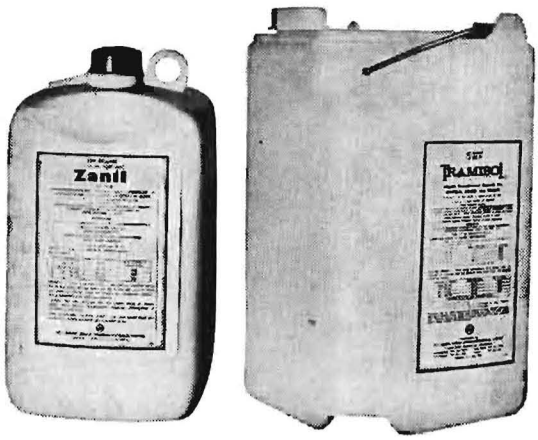

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Gereg. No. G.D. 951 kragtens Wet 36 van 1947.

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- Haakwurm
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- Grootbekwurm
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CASE REPORT

SIAMESE TWINS (Thoracopagus)

HISTORY

A case of dystokia in an excitable Afrikander cow was presented. Examination per vaginam first created the impression of a two-headed foetus being present; subsequently it became clear that the conceptus consisted of equal conjoined twins, the junction occurring along the ventral aspect of each individual from the base of the neck to the umbilicus. One of the twins lay dorsally and one ventrally.

The preliminary idea of performing an embryotomy was rejected in favour of a caesarian section. After tranquillization by means of acetyl promazine injected intramuscularly, caesarian section was performed via the left flank. In order to deliver the twins a 24 inch longitudinal incision had to be made through the uterine wall.

Both twins, of female sex, were alive at delivery: one lived for 2 minutes and the other breathed and bellowed for 10 minutes and then the respiration became shallow and the calf became cyanotic before dying.

The shorter-lived twin had a slightly deformed head and the fore-limbs were somewhat distorted. This was ascribed to the intra-uterine pressure caused by space limitation. Otherwise there were no external deformities bar the fusion.

The thoracic wall of one of the twins met that of the other, so forming a sternum on each side ending in an abnormally shaped, short, dagger-shaped xiphoid cartilage caudally. The abdominal cavity was continuous from one twin to the other, cranial to the single umbilicus. In this region the two livers were extensively fused along what would have been the ventral border of the ventral lobe of each. That of the shorter-lived twin was smaller and an oval mass, with only a rudiment of the umbilical vein and a short falciform ligament present. That of the longer-living twin still had a recognizable conformation of the bovine type, but the umbilical vein was 2 cm in diameter and the only functional one present. Both livers had normal venous contacts.

The shorter-lived member lacked a normal spleen, which was represented by 2 no-

dules of 0.75 cm situated dorsolaterally to the rumen, below the corresponding pillar of the diaphragm. Its caecum was absent, the ileum continuing directly into the ansa proximalis and from thence into a normal ansa spiralis. The ansa distalis again was absent. The right umbilical artery of the longer-lived and the left umbilical artery of the shorter-lived individual petered out before reaching the umbilicus, — i.e. the vessels closest to the umbilicus wall were functional.

It was impossible to determine whether the allantoic sacs had fused and communicated or not. The wide diaphragm clearly consisted of two fused components.

Four pleural cavities and a single pericardial sac filled the spacious double-sized thorax.

Two hearts of almost equal size were present in the pericardial cavity, that of the shorter-lived individual being more indented by the other heart and pushed further caudally.

The lungs of the shorter-lived individual seemed reversed, inasmuch as the left lung presented the conformation of a right lung, complete with tracheal bronchus, but without a properly developed accessory lobe, whilst its right lung had the outline of a left lung, yet also possessed a tracheal bronchus.

The other individual's lungs approximately conformed to the usual appearance.

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Dept. of Anatomy, Faculty of Veterinary Science, Onderstepoort.

KORT MEDEDELINGS

ENTOMOLOGIESE BERIGTE

C. J. HOWELL*.

I LEPTOCONOPS — SKURFTE

SUMMARY

Leptoconops Mange.

Midges responsible for painful and irritant bites of persons on dam construction work in the Williston district were identified as *Leptoconops kertezi*. Subsequent outbreaks of dermatitis on the ears and around the eyes of sheep in the Aliwal North district were thought to be caused by the same midge as these were present in large numbers and caused extensive irritation to the animals and their attendants. Skin scrapings did not disclose any other cause for the "mange". The life cycle and breeding habits of the insect are described, and it is suggested that development of irrigation schemes in areas where the salt content of the soil is high may favour extensive breeding of this insect.

Gedurende 1966 is die aandag van die afdeling Entomologie vir die eerste keer op 'n klein bytende muggie gevestig as gevolg van klagtes wat in die omgewing van De Aar ontstaan het. Ongeveer 25 myl noorwes van hierdie dorp was die Afdeling Grondbewaring besig met die konstruksie van 'n bewaringsdam in die Brakrivier. Die teenwoordigheid van bytende muggies het egter hulle werksaamhede ondraaglik gemaak, en hulle het dit goed gedink om Onderstepoort in hierdie verband te nader vir hulp. Volgens verslag was die byte van hierdie klein vliegies besonder pynlik en irriterend, die bytwonde geneig om te swel, en irritasie het vir so lank as 72 uur bly voortduur. Meeste van die byte was geneig om op die kop, langs die haarlyn en op die ore voor te kom.

Ondersoek van die gebied het 'n redelik onbekende spesies aan die lig gebring, wat alhoewel dit reeds in 1952 in die Piketberg distrik aangetref was, nog nie vantevore in die Republiek in sodanige aanvalle op mense betrokke was nie. Weens die feit dat aanvalle op diere op daardie tydstip nog nie bekend was nie, is die saak daar gelaat, en dit was bloot van akademiese belang dat so 'n bloedsuigende muggie in daardie brakwêreld voorkom.

Gedurende Oktober 1968 is klagte van 'n boer in Williston-distrik ontvang van 'n skurfte-toestand op die ore en om die oë van sy skape. Hy het opgemerk dat die letsels aanvanklik droog en skurf vertoon het, maar later smetterig en bloederig geword het, en dat dit selfs so erg geword het dat die diere nie kon sien nie. In enkele gevalle het hierdie skurfte ook bokant die kloutjies voorgekom, en hy was verplig om party van die diere te slag in gevalle waar die toestand nie wou verbeter nie. Hy het ook melding gemaak van bytende muggies wat hy daar opgemerk het en wat soms in groot getalle voorgekom het. Monsters van velskraapsels en ook muggies, indien beskikbaar, is aangevra, maar het nooit aangekom nie.

Gedurende Januarie 1969 is 'n brief en velskraapsels deur 'n veeinspekteur van Aliwal Noord, ingedien waarin hy ondersoek van die velskraapsels aangevra het. Die skraapsels was van 'n skurftetoestand op die ore en om die oë van skape in die distrik afkomstig. Uit die kudde van 500 skape was 30 aangetas en vir hom het dit voorgekom asof die toestand aansteeklik was.

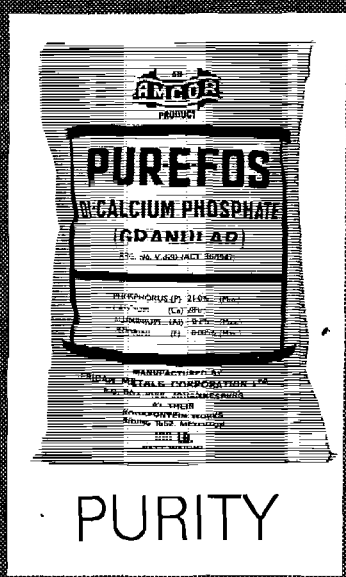
In sy brief het die veeinspekteur ook van groot getalle muggies melding gemaak wat daar teenwoordig was terwyl hy hierdie skraapsels geneem het en dat hulle mens en dier irriteer.

Die velskraapsels was op Onderstepoort ondersoek en geheel en al negatief gevind vir myte of enige ander uitwendige parasiete. In hierdie geval is weer onmiddellik vir monsters van die muggies aangevra wat gelukkig hierdie keer opgedaag het. Verbasend genoeg was dit weereens dieselfde spesies wat twee jaar vantevore in De Aar voorgekom het, maar nou was dit op diere parasities, en gevolglik vir ons van groter belang.

Die muggies is as *Leptoconops kerteszi* Kieffer identifiseer en is maar 2.5 tot 3 mm lank. Die wyfies alleen is bloedsuigend, beide die geslagte is donkerbruin na swart met melkwit vlerkies. Hulle teel in feitlik suiwer sand waarin baie min organiese materiaal voorkom, maar die grootste vereiste is dat dit ten minste 400 tot 500 dele per miljoen

Gelewer tydens die 64ste Jaarlikse Kongres van die S.A.V.M.V., Kaapstad, Sept. 1969.

* Dept. Entomologie, Navorsingsinstituut vir Veeartsenykunde, Pk. Onderstepoort.



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sout moet bevat. Brak gronde rondom vleie, moerasse, panne, en om die rande van mere of langs rivierlope is dus uiters geskik vir hulle aanwas op voorwaarde dat daar 'n voggehalte van 10 persent of hoër teenwoordig is.

Die muggies kom in die somer voor en bly tot diep in die najaar aktief. Gedurende hierdie tyd paar die wyfies eers, en verkry daarna waarskynlik 'n enkele bloedmaal voordat hulle eiers in die klam grond lê. Hulle lê gemiddeld 65 tot 75 eiers wat na 12 dae in gunstige weersomstandighede uitbroei, en waarna die larfies dieper in die sand beweeg. Hoewel hierdie ontwikkeling in die ongeveer eerste 3 duim laag grond plaasvind migreer die papies na die oppervlakte en manipuleer hulself so dat die hele voorkant bo die sand uitsteek van waar die volwassenes dan na enkele dae ontpop.

Die wyfies beweeg tot een myl en meer vanaf hulle teëlplekke, en voed graag op stil warm dae terwyl hulle snags net onder die oppervlakkige sandkorrels rus. Die bloedmaal duur van 2 tot 7 minute en binne 5 tot 6 daarna is sy gereed om eiers te lê.

Sover bekend dra hierdie muggies geen patogene organismes oor nie maar staan bekend as venynige byters, veral in die V.S.A., waar hulle 'n groot rol speel in die irritasie van mense. Hulle is tipies as volg deur een werker beskryf: „One midge is an entomological curiosity, a thousand can be hell".

Tot dusver het ons geen tasbare bewys dat hierdie muggies wel vir die skurfte-toestand by skape verantwoordelik is nie, en hierdie voorlegging is bedoel om u aandag op die insek en die simptoomkompleks by skape te vestig. Daar is tans 'n projek aan die gang om hierdie saak na te gaan en ons sal enige waarnemings in die gebiede waar die muggies voorkom baie waardeer. Weens die feit dat hulle in die brakgronde aangetref word, is dit van besondere belang indien hulle vir hierdie skurfte verantwoordelik is. Dit is moontlik dat die Oranjerivierprojek meer permanente teelgebiede vir die muggies mag ontgin, en dat die klein bloedsuigende vliegies ook daar vir mens en dier 'n ware las kan word.

II BROMMERWEERSTAND

SUMMARY

Resistance of blowflies to insecticides

The factors leading to primary and secondary blowfly strike in sheep are described, as well as the manner in which insecticidal applications have been effective in controlling the situation. Due to the efficiency of recommended spraying programmes, the blowfly problem has receded to the stage where a degree of laxity and misuse of insecticides has appeared. In the Riversdal district resistance to insecticides was reported, and blowfly strains from this area were found to be two to 100 X as resistant to 26 insecticides as the Onderstepoort (control) strain. Inefficient superficial application of insecticides at low concentrations are held to be responsible for development of resistance, which is thought to be likely to be occurring in other areas as well.

Die „groen" brommer, *Lucilia cuprina* is die enigste spesies wat primêre aanvalle op skape sal loods, met die uitsondering van enkele gevalle deur die „koperstert" *Chrysomyia chloropyga.* Die bevrugte „groen" brommer wyfies is egter baie kieskeurig in hulle keuse van 'n aanvalsgebied op die skaap en indien die toestande nie volkome geskik is nie sal hulle eenvoudig nie eiers lê nie. In die afwesigheid van wonde wat as substraat dien vir die ontwikkeling van die jong maaiers, sal hulle deur vagverroting aangelok word waar bakteriese ontbinding van die wolkomponente aantreklike reuke vrystel. Besoedeling van wol, waardeur die vag vir lang periodes natgehou word, vorm ideale plekke vir vagverroting om te ontstaan. Hierdie plekke moet vir tenminste 48 uur nat bly vir brommeraanval om te slaag, aangesien die eiers en jong maaiers baie gevoelig is vir uitdroging en sodat die maaiers die geleentheid kry om oppervlakkige velbeskadiging te verrig. Hulle lewe van die suguitskeiding wat ontstaan, en eers gedurende hierdie fase word die letsel aantreklik vir die sekondêre brommer, *Chrysomyia albiceps.* Die sekondêre aanvallers is eintlik verantwoordelik vir die skade wat plaasvind, en verwek 'n diepgaande myiase van die gasheer dier se weefsels.

Vir alle praktiese doeleindes berus die bestryding van brommerlas dus op die beheer van 'n enkele spesies. Alhoewel selektiewe teling en selfs operatiewe maatreëls dikwels gebruik word om gladdelyf skape te produseer, speel die gebruik van insekdoders met 'n lang nawerking die belangrikste rol by die voorkoming van hierdie toestand. Die blote aanwending van 'n insekdoder op die wooppervlakte maak die dier nie noodwendig minder vatbaar vir brommeraanval nie, aangesien die beskermende effek alleen doeltreffend sal wees indien die middel binne die eerste half duim bokant die veloppervlakte

voorkom. Beskerming van die dier tree eintlik eers in werking nadat die eerstestadium larwes alreeds die huid beskadig het, sodat sug die insekdoder teenwoordig in die wol opneem en op die wyse die maaiers dood wat daarin rondkruip. Die eerste gebruik van beskermende insekdoders, aan die begin van die eeu, was beperk tot arseenpreparate wat 'n mate van beskerming verleen het vir 3 tot 4 weke. Gevolglik moes dit dikwels herhaal word, 'n toedrag van sake wat nie altyd praktries uitvoerbaar is nie.

Gedurende die middel van die veertigjare het die eerste sintetiese insekdoders hulle verskyning gemaak en BHC en DDT was van die eerste wat vir brommeraanval gebruik was. Alhoewel hulle effektief was, en ook baie duur, was die beskermingsperiodes deur hulle verkry nie baie lank nie, en van die twee middels het BHC die langste uitwerking getoon. Die volgende middels wat verskyn het, Dieldrin en Aldrin, was besonder effektief teen lae konsentrasies en Dieldrin het beskerming verleen vir so lank as 9 weke. Gedurende hierdie tyd is gevind dat BHC en Dieldrin die vermoë besit om wolvesels te bedek a.g.v. die teenwoordigheid van wolvet waarin hulle gedeeltelik in oplossing gegaan het, en dat hulle op hierdie wyse in staat was om oor 'n lang periode beskerming teen brommeraanvalle te verleen. Nuwere middels het hierop gevolg en volgens die jongste literatuur wil dit voorkom dat hierdie insekdoders die velkliere penetreer, en sodiende as reservoir dien waarvandaan die groeiende wolvesels hulle bedekking van insekdoder verkry. Hoe hoër die effektiewe konsentrasie dus, hoe langer die periode van beskerming voordat die voorraad uitgeput word en die waarde te laag daal om brommermaaiers te dood. Sommige van die nuwere middels is besonder effektief en kan skape vir so lank as 38 weke beskerm. Die minder oplosbare insekdoders, DDT en verwante TDE en Methozychlor, beskerm inteendeel alleen die behandelde wol en beweeg dan weg van die vel af namate die wol groei, sodat die beskermingsperiode relatief kort is. Die verspreiding van wolvet, wat dus 'n belangrike rol speel in die vervoer van sekere van die insekdoders, is egter nie egalig oor die lyf van die dier versprei nie, en daar is bewys dat rugwol baie meer hiervan bevat as broekwol. Dit is dus duidelik dat korrekte aanwending van insekdoders, veral in die broekgedeelte van die skaap wat reeds aan besoedeling onderhewig is, van uiterste belang is om goeie resultate te verkry.

Gedurende die afgelope paar jaar het die brommerprobleem baie in aansien gedaal as gevolg van die goeie middels wat beskikbaar was. Toedieningsmetodes het baie laks geword, en die effektiwiteit van die middels moes vergoed vir die gebrekkige gebruik daarvan. Gevalle is bekend waar boere eenvoudig die skape in 'n kraalhoek vasgekeer en gesamentlik natgespuit het om hulle teen lyfmyiase te beskerm, terwyl broekbeskerming op die gebruik van allerhande soorte spuite berus het. Benatting tot op die vel kon in meeste van hierdie gevalle sekerlik nie plaasgevind het nie. Terselfdertyd is sommige van die middels voorgeskryf as dippe, maar teen 'n baie laer konsentrasie. Dit was bedoel om gelyktydig skaapluisvliee, luise, bosluise en brommers te beheer, en dit is aanvaarbaar makliker, eenvoudiger en goedkoper om skape op hierdie wyse te behandel. Vir 'n tydlank was die resultate bevredigend, maar vanaf 1968 is dit skynbaar nie meer die geval nie, en was klagte ontvang dat brommerbeheer in die Riversdaldistrik met die huidige middels en toedienings nie meer effektief was nie.

Besoek aan die gebied het bevestig dat die Riversdalbrommerstam nie behoorlik beheer word nie, en is daar van die vlieë na Onderstepoort gebring vir vergelykende toetse met die vatbare Onderstepoort stam.

Oor 'n periode van 'n paar maande is 'n totaal van altesaam 26 insekdoders bestaande uit 9 ou en 17 nuwe preparate teen die twee brommer stamme getoets. Teen al hierdie middels, oud en nuut, het die Riversdalstam 'n verhoogde verdraagsaamheid vertoon wat van tweevoud tot eenhonderdvoud gewissel het, d.w.s. in vergelyking met die Onderstepoortstam. Dit is nie bekend of hierdie verskynsel tewyte is aan lewenstaaiheid (vigour tolerance) wat gewoonlik ontstaan as gevolg van insekdoderdruk, of 'n egte weerstand nie. By laasgenoemde toestand bestaan 'n ingeboude beskermingsmeganisme reeds voordat insekdoders die genetiese materiaal verhoog deur 'n proses van seleksie, en dit word nie verkry deur lae insekdoderkonsentrasies nie.

Dit staan te betwyfel of Riversdal die enigste gebied is waar hierdie proses besig is om plaas te vind, en weerstand teen insekdoders is 'n bekende verskynsel oral in die wêreld. Die probleem sal deeglik ondersoek moet word aangesien ons so swaar moet leun op beskermende insekdoders, omdat ons nog niks het om hulle mee te vervang nie.

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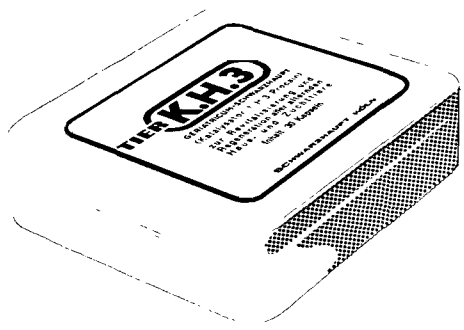

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Literature and Enquiries:

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FEATURE PAGE

DIVERTICULOSIS IN A COW

I. B. J. VAN RENSBURG*, C. J. ROOS** AND E. E. MCCONNELL***.

A 4 year old Friesian cow (second lactation, 6 months pregnant) was presented because of a sudden drop in milk production and partial anorexia. The cow showed evidence of pain (grunting sounds) when pinched over the thoracic spine. Traumatic reticulitis was suspected and a course of tetracyclines was administered. A marked recovery was effected within 48 hours. Two months later the cow revealed similar signs, which were accompanied by severe colic, mild fever (103.0°F.), and neutrophilia. Ruminal movements were present but weak. Rectal examination revealed no abnormalities. The same tentative diagnosis was made and an exploratory lapatomy was effected to determine the exact nature and severity of the condition.

Three separate large diverticula of the small intestine were palpated and each was in turn removed **in toto** by cutting along the circumference at the base of the lesion. The diverticula were kidney shaped, varied in size (15, 8 and 6 cm respectively, in the longest dimension), and contained fetid black sandy material. The mucosa of each was hyperaemic and diffusely ulcerated. Fullowing a course of penicillin-streptomycin she made an uneventful recovery and milk production returned to normal in 4 days.

Ten days after surgery an acute relapse occurred and the animal died 6 hours later.

Post mortem examination revealed severe diffuse purulent peritonitis, certainly of longer duration than suggested by the clinical course. Careful examination revealed a breakdown of one surgical suture line with resultant leakage of intestinal contents, and this was probably the cause of the peritonitis. Six further diverticula, ranging in size from 2 to 15 cm in length, were found in the jejujum (figure). They were all on the opposite surface from the mesenteric attachment and were similar in all respects to those observed at surgery.

Microscopically the diverticula were lined with necrohemorrhagic mucosa which was in direct contact with the serosa. The muscle layers were disrupted and were completely absent in some areas. At the junction with the normal intestine the smooth muscle layer resumed its normal architecture. It is suggested that the pathogenesis of the lesion was a rupture or disintegration of the muscle layers which permitted the outpouching of the mucosa. The cause is unknown.

Photography: A. du Bruyn.

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