CORRIGENDA

'Levamisole: Anthelmintic activity in calves following dermal application' – D. ap T. Rowlands and J. Berger Vol. 48, No. 2, p. 85-93. The following errors should be corrected:

p. 85 Abstract: line 4: 'lumber' should read 'lumbar';
p. 85 Materials & Methods, Rt. Hd Column, line 5: *'C. pectinate'* should read *'C. pectinata'*
p. 86 Table 1a: Insert '+7' opposite 'slaughter 6 treated calves' in the Day column.
p. 89 Table 4a: Opposite Day +28 read 'slaughter 6 . . .' instead of 'slaughter 5 . . .'
p. 90 Table 4b: In left column 'Control Mean' should read 'Control Median'
p. 90 Table 5a: Opposite Day +22 read 'Slaughter 6 treated calves'
p. 91 Table 5b: Experiment 6 *H. placei:* read 'L4' instead of 'L3' stage

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TYDSKRIF VAN DIE SUID-AFRIKAANSE VETERINÊRE VERENIGING

Die TYDSKRIF is die offisiële mondstuk en eiendom en word gepubliseer deur die Suid-Afrikaanse Veterinêre Vereniging. Dit verskyn kwartaalliks en word aan sake van algemene veeartsenykundige belang gewy. Bydraers tot hierdie Tydskrif maak hul stellings en lug hul menings slegs op eie verantwoordelikheid; sodanige stellings word nie noodwendig deur die Redaksiekomitee onderskryf nie en die menings gee nie noodwendig die Komitee se menings weer nie. Kopiereg word op al die letterkundige inhoud van die Tydskrif voorbehou.

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ADDRESS **VOORDRAG**

DIE SUID-AFRIKAANSE VETERINêRE VERENIGING

Dr A.P. Schutte

Presidentsrede

Gelewer tydens die amptelike opening van die S.A. Veterinêre Vereniging se Tweejaarlikse Wetenskaplike Kongres in die 1820 Setlaarsmonument in Grahamstad op 27 Augustus 1977.

Presidential Address

Presented on the occasion of the official opening of the Biennial Scientific Congress of the S.A. Veterinary Association in the 1820 Settlers Monument in Grahamstown on 27 August 1977.

Guests of Honour, Colleagues, Ladies & Gentlemen

We are most privileged this evening to be here in the 1820 Settlers National Monument on the historic Gunfire Hill. In addressing you on behalf of the S.A. Veterinary Assn. I feel it my duty to put forward a few points which are of grave concern to our profession and to make specific mention of some developments we can reasonably expect to take place within the forseeable future. Allow me to first take a very brief glance at the year just gone by. It has been difficult and fraught with obstacles which had to be overcome in our uncompromising efforts to achieve our short-term goals. Today we are most thankful to be able to report on the successes we have had. Our main objective was to obtain recognition for the veterinary scientist, irrespective of his field of endeavour, by emphasising his contribution to the welfare of the society in the form of caring directly or indirectly for the health of South Africa's livestock and its companion animal population. We established very good liaison with the S.A. Defence Force, the Dept. of Agriculture, the Dept. of Health, the Div. of Nature Conservation and the Federation of Societies for the Protection and Care of Animals – all bodies which in the past, in varying degrees were not fully aware of the value and the potential use of veterinarians. By saving this, I do not for one moment wish to convey to you that all those who were blind can now see. We still have ahead of us the formidable task of cementing our relationships – in fact the courtship has just started and that, as you know, is a long way from the pulpit! More than ever before, it is now the time for all members of our profession to stand united and to move as one towards our goals.

'n Ander baie belangrike aspek van die afgelope jaar waarna ons as Vereniging met trots op kan terugkyk, is die welslae wat ons gehad het met ons programme vir voortgesette opleiding. Dit is nou maar eenmaal so dat veral iemand wat in een van die drie professies staan 'n student moet bly. Wat die veearts betref moet hy onthou dat sy BVSc-graad slegs sy vertrekpunt is. Dit is juis op hierdie gebied waar die SAVV in 'n baie belangrike behoefte voorsien. Hier verwys ek ook graag na die baie waardevolle diens wat die Fakulteit Veeartsenykunde lewer deur die aanbieding van kursusse wat lei tot die verwerwing van nagraadse diplomas en grade. My bedoeling is egter om die groot getal referate te beklemtoon wat gedurende die jaar oor die lengte en breedte van ons land onder beskerming van die SAVV se Tak- en Groeporganisasies aangebied is. Dit mag u interesseer om te weet dat vir die sowat 750 aktiewe veeartse in Suid-Afrika daar nagenoeg 100 wetenskaplike referate gelewer en sowat 6 simposia gehou is waarvan die temas gewissel het van snykunde tot pluimvee, van perdewerk tot voorkomende medisyne en van veeteelt tot volksgesondheid. Die wetenskaplike program van die kongres wat nou op hande is, getuig van die SAVV se gemoeidheid met voortgesette opleiding.

Maar dit wat ons bereik het gee ons nog nie die reg om in 'n atmosfeer van selfvoldaanheid ons hande slap te laat hang nie. As verenigde professie waarin daar 'n tekort aan toepaslik-gekwalifiseerde veeartse is, is daar nog veel meer wat gedoen kan word.

With regard to some problems which loom on the veterinary horison and matters about which we as veterinarians are rightly or wrongfully critisised, I wish to comment as follows:

Firstly – The concentration of veterinarians in urban areas:

Practicing veterinarians have often been accused that they are over-inclined to converge cities where they render a fruitless or unnecessary service by caring for companion animals, race horses and polo-ponies. Such an allegation is to my mind absolutely unfounded and its only aim can be to deny a veterinarian his basic right of self-determination. The facts of the matter are:

(1) The urban community surely has the same right to demand a veterinary service as any other section of our population. This fact cannot be denied or glossed-over.
(2) In his training a veterinarian is made to feel particularly confident in the handling of pet animals and the horses which abound in or around cities – so obviously this is where he feels at home and where his professional proficiency can be applied.
(3) The urban community offers the practicing veterinarian a reasonable livelihood which allows him to also provide for the future of his family.
(4) About 80% of students accepted by our Faculty hail from cities. One can therefore expect them to return to the type of life to which they are

accustomed and to the environment in which they grew up with the object of caring for the animals they know best.

(5) In comparison with countries such as Canada, France, Australia and the USA which have one small animal practitioner for every approximately 9 000 urban inhabitants, South African cities can accommodate many more than the 275 odd veterinarians who currently live there. On this point I may mention that the SAVA has brought it to the attention of our Minister of National Education that an estimated 1000 veterinarians will be required in 1985 to man urban practices. Most of the 90 students who will shortly be graduating annually will therefore settle in our cities.

Tweedens – Beskikbaarheid van veeartsenykundige dienste op die platteland:

In hierdie verband het die SAVV reeds by wyse van 'n omvattende memorandum en deur persoonlike samesprekings met die Minister van Landbou, sy kommer oor die toedrag van sake uitgespreek. Dit is onrealisties om van 'n veearts in Suid-Afrika te verwag om doeltreffend om te sien na die behoeftes van 94 000 diereenhede soos tans in sekere blanke gebiede die geval is of om na die behoeftes van 257 000 diereenhede soos tans van toepassing in die tuislande. Daar dien op gelet te word dat 'n verhouding van 1 veearts: 5 000 diereenhede deur die VLO/WGO vir ontwikkelde lande as aanvaarbaar beskou word. Nog minder is dit realisties as daarop gelet word dat vir ontwikkelende lande 'n syfer van 1 veearts tot 30 000 diereenhede aangegee word as 'n aanvaarbare norm.

Ons is pynlik bewus van die probleme waarmee die veebedryf in die algemeen en die suiwel- en vleisprodusent in besonder, mee te kampe het. Laat daar geen illusies bestaan nie: die blote feit dat die verbruik van rooivleis wat met bykans 30% afgeneem het, bedreig sekerlik ook die veearts se bestaansreg op die platteland.

Dit is dan ook duidelik ons taak om die veebedryf in hierdie tye by te staan en besondere aandag te gee aan die faktore wat winste kortwiek soos bv lae kalfpersentasies, kalwermortaliteit, veesiektes en meer spesifiek, erosiesiektes.

Ons kan die feit nie omseil dat, gedurende die afgelope aantal jare, 'n duidelike klemverskuiwing en verandering in die behoeftes van ons veebedryf plaasgevind het nie. Eweso dat die veebedryf vandag van ons 'n globale kuddebenadering vereis en nie net die beperkte horison van die enkele siek dier nie. Dit is my eerlike oortuiging dat vanweë die swak ligging van die bestaande Fakulteit, die tekort aan plaasdiere van goeie kwaliteit in die omgewing en die stedelike agtergrond van meeste van die studente wat gekeur word, die opleiding van veeartse wat spesifiek die veebedryf moet dien nouliks tot sy reg kan kom. Om die redes moet 'n tweede fakulteit vir blankes, verkieslik in die suide van die land, steeds oorweeg word. So 'n stap sal nie alleen help om meer studente met 'n plattelandse agtergrond te werf nie, maar aangesien hierdie fakulteit nie noodwendig by 'n nywerheids-gedomineerde kompleks soos die Pretoria/Witwatersrand-area geplaas sal wees nie, sal die samestelling van die studentekorps ten goede kan verskil van die huidige. Die doelstelling behoort te wees om van meet af aan die BVSc-kursus veeboerdery-georiënteerd te kry.

Thirdly – The necessity of having a corps of suitably qualified state veterinarians:

As a whole we have a critical shortage of suitably qualified state veterinarians. Just over two years ago the SAVA pointed out this shortage to the Minister of Agriculture. He agreed that this matter must receive top priority to effect a change. However, it is sad to say that up to now nothing concrete has been done: The Div. of Veterinary Service still experiences an acute shortage of veterinarians to perform such essential duties as

(1) controlling and policing services;
(2) veterinary advice and control in the Homelands;
(3) applying the provisions of the Animal Slaughter, Meat and Animal Products Hygiene Act;
(4) extension work and diagnostic services;
(5) executing research programmes and producing vaccines.

The stubborness of the authorities about this critical situation remains inexplicable. However, a ray of light has now broken through after the SAVA this year once more interviewed the Minister. After two memoranda and a number of interviews (two with the Minister in person) it seems as though some changes are imminent.

Some of those who are manning the breach are convinced that if the envisaged changes are not implemented very soon, notifiable diseases such as foot-and-mouth disease, tuberculosis and brucellosis will soon take on such dimensions that our stock industry will be brought to its knees. It has also been said that we as veterinarians should lose no sleep about the 800 million odd doses of vaccine, valued at about R1,5 million, currently being imported each year for the poultry industry. The fact is that by means of a reasonable investment in personnel facilities at our Research Institute at Onderstepoort, the foreign exchange required for these imports could be saved. The fact that trade boycotts may very shortly make our sources of supply inaccessible, is of course quite another matter.

Yet another school of thought has it that as long as the authorities are prepared to spend only about 6% to 8%of the budget for Agriculture (R61,5 million) on animal health services, there is no reason why we as a profession should seriously concern ourselves with increasing the production and reproduction potential of our livestock to its optimum.

Maar nieteenstaande die waarheid wat hierdie stellings mag inhou nie, durf ons nie toelaat dat emosies 'n goeie saak verongeluk nie en kan ons as professie nie hierdie standpunte onderskryf nie.

Dames en here, ek wil graag saamvat deur aan die veebedryf die versekering te gee dat die Suid-Afrikaanse Veterinêre Vereniging en die veeartse wat die Vereniging se doelstellings nastrewe, die produsent wat op optimale produksie ingestel is ten alle tye sal bystaan. Ons sal voortgaan om tekortkominge uit te wys en doen wat gedoen moet word om dit reg te stel. Ons sal aanhou om te veg vir 'n ruimer bedeling vir elke faset van veeartsenykundige dienslewering, hoe gering ook al.

ADDRESS **VOORDRAG**

DIEREPRODUKSIE – VANAF BAKEWELL TOT HAMMOND: 1725–1964*

DR D.M. JOUBERT
VISE-PRESIDENT, WNNR, PRETORIA

My onderwerp is bloot 'n nostalgiese terugvaart in die geskiedenis van diereproduksie – per slot van rekening ons gemeenskaplike interesse en verantwoordelikheid. Ek beperk my tot 'n historiese greep wat omstreeks 1750 begin, en gedurende die middel sestigerjare van ons huidige eeu ten einde geloop het: 'n tydperk, dus, wat driehonderd jaar oorspan. Ook beperk ek my tot een land, naamlik Brittanje.

Op 23 Mei 1725 word gebore op die plaas *Dishley Grange* in Leicestershire, Engeland (baie na aan waar die landboufakulteit van die Universiteit van Nottingham tans geleë is), 'n seun genaamd Robert Bakewell. Daar woon hy sy hele lewe lank en sy grafskrif bevat niks meer nie as net: *Departed this life Oct 1, 1795, Aged 70 years.* [7]Maar dit was 70 belangrike jare wat benewens die telling van Longhorn-beeste en die Leicester-skaap gelei het tot die grondbeginsels van moderne telingsleer met inbegrip van prestasie- en nageslagstoetsing. Bakewell het egter ook ander mense geïnspireer en daarom is sy naam nooit los te maak nie van dié van John Ellman en sy Southdown-skape of die Collings, telers van die Shorthorn-bees of die Boothbroers, Thomas Bates en Amos Cruikshank en les bes die ontstaan in 1798 en 1822 van twee pioniersondernemings: onderskeidelik die *Smithfield Club* en die *Coates' Herd-book for the Shorthorn Breed.* Die verreikende gevolge van 'n eerste formele skougenootskap en daarnaas die voorloper van alle stamboekgenootskappe verg gewis geen verdere uitborduring nie.

Daarvandaan 'n sprong wat ons terstond bring by Charles Robert Darwin (1809-1882) en allereers 'n aanhaling uit 'n gesaghebbende geskrif oor hierdie geleerde van die neëntiende eeu:[8]

> Few books have been greeted with such a storm of controversy as the *Origin of species*, in which Charles Darwin set forth his theory of Natural Selection as the means of evolution. The new theory shocked the churchman and astonished the layman; but the scientist, after careful consideration, supported it; and today, although parts of the theory have been modified, the scientist still accepts it. The name of Darwin will always live, for his was the great mind that gave a new conception of creation.

Darwin was geen veekundige nie, kwalik 'n soöloog. Hy was deur en deur "natuurkundige" (naturalist). Nietemin durf ons hom nooit verbygaan nie. Waar geskryf word oor Bakewell en sy tydgenote volg die kommentaar: Their methods were those of what Darwin called 'artificial selection'; that is to say, they chose the best animals they could get for the purposes they had in view and then proceeded to breed from them ... En waar die pionier genetici met William Bateson (1861-1926) aan die spits in oënskou geneem word lees ons: The influence of Darwin ... upon these men was very apparent, while the general acceptance of the doctrine of organic evolution and the theory of natural selection as a factor in the production of new species broughtabout in all educated men a transformation of outlook which extended to breeders of animals.[4]

Ondertussen verskyn 'n tweede en toevallig aanverwante karakter op die Darwin-toneel. Sy neef Francis Galton (1822-1911), later sir Francis, skep naamlik 'n basis vir die biometriese bestudering van oorerwing met sy 'Wet van Voorouerlike Oorerwing' (Law of Ancestral Inheritance = Galton's Law). Dit implise dat die twee onmiddellike ouers tussen hulle die helfte van die genetiese bydrae lewer, die grootouers gesamentlik 'n kwart, ensovoorts. Benewens die feit dat 'n model vir stamboomkonstruksie daardeur ontstaan, skep dit moontlikhede vir eindelose matematies-gefundeerde biometriese navorsing waarvan Karl Pearson die voorloper was. Maar aleer ons van Galton afstap, vergun my ook hierdie aanhaling: In 1850 the famous English explorer Sir Francis Galton landed at Walvis Bay, and from there set off to Ovamboland. He reached a point some seven miles short of his goal – Lake Ngami – recently discovered by Livingstone. It was Galton who opened the road to Ovamboland ... [1] Een en dieselfde man!

Dit bring ons nader aan die twintigste eeu. Gregor Mendel se klassieke *Versuche über Pflanzen-Hybriden*, hoewel reeds in 1965 gepubliseer wag steeds op herontdekking terwyl die fisiologie van reproduksie nog nie 'n belangstellende kon betrek nie. Aan die Universiteit van Edinburgh is ene Cossar Ewart (1851-1933) egter besig om met dierekruisings te eksperimenteer, onder meer om verskynsels soos erfdwang, inteelt, kruisteling, reversie en veral telegonie wetenskaplik te verklaar. Met behulp van 'n Burchell-sebrahings se hibriede nageslag uit perdemerries verwerp professor Ewart mettertyd die sogenaamde 'baarmoederlike infeksie'-teorie wat terloops deur niemand minder nie as Charles Darwin verkeerdelik interpreteer was. Maar van besondere belang met betrekking tot ons verhaal is 'n £200-skenking deur Lord Carmichael aan die vermaarde professor wat hom in staat stel om 'n navorsingsassistent te bekom. Daardeur lok hy vir Francis (FHA) Marshall (1878-1949) wat pas in Cambridge sy studies voltooi het na Skotland en open die toneel op 'n splinternuwe bedryf met voortplantingsfisiologie as tema. Die professor dra 'n studie van die hare van

*Openingsrede, Jaarkongres, Pretoria-tak SAVV, 25 Junie 1977.

equidae aan Marshall op maar die jong man raak steeds meer en meer geinteresseerd in die geslagsiklus van die skaap waaroor hy reeds in 1903 'n verslag publiseer – en wel in die hoogaangeskrewe Transactions of the Royal Society. Pas daarna volg Schäfer met werk oor die fret (1904) en Jolly met resultate oor die hond (1905). Vrugbare samewerking word daaruit gebore en in 1908 keer Marshall na Cambridge terug waar hy die res van sy lewe sou deurbring.

Dat Cambridge die bakermat van die geslagsfisiologie moes word was, histories gesien, baie logies. Sedert die stigting van 'n Evolution Committee deur die Royal Society in 1896 – wat veral aandag geskenk het aan die voorkoms van aborsie en onvrugbaarheid onder verskillende rasse van plaasdiere – was ene Walter Heape (1855-1929) van Cambridge intiem daarby betrokke. Trouens in ons verhaal is Heape in 'n sekere sin die 'onbekende kwantiteit'. Benewens grootwildjagter,* dierkundige, fisioloog en 'n persoon met "... an extensive knowledge of living animals",[3] was hy ongetwyfeld ook 'n buitengewoon vaardige eksperimentele chirurg. In 1897 publiseer hy sy resultate oor kunsmatige inseminasie en roep gelykertyd Spallanzani se eksperimente met honde wat na 1784 terugdateer in herinnering, maar oor die toepassing daarvan hou hy veral perdeteelt in gedagte. Drie jaar later (1900) verskyn Heape se werk oor The sexual season of mammals waarin hy die bestaan van geslagshormone suggereer deur na hulle as "generative ferment circulating in the bloodstream" te verwys. Skielik egter gaan sy belangstelling oor na die genetika en doen hy opnuut 'n ovumtransplantasie (waarmee hy reeds in 1890 sukses behaal het) vanaf swart na wit konyne om sodoende oortuigend die telegoniestorie die nek in te slaan. Soos baie ander uitmuntende vroeë wetenskaplike prestasies gaan hierdie een by meeste van sy tydgenote verby en raak dit spoedig bedek deur die stof van vergetelheid.

Laat ons vir 'n wyle terugkeer na die Edinburghskool van Cossar Ewart. Wat onteenseglik beslag aan hul ondernemings gegee het was die stigting van 'n proefplaas waar eksperimentele diereteelt beoefen kon word. In 1919 word F.A.E. Crew as Direkteur van Genetiese Navorsing aangestel en in 1928 volg 'n leerstoel in Genetika. En daardie tradisie duur natuurlik voort, met Edinburgh steeds in 'n toonaangewende posisie sover dit die internasionale dieregenetika betref.

Aan die Universiteit van Cambridge is toepassing van die erflikheidsleer egter nie onderskat nie. William Bateson gee naamlik die pas aan met sy boek Materials for the study of variation; ook ruk hy vir Mende uit vergetelheid met 'n Engelse vertaling van die nou skielik beroemde Oostenrykse monnik se oorspronklike publikasie. Daar dit is veral die toepassing wat Bateson tref en toelig en wel in sy presidentsrede tot die soölogieseksie van die British Association (1904) met die woorde: Breeding is die greatest industry to which Science has never yet been applied. Andermaal is dit Walter Heape wat die tema aangryp en daarop uitborduur, dié keer in 'n opspraakwekkende boek wat die naam dra van The breeding industry.

*In 1884 skiet hy 'n olifant in die Addo-omgewing waarvan die geraamte steeds in die Soölogiemuseum te Cambridge ten toon gestel word.

Die storie van Bateson is interessant ofskoon ook 'n lang een op sigself. Dit behels onder meer die werk van Punnett op kleuroorerwing by die blou Andalusiese hoender en verklarings oor die genetika van gesigkleur en horings by skape deur T.B. Wood, asmede die skepping van 'n geslagsgekoppelde hoenderras bekend as Cambar deur M. Pease. Laat ons egter terugkeer na die hooffiguur, Marshall, want daaruit vloei die slotbedryf voort met 'n persoonlikheid wat uiteindelik selfs die meester oortref. Maar eers die Marshall-verhaal enduit.

F.H.A. Marshall het twee groot biologiese bydraes tot sy krediet. Eerstens sy identifisering van 'n behoefte vir 'n samevatting van alle bestaande kennis oor die voortplantingsfisiologie en dus sy eerste uitgawe van The physiology of reproduction wat in 1910 gepubliseer is. Dit sou 'n lewenstaak word. 'n Tweede uitgawe met 'n Abridged version for agricultural, veterinary and medical students in 1922, en 'n derde hersiening wat te lywig word vir hom om alleen te behartig – waarvan die eerste volume van uiteindelik drie bande in 1950 verskyn. A.S. Parkes, 'n oudstudent, tree op as redakteur, maar ook vir hom word die taak mettertyd te groot en sou die redigering van 'n vierde uitgawe aan die sorg van G.E. Lamming van Nottingham opgedra word.

In die tweede plek word Marshall onthou en geroem vir sy vooruitsig: sy korrekte afleiding oor die aanwesigheid en rol van follikulêre en luteale hormone lank voordat hulle geïsoleer of selfs ge-ekstraheer is. Oor hom skryf Parkes na sy dood in 1949: Scientists are of many kinds but inspiration flows most fruitfully from those who are able, by some gift withheld from lesser men, to divine the richness of unchartered country and sense the vital landmarks. Thus do they avoid the barren places and the morasses of unimportant detail which engulf so many. To these, discovery is an art rather than a science, a matter of instinct rather than of intellectual machinery. Such was Marshall.[5]

Die slotbedryf voer ons andermaal terug na die neëntiende eeu, na die graafskap Norfolk waar die Hammonds reeds vir geslagte boer en veeartsenykunde praktiseer. Op 23 Februarie 1889 word John Hammond tot hierdie familie toegevoeg, met die vooruitsig om die tradisie van sy voorgangers voort te sit. Hy druip egter in Latyn en kies gevolglik 'n kursus in die natuurwetenskappe met fisiologie, plantkunde, chemie en geologie aan die Universiteit van Cambridge gevolg deur 'n landboudiploma en nagraadse opleiding in veeteelt. Vroeg reeds maak hy kennis met Marshall wat pas van Edinburgh teruggekeer het en toentertyd verbonde was aan beide die sogenaamde Physiological Laboratory en School of Agriculture:

The close collaboration between Marshall and Hammond in many fields of research which persisted until the death of the senior partner in 1949, developed into one of the most significant features of their distinguished careers. Hammond frequently recalled Marshall's theoretical though highly critical approach which, in combination with his won gift for practical insight and application led to so many classical explorations in the field known to them as 'Agricultural Zoology and Physiology'.[2]

John Hammond se debuut was 'n artikel getiteld An investigation conerning the food of certain birds. Die jaar was 1912 and 24 maande later sou die Eerste Wêreldoorlog ontbrand en hom tot militêre diensplig

roep. Maar in daardie tussenpouse vind hy sy ware belangstelling en begin gelyktydig verskeie navorsingsprojekte met plaasdiere, elkeen egter met 'n duidelike uiteindelike toepassing. Sy magnus opus is die monograaf Reproduction in the rabbit wat in 1925 verskyn, onder meer met 'n beskrywing van die vorming van die corpus luteum en logiese uitbouing van Walter Heape se generative ferment-gedagtes. Tegelykertyd publiseer hy saam met Marshall die bekende Fertility and animal breeding wat teen 1952 ses hersienings sou deurmaak, nadat hy en E.T. Halnan geruime tyd tevore reeds A course of practical physiology for agricultural students saamgestel het.

Groter dinge was egter aan't kom. Desondanks karige fondse en fasiliteite vorder sy voortplantingstudies dermate dat The physilogy of reproduction in the cow in 1927 gepubliseer kon word en dan sy mees klassieke werk wat spoedig aan hom 'n Fellowship of the Royal Society of London – inderdaad die hoogste erkenning in die Engelstalige wetenskaplike wêreld – besorg, naamlik die monumentale Growth and development of mutton qualities in the sheep.

Die jaar is nou 1932 en die naam van John Hammond geniet reeds internasionale weerklank. Die Universiteit van Iowa nooi hom as hul gasprofessor en ken die eerste van uiteindelik ses ere-doktorsgrade aan hom toe. Hy word genooi na baie lande om te help met veekundige en in sonderheid vrugbaarheidsprobleme. Maar belangriker, Hammond begin om die room van die wêreld se jong toegepaste fisioloë na Cambridge te lok. Nie alleen dra hy sy kennis en ervaring aan hulle oor nie maar laat hy hulle deel in sy navorsing wat nou ook die groei- en voortplantingsfisiologie van die perd, die skaap en die vark insluit. Hy word by die dag meer en meer gewild en gesog as dosent en openbare spreker en op aandrang van studente en ander gehore vat hy sy gedagtes vir die eerste keer in 1940 saam in Farm animals – their breeding, growth and inheritance – die teksboek wat elke veekundige dwarsoor die wêreld spoedig sou leer ken. Ondertussen het Hammond, in opvolging van Walter Heape, homself begin interesseer in kunsmatige inseminasie. Hy behaal besondere sukses maar sy eie Ministerie van Landbou ignoreer dit; totdat Wêreldoorlog II uitbreek. In Hammond se eie woorde.[6]

> But it wasn't until the second world war broke out that we got it going in this country. Hudson, who was Minister of Agriculture at the time, came down to see us. He was a very blunt man. He said, 'Now look here, what have you chaps got for today? No good thinking about tomorrow – may not be a tomorrow!! (That was about Dunkirk time, you see.)So I immediately put up artificial insimination. Standing behind him was one of the Ministry men who in earlier years had turned it down twice on the grounds that though very spectacular, it had no commercial use. But Hudson said, 'Yes all right, I'll get you some money. Set up a laboratory here in Cambridge and we'll see how it works, and if you can make it work here, I'll take it'. And it did work. So then he said, 'Now I'm going to put through legislation to control it. I want to use it to benefit, not to exploit, the farmer. But I'm going to get opposition from two sources, will you help me?' 'Yes, I'll do anything I can', I said. 'First', he said 'the bull breeders are going to object, because it will prevent them selling a lot of bulls.' So, I met the Cattle Breeders Association, and I pointed out that it was far better to sell one bull for £500, instead of ten for £50, because there was much more profit in it. They agreed, with no opposition. It turned out to be true, too – later on, the bulls went up to such a price that the Minister had to put a ceiling to it. 'And then', he said, 'the other opposition will be the Church – on moral grounds. We've got to meet them.' So I met the Committee of the Church Council, I think it was, and put the case. They attacked me first by saying that it was artificial, and nothing artificial could be of any use. It was going against nature. I had my answer ready for that one. I said, 'Do you drink milk?'. They said they did and that it was very good for them. I said they were being artificial – milk was meant for the calf, not for them. That settled artificiality! And then the second objection was on moral grounds. I said, 'I am not going to argue human, I am going to argue cattle, which we want it for. Humans are not my line, but do you know what happens now with cattle? In lots of villages throughout the country, there is a long village street and a man at one end keeps a bull and a man at the other end keeps some cows. When a cow comes on heat the owner leads it along the village street to the bull at the other end. Everyone knows what is happening and all the small boys come and watch. That is what happens now. Under my conditions, the owner would phone up, a car would appear, and a man with a little black bag would do an insemination before any boy in the village knew anything about it. Which is best for morals?' And that settled them! There was no opposition. But it is only in war-time that this sort of thing can happen; if it hadn't been war-time, we would not have got it through. Scotland did not take artificial insemination until years later.

Die oorlog bring vele verpligting en so-ook die na-oorlogse jare. Veral die heropbou van verpletterde veestapels op die Vasteland verg veel van Hammond se aandag. Gedagtig aan die ontsettende verlies aan biblioteke en hul veekundige literatuur in Europa pak hy Progress in the physiology of farm animals aan en so groot is die sukses dat die uitgewer Paul Parey in Hamburg hom nooi om saam met professore Ivar Johansson van Uppsala en Fritz Haring van Göttingen die magnikieke Handbuch der Tierzüchtung te redigeer.

Teen 1960 is hierdie take almal afgehandel maar, nou reeds in sy sewentigerjare, word die pas nie verslap nie en deel hy sy oudstudente mee dat hy besiger is as ooit tevore. Maar vier jaar later voel hy self die naderende einde aan:[2]

> During his last fortnight, realizing the end had come, he meticulously cancelled engagements, attended to correspondence and handed over the *Journal of Agricultural Science* to the Editorial Board. He paid his last visit to the School of Agriculture within a week of his death, to distribute copies from his renown reprint collection on growth amongst colleagues and friends. He also notified many of the learned societies to which he pledged membership over the years.

Hierdie groot wetenskaplike maar buitengewoon nederige mens sterf op 25 Augustus 1964. Ook sý grafskrif is saaklik maar sy naam leef voort:[2] For Hammond enjoyed the best of two worlds – the world of scientific learning, and the world of human understanding. He was a giant amongst scientists; he was greater even, amongst his fellow men.

Tweehonderd nege-en-dertig jaar dus vanaf Bakewell se geboorte tot met Hammond se dood. Vir ons almal 'n epog van buitengewone betekenis: want deur die toedoen van hierdie mense kan ons vandag dink in terme van onder meer hoogs gesofistikeerde Herverbinde DNS (Recombinant DNA) en komplekse Biochemiese Bane (Biochemical Pathways). 'n Epog waaruit besondere inspirasie te put is solank as wat mense steeds bereid is om hulle met idealisme en entoesiasme aan hul lewenstaak te wy!

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AUTHOR INDEX

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SKRYWERSINDEKS

vir Jaargang 48, 1977

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POST PARTUM INFECTION IN CATTLE: DIAGNOSIS AND PREVENTIVE AND CURATIVE TREATMENT

R. BOUTERS AND M. VANDEPLASSCHE

ABSTRACT: Bouters R.; Vandeplassche M. **Post partum infection in cattle: diagnosis and preventive and curative treatment.** *Journal South African Veterinary Association* (1977) **48** No. 4 237 – 239 (En) Fac. Vet. Med., State University, Ghent, Belgium.

The important economic and other implications associated with an incidence of between 3 and 30 percent of pueperal disease in cattle are strongly emphasized.

To understand the problem the physiology of the puerperium is first reviewed. Possible pathology associated with the puerperium is discussed and the aetiological factors, symptomatology observed in the genital tract and the general symptoms are discussed. Possible ways by which puerperal disease may be prevented are briefly mentioned and possible treatments for various puerperal syndromes are subsequently suggested.

INTRODUCTION

The puerperium constitutes an important period in the reproductive life of the bovine female because of its enormous influence upon subsequent fertility. The estimated incidence of puerperal disease varies between 3% and 30%, depending on the breed and management practices[2]. In an earlier study on more than 200 puerperal cows 10% were found to be suffering from *post partum* disease[3]. The syndrome has wide economic repercussions because of the high morality and morbidity, the lower milk production, the loss of body weight and temporary or permanent sterility following metritis and salpingitis.

In modern cattle breeding, with the increasing size of the herds and the fact that in Europe the animals are kept indoors most of the time and the demand for beef that has to be met has led to an increased birth weight and consequently an increase in the percentage of dystocia in most of our breeds. In this paper some aspects of the puerperal period will be discussed. Observations on the normal bovine puerperium, the pathogenesis of disturbed involution, the criteria for diagnosis and prognosis as well as prevention and treatment will be illucidated.

PHYSIOLOGY OF THE PUERPERIUM

The physiological involution of the bovine uterus can be regarded as a regression in weight of all reproductive tissues but mainly of the uterus. Directly after parturition the weight of the uterus is approximately 10 kg and should return, following involution, to the initial pregravid weight of about 1 kg. Thus 9 kg of tissue has to disappear which means that "involution is not identical with contraction and tonus. Following Caesarean section, for instance, the uterus is normally firmly contracted, but involution will be retarded for several days. Clinical observations demonstrate that normal involution proceeds rapidly during the first days after parturition. After 4 days the cervix will be closed and the weight of the uterus reduced to about 3,5 kg. In the same period the larger caruncles, with an initial weight of 200 g at parturition, are reduced to 50 g in weight. At 7 days *post partum* the uterus, weighing ±2 kg, can be completely embraced on rectal palpation and gives the impression of a 2–3 months pregnancy. At this stage, arterial fremitus has disappeared and the *corpus luteum graviditatis* is no longer palpable. Lochial fluid is minimal and rapidly becomes mucoid. Normal lochia consists of numerous tissue cells with fewer leucocytes and micro-organisms. Both leucocytes (mainly neutrophils) and bacteria are intact and there are no obvious signs of phagocytosis. This would indicate that the organisms present have no invasive character and that they do not stimulate the defence mechanism of the uterus.

PATHOLOGY OF THE PUERPERIUM

A disturbed puerperium is characterized by puerperal metritis frequently associated with a macroscopic or microscopic retention of the foetal membranes.

1. Aetiology

The aetiologic factors can be divided into 2 main groups:

(a) those factors or causes existing prior to parturition like for instance twin gestation, late abortion, prolonged gestation, placentitis, placental oedema, and

(b) those developing at or following parturition. Two main causes can be considered. First any form of dystocia, which requires traction or reposition or even a foetotomy or a Caesarean section, will dramatically increase the incidence of retained placenta and delay uterine involution and regression. A second important factor is the hygienic conditions prevailing at parturition. Workers have noted an increase of retained placenta from 9% to 26% under poor hygienic conditions[1 4]; This was specially true in the loose housing system. These rather surprising findings could be explained by the physiological regression of the genital tract, including loosening of the foetal membranes.

2. Symptomatology observed in the genital tract

(a) Clinical observations

The major observations are (a) retention of the afterbirth and (b) retarded involution, especially in the first few days following parturition. In these instances the uterine mass remain almost unchanged for the first 2–3 d, although the uterus is generally well contracted. In the majority of the animals involution starts notwithstanding retardation of 3–4 d. Once the foetal membranes are expelled, usually after 5–10 d, involu-

tion proceeds very rapidly. However, in about 10% of the animals, the expulsion of the foetal membranes does not occur before the 10th or even the 20th day after parturition, in which case the caruncles and cotyledons do not regress and the uterus stays almost the same weight for several weeks. In a cow on emergency slaughter 37 d *post partum*, the uterus with its contents still weighed 14 kg and the placentomes were practically unchanged. Arterial fremitus can persist for 2–3 weeks but the *corpus luteum graviditatis* always shows normal regression within 10 d *post partum*.

Involution especially will be delayed in the presence of uterine adhesions. Perimetrial adhesions are seen in about 25% of animals after Caesarean section. In exceptional cases urometra with accumulation of up to 20 l of urine can be associated with ventral uterine adhesions which causes the genital tract to be pulled downwards and thus regression is inhibited. In all cases of delayed involution, lochial fluids will be abundant, fetid and less viscous.

(b) Laboratory findings

As a rule a number of different bacteria will be abundant in Gram-stained smears of uterine discharge, with Gram positive micro-organisms more frequently encountered than Gram negative bacteria. In almost every instance *Streptococcus, C.pyogenes, Staphylococcus* and *Clostridium* are present. Sensitivity tests have indicated a high degree of resistance against streptomycin and we found the best combinations to be penicillin and neomycin or penicillin-colistin. The *in vitro* activity of chloramphenicol is remarkably good but its solubility in uterine fluids is very limited while tetracyclines have only limited value in puerperal infections in the bovine. Microscopic examination of the uterine tissue cells showed that they are generally replaced by macrophages (neutrophiles).

Special attention should be given to the degree of phagocytosis, which can be attributed mainly to cells such as neutrophiles (80%) and to a lesser extent to macrophages (20%) which is more directed towards Gram positive than towards Gram negative organisms. It is exceptional for phagocytosis to be initiated before parturition, particularly in the presence of foetal emphysema; more usually it sets in from the second day post partum.

Under pathological conditions phagocytosis can be delayed for 4–5 d or in some cases even be absent for up to 3 weeks. The intensity of phagocytosis, expressed as the number of bacteria ingested by macrophages, will vary enormously even in the individual animal but it is still a good indication of the degree of uterine defence and, in this way a useful parameter for prognosis. The prognosis can be classified as good when masses of bacteria are engulfed inside the phagocytes, this will bring about rapid degeneration of both phagocytes and micro-organisms. In contrast a large number of free-lying bacteria with only a few intact neutrophils is indicative of a poor defence mechanism.

3. General symptoms

A small percentage of cows suffering from puerperal metritis will succumb after an acute attack or even following on chronic disease. The most important general disturbances are perimetritis followed by peritonitis. In some cases micro-organisms present in the uterine lumen will penetrate the uterine blood- or lymph barrier. In this way fatal septicaemia with metastases to the lung, the mammary gland (mainly by *E. coli)* and the kidneys (mainly by *C. pyogenes)* will develop. More chronic cases may end in puerperal acetonaemia, chronic arthritis (either infectious, toxic or allergic) and finally in some cases associated with abomasal displacement.

PREVENTION

The prevention of puerperal disease is closely related to the prevention of abortion and to a breeding policy for easy calvings. Special attention should be given to hygiene immediately prior to and at parturition. The role of nutrition in protecting the animals against liver damage which, in combination with the stress of parturition, is said to be the cause of puerperal disturbances[2], is not yet completely understood. As it is, our own experiments with a liver-protecting treatment during gestation with "Catosal" (Bayer) gave inconclusive results.

THERAPY

There is no single and well-defined treatment available for the puerperal syndrome since the intervention has to be adapted to each individual case. However, the following categories should be considered:

1. Fresh retention: (Retention of the foetal membranes, i.e. within 24 h after parturition.)

Although opinions are equivocal, according to our clinical experience manual detachment should only be resorted to when the intervention can quickly and easily be completed. This is generally the case when some cotyledons are already spontaneously detached and hanging free out of the vagina. Once the mass of foetal membranes has been removed, involution will proceed rapidly and an intrauterine antibiotic treatment repeated 2 or 3 times will prevent puerperal disease in most instances.

When the membrances are not easily detachable, no further attempts should be made because the extra trauma will retard involution, open the way for heavy infections and severaly depress phagocytosis. Furthermore, it should be stressed that we have efficient drugs for uterine contraction but none which will stimulate uterine involution. Under favourable conditions, i.e. after normal parturition-, with only a slight degree of infection, the foetal membranes will be expelled spontaneously within 10 d and involution retarded for only 5 d when the animals are examined 3 weeks post partum. In heavily infected cases, mostly after dystocia, trauma or individual predisposition, a systemic and local antibiotic treatment will be indicated. Corticosteroids or oestrogens however are contraindicated in the early post partum phase.

2. Retention of more than 7 d duration:

These animals are frequently in poor general condition and a systemic antibiotic treatment has to be given for 3–4 d in order to prevent extra genital dissemination.

Local antibiotic application is of little use in most instances and merely a waste because the antibiotics will be rapidly inactivated in the lochial fluids and foetal membranes. The first aim must be to empty the uterus. When the cervix is firmly closed, a *small* dose of 1–2 mg oestradiol can be given. This will relax the cervix, increase uterine contractions and stimulate phagocytosis. Once the cervix is sufficiently open, the membranes can gradually be removed and the uterus flushed with several litres of saline. Antiseptic fluids should not be used because they depress phagocytotis. Once the uterus has been emptied and rinsed, antibiotics can effectively be introduced into the uterine lumen for at least 3–4 d. This treatment can be given by the owner provided sufficient hygienic measure can be assured.

3. Puerperal metritis not associated with retained placenta:

This type of puerperal problem is becoming more and more important and may constitute a real herd problem. In the great majority of the cases, *C. pyogenes* will be isolated as the causal agent. When the animal as a whole is affected, systemic treatment combined with local intrauterine therapy is indicated. In practice, many cases due mainly to an underdosage of antibiotics (5–10 million i.u. penicillin combined with 2–4 g neomycin or 3 g tetracycline are minimal doses) will not respond to treatment. Secondly, the treatment should be repeated every 24 h because resorption is very fast during the puerperial period. Finally, the treatment should be applied in both uterine horns and the antibiotics well mixed with the uterine secretions by rectal massage.

In conclusion, we must face the fact that during the last decade our knowledge on the pathogenesis of puerperal disturbances in the bovine has more or less remained static and that very little progress has been made in treating these cases.

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BOOK REVIEW — BOEKRESENSIE

EQUINE INTESTINAL CLOSTRIDIOSIS

Martin Wierup
(Dept Bact/Epizootology, Royal Vet. College Uppsala, Sweden)
Acta Veterinaria Scandinavica Suppl. 62, Uppsala, 1977, pp 182; Tabs. 14; Figs. 10.

Intestinal conditions in horses pose difficulties in diagnosis due largely to a lack of clearly identified aetiological factors. The difficulty in defining aetiological factors in digestive disturbances is compounded in herbivores by the fact that they depend on complex microbial decomposition of their food. To prove unequivocally, for instance, that an organism such as *Clostridium perfringens* type A, which is normally present in the intestinal contents of herbivores, can assume a pathogenic rôle under certain circumstances, is no mean task. The existing data about the significance of *Cl. perfringens* for the horse are understandably sparse.

By systematically and extensively studying the clinical material at his disposal, Wierup made a substantial contribution to our knowledge of the rôle of this organism in a well-defined morbid condition of horses. He investigated 31 cases of what he calls 'equine intestinal clostridiosis'. Twelve of the animals died. The most outstanding symptoms were a foul-smelling diarrhoea, discoloured mucous membranes, a temperature and an accelarated pulse rate. At post mortem acute typhlitis and colitis were obvious and some animals showed degeneration of the myocard, liver and kidneys.

Extremely high counts of *Cl. perfringens* were detected in the intestinal contents during the acute phase of the disease. Surviving animals showed a decided immunological response to the antigens of the organism.

The author suspects that a diet rich in protein and low in fibre predisposes to the abnormal multiplication of this potentially pathogenic organism. The same notion is generally accepted as the trigger for an abnormal multiplication of *Cl. perfringens* type D in the intestines of sheep leading to pulpy kidney disease.

Experimentally a rise in the intestinal faecal *Cl. perfringens* counts could be achieved by supplementing the diet of intensively fed racehorses with protein concentrates.

Although *Cl. perfringens* has not been conclusively proved to be the cause of 'equine intestinal clostridiosis', Wierup has produced sufficient evidence to persude clinicians to consider this condition when dealing with the incidence of diarrhoea of obscure aetiology in horses. Nutritionists should also take heed of the circumstances under which this type of derangement occurs.

BCJ

Die mees belangrike 21 dae in 'n koei se jaar.

Die Probleem.

'n Hoë persentasie koeie het 'n residuele infeksie aan die einde van laktasie.

Daarby is alle koeie vatbaar vir 'n nuwe infeksie gedurende die vroeë stadia van die droë periode. Met 'n paar uitsonderings sal dit gedurende die eerste 10 tot 21 dae voorkom.

Die Antwoord.

Orbenin Droë Koei is ontwerp om beide hierdie probleme te oorbrug. Dit is geformuleer as gevolg van aanhoudende navorsing, beide in die laboratorium en in die veld.*

Orbenin Droë Koei is bakteriedodend teen streptokokke, penisillien sensitiewe en penisillien weerstandbiedende staphylokokke, die mees oorsaaklike organismes wat in residuele en nuwe infeksies gevind word.

Dit was duidelik uitgewys dat infeksie tydens kalwing gewoonlik van NUWE oorsprong en meesal 'n omgewings, of Gram -we infeksie is. Behandeling tydens daardie tyd met 'n breëspektrum Lakterende Koei produk soos Ampiclox L.K. is nodig om genoegsame antibiotiese konsentrasies te bereik om mastitis tydens kalwing te voorkom.

Orbenin Lakterende Koei en Ampiclox L.K. is bedoel om mastitis gedurende laktasie te beheer. Ampiclox word veral aanbeveel wanneer coliforme vermoed word.

Orbenin (kloksasillien) en Ampiclox (ampisillien/kloksasillien) is Beecham handelsmerke.

*Die jongste kliniese proef het 507 kuddes oor 'n tydperk van 3 jaar ingesluit – Brander G.C., Watkins J.H., en Gard R.P., Vet Rec. (1975) 97. 300-304.

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SALMONELLAE IN RHODESIA: SOURCES AND SEROTYPES OF SOME ISOLATES FROM ABATTOIRS, DOMESTIC ANIMALS, BIRDS AND MAN

P.G. CHAMBERS

ABSTRACT: Chambers P.G. **Salmonellae in Rhodesia: Sources and serotypes of some isolates from abattoirs, domestic animals, birds and man.** *Journal of the South African Veterinary Association* (1977) **48** No. 4, 241-244. Div. Meat Hygiene, Dept. Veterinary Services, Box 545, Sinoia, Rhodesia.

Sources and serotypes of some salmonellae isolated from abattoirs, domestic animals, birds and man are given. At least 72 serotypes have been identified from 1273 isolations from abattoirs, animals and birds, and from 7 137 isolations from man. The sources and serotypes of these isolations are discussed and some suggestions concerning the epidemiology of *Salmonella* in Rhodesia are made.

INTRODUCTION

Salmonellae are ubiquitous organism and their isolation in many parts of the world has been well documented. However Hobbs[4] comments that in spite of surveys and efforts at surveillance, salmonellosis is thought to be grossly under reported in all parts of the world.

Recent publications about sources and serotypes of salmonellae found in animals and abattoirs in Africa appear to be comparatively few. The purpose of this paper is to augment this situation by giving information about salmonellae isolated from animal, bird and abattoir specimens in this country during the past few years, together with some general information about isolations from human specimens.

MATERIALS AND METHODS

Abattoirs

The Meat Hygiene Division fo the Department of Veterinary Services undertakes routine sampling of various sites and materials in the main cattle, sheep and pig abattoirs under its jurisdiction, as well as the annual examination of rectal swabs of abattoir employees. Samples were incubated in selenite-lactose enrichment broth or tetrathionate broth for 18 h at 37°C. After incubation a few drops were streaked onto brilliant green - lactose - sucrose - phenol red agar and further incubated for 18 h at 37°C. Suspect colonies were subinoculated by stabbing and streaking a butt/slant each of Kligler iron - lactose - dextrose - phenol red, lysine iron - dextrose - brom cresol purple and urea - dextrose-phenol red agar, and then incubated for 18 h at 37°C. Suspect cultures were tested against polyvalent "O" and "H" (Wellcome Ltd) antisera and then submitted for typing to the Meat Hygiene Division's Salmonella Typing Laboratory. The origin, frequency of isolation and serotypes of these salmonellae are summarised in Tables 1 to 5.

Table 1: *SALMONELLA* ISOLATED FROM BOXED DE-BONED BEEF DURING 1969–1976

No. boxes swabbed	No. swabs positive	Percentage positive
15 970	125	0,78

Serotypes identified: *S.typhimurium* (1) *S. enteritidis* (13) *S. anatum* (19) *S.cerro* (4) *S.senftenberg* (1) *S.mobeni* (3) *S.arizona* (4) *S. newington* (1) *S. bleadon* (1) *S.menston* (1) *S.oranienburg* (1) Untyped (78).

Table 2: *SALMONELLA* ISOLATED FROM BOXED BOVINE TONGUES DURING THE PERIOD 1969–1976.

No. boxes swabbed	No. swabs positive	Percentage positive
13 680	199	1,45

Serotypes identified: *S.typhimurium* (4) *S.adeoyo* (39) *S. cairo* (1) *S.tennessee* (1) *S.mobeni* (9) *S. bleadon* (2) *S.newington* (2) *S.senftenberg* (13) *S.raus* (6) *S.limbe* (3)
Note: *S. adeoyo* (38) and *S.senftenberg* (12) were isolated from the same abattoir within a few weeks of each other.

Table 3: *SALMONELLA* ISOLATED FROM SAMPLES OF MEAT AND BONE MEAL AND FROM BLOOD MEAL AT SIX ABATTOIRS DURING THE PERIOD 1969–1976.

Meat and Bone Meal			Blood Meal		
No. samples	No. positive	% positive	No. samples	No. positive	% positive
2 768	148	5,3	2 688	43	1,6

Serotypes identified: *S.typhimurium* (1) *S.dublin* (1) *S.senftenberg* (3) *S.cerro* (5) *S.clifton* (29) *S.newington* (6) *S.anatum* (1) *S. mobeni* (2) *S. nigeria* (1) *S.pretoria* (2) *S. zanzibar* (1) *S.rideau* (2) *S.raus* (1) *S.rissen* (1)
Note:
1. One abattoir processes pigs – no positive samples found in 48 each of meat and bone meal and blood meal.
2. All *S.clifton* isolated from the same abattoir.

Table 4: *SALMONELLA* POSITIVE SAMPLES TAKEN FROM EIGHT SITES AT TWO CATTLE ABATTOIRS DURING THE PERIOD 1969–1976

Site	Sample	No. samples	No. positive	Percentage pos.
Carcase surface	Swab	2 355	12	0,5
Gall bladders	Mucous membr.	2 760	84	3,0
Rumens	Content	680	32	4,7
Tripes	Wash water	363	17	4,7
Red offal	Swab	736	39	5,3
Abatt. effluent	Swab	398	46	11,6
Bile receiver	Swab	199	43	21,6
Slaughter floor drain	Swab	423	109	25,7

Serotypes identified: *S.newington* (8) *S.menston* (7) *S.typhimurium* (5) *S.infantis* (1) *S.senftenberg* (6) *S.enteritidis* (4) *S.cerro* (2) *S.mobeni* (1) *S.helsinki* (2) *S.mim* (1) *S.heidelberg* (1) *S.banana* (1) *S.oskarshamn* (1) *S.mission* (1) *S.adeoyo* (1) *S. montevideo* (1) *S.bron* (1). Unidentified (4).

Table 5: *SALMONELLA* ISOLATED FROM HEALTHY MEAT HANDLERS AND ABATTOIR WORKERS DURING THE PERIOD 1969–1976

Rectal Swabs	No. pos.	Percentage pos.
12 182	56	0,45

Serotypes identified: *S.typhimurium* (6) *S.anatum* (4) *S.menston* (5) *S.muenchen* (1) *S.saint paul* (1) *S.newington* (3) *S.adeoyo* (1) *S.senftenberg* (7) *S.bovis-morbificans* (1) *S.jedburgh* (1) Unidentified (36)

Animals and Birds

Specimens (mainly from clinical cases and cadavers) from domestic animals and other birds were sent by Veterinary Field Officers to laboratories for bacteriological examination. Samples were incubated for 18 h in selenite-lactose broth at 37°C. A few drops were then streaked onto desoxycholate citrate agar and incubated at 37°C for 18 h. Suspect colonies were inoculated into triple-sugar iron, lysine and urea agar tubes and incubated for 18 h at 37°C. Cultures from tubes showing Salmonella growth characteristics were tested against polyvalent "O" and "H" antisera (Wellcome Ltd.) and agglutinating cultures sent for serotyping. The origins and serotypes of the *salmonellae* isolated are given in Tables 6 and 7.

Humans

Blood, urine and stool specimens submitted to Public Health laboratories were bacteriologically examined for salmonellae. Stool samples, after enrichment in selenite and incubation at 37°C for 18–24 h, were streaked onto either Salmonella/Shigella agar or desoxycholate citrate agar, after which they were incubated at 37°C for 18–24 h. Blood or urine was initially by enriched in glucose saline before a few drops were streaked onto McConkey - bile salts - lactose - crystal violet agar and incubated for 18 to 24 h at 37°C. Non-lactose fermenting colonies were subcultured into DCA and incubated for 18 to 24 h at 37°C. In all cases suspect colonies were inoculated into Kligler slope/butt tubes and further incubated for 18 to 24 h at 37°C. Suspect cultures were identified serologically using either Wellcome or Difco sera. The numbers of specimens found to be positive for salmonellae, as well as some serotypes are given in Table 8.

DISCUSSION

During the period under revue at least 8 410 isolations of *Salmonella* spp. were made in Rhodesia. Of these 10,6% came from various sites at abattoirs; 2,7% from 7 species of domestic animals; 1,2% from 6 species of birds and 85,4% from humans. From these isolations

Table 6: *SALMONELLA* ISOLATED FROM SPECIMENS FROM DOMESTIC ANIMALS SUBMITTED BETWEEN 1972–1976

Animal	*S.dublin*	*S.typhimurium*	*S.enteritidis*	Other	Total
Cattle	99	23	5	*S.essen* (1) *S.hindmarsch* (2) *S.infantis* (3) *S.kiel* (3) *S.bovis-morbificans* (1) *S.heidelberg* (3) *S.limbe* (1)	164
Pigs	–	6	3	*S.bovis-morbificans* (1) *S.heidelberg* (1)	16
Sheep	–	–	1	*S.uppsala* (1)	2
Horses	–	2	–	*S.virchow* (4) *S.heidelberg* (1) *S.paratyphi A (1)*	10
Dogs	2	3	1	*S.virchow* (1) *S.bradford* (1) *S.bovis-morbificans* (1)	10
Rabbit	1	–	–		2
Chinchilla	–	9*	6	*S.muenchen* (1)	20

(*8 from one outbreak)

Table 7: *SALMONELLA* ISOLATED FROM AVIAN SPECIMENS SUBMITTED DURING THE PERIOD 1972–1976

Species	*S.gallinarum*	*S.typhimurium*	Other	Total
Chicken	16	8	*S.enteritidis* (1) *S.virchow* (1) *S.montevideo* (1) *S.stanley* (2) *S.infantis* (2) *S.equatoria* (7) *S.heidelberg* (2) *S.norwich* (1) *S.colindale* (1) *S.braenderup* (6) *S.schwarzengrund* (1) *S.newlands* (1)	86
Turkey	–	1		3
Guinea fowl)	–	1	*S.enteritidis* (2) *S.cambridge* (1)	
Game birds)		–	*S.schwarzengrund* (1)	4
Cage brids	–	3 parrot	*S.colindale* (1)-pigeon	3

Table 8: *SALMONELLA* ISOLATIONS FROM HUMAN SPECIMENS SUBMITTED TO THREE PUBLIC HEALTH LABORATORIES DURING 1968–1976

Serotypes	Public Health Lab. Salisbury		Harari Hospital Lab. Salisbury		Group Lab. Bulawayo
	Urine) Stool)	Blood	Urine) Stool)	Blood	Stool
S.typhi	379	566	307	1 065	421
S.typhimurium	75	nk	63[2]	56	203
S.heidelberg	1 006	nk	nk	nk	210[3]
S.infantis	nk	nk	nk	nk	55
Other[1]	529	nk	195	nk	547

Note:
1. Most other serotypes were Group C or D. nk = not known
2. 6 year period
3. Isolated in one outbreak

72 serotypes have been identified. Most serotypes fell into Sub-genus I, involving nearly the whole range of sero-groups. Twenty five isolations (five serotypes) identified from sources in abattoirs belonged to the Sub-genus II, as well as 100 isolations (of which 10 were *S. sofia* normally found in tortoises) made from Africans(mainly young children). One isolation, made from bovine tongues, was identified as *S. soesterberg* (Sub-genus IV). Identification of a variety of *Salmonella* serotypes from many sources widespread throughout the country would seem to suggest that this genus of bacterium is as ubiquitous in Rhodesia as in other countries.

A wide range of *Salmonella* serotypes was isolated from sources in abattoirs. The most frequently identified were *S. senftenberg* (3,4%). *S. newington* (1,9%), *S. mobeni* (1,6%), and *S. typhimurium* (1,4%). The incidence of salmonellae isolated from food commodities for human consumption was low. However the incidence in tripes (and casings) was disturbingly high in view of the fact that these items form a desirable addition to the diet of the indigenous population. The higher incidence of positive samples from the bile receiver compared with that from gall bladders suggests that the bile collection point may be an important source for contamination in an abattoir.

In general, serotypes appear to be similar to those found in domestic animals and man. With some exceptions, these serotypes are dissimilar to those isolated from abattoirs, meat, butcheries and humans in South Africa[9 8 7 12] and in Nigeria[6]; Feedingstuffs of animal origin commonly contain salmonellae but seldom include *S. typhimurium* and rarely *S. dublin*[3π] Serotypes isolated from meat & bone meal and blood meal in this country would appear to agree with this finding.

Drains and effluent material yielded the highest incidence of positive abattoir samples. Similar findings have been reported from South Africa[5]. Effluent may be used in the irrigation of pastures and in view of the ability of *Salmonella* to survive in the invironment under different conditions[11] and the possible transmission by bird vectors[10] abattoir effluent should be carefully monitored and disposed of.

From specimens submitted from domestic animals the most frequently isolated serotypes were *S. dublin* (45,5%) of which 97,0% were from cattle, 2,0% from dogs and one from a rabbit; *S. typhimurium* (18%) of which 54,1% came from cattle, 21,0% from chinchillas, 14,0% from pigs and 7,0% from dogs; *S. enteritidis* (7,1%), *S. heidelberg (2,2%), S. virchow* (2,2%) and *S. bovis-morbificans* (1,8%). *S. dublin* appears to be almost host specific as, with the exception of two isolations from dogs and one from a rabbit, none were identified from sources other than cattle, although this serotype has been identified from children[13]; No. *S. dublin* were isolated from 515 fresh faeces samples taken from cattle awaiting slaughter in Rhodesia and *S. dublin* was isolated only once from abattoir samples (Table 3). These findings would seem to indicate that healthy animals in Rhodesia do not form an important reservoir of *S. dublin.* On the other hand *S. typhimurium* has been frequently isolated from several sources, including abattoirs and food.

Evidence shows that sheep do not serve as important reservoirs of *Salmonella* in Rhodesia. Only two isolations were made from sheep (Table 6). Similar findings in West Africa have been reported[6]. *Salmonella* has been isolated in 14 out of 1718 (0,8%) pig mesentery lymph node samples taken during a three year period in Rhodesia. Also three (5,0%) of sixty samples of pig intestinal contents were positive for salmonellas, *(S. mobeni, S. westhampton)* and two (0,3%) of 867 "cocktail" (muscle, kidney, lymph node & spleen) samples from pigs detained for septacaemia yielded salmonellae *(S. wellingtom & S. cambridge);* No *S. cholera-suis* has been identified in Rhodesia.

The incidence of *Salmonella* in birds appears to be low, although a number of different species have been found to harbour the infection. (Table 7). No isolation of *S. pullorum* was made. The serotypes identified, with the exception of *S. typhimurium,* appear to be different from those isolated from other animals. Meat and bone meal of animal origin, used as poultry feed, may not yet constitute an important source of infection for poultry, a possibility suggested by other authors[2 5]. This should give no cause for complacency and methods for the prevention of contamination of poultry feed should continually be observed.

The isolation of *Salmonella* in reptiles in Rhodesia has not been reported but isolations have been made in other parts of Africa[6]. However, serotypes from Sub-genus II, normally found in reptiles, have been isolated from animals, abattoir and human specimens in Rhodesia as well as in South Africa[1 9 8]. These findings suggest that reptiles may play a role in the epidemiology of this organism in Africa.

Zilberg[13] reports that 180 isolations were made from 2 653 children (European) with gastro-enteritis in Salisbury, an incidence of 7,0%. Of these 2,2% were *S. typhi* and 5,6% were *S. typhimurium.* Approximately 22 000 stool samples examined at the Bulawayo Group Laboratory (mostly from young African children) yielded approximately 6,5% salmonellae, of which 29,3% were *S. typhi,* 14,0% *S. typhimurium,* 15,0% *S. heidelberg* and 3,8% *S. infantis.* Approximately 1,4% of urine/stool samples examined at the Public Health Laboratory, Salisbury, yielded salmonellae. Of these 20,0% were *S. typhi,* 9,0% *S. typhimurium,* and 56,0% *S. heidelberg.* Most serotypes identified from all three groups of human specimens were similar to those identified from other sources in Rhodesia described elsewhere in this paper. Rectal swabs from healthy

abattoir workers (African) in Rhodesia yielded *S. typhimurium* in 5(8.9%) of 56 positive swabs. A similar incidence in the isolation of this serotype from healthy African children in South Africa is reported[1]

CONCLUSIONS

Salmonellosis does not appear to be a serious problem in animals, abattoirs and birds in Rhodesia at the present time. Isolation of *Salmonella* from a wide range of sources suggests, however, that a serious potential threat exists and this survey underlines the necessity for continuing and more vigilant surveillance and monitoring of domestic animals, birds and slaughter houses as well as humans. A national salmonella surveillance should be inaugurated and co-ordinated as a joint effort of the veterinary and public health services. The introduction of a National Salmonella Register of all *Salmonella* isolations needs serious consideration.

ACKNOWLEDGEMENTS

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BOOK REVIEW

BOEKRESENSIE

POULTRY MEAT HYGIENE AND INSPECTION

A. S. BREMNER

Bailliëre Tindal: London 1977, pp. ii, 186, Figs 27, Publ. Price R6,65.

The author is Adviser in Poultry Meat Hygiene with the Veterinary Service of the British Ministry of Agriculture, Fisheries and Food. The EEC directive on poultry meat hygiene has highlighted the need for a text on this subject and the author has made a special study of poultry meat hygiene in several countries. The EEC directive requires an inspection service to function under a veterinarian responsible for inspection and plant hygiene – assisted by poultry meat inspectors. This book is intended to provide some of the information required in the training of the latter.

After discussing selected aspects of Poultry Production, the author deals consequtively with Avian Anatomy, the Construction and Layout of an Approved Poultry Slaughter Plant, some Technical Aspects of Slaughtering and Dressing Poultry, the Bacteriology of Poultry Meat, Ante-Mortem Inspection, Hygiene of Production (Two Parts), Post Mortem Inspection relevant to Techniques and Processing Faults as well as Disease Conditions, Additional Processing and the Storage and Transport of Poultry Meat. An Appendix provides details of the Poultry Meat (Hygiene) Regulations 1976 now in force in the United Kingdom.

The book is clearly written and printed; the illustrations are excellent. Primarily intended for trainee inspectors, it contains a wealth of practical information which the veterinarian who is already engaged in poultry meat hygiene and inspection or who is about to enter this field will find interesting and useful. It fills a long felt need and has a definite place on the desk of all who are concerned with this important and growing source of food of animal origin.

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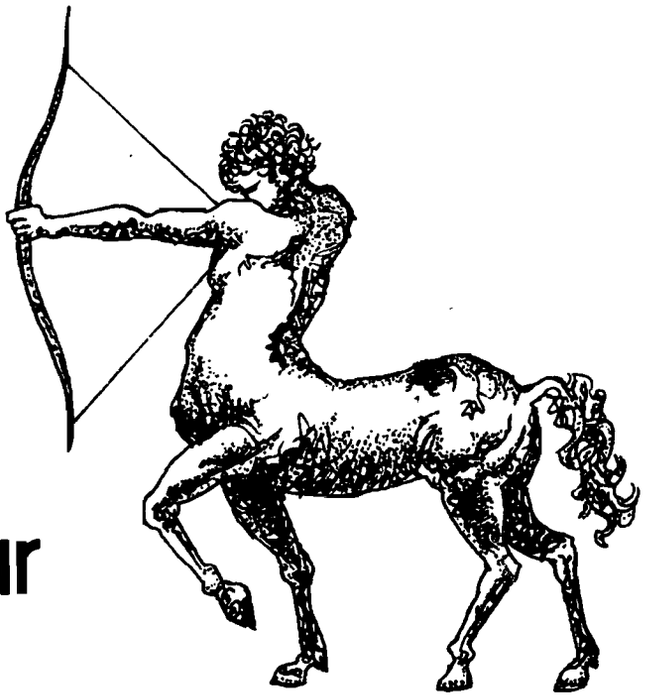

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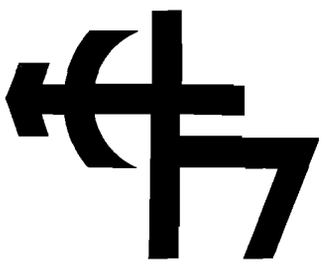

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COMMON CANINE DERMATOSES*

P. BLAND-VAN DEN BERG

ABSTRACT: Bland-van den Berg, P. **Common canine dermatoses.** *Journal of the South African Veterinary Association* (1977) **48** No. 4, 247 – 253 (En) Dept. Med., Fac. Vet. Science, Univ. Pretoria, Box 12580, 0110 Onderstepoort, Rep. of South Africa.
Refractory canine skin disorders from a large percentage of the cases referred to the Department of Medicine, Faculty of Veterinary Science, University of Pretoria. Included in these conditions are allergic skin diseases, primary pyoderma, generalised pustular demodicosis, endorine alopecia, dermatomycosis, seborrhoea, acral pruritic nodule and nasal solar dermatitis. These conditions are discussed with emphasis on aetiology, pathogenesis, diagnosis and treatment. Thirteen colour plates illustrate the classical appearance of the dermatoses described.

INTRODUCTION

Refractory skin conditions comprise approximately 20% of the cases referred by practitioners to the Department of Medicine of the Faculty of Veterinary Science, University of Pretoria. Over the past 3 years the "canine pruritic syndrome" has been the most common cause for referral, followed by deep primary pyoderma, generalised pustular demodicosis, endocrine alopecia, dermatomycosis, seborrhoea, acral pruritic nodule and finally nasal solar dermatitis. This report reviews some of the basic causes and pathophysiology of these conditions and discusses the diagnostic techniques and therapeutic measures employed in this department in their management.

CANINE DERMATOSES

"Canine pruritic syndrome"

Although there are a number of causes of canine pruritus the most common cause appears to be "allergy". It is now well recognised that allergies may be of two types. the immediate type and the delayed type[1 9]. Immediate type allergies include the inhaled (canine atopy) and ingested (food) allergies, while delayed type reactions are mainly associated with "contact" allergies. Flea bite dermatitis is generally considered to be a combination of both[3 16 17]. A basic knowledge of the underlying mechanisms involved in immediate and delayed type allergic reactions is essential in the understanding of the symptomatology, diagnosis and treatment of these cases.

Immediate type reactions are mediated by immunoglobulin E (IgE), also known as the "reaginic" antibody[1 9 10]. IgE is formed by immuno-competent cells (plasma cells transformed from B lymphocytes) on exposure to an antigen[1]. The production of IgE is particularly marked in so-called atopic individuals, animals with an apparent hereditary propensity to form this immunoglobulin class[8]. Following production of IgE the antibody attaches to the surface of tissue mast cells and circulating basophiles[1 9]. On combination of the antigen with its specific antibody the antigen-antibody complex alters the structure of the cell membrane and the release of a number of pharmacologically active substances occurs. Included in these substances are histamine, serotonin, kinins, slow reacting substance A, prostaglandins, heparin and proteolytic enzymes[1 4 8 9]. It is these substances which are then responsible for the production of symptoms. In man, with a high concentration of mast cells in the respiratory tract, the symptoms are mainly respiratory (ie asthma) while in the dog, with a high concentration of these cells in the skin, pruritus commonly results[8].

In the delayed type reactions an entirely different process occurs and IgE is not a part of these reactions. Instead the T lymphocyte plays a vital role and a cellular rather than a humoral reaction takes place[1 9]. On exposure to the contactant sensitized T lymphocytes produce so-called lymphokines. These are responsible for the production of many more sensitized T lymphocytes (mitogenic factors), the aggregation of macrophages in the area of the reaction (macrophage migration inhibition factors) and the destruction of antigen and host cells (cytotoxic factors)[1]. The lymphocytic, macrophagic, necrotic reaction, reflected clinically by inflammation and pruritus, is thus not associated with the release of pharmacologically active substances such as histamine etc.

(i) Canine atopy

Canine atopy is an immediate type allergic reaction and is perhaps the most common cause of canine pruritus. The term atopy has come to imply two things, namely an inherited predisposition to allergy (ie the increased propensity to produce IgE as mentioned above) and the inhalation of the allergen. Potential allergens include a large nuber of airborne particles such as pollens, house dust and fungal spores. The high incidence of pollen allergies results in a tendency to seasonal exacerbations co-inciding with the production of the offending pollen (the syndrome is also known as seasonal pollinosis). Initially at any rate pruritus may therefore be confined to certain periods of especially the summer months. However, as the animal becomes older, new allergies develop through the greater tendency to IgE production and the period of pruritus becomes more extended. Eventually pruritus may be present for most of the year, although the tendency for greater problems in summer is maintained.

The chief symptom of canine atopy is of course pruritus, involving more or less the whole body but with particular involvement of the feet and ventral portions of the thorax and abdomen. Rarely symptoms of "hay fever" may occur with lacrimation, a nasal discharge and sneezing. The latter symptoms, if present, are very characteristic, since they do not occur with delayed type reactions. Self-traumatization following pruritus will lead to the development of skin lesions including

*Presented at the Annual Congress, Pretoria Branch, SAVA, June 1977.

alopecia, erythema, papules, scales, crusts, excoriations (acute moist dermatitis may sometimes develop) and in the chronic case hyperkeratosis and hyperpigmentation.

The diagnosis of canine atopy depends on history and clinical observation (a high suspicion index for this condition should always be retained in all cases of canine pruritus), and may be confirmed through the use of intra-dermal skin testing. The latter technique is based on the immediate type reaction which is the basis of this syndrome. A small amount of the allergen injected intra-dermally will combine with specific IgE antibody on mast cell surfaces and cause the release of pharmacologically active substances. These are then responsible for the typical wheal and flare reaction which may be observed and measured within minutes after the injection. It is convenient to use allergens supplied for human use. Using a tuberculin syringe, 0,02 ml is injected intra-dermally into marked areas of the skin, usually on the abdomen, resulting in a bleb approximately 5 mm in diameter. Readings are then taken at 10, 20 and 30 m after injection and compared with a control injection. An increase in size between 10 to 15 mm is considered suspicious, while an increase to 15 mm plus is considered positive. False positives rarely occur and usually only when too large a dose is injected[4]. False negatives occur more frequently and are associated with a faulty injection technique: antigen injected subcutaneously or air bubbles in the syringe, the use of out-dated antigen or the injection of antigen into an animal recently treated with cortisone (in general, cortisone must be withdrawn approximately 6 weeks before the test)[4]. In a typically atopic dog reactions are seen with a number of antigens leaving little doubt as to the diagnosis.

Theoretically two alternatives are now available for treatment. Hyposensitization, using repeated injections of the identified allergens in increasing dosages over a period of time to induce the formation of "blocking IgG antibodies", would appear to be rational[4 8 17]. However a number of drawbacks exist. The procedure is costly and time-consuming and apart from this it is difficult to identify all the potential allergens and to include these in a desensitization program. Furthermore it may well be that by the next season the dog is allergic to a whole new crop of substances with a subsequent recurrence of symptoms. For these reasons, despite the attractiveness of the idea, hyposensitization is rarely performed in this department.

The other alternative is to accept that the dog is destined to be atopic for the rest of its days, and to provide relief by the judicious use of antihistamines and corticosteroids or combinations of these. The use of antihistamine is rational, because as discussed earlier, histamine is released during the immediate type reaction. In many cases of atopy antihistamine (eg promethazine HCl)* alone may be effective in controlling the symptoms. However, other pharmacologically active substances such as serotonins, kinins etc. are released, against which antihistamine has no effect, and therefore cortisone must be used in some cases. As always the desirability of maintaining as low a dose of cortisone as possible should be borne in mind. In general this can best be achieved by using short-acting corticosteroids (eg prednisolone**) in oral form, given daily, every second day or even once or twice a week in the morning in order to fit in with the normal diurnal fluctuation of endogenous cortisone production. The dose of cortisone may be further reduced by combining antihistamine and cortisone and proprietory products are available containing these two drugs† ††. The use of frequently repeated long-acting injectable corticosteroids has a far greater risk of causing untoward side-effects, and for this reason it is our opinion that they should be avoided. The control of canine atopy, based on the above principles, has proved satisfactory in a large percentage of positively identified cases.

*Phenergan – Maybaker (SA) (Pty) Ltd.
**Medrol – Upjohn (Pty) Ltd.

(ii) Delayed type hypersensitivity

Delayed type hypersensitivity reactions, ie contact allergies, differ from canine atopy in a number of important points. There is no strong hereditary basis for this syndrome. Subsequently a contact allergy is likely to be due to one specific substance which the animal lies on or walks through. It is unlikely to develop into a multiple reaction with a number of contactants involved. It may be seasonal or non-seasonal depending on the nature of the contactant. Many substances are present throughout the year and symptoms tend therefore to continue unabated through winter and summer. The main symptom, like atopy, is pruritus, but areas of involvement are fairly constantly confined to the ventral portion of the body (Fig. 1). Occasionally lesions are confined to the lips and external genitalia, the so-called "cheilo-genital" syndrome (Fig. 2). Skin lesions are often of the more chronic type with hyperpigmentation and hyperkeratosis being especially marked.

The diagnosis cannot be made by intra-dermal testing since no rapid wheal and flare reactions occur as no pharmacologically active substances are released. The only method of diagnosis is by "patch testing", which implies the close contact of the suspected allergen with the skin for a minimum of 72 h (the time necessary for a delayed reaction to occur)[17 18]. The test can be quite crudely done by strapping (with elastoplast under gauze dressing) approximately 100 mm² of squares of carpet, blanket, upholstery fabric etc., to the skin of the abdomen. Unlike the small "patch" of elastoplast used in man, the strap is best taken around the abdomen. This minimises interference with the test by the animal which may be especially marked if pruritic positive reactions occur. Positive reactions are characterised by inflammatory signs (mainly erythema) directly under the "patch", and are mediated, as mentioned, by sensitized T lymphocytes. In many cases the positive identification of a contactant allows the removal of the offending substance or material, with resultant immediate cessation of symptoms. Where this cannot be achieved the only treatment is the suppression of the reaction by the administration of cortisone. Dosage of cortisone must invariably be high and maintained for indefinite periods, with consequent undersirable effects in the animal. Antihistamines have no effect since histamine is not released, and hyposensitization is not possible since there is no humoral reaction to be blocked by a blocking antibody. The value of positive identification and removal of a contact allergen is therefore obvious.

†Bucoderm – S.A. Cyanamid (Pty) Ltd.
††Temaril P – Smith Kline & French (Pty) Ltd.

Fig. 1 Contact allergic dermatitis characterised by ventral alopecia, hyperpigmentation and hyperkeratosis.

Fig. 2 Contact allergic dermatitis with lesions localised to the lips and external genitalia ("Cheilo-genital eczema").

Fig. 3 Severe generalised demodicosis with secondary bacterial infection.

Fig. 4 Hypothyroidism associated with obesity and truncal alopecia.

Fig. 5 Hyperadrenocorticism characterized by pendulous abdomen, generalised alopecia and thinning of the skin.

Fig. 6 Hyperoestrogenism in the bitch with enlargement of the vulva, gynaecomastia, ventral alopecia and hyperpigmentation.

Fig. 7 Sertoli cell tumour in the male with gynaecomastia, preputial enlargement, alopecia and lichenification.

Fig. 8 Dermatomycosis associated with irregular, disseminate, hyperaemic, pruritic lesions.

Fig. 9 Photodermatitis ("Collie nose").

Fig. 10 Deep primary pyoderma of the legs and abdomen.

Fig. 11 Flea bite dermatitis with characteristic lumbo-sacral lesions.

Fig. 12 Acral pruritic nodule.

Fig. 13 Seborrhoea oleosa characterised by alopecia and oily crusts.

(iii) Flea-Bite dermatitis

Flea-bite dermatitis is a common cause of canine pruritus. Flea saliva, acting as an hapten (a substance which must combine with a tisssue protein before becoming a complete immunogen), causes both immediate and delayed type reactions, with resultant seasonal pruritus and acute and chronic skin lesions[16 17]. Intra-dermal testing using flea saliva antigen gives variable results and the diagnosis is best made on the seasonal incidence and the characteristic distribution of the lesions in the lumbosacral area (Fig 11), perineum, medial aspects of the back legs and the ventral abdomen.

Treatment aimed at flea control can be most rewarding and the recently available carbamate type flea collar* is especially useful in this respect. Low level oral corticosteroid therapy is, however, necessary in some cases. Hyposensitization using a 1:5 000 w/v crushed flea suspension in phenol glycerol saline (0,5 g phenol, 5,0 ml glycerol, 0,85 g sodium chloride, distilled water to 100 ml) is a third alternative which sometimes gives exceptionally good results[12]. At the beginning of the flea season 0,5 ml of the preparpation is injected intradermally at weekly intervals for 3 weeks. Booster injections during the season are sometimes necessary as well as at the beginning of subsequent seasons. Of the three forms of treatment, flea control is the most rational and it is this facet which is concentrated on in our department.

(iv) Food allergies

Food allergies are rarely diagnosed amongst the cases referred, although a few memorable ones have been seen, including one dog presented with a severe pyoderma with purulent exudation from the skin and swelling of regional lymph nodes associated with a severe pruritus. The condition had proved refractory to intensive systemic and topical antibiotic therapy. On food withdrawal for 3 days (the standard test for food allergies, water only being given) the lesions showed a marked improvement. On re-introduction of the offending food (commercial cubes), pruritus was again noted, associated with severe gastrointestinal signs in the form of watery diarrhoea. The dog, although obviously hungry, became reluctant to continue eating the food. A change to another proprietory brand of dog food resulted in spontaneous remission of dermal and intestinal signs and a return of normal appetite.

Food allergies therefore play a role in the canine pruritic syndrome but their incidence is low, and canine atopy, contact dermatitis and flea bite dermatitis should be eliminated first. Diagnosis of a food allergy is relatively simple requiring only, as mentioned above, the withdrawal of all food for 3 days.

(v) Mites and fungi

Sarcoptic mange remains a relatively common cause of canine pruritus. The demonstration of parasites, even with floatation techniques[17], is difficult and the diagnosis is often best made on the response to acaricidal therapy.

Finally, a few cases of demodicosis and dermatomycosis present as pruritus. In these cases, which are normally not pruritic, it is thought that a hypersensitivity to the causative organism develops, i.e. an immediate type allergic reaction with resultant pruritus[17]. Diagnosis is made on demonstration of the organism by scraping and fungal culture. Treatment may be difficult, especially with demodicosis, since control of pruritus depends on virtual sterilization of the infection.

Pyoderma

Individuals of certain breeds, the Bull Terrier and Dalmation especially, are commonly referred to our clinic suffering from localised or generalised deep primary pyoderma. Breed susceptibility raises the question of hereditary factors and it appears that an hereditary immunodeficiency may exist in affected animals[7 19]. The immunodeficiency takes the form of a deficient B or T lymphocyte response (i.e. humoral and cellular immunity) or possibly inadequate neutrophile function (inability to phagocytose micro-organisms)[7]. The production of abnormal sebum may be another (hereditary?) factor leading to the invasion of organisms[7]. Recognition of the state of immunodeficiency has certain implications in respect of treatment.

The diagnosis of primary pyoderma is made on the fairly characteristic appearance of the lesions which usually appear on the face, abdomen or legs (Fig. 10), the culture and identification of a pyogenic organism (almost all cases referred to us in the past 3 years have been due to *Staphylococcus aureus* infection), and the elimination of other aetiological agents, especially Demodex.

Therapy is based on the judicious use of antibiotics and/or the stimulation of immune mechanisms. By culture of the causative organism and subsequent determination of antibiotic efficiency by means of an antibiogram specific antibiotic therapy can be applied both systemically and topically. The chosen drug (cloxacillin*, ampicillin** and lincomycin*** are commonly used in our clinic) should be given in maximum doses at the correct interval and should be maintained for relatively long periods of time (10 to 20 days) before changing to alternative drugs. Topical treatment is probably most beneficial when the antibiotic is mixed with dimethyl sulphoxide (DMSO)**** to promote penetration. The antibiotic, again chosen on the results of the antibiogram, is applied as a 10% solution (e.g. 10 g of chloramphenicol***** in 100 ml of DMSO) four times daily to the affected areas using suitable precautions in the form of gloves, thumb forceps and cotton wool. DMSO is potentially toxic to the user and will readily penetrate the intact skin. Toxicity in dogs has not been observed. In many cases effective systemic and topical antibiotic treatment will be successful in resolving even severe lesions.

In those cases which fail to respond stimulation of the immune system may be attempted. Autogenous bacterin vaccine prepared from the original cultures is routinely used for this in our department. A number of factors play a role in the preparation of the vaccine.

*Vet-Kem – Thuron Industries, Dallas, Texas.

*Orbenin – Beecham Pharmaceuticals (Pty) Ltd.
**Penbriten – Beecham Pharmaceuticals (Pty) Ltd.
***Lincocin – Upjohn (Pty) Ltd.
****Dimethyl sulphoxide – Centaur Laboratories (Pty) Ltd.
*****Choramphenicol – Centaur Laboratories (Pty) Ltd.

most important being the presence of a sufficiently large number of organisms in the culture. Vaccine is administered by subcutaneous injection over a relatively long period of time in increasing dosages (in our clinic 9 to 12 injections over as 6 to 8 week period are given depending on the response). Localised swelling and abscessation are occasionally noted but in general dogs tolerate the course of injections well. The results are in many cases very good, although some dogs do not respond, while others respond initially but relapse after some months. For these cases a second course of vaccine prepared from new cultures may be attempted.

A second means of stimulating immunity may be the administration of levamisol* at the rate of 5 to 10 mg/kg body mass every second day for a minimum of 6 weeks. The stimulatory effect of levamisol on the T lymphocyte is now well recognised and the drug has been used in man and animals in a number of immunological disorders and chronic infections[11]. The effects in canine pyoderma have still to be fully evaluated. Our initial clinical impressions are favourable however, although the drug is generally used in combination with antibiotics or a course of autogenous bacterin vaccine which makes the evaluation of its specific contribution difficult.

Finally, it may be pertinent to note that we consider the use of long-term corticosteroid therapy to be contraindicated in the treatment of most cases of pyoderma. The depressive effects of prolonged cortisone administration on immune mechanisms in a condition where immunodeficiency appears to be the predisposing factor makes their use illogical. The only cases where cortisones may be rationally used are those cases where bacterial hypersensitivity plays a role. This phenomenon is seen mainly in juvenile and interdigital pyoderma and rarely in the more generalised pyoderma described above.

Generalised demodicosis

Severe generalised demodicosis (Fig. 3) remains, as always, a frustrating therapeutic problem. However, some new concepts as to the pathogenesis and treatment have emerged which may improve results. It has for some time been known that many dogs carry some *Demodex* parasites without developing lesions[20]. Other dogs develop the localised dry or squamous form of the disease while yet others develop the severe generalised or pustular form. Predisposing factors leading to the development of severe lesions were traditionally considered to include intestinal parasitism, inadequate nutrition or intercurrent debilitating disease[20]. However, observations that littermates often develop the generalised form simultaneously, even though they may be living under different environmental conditions, and that certain breeding bitches have the tendency to produce successive litters of such pups led to the idea that hereditary factors could be involved[21]. It was subsequently shown that the basis for this hereditary predisposition could again be a cellular immunodeficiency. A specific inherited T lymphocyte deficiency has been proposed, allowing the demodex parasite to multiply in the skin[21]. Once established in large numbers the parasite seems capable of producing a substance which further suppresses cellular immunity[21]. The result is the rapid development of severe lesions.

Treatment is aimed at the control of secondary infection (cleansing of the skin, cultures, antibiogram and specific antibiotic therapy) and elimination of mites by means of acaricidal therapy and stimulation of immune mechanisms. As an acaricidal agent an 8,5% Ronnel solution (365 ml Ronnel* concertrate, 900 ml propylene glycol and 150 ml isopropyl alcohol) applied to one third of the body per d has been found very effective[2 21]. The solution is however expensive and potentially hepatotoxic, and weekly monitoring of serum glutamic pyruvic transaminase levels is advisable.

For stimulation of immune mechanisms levamisol may again be tried and some promising results have so far been achieved. Once again its full value as an adjunctive treatment in demodicosis will only become apparent with more widespread clinical usage. The full implications of prolonged cortisone therapy should once again be obvious and we consider its use totally contra-indicated in the treatment of demodicosis. Treatment for severe demodicosis should be intensive and maintained for a minimum of 3 months before being considered hopeless.

Endocrine alopecia

Cases of skin disease resulting from hypothyroidism, hyperadrenocorticism and hyper- or hypo-gonadism are relatively commonly referred.

(i) Hypothyroidism

Hypothyroidism is classically associated with non-pruritic symmetrical alopecia, scaling and increased pigmentation of the skin of the trunk, together with obesity (myxoedema) (Fig 4), lethargy, sensitivity to cold, lack of libido or abnormal oestrus cycles and slight anaemia[17]. Atypical cases do however occur, with localised myxoedema of the head and neck with wrinkling of the skin of the forehead and thickening of the eyelids, and alopecia of the tail or dorsum of the nose. Hypothyroidism may also be the underlying condition in pyoderma, especially of the feet, and seborrhoea. The atypical forms are not normally associated with obesity, lethargy etc. Diagnosis of hypothyroidism in our department depends on history and clinical observation with confirmation based on cholesterol, tri-iodothyronine (T3) and thyroxin (T4) determinations. The latter sensitive tests are direct measurements of T3 and T4 by means of radio-immunoassay and are the only reliable means of establishing thyroid function. We generally do not attempt to differentiate between primary (thyroid malfunction) and secondary (deficiency of pituitary thyroid stimulating hormone TSH) hypothyroidism (classically the TSH response test is used for this). If a hypothyroid state exists replacement therapy is necessary – whether it is primary or secondary is of no great practical significance. For replacement therapy we

*Ripercol-Ethnor (Pty) Ltd.

*Ectoral Emulsifiable Concentrate – Pitman – Moore Inc. Washington.

advocate the use of combined T3 and T4* (T3 is considered to be the active hormone although this has not been finally established) at relatively high doses. Initially 10 to 40 micrograms (total T3 and T4) per kg body mass per d is given in two divided doses. This dose should, however, be modified according to effect. Response to therapy is usually very satisfactory.

(ii) Hyperadrenocorticism

Suspected cases of hyperadrenocorticism (canine Cushing's disease) are presented from time to time. Typical symptoms include polydipsia, polyuria, polyphagia, lethargy, muscle wasting and weakness, pendulous abdomen, redistribution of fat, and skin lesions consisting of symmetrical alopecia of the trunk (Fig. 5), thinning of the skin, macules surrounded by peeling keratin and calcinosis cutis[13 17]. Prolonged anoestrus in the bitch and testicular atrophy in the male may also be observed[13]. Confirmation of the diagnosis depends on haematological examination, determination of blood sugar, cholesterol, sodium, potassium, and calcium, and urine analysis. In classic cases leucocytosis, neutrophilia, lymphopenia, eosinopenia, hyperglycaemia, hypercholesterolaemia, hypernatraemia, hypokalaemia and hypercalcaemia may be seen together with polyuria and a low urine specific gravity (± 1.010)[13 14 17]. In addition determination of plasma cortisol, ACTH stimulation tests and dexamethazone depression tests may be attempted. In a number of cases, despite all the above determinations, we find the diagnosis remains somewhat inconclusive. Literature references point to treatment using the DDT derivative o,p DDD*, (to effect a "chemical adrenalectomy") as being the most practical approach to therapy[5 13 14]. Precautions must be taken to avoid overdosage with subsequent induction of an Addisonian type crisis. We have as yet had little experience with this drug.

(iii) Hyperoestrogenism

Hyper-oestrogenism in the female is a characteristic, easily recognizable syndrome generally associated with ovarian cysts. Symptoms include gynaecomastia, enlargement of the vulva, oestrus cycle abnormalities and pseudopregnancies associated with alopecia, hyperpigmentation and lichenification(Fig. 6) of the genital area, perineum and flanks[17]. Skin lesions can ascend along the ventral abdomen to involve eventually the axillary regions. Secondary seborrhoea is common. Diagnosis can generally be made on the clinical appearance and confirmation (blood and urinary oestrogen levels) is seldom necessary. Treatment is surgical, i.e. ovarohysterectomy.

(iv) Sertoli cell tumour

Sertoli cell tumour in the male is another easily recognizable syndrome resulting from an oestrogen producing neoplasm of an often abdominally retained testicle. Feminization characterized by gynaecomastia, atrophy of the testis in the scrotum, enlargement of the prepuce, loss of libido and prostatic enlargement is associated with alopecia, hyperpigmentation, lichenification and seborrhoea of especially the genital, perineal and flank areas (Fig. 7), although spread to the abdomen and trunk can occur[5 17]. Diagnosis is on clinical appearance and treatment is by castration and testosterone replacement therapy.

(v) Male feminising syndrome

A syndrome resulting in symptoms identical to those seen with the Sertoli cell tumour is the so-called "male feminising syndrome"[17]. In contrast to the Sertoli cell tumour, however, both testes are present in the scrotum and palpably normal, and histological examination fails to reveal neoplastic tissue[17]. Furthermore there are no significant changes in serum oestrogens or androgens[15]. The diagnosis must therefore be made on symptoms and on the exclusion of differential diagnoses, and confirmation is obtained following a response to castration and testosterone replacement therapy. Most of the cases of male feminizing syndrome seen in our clinic have been in the toy Pomeranian breed.

Dermatomycosis

It has become very obvious that not all cases of dermatomycosis appear as the classic circular, alopecic, scaly, nonpruritic and slightly hyperpigmented lesion. In many cases the lesions are extensive and irregular, moist, erythematous, crusted and pruritic (Fig. 8). Another factor which has emerged is that dermatophytes may be present in association with other skin pathogens, especially *Demodex* and pyogenic bacteria. Successful treatment of these "mixed infections" requires intensive therapy directed against both the fungus and the other agent involved. The above observations have been made through routine fungal culture of all referred skin cases. This has in fact proved to be the only reliable means of diagnosis. Examination under ultra-violet light and direct microscopic examination of hairs using the lactophenol-cotton blue stain have been very unreliable. Cultures must, however, be kept for up to 12 weeks before being considered negative. Routine treatment in our department involves mainly systemic therapy using griseofulvin* at a dose of 20 mg/kg body mass daily for 3 to 12 weeks together with body washes. Captab** has proved to be very effective as a wash used as a 1% solution (equivalent to a 2% solution of "Kaptan" which contains 50% inert ingredients) twice a week. Topical treatment is used only in cases with a few small localised lesions. Application of 4% thiabendazole† in vaseline or cetavlon udder cream has proved very effective for this purpose.

Seborrhoea

The aetiology of this intractable skin condition remains uncertain. Hormonal factors (hypothyroidism and gonadal imbalance), dietary factors (fatty acid deficiency) and metabolic diseases have been suggested[6]. The condition results in increased scaling with or

*Diotroxin – Glaxo-Allenbury SA (Pty) Ltd.
*Lysodren – Calbio Pharmaceuticals, California.

*Fulcin – ICI South Africa (Pharmaceuticals) Ltd.
**Kaptan – Triomf (Pty) Ltd.
†Thibenzole – MSD Laboratories.

without increased sebum production. Three forms are recognised but overlapping does occur. Seborrhoea sicca is associated mainly with fine dry scaling and alopecia. In seborrhoea oleosa (Fig. 13) alopecia and greasy scales and crusts are often accompanied by a ceruminous otitis externa, and in so-called seborrheoic dermatitis alopecia and scaling is accompanied by erythema and pruritus[6 17]. The diagnosis is somewhat vague since no specific confirmatory test exists. It depends on a thorough clinical and laboratory investigation and the elimination of differential diagnoses (fungal infections, mites, allergies, etc.) Alopecia, scaling and crusting not due to any obvious cause may thus be termed seborrhoea! The treatment is as unsatisfactory as the diagnosis since the condition is not cured, but only controlled, by therapy. Our treatment regimen consists of selenium sulphide* or tar shampoos**, thyroid, oestrogen*** or androgen**** replacement therapy, supplementation of essential fatty acids and systemic corticosteroids. This form of treatment gives relatively good results if maintained properly.

Acral pruritic nodule

This lesion is a therapeutic rather than a diagnostic problem. Its aetiology is still somewhat obscure although it is generally attributed to the "lick-itch-lick" cycle initially set up by boredom. Our standard treatment is infiltration of the lesion (Fig. 12) with long-acting corticosteroid***** under general anaesthia, followed by occlusive bandaging and oral corticosteroids. In most cases this is relatively successful. In those which do not respond infiltration with cobra venom† is tried and only as a last resort is irradiation or surgical excision attempted. Surgical results are invariably unsatisfactory. Cryosurgery may offer a more promising alternative to surgical excision.

Nasal Solar Dermatitis

This hereditary predisposition of the Collie and Sheltie (Alsation and other breeds are involved occasionally) to sunburn of the nose, eyelids and sometimes lips (Fig. 9) is again primarily a problem of treatment. Response to barrier creams and lotions, cortisones, antibiotics and vitamin A is usually unsatisfactory. We have found that tattooing affected areas by means of intra-dermal injections (25 gauge needle) of indian ink with hyaluronidase* (200 i.u. per 2 ml of indian ink) to promote spread gives remarkably consistent results.

CONCLUSION

The above comments may serve to provide some new thoughts and better results in the control of the more troublesome causes of skin disease in small animals. Careful diagnosis, particularly in respect of allergies, may be most rewarding, and may reduce reliance on non-specific suppressive measures. It is hoped too that the hazards of immunosuppression particularly in the treatment of demodicosis and pyoderma, may be more fully appreciated.

*Selium – Centaur Laboratories (Pty) Ltd, Johannesburg.
**Polytar – Stiefel Laboratories Inc, USA.
***Stilboestrol – Centaur Laboratories (Pty) Ltd, Johannesburg.
****Durateston – Organon Labs, Ltd, Surrey.
*****Depo Medrol – Upjohn (Pty) Ltd.
†Cobroxin – Hynson, Westcott & Dunning Inc, Baltimore.
*Hyalase – Fisons Limited (Pharmaceutical Division) England.

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MICROBIOLOGICAL INVESTIGATION OF MEAT WHOLESALE PREMISES AND BEEF CARCASES IN JOHANNESBURG

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ABSTRACT: Meara P.J.; Melmed Leah N.; Cook R.C. **Microbiological investigation of meat wholesale premises and beef carcases in Johannesburg.** *Journal of the South African Veterinary Association* (1977) **48** No. 4 255 – 260 (En) City Health Department, Box 1477, 2000 Johannesburg, Rep. of South Africa.

Microbiological surveillance by swabbing meat wholesaler premises revealed ineffective cleaning and build-up of bacteria. Proper cleaning, sanitation and handling resulted in a vast improvement during 1975–77.

Beef samples from the neck of carcases in the wholesale trade were investigated by microbiological methods. Excessive total bacterial counts were obtained from numerous carcases. Most carcases carried coliform organisms. Roughly 90% of carcases were contaminated with *E. coli I;* counts exceeded 10^3/g in 18% of carcases tested. Twenty serotypes of *Salmonella* were identified. Salmonella contamination decreased from nearly 5% in 1975 to less than 0,5% in 1977, and *S. aureus* contamination from 52% to 36 % during the same period. Approximately 30% of carcases revealed contamination with unidentified clostridial species.

The results indicate the need for stricter control over the production and slaughter of animals and over the handling of carcases in the wholesale trade.

INTRODUCTION

The statutory health requirements for food premises in Johannesburg and for meat are prescribed by the Standard Food-Handling By-laws[1] and the Meat By-laws[2]. These state the criteria for premises and vehicles and the duties of persons carrying out or in control of a food-handling business. The City Health Department is responsible for enforcing these requirements by inspecting and supervising the wholesale and retail raw meat outlets.

During 1974/75 the Veterinary Branch assumed control over the wholesale meat trading premises and it was decided to introduce microbiological procedures to amplify the customary macroscopic visual inspections. The investigations were started in 1975 by swabbing meat contact surfaces and items of equipment during routine inspection visits and collecting samples of meat from random beef carcases for laboratory analysis.

I. CLEANING OF WHOLESALE PREMISES AND EQUIPMENT

The objective was to evaluate the hygienic conditions of premises and working equipment and to instigate improved cleaning practice.

The overall purpose of microbiological surveillance is to eliminate pathogens and to reduce the level of bacterial contamination of premises and equipment below that of the meat handled. A variety of standards have been suggested. For instance, a total count of $<10^3/cm^2$ for plant and equipment may be regarded as satisfactory, and of $<10/cm^2$ for knives and equipment exposed to contact with diseased and suspect tissues[3]. A total count of $>46/cm^2$ for equipment is considered excessive and requires cleaning[4]. An advisory standard of $<10^3/cm^2$ for working surfaces is advocated[5] Microbiological standards recommended for surfaces are shown in Table 1:

Table 1: MICROBIOLOGICAL LIMITS FOR SURFACES[6]

Working surfaces	*Satisfactory*	*Fairly Satisfactory*
Total count/cm²	<1 000	<5 000
Coliforms/cm²	< 10	< 50
Cleaned Surfaces	*Satisfactory*	*Fairly Satisfactory*
Total count/cm²	<50	<100
Coliforms/cm²	< 1	< 5

Endeavour to comply with these advisory standards is prejudiced by the outdated design and inadequacies of the Newtown meat trading premises and by the consequent unhygienic environment. Urgent need soon became evident too, for greatly improved procedures for cleaning and sanitising premises and plant because the individuals concerned had not yet realised that the days are past when cleaning only involves sweeping or hosing down working areas. Strenuous efforts were therefore needed to persuade managements to adopt modern methods of cleansing their property, equipment and vehicles and to provide suitable environmental conditions for employees.

At the outset high pressure spray and other physical and chemical methods of removing contamination were demonstrated on site at wholesale premises and a programme of microbiological monitoring was initiated by swabbing premises and equipment for laboratory analysis. These results were then followed by discussion and by other appropriate corrective action to educate the traders how to clean their properties effectively.

METHODS

The swab method was selected for microbiological assessment of the wide variety of sampling surfaces in a meat wholesale plant. The basic procedure is to swab areas, articles or components, firstly by wet swab over a surface area of 25 cm² and immediately afterwards by dry swab as prescribed by the Standard Food-Handling By-laws of Johannesburg[1]. It is not possible to sample a known area when dealing with small items of equipment like knives, steels, hooks, etc., and such items are swabbed over all parts of the surface likely to come into

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contact with meat. These swabs were then examined in accordance with the South African Bureau of Standards Standard Method No. 756 to determine the total mesophilic aerobic count of viable organisms.

A grading system was employed to evaluate the laboratory results and to estimate the standard of efficiency of cleaning of premises and equipment by codifying the counts of viable bacteria per 25 cm² into the following working standard:

Bacterial Count/25 cm²	Item Rating	Overal % Rating	Remarks
<100	6	76 – 100	Very Good
101 – 500	5	61 – 75	Good
501 – 1 250	4	46 – 60	Satisfactory
1 251 – 2 500	3	31 – 45	Fair
2 501 – 5 000	2	16 – 30	Poor
5 001 – 10 000	1	1 – 15	Excessive
>10 000	0	0	Unacceptable

By directing attention to badly contaminated equipment the grading is useful in improving the efficiency of clean-up operations.

RESULTS

The microbiological history of the premises of all the wholesalers cannot be shown. By way of example the initial bacterial counts for three wholesale premises are shown together with the most recent test results (Table 2).

The trend of results for Wholesalers "D" and "E" over the period of investigations is also illustrated by the graphs presented in Figure 1.

The end results show vastly improved standards of cleaning and disinfection compared with the original circumstances of ineffectual cleaning and the build-up of bacteria.

Table 2: TOTAL BACTERIAL COUNTS WHOLESALE PREMISES

Wholesaler	Date	Surfaces Swabbed	Mean Bacterial Counts/25 cm²	Overal Rating – %
"A"	10.2.1975	Scale	6 500 000	
		Chiller door	5 400 000	
		Chiller door	2 300 000	
		Chiller door	1 900 000	
		Chiller door	1 900 000	
		Oilskin hat	1 500 000	
		Beam scale hook	500 000	
		Electric saw blad	500 000	
		Platform	300 000	
		Oilskin coat	200 000	
		Cover sail	200 000	0%
	12.1.1977	Scale	9 000	
		Saw	6 400	
		Chiller doors I – III	2 500	
		Wheelbarrows I – III	300	
		Beam scale hook	60	67%
"B"	8.4.1975	Galvanised offal bin I	46 600 000	
		Coversail	34 000 000	
		Tiled counter	9 400 000	
		Galvanised offal bin II	8 100 000	
		Scale pan	800 000	
		Vehicle	700 000	
		Wheelbarrow I	700 000	
		Wheelbarrow II	600 000	0%
	10.1.1977	Scale bins	23 000	
		Tiled counter	3 500	
		Plastic aprons I – III	3 000	
		Wheelbarrows I – III	1 000	
		Galvanised offal bins	1 000	62%
"C"	5.3.1975	Pillar	70 000 000	
		Meat hooks	4 500 000	
		Chiller door	3 500 000	
		Scale hooks	3 500 000	
		Meat rails I & II	2 300 000	
		Meat hooks	2 100 000	
		Rear offal container	51 000	
		Coversail	48 000	
		Offal container	29 000	4%
	10.5.1977	Chiller door	5 000	
		Scale hook	2 600	
		Handsaws	2 000	
		Large meat hooks	60	
		Small meat hooks	40	
		Plastic meat containers	40	
		Steel	30	
		Knife	20	81%

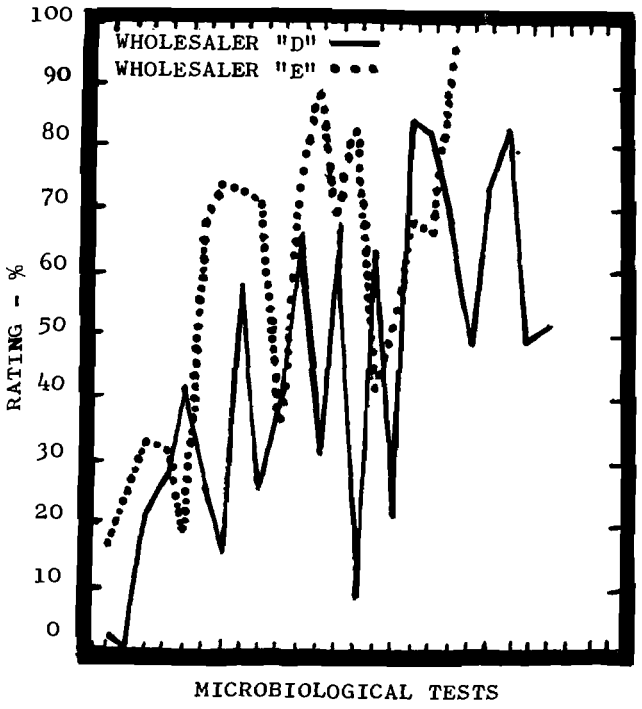

Figure 1: Efficiency of cleaning of wholesaler premises and equipment

II. BACTERIAL FLORA OF BEEF CARCASES

GENERAL

Microbial standards for water and milk were developed long ago to ensure that these supplies are safe. The International Commission on Microbiological Specifications for Foods has proposed microbiological criteria for a variety of foods but because of many variable factors bacterial standards for carcases cannot easily be formulated [3 5 7 8-10]. Even after careful abattoir dressing a carcase carries numerous bacteria. Apart from sources of abattoir supply, conditions of storage, handling, transport and post-slaughter period influence the extent of the microbial contamination and proliferation. Sampling is complicated by the large surface area, presence of both muscle and fat surfaces, uneven distribution of micro-organisms, types of bacteria and need to use a nondestructive sampling procedure[5]. As regards the laboratory investigations workers generally prefer to employ a greater number of simpler tests of reasonable accuracy rather than fewer elaborate technical analyses.

The problems of microbial monitoring of meat are being investigated by overseas workers together with the drafting of specifications and codes of practice for improving meat safety and hygiene. The South African Bureau of Standards has issued directives concerning the standard methods necessary for microbiological examination of foods but little information is yet available in South Africa regarding the microbiological quality of our meat supplies[11-13]

METHODS

The neck was selected as the site for obtaining samples of meat; this accords with a proposal adopted by the International Organisation for Standardisation that samples be taken from this region[14]. Not only is the neck an area which may be highly contaminated depending on local circumstances but sampling from this site does not significantly disfigure nor depreciate the carcase.

Arrangements were accordingly made during routine visits of inspection to wholesale establishments to collect individual carcase samples of not less than 200 g from the beef carcases available in the course of the trader's daily business operations. No control could however be employed regarding the extent of the post-slaughter period and the correspondingly variable microbial proliferation. The subsequent microbiological analysis then proceeded at Cydna Laboratory in accordance with the Standard Methods, South African Bureau of Standards as follows:

(a) SABS Method 756 – Total mesophilic aerobic count of viable organisms in foods.
(b) SABS Method 757 – Presumptive coliform count in foods – (violet red bile agar utilised in place of MacConkey agar with SABS knowledge and concurrence).
(c) SABS Method 758 – Examination for the presence of viable *Escherichia coli* I in foods.
(d) SABS Method 759 – Examination for the presence of viable *Salmonella* in foods. Salmonella cultures were sent to the recognised Salmonella Reference Centre of the SA Instiute for Medical Research, Johannesburg, for serological confirmation and sero-typing.
(e) SABS Method 760 – Examination for the presence of viable *Staphylococcus aureus* in foods.
(f) SABS Method 761 – Examination for the presence of viable spores of mesophilic *Clostridium* in foods.

RESULTS AND DISCUSSION

1. Total Mesophilic Aerobic Count of Viable Organisms

The surface of a carcase is contaminated with bacteria during dressing operations. Additional bacteria are acquired subsequently during handling, storing, quartering, cutting, loading, transporting and from contaminated premises and equipment like hands, knives, saws, containers, tables and vehicles. Even under refrigeration extensive bacterial growth may develop including organisms such as *Pseudomonas, Achromobacter* and *Proteus, yeasts and moulds. The total count demonstrates only those organisms growing on the laboratory medium at the temperature employed. Organisms are not identified and the total count does not measure safety. Nevertheless total counts are helpful by indicating insanitary practice, the extent of microbial proliferation and the probable keeping quality of the carcase.*

Reasonable hygienic practice enables microbiological limits for freshly butchered carcases (beef and lamb) as follows[15]

	Total count/cm²	*(Total count/25 cm²)*
Rump	< 3 000	(< 75 000)
Brisket	<10 000	(<250 000)
Foreleg	< 3 000	(< 75 000)

When the surface count exceeds 10^6 to 10^7 organisms/cm² deterioration usually becomes apparent by surface slime, tissue discolouration, souring and odour[3].

The larger the bacterial count the greater the possibility of pathogens being present and the poorer the keeping quality of the end-product with expectancy of spoilage loss. As compared with a storage life of around 18 days at 0°C for beef carrying say 10 spoilage bacteria per cm^2, beef with 10^5 bacteria per cm^2 may keep only 7 days at 0°C[16]. A limit of $10^4/cm^2$ or/g initial count of carcase after slaughter has been suggested and of $10^6/cm^2$ or/g for carcases after processing[3]. Limits in saleability of meat are associated with counts of 5–6 × $10^7/cm^2$ [7]. A count of 10^6 micro-organisms/g was considered excessive for quality meat[4]. The bacterial level at which decomposition changes may become evident to the human senses is usually from 10^6/g upwards[16];

There is difficulty in comparing the results of different workers due to dissimilarities in reporting laboratory findings. Results have to be converted to common basis for comparison, for instance as estimated in Table 3.

Table 3: ADVISORY BACTERIAL STANDARDS – NEW ZEALAND, N. IRELAND, U.K.

Worker	Freshly Slaughtered Carcase	Estimated Bacterial Count/25 cm^2
Nottingham[3]	$10^4/cm^2$	250 000
Petterson[5]	▷ 50 000/16 cm^2 (rump) ▷150 000/16 cm^2 (brisket) ▷ 50 000/16 cm^2 (foreleg)	< 80 000 <240 000 < 80 000
Ingram and Robers[9,10] and Roberts[17]	Mean $\log_{10}$ cm^2 3,20 ± 0,64 (Converted average 1 600/cm^2 Range 360 – 6 900)	Mean 40 000 (Range 9 000 – 172 500)
Nottingham, Penney and Harrison[18]	Mean $\log_{10}$ cm^2 1,78 (neck-cradle) 60/cm^2 Mean $\log_{10}$ cm^2 2;10 (neck-rail) 130/cm^2	Mean 1 500 Mean 3 300

Table 4: STANDARD AGAR PLATE COUNT/g

		Total Plate Count/g				
Year	Carcases Sampled	<100 000 %	100 001 – 250 000 %	250 001 – 500 000 %	500 001 – 1 000 000 %	>10^6 %
1975	168	55,4	9,5	7,7	6,6	20,8
1976	524	74,6	9,9	5,3	3,6	6,5
1977	244	65,5	8,2	9,8	2,6	13,9

The total plate counts shown in Table 4 indicate that already at the initial wholesale stage of the trading cycle an appreciable proportion of the beef carcases examined had bacterial flora with incipient spoilage and limited remaining storage life (e.g. 1975 ± 21% >10^6/g: 1976 ± 7% >10^6/g: 1977 ± 14% >10^6/g).

Table 4 shows considerably reduced total counts during 1976 as compared with 1975. As the beef carcases during both years came from the same general sources of supply the trend towards lower counts is attributed to the improving hygienic conditions in the wholesaler premises and equipment. The Newtown Abattoir closed on 26 January 1977 and the 1977 results refer to the carcases from the new mechanised abattoir at City Deep with compulsory post-slaughter chilling. It is disappointing that the microbiological improvement achieved from 1975 to 1976 did not continue into 1977. Possibly the initial problems encountered at the new abattoir and associated disrupted removal of carcases contributed to the unexpected high 1977 bacterial counts.

In the long term too, the potential for optimal meat hygiene can finally only be realised when the wholesale traders eventually relocate in new premises at City Deep Township or elsewhere.

2. Coliforms

Standards ranging from <100 to 1000 coliforms/g have been suggested for meat[3]. Certain coliform organisms inhabit the intestinal tfact of man and animal. Others are ubiquitous and occur widely in nature. As coliforms also establish themselves in insanitary meat premises and equipment their presence on carcases is not proof of direct faecal contamination. They serve as useful indicator organisms of unhygienic food handling practices.

Table 5: PREVALENCE OF COLIFORMS

		Coloforms/g		
Year	Carcases Sampled	<1 000 %	1 001 – 33 000 %	>33 000 %
1975	168	66,7	25,0	8,3
1976	524	82,2	15,4	2,3
1977	244	67,2	17,6	15,2

The microbiological analysis from 1975 to 1977 revealed coliform contamination of approximately 80 to 90% of carcases examined. The coliform load exceeded the suggested 1000/g upper limit[3] in 33, 18 and 33% of carcases tested during 1975, 1976 and 1977 respectively (Table 5).

During 1977, 15,2% of carcases carried coliform organisms in excess of 33 000/g as compared with 2,3 and 8,3% in 1976 and 1975 respectively. This regression in 1977 to more massive coliform contamination is consistent with the high bacterial counts recorded for 1977, no doubt for similar reasons.

3. *Escherichia coli I*

Over the three year period of investigations eight or nine out of every 10 carcases examined were contaminated with *E. coli I* (Table 6). Although *E. coli* originates from the intestinal tract the organism also

thrives outside the animal body in insanitary premises and equipment which may serve as additional source of contamination. Such contaminated carcases may then spread contamination throughout butcher shops and onto other carcases by direct means, and onto other foodstuffs.

Table 6: PREVALENCE OF *ESCHERICHIA COLI* I

		Number of *E. Coli*/g					
Year	*E. Coli* Positive 0,1 g	<10	11 – 100	101 – 1 000	1 001 – 5 000	5 001 – 10 000	>10 000
1975	88,7						
1976	92,0	35,2	21,0	26,2	15,7	1,3	0,6
1977	84,4	22,9	27,9	16,8	30,4	1,2	0,8

Quantitative analysis of *E. coli* was started in 1976 in order to establish the degree of contamination. The investigations showed that during 1976, 17,6% of carcases carried *E. coli* in excess of 10^3/g and during 1977, 32,4%. Abattoir sources of contamination may be implicated and/or unhygienic handling and distribution of dressed carcases. The source of entry of *E. coli I* onto the meat requires to be eliminated so that the hazards from filth and insanitary procedures are removed.

4. Pathogens

Complete absence of pathogens is desirable but impossible[3] [17] [20]. Because a nil-tolerance cannot be attained nor verified by any practicable means, a criterion of the lowest possible prevalence of pathogens in meat has to be tolerated[6] [9] [10].

i) *Salmonella*

The main reservoir of salmonellae is the intestinal tract of man and animal. In order to prevent meat becoming contaminated preventive measures are necessary on the farms producing food animals, during their conveyance to market, and during slaughtering and dressing and the subsequent handling and processing of carcases.

Inefficiencies in the meat industry are revealed by the alarming prevalence of roughly 5% carcases contaminated with salmonellae during 1975 (Table 7).

Table 7: PREVALENCE OF *SALMONELLA* CONTAMINATION

Year	Carcases Sampled	*Salmonella* Positive 1,0 g %
1975	168	4,98
1976	524	2,10
1977	244	0,40

Better abattoir dressing and improving hygienic circumstances in wholesale premises no doubt helped to bring about the reduced salmonella contamination in 1976 of 2% and in 1977 of 0,4%.

The serotypes (and number) isolated from beef samples were *S. london* (6); *S. st paul* (5); *S. johannesburg* (3); *S. typhimurium* (3); *S. dublin* (1); *S. poona* (1); *S. sarajane* (1).

Salmonella contamination of meat cannot be condoned because of the direct hazard to the health of consumers and indirectly by cross-contamination of all other meats in the butchery and its equipment. "For example, Pether and Gilbert have shown that, under experimental conditions, salmonellae can survive at least 3 hours on the finger tips and are easily transferred from raw to raw and raw to cooked or processed foods by the hands"[13]; The organisms also proceed onwards with the raw products throughout the following trading cycles and into the factories preparing processed meat products. It is of special significance that jointing, cutting-up and mincing will spread salmonella contamination onto all freshly exposed meat surfaces, ensuring that the surface micro-organisms are disseminated throughout the entire mass of meat and magnifying the health hazards. Hardly surprising is the previously reported prevalence of salmonellae in beef mince of 9,3% [12] and 64% [13].

ii) *Staphylococcus aureus*

Staphylococcus aureus cannot altogether by excluded from meat. Many investigators have shown that *S. aureus* strains exist on almost every object and in most environments where man and certain animals exist[19]. The organism is widely carried by many normal persons in the nasopharynx and on the skin and in septic foci like boils, carbuncles and skin infections. *S. aureus* is also common in animals on the skin and in wound infections and in the bovine udder. Therefore a small number of *S. aureus* organisms in meat have to be tolerated because of the difficulty of excluding this form of contamination[20].

Table 8: PREVALENCE OF *STAPHYLOCOCCUS AUREUS*

		S. Aureus Positive	Number of *S. Aureus*		
Year	Carcases Sampled	0,10 g %	<100 %	101 – 1 000 %	>1 000 %
1975	168	52,4			
1976	524	34,7	79,0	18,4	2,6
1977	244	36,4	83,6	15,2	1,2

The prevalence of *S. aureus* on carcases is shown in Table 8. The organism was identified in roughly half of the carcases tested during 1975, and one-third of carcases tested during 1976 and 1977.

Quantitative analysis was introduced during 1976 to determine the degree of *S. aureus* contamination. The results in Table 8 show that 21% of the carcases tested during 1976 carried *S. aureus* in excess of 100 organisms/g and 16% during 1977. An appreciable volume of our beef supplies carry excessive *S. aureus* as compared with the tolerance limit of less than 100 coagulase-positive staphylococci/g[3]. Situations can be anticipated where poor cooling practice and long holding of carcases will permit the already excessive staphylococcal contamination to proliferate towards the level of 10^6 to 10^9 organisms/g usually implicated in staphylococcal food poisoning incidents.

The levels of *S. aureus* contamination shown for beef carcases in Table 8 indicate insanitary meat practice

and defective hygiene of plant personnel. Appropriate corrective action is required.

iii) *Clostridium* species

Clostridium perfringens is now regarded as one of the commonest causes of food poisoning. The organisms is ubiquitous in nature, and is usually present in faeces of man and animals and in soil and in raw food products.

Table 9: PREVALENCE OF CLOSTRIDIAL CONTAMINATION

Year	Carcases Sampled	*Clostridium* Positive 1,0 g %
1975	168	38,1
1976	524	29,4
1977	244	25,0

Table 9 reveals that clostridium species were present in approximately 30% of the entire series of carcases investigated from 1975 to 1977.

Identification of *C. perfringens* was not undertaken. The work is laborious and results would be meaningless unless quantitative prevalence of *Cl. perfringens* could also be established towards the dangerous potential of say 10^6 organisms/g which gives rise to food poisoning[20]. Consideration of cost and labour precluded such in-depth investigation of the clostridial flora isolated from beef carcases.

SUMMARY

The cleaning of the premises and equipment of meat wholesale trades in Johannesburg was investigated by microbiological methods. Total bacterial counts obtained by swabbing surfaces coming into contact with meat revealed ineffective cleaning and a build-up of bacteria. Continued microbiological monitoring during the period 1975 to 1977 resulted in vastly improved cleaning standards.

Microbiological meat investigations were done using beef samples taken from the neck of carcases in the wholesale trade. Excessive bacterial counts were shown for an appreciable volume of carcases. Most carcases also carried coliform organisms. Eight or nine of every ten carcases were contaminated with *Escherichia coli I,* which exceeded 10^3 organisms/g in 18% of carcases tested during 1976 and 16% during 1977.

5% of carcases examined during 1975 revealed salmonellae. The prevalence of contamination decreased in 1976 to 2%, and to roughly 0,5% during 1977. Twenty varieties of salmonella were identified during the period that beef carcases were tested.

The percentage contamination of carcases with *Staphylococcus aureus* during 1975, 1976 and 1977 was 52, 35 and 36 respectively. 21% of the carcases tested during 1976 carried *Staphylococcus aureus* exceeding 100 organisms/g and 16% during 1977.

Unidentified species of clostridial bacteria contaminated approximately 30% of the carcases examined during the three-year period.

These investigations concerning the Johannesburg wholesale meat supplies represent approximately 40% of the volume of meat handled in the nine Controlled Areas of the Republic under the Meat Scheme. The unsatisfactory results indicate need for improved supervision and control over the production and slaughter of cattle, and over the subsequent handling and distribution of carcases.

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CHLAMYDIOSE BY SKAPE EN BEESTE IN SUID-AFRIKA*

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ABSTRACT: Schutte A.P., Pienaar J.G. **Chlamydiosis in sheep and cattle in South Africa.** *Journal South African Veterinary Association* (1977) **48** No. 4, 261 – 265 (Afr; en.) Sect. Reproduction. Vet. Res. Inst. Onderstepoort 0110 Rep. of South Africa.

The prevalence of chlamydiosis in sheep and cattle in South Africa during the period 1971–1977 is reviewed briefly. The causative organism has been identified as *Chlamydia psittaci* in both cattle and sheep. Despite this, contact between cattle and sheep is not a prerequisite for spread of the disease between species. *Per os* ingestion of contaminated material is the main means of infection. The role of intestinal carriers and insect vectors is also discussed.

Enzootic abortion in sheep and associated neonatal complications such as weak lambs, showing nervous symptoms, or developing pneumonia 4–5 weeks post partum are discussed. A high incidence (60%) of abortion is encountered on intitial exposure of the flock to the infective organism. In chronically infected flocks this figure drops to 5–8%. In cattle the incidence of epizootic abortion in a fully susceptible herd may reach 30% with sporadic abortions occurring in chronically infected herds.

The post mortem changes found in both the above manifestions are detailed. Neonatal complications such as the occurrence of joint lesions, pneumonia and diarrhoea encountered on farms where abortions have occurred have profound financial implications. In many cases the isolation of *C. psittaci* is also associated with other pathogens such as *E. coli, Salmonella* and *B. abortus*. The role of *Chlamydia* in congenital infections including orchitis and epididymitis in rams as well as epididymitis and vesiculitis in bulls is noted. The exact role of *Chlamydia* in the male is, however, still not clearly defined. Congenital transfer of chlamydial organisms occurs in both sheep and cattle resulting in latent lesions which may flare up in acute neonatal disease outbreaks when the offspring subjected to stress conditions. Experimental production of several naturally occurring manifestions is mentioned.

Diagnosis of chlamydiosis is dependant on history, clinical examination and post mortal findings, coupled with culture of freshly collected foetal organs and foetal membranes as well as serological tests. Effective control presents a problem because of difficulties in carrier identification, but is based on vaccination and the principles of general hygiene. Abortion in sheep and cattle is well controlled by vaccination but as yet no effective vaccine for the protection of the neonate has been developed.

INLEIDING

Alhoewel aborsies by beeste en skape gedurende die afgelope 5 jaar dikwels hier ter plaatse as sinoniem vir chlamydiose beskou is, is fetale afsterwing en verwerping maar slegs 'n enkele manifestasie van 'n meer komplekse siektebeeld wat deur *Chlamydia psittaci* veroorsaak word.

Sedert die bekende werk van Stamp en sy medewerkers met ensoötiese aborsie by skape is heelwat nuwere manifestasies geboekstaaf wat aan *C. psittaci* toegeskrywe kan word. Afhangende van klimaatomstandighede, boerderymetodes, natuurlike weerstand en die ouderdom van die dier, kan die siektebeeld verskillende vorms aanneem. Behalwe vir die erkende aandoenings soos sporadiese beesenkefalomeningitis (SBE), ensoötiese aborsie by skape en episoötiese aborsie van beeste, blyk dit dat *C. psittaci* verantwoordelik gehou kan word vir uitbreke van gewrigontsteking, longontsteking, konjunktivitis en dermsteurnisse by lammers sowel as kalwers. Hierbenewens het ons gedurende die afgelope paar jaar bewyse gekry dat *Chlamydia* en meer spesifiek *C. psittaci* as 'n belangrike oorsaak van steurnisse van die geslagstelsel van die herkouer geklassifiseer behoort te word.

Alhoewel *Chlamydia* as oorsaak van enkefalomeningitis by beeste in Suid-Afrika reeds in 1961 aangeteken is, kon dit eers 10 jaar later met aborsies by skape in verband gebring word. Tot watter mate *Chlamydia* sedert 1971 vir perinatale verliese by skape en beeste verantwoordelik gehou kan word, word in Tabel 1 saamgevat. Dit wil egter voorkom asof aborsies a.g.v. hierdie siekte aan die afneem is.

Waar gedurende 1971 sowat 85% van verliese aan *C. psittaci* toegeskrywe kon word, was dit gedurende 1976/77 slegs vir 17% van die verliese by skape en 11% van die verliese by beeste verantwoordelik.

Table 1: VOORKOMS VAN CHLAMYDIOSE IN BEESTE EN SKAPE IN SUID-AFRIKA

Jaar	Aantal bedrywe*	Persentasie van totaal positief *C. psittaci*
1972/72 Skape	310	85%
Beeste	136	47%
1972/73 Skape	199	33%
Beeste	364	40%
1973/74 Skape	197	50%
Beeste	342	60%
1974/75 Skape	387	18%
Beeste	534	61%
1975/76 Skape	226	15%
Beeste	565	39%
1976/77 Skape	118	17%
Beeste	535	11%

*Bedrywe waar perinatale verliese voorgekom het en vanwaar materiaal na die NIV vir ondersoek aangestuur is

Veroorsakende Organisme[25].

Die *Chlamydia* wat by herkouers van belang is, maak deel uit van 'n groot groep van organismes wat antigenies baie nou verwant is en wat morfologies nie van mekaar onderskei kan word nie, en wat as redelik gasheerspesifiek beskou word. Dit word egter betwyfel of meer as die twee bestaande spesies naamlik *C. psittaci* en *C. trachomatis* as suiwer spesies erkenning

*Referaat gelewer tydens die Algemene Jaarvergadering van die Oranje-Vaal Tak SAVV, Potchefstroom 1977.

**Seksie Reproduksie, Navorsings Instituut, Onderstepoort.
***Seksie Patologie, Navorsings Insituut, Onderstepoort.

regverdig aangesien die verskille wat wel bestaan en waarvan die veearts kennis moet neem, meer dikwels net toegeskrywe kan word aan die organisme se vermoë om spesie- en orgaanadaptasies te ondergaan.

Die oorspronklike benaming psittacose-lymphogranuloma venereumgroep van organismes word selde meer gebruik. Eweso beskrewe benamings soos neorickettsias, *Bedsonia* virusse en *Miyagawanella.* Hierteenoor het chlamydiose, 'n siektetoestand wat deur *Chlamydia* organismes veroorsaak word algemene byval gevind en dit is dan ook die term wat by volstaan word.

Chlamydia kan slegs intrasellulêr vermenigvuldig. Die besmetlike vorms, naamlik die elementêre liggaampies is rond tot ovaalvormig en wissel in grootte van 200–300 nm. Die nie-besmetlike vorms, nl. die retikulêre liggaampies is pleomorfies en wissel in grootte van 500–1000 nm. *Chlamydia* is besonder gevoelig vir sonlig, hitte en uitdroging. Antimikrobiese middels blyk alleenlik effektief teen die elementêre liggaampies te wees en het geen uitwerking op die retikulêre vorms nie.

Verspreiding[17 19 25 27 28]

Weinig is bekend oor hoe die organisme 'n vatbare populasie binnedring, dissemineer en verskillende siektetoestande verwek. Alhoewel dieselfde organisme vir aborsies in beeste sowel as skape verantwoordelik gehou word, blyk dit tog dat kontak tussen beeste en skape nie noodsaaklik vir die verspreiding en vestiging van die organisme is nie.

Uit eksperimentele waarnemings blyk dit dat oordraging waarskynlik *per os* geskied en dat die verwerpte konseptus, vrugvliese en baarmoederafskeidings 'n bron van besmetting is. Dit is ook bekend dat die organisme uit die dermkanaal en faeces van gesonde skape, bokke en beeste afgesonder kan word en dat "dermdraers" moontlik die grootste bron van gevaar inhou. Die moontlikheid van insekoordraging is ook nie uitgesluit nie. In die VSA is die organisme vanuit enkele bosluisspesies afgesonder en hier in die Republiek is *Chlamydia* uit die gewone huisvlieg wat van skape met konjunktivitis afgevang is, afgesonder.

Ensoötiese Aborsie by Skape[15 17 19 21 22 23 25]

Dat die persentasie van ooie wat aborteer, wissel na gelang van die immuun status van die kudde, word duidelik deur die ondersoeke soos alhier gedurende die afgelope 5 jaar van stapel gestuur was, onderskryf. In kuddes waar die infeksie vir die eerste keer gediagnoseer is, het soveel as 60% van die ooie geaborteer. In kuddes waar die besmetting 'n meer kroniese vorm aangeneem het, is selde meer as 5–8% aborsies aangeteken. Dit is dan ook net met uitsondering dat ons vandag nog met stormaborsies a.g.v. *Chlamydia* besmettings gekonfronteer word.

In die breë blyk dit dat die dragtige ooi maar selde tekens van sistemiese siekte of tekens van naderende aborsie vertoon. Die eerste aanduiding dat vrugresorpsie plaasgevind het, is 'n swak lampersentasie. Die boer verkeer egter onder die indruk dat die ooie oorgeslaan het. Ondervinding het geleer dat dit net die boer is wat daagliks sy dragtige ooie te siene kry, wat aborsies onder die ooie wat twee tot drie maande dragtig is, sal opmerk. Dikwels is bloedvlekke aan die hakskene en op die melkspieël die enigste sigbare teken. Retensie van die nageboorte vir periodes langer as normaal in enkele gevalle verstening en oppervlakkig beskou, mag die boer dit verkeerdelik as 'n afwyking of misvormende fetus rapporteer. Die puerperium verloop egter sonder komplikasies. *Retentio secundinarium* word slegs by uitsondering aangeteken.

Namate die verwagte lamtyd nader kom, word groter lammers wat kort na afsterwing verwerp word en derhalwe baie min outolitiese veranderinge ondergaan het, opgemerk. Gedurende hierdie tydperk begin ook die eerste vroeggebore, klein, maar lewende lammers aankom. Hulle mag, hoewel swak, lewensvatbaar wees en onder gunstige toestande normaal ontwikkel. Enkele van die lammers wys senusimptome. Longaandoenings wat wissel van klein omskrewe areas van pneumonitis tot groter areas van konsolidasie kom soms saam met of onafhanklik van ander afwykings soos gewrigontsteking, konjunktivitis en dermsteurnisse voor. Pneumonie as kuddeprobleem is egter meer dikwels beperk tot lammers in die vier tot vyf weke ouderdomsgroep.

Met nadoodse ondersoek blyk limfadenopatie, subkutane edeem en bloedings in die trachea, konjunktiva en abomasum egter die meer kenmerkende afwykings te wees. Dikwels word ook hidrotoraks en buikwatersug aangeteken. Maar dit is noodsaaklik om kennis te neem dat die nadoodse ondersoek van die konseptus ook dikwels negatief kan wees. Die veranderings in die plasenta wissel na gelang van die graad van outoliese en nekrose wat ingetree het. Sommige areas van die plasenta kan heeltemal normaal voorkom, terwyl duidelik afgebakende areas van nekrose in ander dele waargeneem kan word. In die skaap ontstaan die letsel in die plasentoom en sprei later na die interplasentoom gedeeltes. Met histologiese ondersoeke blyk die inflammatoriese veranderinge veral in die hilus gebied teenwoordig te wees. Met verloop van tyd brei die inflammatoriese veranderinge uit na die diepere dele van die plasentoom en mag ook soms die miometrium aantas. Die chorio-allantois is edemateus en trombose met perivaskulêre rondesel infiltrasies kan soms in die bloedvate gesien word.

Episoötiese Aborsie by Beeste[4 5 7 10 12 13 14 16 17 18 25]

Net soos in die geval van die skaap blyk dit dat die aantal koeie wat aborteer eweneens wissel na gelang van die immuunstatus van die moederdier. In 'n vatbare kudde kan soveel as 30% van die koeie en verse aborteer. Waar 3 jaar gelede heel dikwels stormaborsies aangeteken was, blyk dit tans dat die besmetting redelik gevestig geraak het en dat aborsies a.g.v. *Chlamydia* organismes slegs nog sporadies en dan ook slegs onder enkele koeie in 'n kudde voorkom. Dit gebeur ook selde dat koeie 'n tweede keer aborteer.

Aborsies kom voor in verse en koeie wat 7–8 maande dragtig is. Geen tekens van siekte of aborsies kan bespeur word nie. Benewens die afsterwing en verwerping van die konseptus word dikwels swak ontwikkelde maar lewendige kalwers gebore. Sommige vrek binne enkele ure na geboorte terwyl ander weer heeltemal lewensvatbaar mag wees.

Die konseptus wat voor sewe maande ouderdom verwerp word, wys weinig kenmerkende letsels behalwe bloederige onderhuidse edeem en vogaansamel-

ing in die bors- en buikholte. Die inwendige organe is gewoonlik in 'n gevorderde stadium van vervloeiing wat gewoonlik met outoliese verband hou.

In soverre dit voltydse doodgebore kalwers, asook die wat lewendig aankom, maar binne enkele ure na geboorte vrek aangaan, kan dit ook gebeur dat weinig of geen van die kenmerkende letsels makroskopies waargeneem word nie. In die voltydse fetusse wat kort na afsterwe verwerp word, kan speldpuntbloedings op die slymvliese van die trachea, tong, bekholte, konjunktiva en abomasum gevind word. In ongeveer 40% van gevalle word 'n vergrootte, bros en geswolle lewer met onreëlmatige oppervlakte aangetref. Of hierdie afwyking wel verband hou met die siektetoestand is nie duidelik nie, aangesien sulke lewerletsels ook in nie-besmette gevalle aangetref word. Die kenmerkende letsel is egter die duidelike waarneembare limfadenopatie. Veral die mesenteriese limfkliere is edemateus en vergroot.

Die plasenta mag *in utero* agterbly na aborsie en in sulke gevalle bemoeilik gevorderde outoliese 'n deeglike ondersoek. Dit is dan ook meer die reël as die uitsondering dat die vrugvliese wat vir ondersoek aangebied word erg besoedel is met mis en grond, wat eweneens die ondersoek belemmer. Die makroskopiese voorkoms van die aangetaste vrugvliese varieër baie in voorkoms. Hulle is dikwels edemateus en 'n groot hoeveelheid eksudaat mag aan die oppervlakte van die chorion vaskleef. 'n Variërende aantal cotyledons is nekroties. Die eksudaat kan wissel van 'n dik slymerige bruin, bloederige, tot 'n roomkleurige, kaasagtige laag wat tot 2 cm dik kan wees. Kenmerkend is dat hierdie eksudaat nie eweredig tussen die moeder en fetale dele van die plasenta versprei is nie, maar wel kollerig. Hierdie areas van plasentitis kan so groot as 20 cm in deursnee wees. Bloedstuwing en bloedings mag orkom op die rande van die letsel.

Neonatale Aandoenings[1–5 7 9 11 16 17 19 20 24 25 27 28]

In teenstelling met wat in ander lande gedokumenteer is en waar gewoonlik net een van die erkende manifestasies van chlamydiose in herkouers voorkom, het ons by skape sowel as by beeste terselfdertyd gewrigsontstekings, longaandoenings en diaree in jong diere op plase waar aborsies voorgekom het, waargeneem. Heel dikwels het dit dan ook gebeur dat neonatale verliese groter afmetings aangeneem het, en meer dramatiese finansiële implikasies ingehou het as wat aan voorgeboortelike verliese toegeskrywe kon word. In sulke gevalle, en veral in lammers 3–8 weke oud, is pneumonie, hidrotoraks, 'n verdikking van die ileumwand en uitgesproke limfadenopatie gedokumenteer. In jong kalwers is behalwe vir pneumonie, poliartritis, dermsteurnisse en interstisiële nefritis ook pleuritis, perihepatitis, perisplenitis en peritonitis as algemene afwykings aangeteken.

Met *C. psittaci* isolate afkomstig van natuurlikbesmette kalwers en lammers kon die meeste van bogenoemde letsels eksperimenteel in kalwers verwek word. Veral van belang was die derm- en nierletsels wat ontwikkel het en wat blyk a.g.v. binne-baarmoederlike besmettings tot stand te kom. Die verdikking van die dermwand kan toegeskrywe word aan die proliferasie van limfoïede weefsel en die samevloeiing van Peyer se vlakke. Hierdie letsels van die ileum en die hiperplasie van die mesenteriese limfknope was eweneens uitstaande kenmerke van die siektetoestand by jong lammers. Hier dien dit vermeld te word dat heel dikwels meer as een patogene organisme uit natuurlike besmette gevalle afgesonder is. Dikwels is *C. psittaci, E. coli, B. abortus, Salmonella* en virusse in verskillende kombinasies afgesonder. Die verwantskap tussen veral *C. psittaci* en *E. coli* in hierdie gevalle verdien verdere ondersoek, veral omrede dit blyk dat *C. psittaci* bloot deur die biochemiese letsel wat dit in die dermkanaal ontketen, dit vir die patogene *E. coli*-stamme moontlik maak om die liggaam binne te dring.

Longletsels is gewoonlik beperk tot 'n interstisiële pneumonitis. Die aangetaste dele van die long is saamgeval en grys-pers van kleur. Hierdie areas is gewoonlik beperk tot die hilus en ventrale gedeeltes van die apikale lobbe alhoewel groter areas oor die hele long mag voorkom. Klein areas van bloeding verspreid deur die longe, mag ook in akute gevalle voorkom. Klein foki van grys-pienk areas van konsolidasie in die apikale en kardiese lobbe is meer dikwels in die kroniese gevalle waargeneem.

Die nierletsels soos in lammers en kalwers verwek met isolate afkomstig van natuurlik-besmette lammers en kalwers het in die akute toestand bestaan uit veelvoudige klein punt bloedinge in die nierskors. Histologies bestaan hierdie letsels uit fokale nekrose en bloeding. Op die akute letsel volg 'n infiltrasie en proliferasie van rondeselle, wat aanleiding gee tot 'n interstisiële rondeselnefritis wat fokaal van aard is. Makroskopies kom die letsel voor as opgehewe gryswit areas, varieërend in grootte, in die nierskors. Met verloop van tyd vind bindweefsel-vorming plaas en verander die voorkoms van die letsel na diè van 'n ingesonke litteteken. In baie gevalle word die akute en kroniese letsels in dieselfde nier aangetref.

Urogenitale besmettings[6 17 19 25 26]

Gedurende die afgelope aantal jare was daar sporadiese aanduidinge, uit verskillende dele van die wêreld, dat *Chlamydia* in herkouers, afgesien van aborsies, ook letsels in sekere dele van die urogenitale kanaal kan ontketen. In Suid-Afrika is *C. psittaci* ook gedurende die afgelope paar jaar uit die semen van ramme met epididymitis en orchitis afgesonder. Hierdie afsonderings is gemaak vanuit kuddes, waar onvrugbaarheid by ramme voorgekom het en waar ondersoeke na *B. ovis* en *A. seminis* deurgaans negatief was. Serologies was daar ook geen aanduidings dat laasgenoemde betrokke kon wees nie. *C. psittaci* is ook uit die semen van bulle met letsels van die geslagsorgane afgesonder. Met isolate van sulke gevalle kan met intra-uretrale toedienings 'n vesikulitis verwek word. Die epididimitis, soortgelyk aan die sogenaamde "Epivag" sindroom, kan egter net met intratestikulêre toedienings totstand gebring word. Die moontlikheid dat Mycoplasma hier 'n onderliggende rol speel, word tans ondersoek.

In teenstelling met die vroulike dier waar die invloed van *Chlamydia* redelik duidelik omlyn is, is dit duidelik dat daar nog heelwat onsekerheid oor die rol van *Chlamydia* in die geslagskanaal van die manlike herkouer is. Soos hierbo aangedui is daar wel 'n sterk vermoede dat *Chlamydia* vir afwykings en letsels in sekere dele van die manlike herkouer se geslagstelsel verantwoordelik gehou kan word. Dit is interessant om op die nierletsels wat saam met orchitis en epididymitis

in ramme voorkom, te wys. *C. psittaci* blyk hier 'n besliste rol te speel. Dikwels word hierdie kombinasie ook in jong ramme kort na bereiking van geslagsrypheid gevind.

Uit ondervinding met eksperimentele studies weet ons dat *C. psittaci* transplasentaal oorgedra kan word na die fetus. Hierdie kongenitale besmetting kan in die lam en kalf vir lang periodes smeulend bly, veral in organe soos die nier en die derm. Onder stremmingstoestande kan hierdie weer opvlam en 'n akute siektetoestand totstand laat kom. So 'n opvlamming in die urogenitale stelsel met bereiking van geslagsrypheid, om tipiese letsels van epidimytis en orchitis te veroorsaak, word as 'n aktuele moontlikheid beskou en regverdig verdere ondersoek.

In die mens is daar voldoende bewys dat *Chlamydia* met coitus oorgedra kan word. Geen besliste inligting of dit ook in die herkouer gebeur is tot dusver gedokumenteer nie. Die teenwoordigheid van hierdie organisme in die semen van herkouers dui egter wel op die moontlikheid van geslagtelike oordraging.

Diagnose[5 8 12 13 14 16 17 19 22 25 27 28]

'n Tentatiewe diagnose gebaseer op die geskiedenis, kliniese ondersoeke en letsels waarneembaar met nadoodse ondersoeke kan bevestig word deur:

(i) Mikroskopiese waarneming van *Chlamydia* organismes in druksmere van aangetaste longdele en vrugvliese wat gekleur is volgens die Casteneda, Macchiavello, of Stamp kleurmetodes. Die beste resultate word egter met die Gimenez kleurmetode verkry. Die kolonies van elementêre liggaampies kom intrasellulêr voor. In die geval van longsmere moet die diagnose nie net op die teenwoordigheid van retikulêre liggaampies en enkele los verspreide elementêre liggaampies gemaak word nie. Hier kan *Mycoplasma* organismes die diagnose besonder bemoeilik. In die geval waar druksmere van aangetaste cotyledons gemaak word, kan *C. burnetii* weer verwarring skep.

(ii) Afsondering van die organisme uit vrugvliese of fetale orgaanmateriaal in bebroeide eiers of weefselkulture. Monsters wat vir isolasiewerk bestem is, moet so steriel as moontlik geneem en in aparte houers versend word. Monsters wat van verafgeleë areas aangestuur word, moet by −59°C bewaar word. Dit is egter wenslik om die konseptus met die vrugvliese, of die lam of kalf as geheel so gou as moontlik na verwerping of afsterwe vir ondersoek by die laboratorium in te handig. Behalwe vir die feit dat die isolasie van *Chlamydia* hierdeur vergemaklik word, gee dit die laborant die geleentheid om ook vir die teenwoordigheid van ander patogene organismes te ondersoek.

(iii) Serologiese toetse, en meer spesifiek die komplementbindingtoets kan vir die ondersoek van spesifieke teeliggame in gepaarde sera (versamel met aborsie en weer 3 weke later) gebruik word. Die daling of styging van die teëliggaamtiter kan diagnosties wees. Ondersoeke van 'n enkele serummonster het weinig waarde en kan net tot verwarring of selfs foutiewe diagnoses aanleiding gee.

Beheer[16 17 19 25 28]

Kennis aangaande oordrag en verspreiding van *Chlamydia* en metodes om draerdiere te identifiseer skiet te kort, as gevolg hiervan is dit besonder moeilik om doeltreffende beheermaatreëls te formuleer. Beheer berus egter deurgaans op algemene beginsels van higiëne en dissipliene wat hiermee gepaard gaan.

Die ontwikkeling en uitsaaiing van *Chlamydia* organismes kan met behulp van antimikrobiese middels gekontrolleer word. Die doeltreffendheid van die middels is egter beperk aangesien net die besmetlike fase, nl. die elementêre liggaampies beheer word. Sodra die dier aan stremmingsfaktore blootgestel word ontwikkel die retikulêre liggaampies om uiteindelik weer aan elementêreliggaampies oorsprong te gee en 'n akute siektetoestand totstand laat kom.

Die skaapentstof vir chlamydiose gee goeie beskerming teen aborsie. Nog geen entstof vir beeste is beskikbaar nie. Inligting dui egter daarop dat ook in die bees 'n redelike immuniteit na toediening van die skaapentstof (teen dubbeldosisse) verkry kan word. Dit wil egter hier ook voorkom dat alhoewel goeie beskerming teen aborsie verkry word, dit weinig waarde vir neonatale besmettings inhou. In kuddes waar chlamydiose gediagnoseer is, is dit wenslik om elke jaar vir 'n paar jaar lank alle teeldiere te ent.

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LETTER TO THE EDITOR

BRIEF AAN DIE REDAKSIE

Dear Sir,

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TYDSKRIF VAN DIE SUID-AFRIKAANSE VETERINÊRE VERENIGING 48(4) 1977

EXAMINATION OF RAMS FOR GENITAL SOUNDNESS*

E.M. VAN TONDER

ABSTRACT: Van Tonder E.M. **Examination of rams for genital soundness.** *Journal of the South African Veterinary Association* (1977) **48** No. 4, 267 – 272 Regional Veterinary Laboratory, Middelburg, 5900, Cape Province, South Africa.

The relevant terminology is briefly reviewed.

A complete examination of rams for genital soundness is discussed. Apart from fertility, emphasis is placed on various other aspects to be considered in the determination of genital soundness. The methods employed in the various examinations and tests are also given.

INTRODUCTION

The examination for genital soundness consists of a series of examinations and tests which can be carried out in order to estimate a ram's reproductive potential. The individual examinations are subject to specific limitations and are also supplementary to each other. It is therefore advisable that, depending upon the relevant circumstances, a combination of as many of these examinations as possible should be selected.

VIEWS ON THE RELEVANT TERMINOLOGY

There are a few terms that are often used in this respect namely fertility, breeding soundness and genital soundness.

Fertility is probably the oldest and most widely used of these terms. In general it means that the ram must be capable of reproducing, i.e. it must produce semen containing sufficient viable sperm cells which it must be able to convey to the ewe by the natural process of mating with resultant fertilisation. In the assessment of fertility however, it has become customary to give judgement on a semen evaluation only, with complete disregard of the other examinations and especially the capability of the animal to partake in a natural mating process. The emphasis was therefore mainly on the production of fertile semen rather than reproductive effeciency.

The term *breeding soundness* is also often used in connection with fertility examination. It is however felt that whereas fertility only describes the capability of a ram to reproduce without considering whether it is a desirable breeding animal, the term breeding soundness should be reserved to include only those rams that are selected or judged as suitable for a breeding program. The standard or level of breeding soundness will obviously vary within breeds, between individuals and according to the aims of the breeding program, but minimum standards of excellence and culling faults for each breed as determined from time to time, are intended to serve as guides.

By means of definition a 'breeding sound' ram can be described as a ram that conforms at least to the minimum standard of excellence for the particular breed and is free of culling faults. Such a ram should also be genitally sound.

Genital soundness on the other hand mainly concerns the reproductive capability and potential of the breeding animal. Such a ram can therefore be defined as one that is clinically healthy, possesses well-formed, well-developed and functional genital organs and is capable of reproducing successfully under natural circumstances.

Whereas breeding soundness, which applies to breed qualities and culling faults, is mainly judged by those who guard the improvement of the breed i.e. breeders and members of their association, genital soundness involves the veterinarian directly and comprises nothing less than a complete examination for fertility and reproductive efficiency.

It is obvious that there may be some overlapping between the fields of breeding and genital soundness, especially with regard to physical or anatomical features. This may possibly lead to confrontation and controversy, especially where the degree of deviation is of importance. However the veterinarian will and should only concern himself with the aspect of genital soundness, while breeding soundness will be judged by the people concerned, which will normally have been done, before the animal is offered for veterinary examination.

It is felt that these two concepts should exist parallelly rather than the one forming part of the other, as a breeding sound ram may not necessarily be genitally sound and *vice versa*. Fertility on the other hand, although it may be regarded as the most important part, only constitutes a sub-section of the concept of genital soundness or reproductive efficiency, as a ram producing the best quality fertile semen but incapable of transferring it to the ewe, either through lack of interest or anatomical disenablement, is functionally or practically infertile. An examination for fertility and infection in the semen has therefore limited value, if not evaluated within the broad concept of genital soundness.

EXAMINATION FOR GENITAL SOUNDNESS

The various examinations and tests for genital soundness will be discussed, irrespective of whether they are all able to be performed under all circumstances or not.

General information and identification:

Apart from the identification of the owner, date and place of examination a detailed and complete identification of the animal in question, should be made. Relevant information on the animal concerned should be obtained as accurately as possible.

General clinical examination:

This examination is essential and can be performed

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under all circumstances with relative ease and the minimum requirements. An assessment of the physical status of the ram and the presence or absence of any infectious or other disease, is of utmost importance in the evaluation of genital soundness. Not only should evidence of existing and imminent disease be sought but also of previous disease, especially during the preceding 2 to 3 months. It should be borne in mind that the initial processes of spermatogenesis are more sensitive and therefore vulnerable to temperature and other conditions and that a poor semen picture could often be the consequence of an infliction at any stage in the preceding 2 to 3 months. Spermatogenesis in the ram takes more or less 49 days and the movement of sperm cells through the epididymis another 2 to 3 weeks.

Apart from disease conditions, specific anatomical or conformational defects, which have a decided effect on genital soundness should be looked for. These included excessive development of the third cervical fold, hip dysplasia etc.

Examination of the genital system:

This examination is carried out by close inspection and palpation of the external genitals, with the ram first in a standing and then a sitting position. Inspection and palpation of the scrotal contents, are best done with the ram in a standing position. In this position features like symmetry, length of the scrotum, functioning of the thermo-regulatory system, reversion of the testes and distensions of the scrotum can best be observed. Careful scrotal palpation on the other hand would reveal the existence of anatomical and pathological abnormalities such as varicocoele, scrotal hernias, paradydimal cysts, spermatocoele, spermatogranuloma, epididymitis, orchitis, atrophy, hypoplasia and scrotal abscesses.

With the ram in a sitting position the penis and sheath can be examined more conveniently. The penis itself should be examined both before and after extrusion from the prepuce. Anatomical and pathological abnormalities like pendulous penis, preputial stenosis, ulcerative balanitis and posthitis, phimosis, paraphimosis, prolapse of the preputial membrance etc. should be looked for.

Semen collection and evaluation:

As semen is a very specialised excretory product, containing millions of highly specialised sensitive sperm cells, it is essential that all tests intended to determine it's viability should be carried out in the shortest possible period under the most favourable circumstances.

1. Semen collection:

Although semen collected by the artificial vagina is generally of a better quality when compared to semen obtained by electrical stimulation, the former technique is usually limited to rams used to it, which renders it unpractical as a routine method. On the other hand, when the necessary skill is developed, semen specimens of outstanding quality, equalling that obtained by the artificial vagina, can be collected by the electrical method with the utmost ease.

Ram testing tables can be used but obviously confine the activities to the consulting room or laboratory and are also more laborious and time-consuming when a number of animals have to be tested. Rams can be conveniently laid down on any solid floor and are kept down flat on the left side by three to four assistants holding the head, hind and front legs respectively. The front and hind legs are kept together in such a way that the animal is not stretched. A fourth assistant is seated against the back of the ram opposite the loins grasping the upper loin flap and pressing the ram down.

The penis is extruded by the usual method. Should difficulty be experienced, the ram can be lifted to the sitting position, the penis extruded and grasped before the ram is carefully moved over and laid down on the left side again. The extruded penis is cleaned with distilled water and sterile cottonwool.

A piece of ordinary bandage is folded in a tape ± 1 to 2 cm wide and placed as a single loop around the *collum glandis* of the penis. The person collecting the semen pulls the tape tight around the penis with the two ends held close together between the palm and last three fingers of the left hand. By pressing the two sides of the tape together with the thumb and forefinger of the same hand immediately below the ventral aspect of teh penis, opposite the urethra, a firm grip on the tape and penis is obtained. The penis can therefore be directed and semen flow controlled by pressure with the thumb and forefinger.

Immediately before ejaculation takes place only the tip of the glans penis and the urethral process is introduced into the container and the pressure on the tape and urethra released. The container is kept at the correct temperature before and after collection while the viability examinations are carried out as soon as possible after collection.

The lubricated rigid electrode is inserted into the rectum for a distance of 12 to 15 cm and pressure on the handle exerted in such a way as to press the inserted end firmly against the ventral wall of the rectum and indirectly on the *ampullae*. When the collector is ready the handle of the ejaculator is turned, starting very slowly and gradually working up to a climax within the extent of 4 to 6 turns. The process is then stopped for a few seconds while the electrode is moved around in the rectum. During this pause the collector quickly removes and opens the container and inserts the urethral process. When the electrode is fixed at the correct site again, a short sharp turn of the handle is given. This is usually followed by spontaneous ejaculation.

For the collection of semen either graduated tubes or widemouth McCartney bottles can be used. In the last mentioned case the volume will have to be estimated or measured afterwards.

The warming of containers and slides usually present practical problems when more than one animal is to be done. Thermos flasks can be used for containers while the available warm stage can only accommodate one slide at a time and usually takes some time to warm a slide properly. For the warming of containers and slides the so called 'dish-warmer' consisting of flat electrically heated enamel topping, has been found very useful and practical. Slides and containers are placed on the platform while the latter are also covered with cotton wool.

For motility examination a drop of semen is placed

on the slide on the platform, which is then quickly removed and examined, while the nigrosin-eosin staining is also done on the platform at the correct temperature.

2. Visual examination:

This is done immediately after collection and features like volume, colour, density and motility noted.

Motility can easily be seen by a close look and by tilting the container so as to cause the semen to run down the sides in a thin film. Special attention must be given to abnormalities in appearance such as blood and urine contamination and the presence of granules or flakes of pus.

The density of the semen specimen can be used to estimate the number of sperm in the ejaculate since counting of the cells is a laborious procedure and also interferes with the other observations. The following scale for rating the number of sperm cells was evolved by Gunn, Sanders and Granger[3].

Density	*Approximate number of spermatozoa* (Million per ml)
Very thick creamy	3 000
Thick creamy	2 500
Creamy	2 000
Thin creamy	1 500
Thick milky	1 000
Milky	500
Cloudy	100
Less than cloudy	insignificant

The semen volume can either be measured or judged and varies from 0,5 to 2,5 ml.

3. Microscopic examination:

(1) Motility:

Examination for motility has to be carried out as soon as possible after collection and care should be exercised to prevent sudden exposure of the semen to lower temperatures, especially when placed on a slide.

Motility examination consists of two steps namely the determination of wave or mass motility and the individual movement of sperm cells.

In the first instance a drop of semen is examined under low power magnification under the microscope. Although it is generally recommended that a hanging drop on an inverted coverslip placed on the crossbars of a McMaster or selfprepared slide should be examined, a drop of semen placed directly on a ordinary warmed slide has proved to be equally satisfactory.

Wave motility is observed as dark crested waves moving swiftly in all directions across the field. According to the intensity of movement and crispness of the waves, the motility can be rated on a scale varying from 0 to 5. Semen of high quality should show a motility rating of five and should show crisp, dark crested waves with rapid movement and change in direction. Such a specimen will at least have a creamy consistancy, density and colour. Semen showing wave motility of four and upwards is generally considered as satisfactory.

Wave motility which is determined by the percentage of spermatozoa viable and the vigour of their movements, can be rated as follows[6].

Wave motility	Percentage of spermatozoa viable and showing progressive movement
5	95 – 100
4	75 – 95
3	55 – 75
2	30 – 55
1	Very few
0	No motile sperm

The percentage of viable spermatozoa can be estimated by examining fields closer to the edge of the drop of semen.

In the examination for individual movement a drop of semen is diluted approximately 10 times with normal saline and one drop of diluted semen examined under a coverslip and high magnification. Individual spermatozoa should be observed for direct, determined and even movement.

(2) Percentage live sperm:

Apart from the rough estimation as explained previously the nigrosin-eosin staining method[1] should also be carried out. There are two technicques that can be followed.

In the one instance a drop of 5% eosin and two drops of 10% nigrosin are placed on a warmed glass slide close together. A drop of semen is placed onto the eosin and gently stirred by means of a glass rod and then immediately mixed with the nigrosin. The final mixture is stirred for a few more seconds and a small drop streaked out on another glass slide.

The other technique is only different to the extent that the drops of eosin and nigrosin are mixed beforehand and the drop of semen placed directly onto theis mixture and stirred for approximately five seconds before smears are prepared.

Actual counts of stained (dead) and unstained (live) sperm cells are made and expressed on percentage basis. A percentage of less than 20% non-viable spermatozoa is taken as satisfactory.

(3) Morphology:

The morphological examination of individual sperm cells can also be done on the eosin-nigrosin smear.

Special staining techniques can also be employed. The most common methods are Giemsa, the eosin and carbol fuchsin method[8] and the method of Karras as modified at Onderstepoort[2].

Although there is no general agreement as to what percentage of abnormal spermatozoa is to be allowed, it would appear as if this should not exceed 20%. The most common type of abnormality is the secondary type, which involves the tail of the sperm cell and usually occurs after the cell is formed. Amongst these coiled tails, loose heads and immature forms with protoplasmic droplets are found.

The primary type of abnormality which involves the head of the sperm cell and is more serious, is less often encountered.

(4) pH of semen:

The normal pH of ram semen falls within the range of 5,9 to 7,3. The pH of semen is determined by the metabolic activity and indirectly therefore also the concentration of spermatozoa in the specimen.

Examination for genital infection:

Apart from the typical lesions in the clinical disease, genital infection in both clinical and sub-clinical cases, is characterised by the presence in the semen of neutrophils and the causative agent. It should be borne in mind that the clinical disease, once the acute stages have subsided, usually terminates in complete occlusion of the epididymal duct of the affected side and the disappearance of inflammatory products from the semen. A semen examination in such cases will be negative on condition that the other side is free of infection.

1. Semen smear examination:

Following the other examinations, smears are prepared by spreading a drop of semen on a glass slide by the use of a glass rod, in such a manner that the smear consists of thin and dense portions. Smears of up to four rams can be prepared on the same slide. The dense portions are used to detect and rate the presence of neutrophils while the thinner areas are more suitable to study the presence and morphology of bacterial organisms.

The Giemsa method of staining semen smears is very useful for detecting neutrophils and other cellular elements but usually fails to show up the bacterial organisms.

The other staining techniques that are useful for detecting bacterial and chlamydial organisms are the Stamps modification of the Ziehl Neelsen technique[5], Hansen's method as cited by van Drimmelen[7] and also the Gram's staining technique[4].

The modified Ziehl Neelsen and Hansen's techniques are useful and specific for the identification of *Brucella ovis* organisms, while the former as it was specifically devised for it, will also show up chlamydial organisms. Both methods are however nonspecific for the identification of other micro-organisms encountered in ram semen, although their presence will be detected.

On account of the fact that all cellular material stains negatively with the Grams method, this technique has a very limited application in the routine examination of semen smears. It's value is confined to cases where Gram-positive bacterial organisms are involved and since these organisms are merly secondary invaders it's use is of academic importance only.

There are therefore two methods that can be recommended for routine purposes namely the Giemsa and modified Ziehl Neelsen techniques, but as the latter method clearly stains neutrophils and other cellular elements, the preparation of Giemsa stained smears is from a practical point of view, superfluous.

As normal semen should contain no neutrophils, their presence whether sporadic or in abundance should be viewed with suspicion and indicative of genital infection. Although fertility is only affected when neutrophils and bacteria and their products are present in abundance and to the extent that the semen quality is affected, rams showing neutrophils in the semen should not be passed as genitally sound.

Brucella ovis stains weakly acid-fast by Stamp's method and can easily be detected. As this infection is transmitted by direct contact or venerially, rams showing this infection should be eliminated without hesitation.

Actinobacillus seminis stains non-acid-fast by Stamp's method but can usually be detected and identified on it's morphology and arrangement. Sometimes and particularly in very acute cases however, the organisms cannot be clearly seen despite the presence of vast numbers of neutrophils and pure and abundant growth on semen cultures. As *A. seminis* is transmitted by the maternal route and a large percentage of young rams tend to loose the subclinical or even latent infection at any stage between weaning and the late two tooth stage, indiscriminate elimination of young rams with neutrophils and or bacteria in the semen should be avoided. In this case it is important that the examination of young rams at an early age and from studs where the infection exists, should not even be attempted. Rams from these properties should be examined from the age of 14 to 18 months, when they are normally sold and should not be condemned before at least three examinations with monthly intervals have been carried out and the semen remains heavily infected or show an increase of infection. Rams which show a distinct decrease in neutrophils and or bacteria in the semen should be retained for further examinations on condition that it is economically warranted to the specific owner.

2. Bacteriological examination:

In practice this will mainly entail the collection of sterile semen specimens and their submission in the fresh state or preserved on ice to the nearest laboratory. The value of this examination is that bacterial and other agents can be identified without reasonable doubt. Furthermore latent or very mild sub-clinical cases that would be missed on smear examination on account of the absence of inflammatory cells, could only be detected by this method.

3. Serological tests:

In practice this will entail the collection of blood in appropriate preservative and the submission of decanted serum to the nearest laboratory. The value of these tests is to be found in the fact that the infectious cause can be identified in all cases where circulating antibodies are still present and where other methods failed. It is particularly of value in those clinical cases where occlusion of the epididymal duct has already taken place and the infection is no longer excreted in the semen. It is also a more rapid method of identifying genital infection on a herd basis.

The mating test:

This test which is seldom carried out, covers one of the most important aspects of genital soundness. It involves the actual mating act and is an infallable method of determining the libido and mating dexterity of a ram. Furthermore by allowing competition for the same ewe on heat other aspects like sexual dominance or homo-sexuality could be determined.

The careful observation of features like courting or

teasing, mounting, mating and the time intervals between and frequency of these acts will provide excellent proof of the mating efficiency of a ram.

The breeding test:

This test which will only be carried out where serious desputes have developed, entails the mating of a ram to a pre-determined number of ewes either by hand mating or individual mating and the calculation of the number of successful matings as a percentage of the number of ewes mated. In such a test ewes will be mated during the course of one or two heat periods.

In both instances it would not be necessary to wait until lambing approximately 5 months later but by direct observation or with the aid of raddling harnesses, the number of ewes served and the number of ewes returning after one or two heat periods can easily be determined.

The breeding test can be regarded as the final test for the determination of the reproductive efficiency of a ram.

FINAL REMARKS

It should be emphasised that in the examination of rams the object should be to determine genital soundness and not fertility as such. A combination of tests should be selected to obtain the best information under all circumstances in order to allow a decision to be made, which will be justified to both examiner and owner.

In case of valuable breeding animals which show unilateral clinical lesions and are still producing fertile semen without any evidence of infection on repeated examinations, it is felt that such rams should be allowed to be used or sold on condition that the people concerned should be fully informed and that a qualified certificate be issued.

ACKNOWLEDGEMENTS

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ANNEXURE

EXAMINATION OF RAMS FOR GENITAL SOUNDNES STAINING METHODS

I. NIGROSIN-EOSIN METHOD

Reagents:

(a) Eosin – 5 g
Aqua dist. – 100 ml
Dissolve and filter
(b) Nigrosin – 10 g
Aqua dist. – 100 ml
Dissolve and filter.

Method:

(a) Place 2 drops of nogrosin and 1 drop of eosin on a glass slide close together.
Place a drop of semen in eosin, stir gently and mix with negrosin and prepare smears.
(b) Mix 1 part of eosin and two parts of nigrosin. Place 3 drops of the mixture on a glass slide, add 1 drop of semen, stir gently and allow to stain for 5 to 10 sec.
Live sperm remain unstained.

2. EOSIN BLUE – CARBOL FUCHSIN

Reagents:

(a) Stain 1
Saturated alcoholic solution of eosin blue, 1 part.
Ziehl-Neelsen carbol-fuchsin, 2 parts.
Alcohol 95%, 1 part.
Mix the eosin blue and carbol-fuchsin, filter and add the alcohol to the filtrate.
(b) Stain 2
Loefflers methylene blue, 1 part.
Distilled water, 4 parts.
(c) Chlorazene solution 0,5%

Method:

(1) Immerse the smear in the chlorazene solution for 5 to 7 min.
(2) Wash gently with water and dip into 95% alcohol.
(3) Apply stain 1 for 3 to 4 min and add more stain from time to time.
(4) Wash in water and counterstain with stain 2 for 3 sec.
(5) Wash, dry and examine.

3. KARRAS (Onderstepoort modification)

Reagents:

(a) Congo red saturated watery solution
(Congo red 74,5 g/100 ml distilled water).
(b) Bromo-thymol-blue-saturated alcoholic solution 1 ml
Aqua dist .....500 ml.
(c) Methyl violet – 3 g.
Methyl alcohol (Methanol) – 100 ml.
Dissolve.
(d) Methyl violet (3% Methanol) solution – 1 ml.
Aqua dist. .....4 ml.

Method:

(1) Stain with (a) for 1 minute. Wash carefully with running tap water.
(2) Stain for 1 minute with (b). Wash in tap water.
(3) Stain with (d) for 20 seconds. Wash, dry and examine.

4. STAMP'S MODIFICATION OF THE ZIEHL-NEELSEN TECHNIQUE

Reagents:

(a) Basic fuchsin – 3 g
96% ethyl alcohol – 100 ml
(b) Phenol 50 g
Aqua dist. 950 ml
(c) Mix a + b, filter. Dilute 1:10 with aqua dist. before use
(d) Acetic acid (glacial) 0,5 ml
Aqua dist. – 99,5 ml
(e) Methylene blue – 1 g
Aqua dist. – 100 ml
Filter

Method: (1) Dry and fix by heat.
(2) Stain carbol fuchsin 1/10 dilution (c) for 10 min.
(3) Wash in tap water.
(4) Differentiate 0,5% acetic acid (d) – 20 sec.
(5) Stain Methylene blue (1%) 30-45 sec.
(6) Wash, dry and examine.
Brucella organisms stain red, other organisms blue.

5.HANSEN'S METHOD

Reagents:

(a) Methylene blue 1,5 g.
96% ethyl alcohol 100 ml.
(b) 0,04% Potassium hydroxide in aqua dist.
(c) Before use mix 3 parts of (a) and 7 pars of (b).
(d) Saffranin 1,25% in aqua dist.

Method:

(1) Stain with (c) for 5 min.
(2) Wash in tap water.
(3) Stain with saffranin for 5 sec.
(4) Wash dry and examine.
Brucella organisms stain blue, other organisms stain red.

VERSAMELING EN VERPLANTING VAN BEES-EMBRIOS ONDER PLAASLIKE TOESTANDE*

J.C. HENDRIKS

ABSTRACT: Hendriks J.C. **Collection and transfer of bovine embryos under local conditions,** *Journal South African Veterinary Association* (1977) **48** No. 4 273 – 277 (Afr en) Box 1054, 9500 Kroonstad, Rep. of South Africa.

Six proven pedigree cows were used as embryo donors in this study. Superovulation as brought about by the administration of 500 iu PMS/100 kg body mass on the 11th day of the cycle and two days later prostaglandin was injected at the recommended dosage rate. The cows were then inseminated during the oestrus period which generally occurred 2 to 3 days after administration of the prostaglandin. An additional 2 inseminations were routinely carried out 12 and 24 h later.

Non-surgical collection of the embryos was successfully performed by using Rasbech's apparatus and technique and Dulbecco phosphate-buffered saline solution for irrigation.

Both non-surgical and surgical techniques were utilized for inovulation. In the non-surgical method the embryo was deposited about 50 to 60 mm from the utero-fallopian tube junction by making use of the "enovulator" designed by Rasbech. During the surgical procedure the embryo was deposited about 30 to 60 mm from the utero-fallopian tube junction by means of a Pasteur pipette introduced through an entrance made by a blunt needle in the uterine wall. The surgical approach proved 20% more successful than the non-surgical method.

The results of the embryo transfers carried out locally are regarded as being promising when compared with those of overseas workers. About 80% of the 5 to 7 d old fertilised ova were recovered and this represented about 8,3 embryos per collection. Sixty two per cent of these embryos were regarded as being suitable for inovulation and a conception rate of about 65% was obtained. A number of factors may influence these results and these are mentioned.

The advantages associated with embryo transfer are presented and discussed. Genetic improvement, progeny testing, increased productivity, inbreeding, decreased generation interval, import and export of genetic material, and the evaluation of lethal and semi-lethal genes are regarded as being the most important considerations.

INLEIDING

Die lae tempo van voortplanting van die koei was nog altyd as 'n remmingsfaktor vir genetiese verbetering beskou. Toepaslike metodes vir die versameling van embrios van uitstaande genetiese materiaal en die verplanting van sulke embrios na ontvangerdiere kan bydra tot 'n baie vinniger vermeerdering van nageslagte van geselekteerde en hoogs produserende diere.

Die tegnieke tot dusver gebruik vir die versameling en oorplasing van bevrugte eiselle het chirurgiese ingryping ingesluit wat nie alleen geweldige koste tot gevolg gehad het nie maar ook heelwat risiko's veral ten opsigte van post-operatiewe verklewings by die skenkerdier. Sodanige verklewings maak meermalige versamelings van eiselle uiters moeilik of selfs onmoontlik. Daar het gevolglik 'n behoefte ontstaan vir 'n meer eenvoudige bloedlose tegniek waar die hele prosedure van eisel versameling en verplanting (inovulasie) onder praktiese toestande op 'n plaas uitgevoer kan word.

Daar word gespekuleer dat meermalige versamelings van eiselle met bloedlose versamelingstegnieke slegs beperk word deur die aantal kere wat veelvuldige ovulasies by die koei bewerkstellig kan word. In hierdie verband behoort daar egter geen beperkings aan die herhaalbaarheid van die bloedlose tegniek te wees by diere wat normale siklusse deurmaak en ovuleer nie en waar derhalwe net een embrio per siklus versamel word.

Rasbech en Greve van Denemarke het in 1976 daarin geslaag om 'n bloedlose tegniek vir inovulasie by beeste te ontwikkel en het reeds suksesvolle resultate gedokumenteer[6]. Bouters in België en Ayalon in Israel het eweneens insiggewende resultate in hierdie verband aangeteken[1]. Teen die einde van 1976 is 'n studiereis na Denemarke, België en Israel onderneem en 'n studie van hierdie gespesialiseerde ingrypings by die koei gemaak. Huidiglik word inovulasie by beeste dan ook vir die eerst keer by beeste in die Republiek op groot skaal beoefen. Enkele van die resultate word hier weergegee.

*Voorgedra aan Oranje-Vaal Tak van die SAVV, 1977.

MATERIAAL EN METODES

Ses uitstaande beproefde vroulike diere uit verskillende stoetkuddes is reeds vir die doel gebruik. Veelvuldige ovulasies by skenkerdiere word bewerkstellig deur 500 ie PMSG**/100 kg liggaamsmassa, gewoonlik op dag 11 van die siklus toe te dien. Twee dae later word prostaglandiene*** teen voorgeskrewe dosisse binnespiers toegedien. Skenkerdiere word gedurende estrus, wat gewoonlik 2 tot 3 d na die prostaglandien toediening volg, met semen van geselekteerde bulle geïnsemineer. 'n Verdere twee inseminasies, 12 en 24 uur later, word as roetine uitgevoer. Vyf tot sewe dae na die eerste inseminasie word die skenkers rektaal ondersoek vir die teenwoordigheid van *corpora lutea* in die ovaria.

Vir die bloedlose versameling van bevrugte eiselle word die tegniek en apparaat van Rasbech gebruik. Voor versameling word die skenkergevalle in 'n drukgang vasgemaak, 'n epidurale verdowing toegedien, die rektum leeggemaak en die periniale gedeelte deeglik gewas.

Die embriokollekteerder van Rasbech soos gebruik bestaan uit 'n buis, 5 mm in deursnee wat vir koeie of een van 4,5 mm wat vir verse gebruik kan word. 'n Tweerigting latex ballon-kateter word deur die buis gestoot en uitgerek met 'n stillet. Die embriokollekteerder word versigtig deur die cervix tot in die een

**Dragtige merrieserum: "Antex" (Leo, België)
***"Estrumate" (ICI) of "Lutalyse" (Upjohn)

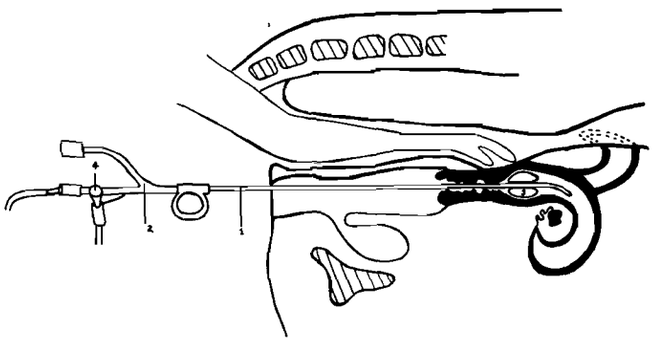

Fig. 1. Versameling van eiselle
1. Staalkateter
2. Latexkateter
3. Ballon in posisie
4. Stopkraan

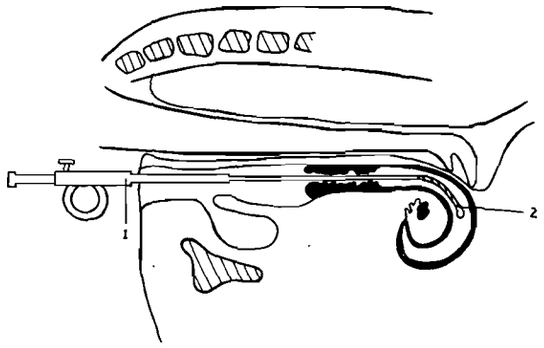

Fig. 2 Oorplasing van eiselle in ontvangerdiere
1. Inovuleerder in posisie
2. Spiraalmondstuk wat tot in punt van horing uitgestoot word

baarmoederhoring van die skenkerdier gestoot tot die punt van die kateter die ventrale buiging bereik en teruggehou word deur die uteruswand (Fig. 1). Hierdie prosedure word rektaal gekontroleer. Sodra die embriokollekteerder in posisie is word die ballon van die kateter opgeblaas met 12 tot 15 ml lug om korrekte plasing van die kateter te verseker en die terugvloei te voorkom.

'n Twintig tot dertig milliliter volume Dulbecco fosfaat-gebufferde soutoplossing word ingespuit deur 'n spuit wat aan 'n drierigting stopkraan aan die kateter gekonnekteer is. Die spoelvog vloei deur die kateter na die apikale gedeelte van die horing en spoeling word bevorder deur die baarmoederhoring rektaal te masseer. Daarna word die spoelvog weer teruggesuig deur 'n tweede 60 ml spuit wat ook aan die drierigting stopkraan verbind is. Dit is noodsaaklik dat die vloeistof gedurende die hele prosedure deur 'n geslote sisteem van buise na die baarmoederhoring en terug langs die kateter moet beweeg en weer deur dieselfde buise na die tweede spuit nadat die stopkraan gedraai is. Dit is ook belangrik dat dieselfde hoeveelheid spoelvog herwin moet word as wat ingespuit word. As die vloeistof verby die ballon sypel na die baarmoederliggaam moet die ballon stywer gespan word deur meer lug in te spuit. Versigtigheid moet egter aan die dag gelê word aangesien as die ballon te styf opgeblaas word mag die baarmoedermukosa as gevolg van die drukking skeur en sal die spoelvog rooierig verkleur weens die bloed wat vry kom. 'n Suksesvolle spoeling is afhanklik van volledige herwinning van helder deurskynende vloeistof.

Soms is dit nodig om die baarmoederhoring na ligte massering op te lig vir totale dreinering van vloeistof in die kateter in. Spoeling van een horing word soms vir soveel as agt keer herhaal. Na die kateter verwyder is word 'n tweede kateter gebruik en die proses herhaal vir die teenoorgestelde baarmoederhoring. Die spoelvog word na skeitregters oorgedra en by kamertemperatuur gelaat vir 10 tot 15 m. Die embrios sak uit en word gewoonlik gevind in die eerste paar milliliter vloeistof wat uit die tregters vloei en word met behulp van 'n stereomikroskoop geidentifiseer.

Goeie resultate word met Dulbecco se soutoplossing verkry – heelwaarskynlik omrede die pH langer konstant bly in vergelyking met byvoorbeeld weefselkultuurvloeistof. Die temperatuur van die vloeistof behoort tot 37°C verhit te word voordat spoeling 'n aanvang neem maar kan afkoel tot ±20°C terwyl die mikroskopiese ondersoeke vir die teenwoordigheid van eiselle gedoen word.

INOVULASIE

(a) Bloedlose tegniek

Dit is reeds proefondervindelik bewys dat vir suksesvolle resultate met inovulasie die embrios tot en met 50 tot 60 mm van die uterofallopiese buisaansluiting van die baarmoeder in die ontvangerdier gedeponeer moet word. Konvensionele kateters soos dié wat vir inseminasiedoeleindes gebruik word kan gewoonlik net gepasseer word tot in die middel van die baarmoederhoring waar dit teen die endometrium vasdruk en terug gehou word. Die embrio kan gevolglik nie in die juiste en korrekte posisie geplaas word nie. Hierdie probleem kan oorbrug word deur van die spesiaal saamgestelde "Enovulator" van Rasbech gebruik te maak.

Die instrument vir die oorplasing van die eisel in die ontvangerdier is so saamgestel dat dit moontlik is om onder 'n stereomikroskoop 'n embrio vanuit die spoelvog in die buissisteem op te suig en om dit in suspensie te hou met 'n klein hoeveelheid spoelvog. Die buis met inhoud word in 'n vlekvrye staalbuisomhulsel geplaas en tot in die middel van die horing gemanupuleer alvorens die spiraal mondstuk wat aan die binnebuis gekoppel is uitgestoot word tot in die apikale gedeelte van die horing (± 60 mm van die uterofallopiese buis aansluiting). Die embrio word dan in hierdie omgewing gedeponeer (Fig. 2). Om hierdie manupulasie te vergemaklik is die agterste gedeelte van die binnebuis omskep tot 'n 1 ml-spuit wat met 'n buisie, 1,5 ml in deursnit verbind is en wat eindig in 'n 100 mm lang politeenbuisie wat omring is met die vervangbare spiraal mondstuk van dieselfde lengte. Hierdie spuit en koppelbuise word omsluit deur 'n glybuis. Wanneer die instrument in die geslagskanaal geplaas word is die binneste gedeelte volledig beskerm deur die buitenste omhulsel. Sodra die buis teen die kromming van die horing vasdruk, word die spiraal mondstuk uitgestoot tot by die punt van die horing waar die embrio gedeponeer word. Dit is egter noodsaaklik dat die endometrium nie beskadig word nie en dat die prosedure onder epidurale verdowing gedoen word.

(b) Chirurgiese tegniek

'n Insnyding van ±150 mm reg onder die *tuber coxa* word onder lokale verdowing gedoen. Die punt van die horing, dieselfde kant as die eierstok wat die aktiewe corpora lutea bevat, word blootgelê en gepenetreer met 'n stomp naald. 'n Pasteurpipet met die embrio daarin

opgesuig en gekoppel aan 'n 1 ml-spuit word deur die gaatjie gestoot in die rigting van baarmoederhoringpunt en die embrio word ongeveer 30–60 mm van die utero-fallopiese aansluiting gedeponeer.

RESULTATE EN BESPREKING

Lampeter het volgens data soos gepubliseer 200 embrios uit 29 verse versamel[4]. Drie van sy skenkerdiere het nie op behandeling soos ingestel vir superovulasie gereageer nie maar hy het desnieteenstaande 'n gemiddelde van 7,69 embrios per skenkerdier versamel. Die aantal embrios het egter gevarieer van 1 tot 19 per vers terwyl 84, 93% van die embrios soos versamel, geskik was vir oorplasing. Hierteenoor het Rasbech[6] en Greve[2] daarin geslaag om 43 embrios van sewe skenkerdiere te versamel wat 'n gemiddeld van 6,14 embrios per koei voorstel. Gedurende opvolgende studies is heelwat beter resultate verkry en word inovulasie tans op 'n baie groter skaal in Denemarke beoefen. In Israel het Ayalon en medewerkers[7] negentien melk koeie gespoel wat volgens kliniese ondersoeke normale enkelkvoudige ovulasies deurgemaak het en is met hulle tegniek uit elf van die skenkerdiere 58% embrios (12 tot 17 d oud) versamel.

Gebaseer op die aantal corpora lutea wat rektaal gepalpeer kan word, versamel ons hier ter plaatse ongeveer 80% van al die 5–7 dae oue ova wat vrygestel word wat dan ook 'n gemiddelde van 8,3 embrios per spoeling omskrywe. Ongeveer 62% van hierdie embrios kon as geskik vir inovulasie geklassifiseer word (Tabel 1). Dit moet egter vermeld word dat hierdie syfer veel beter kon gewees het met uitsluiting van die 17 embrios wat ingeboet moes word weens die temperatuur-reaksie (106°C) wat by een van die skenkerdiere 12 uur voor die spoeling aangeteken is. Die feit dat ou koeie in ons studie as skenkers gebruik is, waar enkele selfs as swak telers geklassifiseer was, kan eweneens ons resultate beïnvloed het. As hierdie resultate met die van ander werkers wat slegs verse as skenkerdiere gebruik het, vergelyk word, dan kan dit, inagnemend van bogenoemde, as uiters belowend geklassifiseer word.

Uit ondersoeke alhier onderneem het dit geblyk dat ons tans ongeveer 20% beter resultate met die chirurgiese tegniek as met die bloedlose tegniek kan verkry en vir kommersiële doeleindes is ons nog op eersgenoemde tegniek aangewys. Die eerste ontvangerdier wat inovuleer is op 77/01/03 m.b.v. die bloedlose tegniek is reeds dragtig gesertifiseer. Metodes en maniere om nog beter resultate met die bloedlose tegniek te verkry word voortgesit. Soos in Tabel 1 uiteengesit, is die gemiddelde dragtigheid wat met ons inovulasie tegnieke bewerkstellig kon word ±3,4 per spoeling. Daar moet egter ook gelet word op die feit dat die skenkerdiere herhaaldelik gespoel was en dat dit ook die resultate kon beïnvloed het.

Geweldige individuele variasies kan voorkom maar in die breë kan die resultate soos onder plaaslike toestande verkry, as baie bevredigend beskou word. Ouderdom van die skenkerdier beïnvloed sekerlik die inovulasie-resultate. Volgens Lamond moet faktore soos voeding, seisoenskommelinge, laktasie, stremming met speen en uithongering eweneens in ag geneem word[3]. Veral die beskikbaarheid van vitamien A en minerale soos koper is besonder belangrik vir suksesvolle superovulasies en vir die lewensvatbaarheid van embrios. Dit is eweneens gebiedend noodsaaklik dat die estrussiklus van die ontvangerdier baie nou met dié van die skenkerdier gesinkroniseer moet word. Hierdie aspek is baie duidelik deur Screenan, Beehan en Mulvehill bewys[7].

Tabel 1: RESULTATE MET BLOEDLOSE TEGNIEK BEHAAL

Skenkerdiere	Geboorte-datum	Datum embrios versameling	Corpora lutea rektaal palpeerbaar L/O	R/O	Embrios versamel L/H	R/H	Totaal	Vloeistof herwin L/H	R/H	Embrio-kwaliteit goed	swak	Aantal dragtig na inovulasie
1. Annemarie	10.09.73	28.12.76	6	5	1	2	3	217ml (90%)	285ml (95%)	2	1	1
1. Annemarie		11.03.77	4	3	0	1	1	300ml (100%)	384ml (100%)	1	0	0
2. Anna	12.11.65	3.01.77	1	4	0	4	4	284ml 99%)	272ml 99%)	4	0	1
2. Anna		23.02.77	3	2	1	2	3	390ml (100%)	325ml (100%)	2	1	2
2. Anna		18.04.77	6	2	6	1	7	460ml (100%)	315ml (100%)	4	3	2
3. Linda	18.12.68	20.01.77	4	3	4	1	5	335ml (100%)	365ml (100%)	1	4	1
3. Linda		9.03.77	4	3	4	3	7	358ml (100%)	402ml (100%)	7	0	6
4. Sonne	16.06.72	16.03.77	6	10	5	6	11	450ml (100%)	346ml (100%)	3	8	2
4. Sonne		11.05.77	2	6	2	6	8	388ml (100%)	462ml (100%)	8	0	5
5. Lynette	18.05.71	28.03.77	8	4	12	2 bloed	14	369ml (99%)	280ml* (93%)	12	2	11
6. Grace	21.11.74	30.03.77**	10	7	10	7	17	360ml (100%)	360ml (100%)	0	17	0
6. Grace		23.05.77	7	10	8	12	20	353ml (98%)	417ml (100%)	17	3	10

L/O = Linker ovarium; R/O = Regter ovarium; R/H = Regterhoring; L/H = Linkerhoring
* = bloeding; **= skenker met koorsreaksie

VOORDELE VAN EMBRIO-OORPLASINGS

Die doeltreffendheid van diereproduksie hang tot 'n groot mate af van die reproduksietempo. Omdat die oorerflikheid van reproduksie doeltreffendheid laag is kan ons baie stadiger genetiese verbetering verwag as seleksie alleen gebaseer word op konsepsietempo en die verkryging van tweelinge. Superovulasie en embrio-oorplasing bied 'n alternatief. Sou inovulasie prakties uitvoerbaar word met realistiese besettingsyfers as resultaat, kan dit vir die veebedryf die volgende voordele inhou:

(a) Genetiese verbetering

Soos allerweë bekend, bepaal genetiese eienskappe in 'n groot mate die kwaliteit en ekonomiese doeltreffendheid van melk-sowel as vleisbeeskuddes. Tot watter mate kunsmatige inseminasie die verspreiding van gewenste gene gedurende die afgelope twee dekades laat toeneem het, is wel bekend. Eweso kan met inovulasie, gene van uitstaande vroulike diere op basies dieselfde wyse benut word. Geneties uitstaande diere kan verlos word van die tydrowende proses van dragtigheid deur uitsluitlik as eisel skenkers te dien. Hierdeur kan haar nageslagte binne 'n relatiewe kort periode veelvoudig toeneem. Dit is byvoorbeeld nie onmoontlik om met die metodes tot ons beskikking tot 40 kalwers per jaar van so 'n koei te bekom nie.

Die waarde van genetiese verbetering hang af van die aantal afstammelinge wat verky kan word. So byvoorbeeld is dit wel bekend dat vooruitgang kan toeneem van 1,5 tot selfs 2 keer by melkbeeste in die eerste generasie. By vleisbeeste kan dit van 2,5 tot 3,5 keer toeneem omrede ons vir vleiseienskappe in die manlike sowel as vroulike diere selekteer. Wat die daaropvolgende generasies betref kan 'n tempo van vooruitgang van net minder as twee keer die huidige tempo verwag word mits elke generasie 'n familie van vol susters is. Dit is dus duidelik dat superovulasie en inovulasie van besondere waarde vir die genetiese verbetering by beeste kan inhou.

(b) Nageslagstoetse

Nageslagstoetse was in die verlede beperk tot die manlidier terwyl die vroulike dier vir niks meer as net 'n medium vir soda nige toetse gebruik was nie. Die prestasie van 'n vroulike dier se afstammelinge kan die basis vorm deur veelvuldige ovulasies te bewerkstellig en om embrio oorplasings te doen. Die genetiese potensiaal van die vroulike dier kan derhalwe bepaal word lank voordat sy die vermoë verloor het om embrios te produseer. Dit is vandag reeds moontlik om embrios van 'n vers te versamel nog voordat sy in staat is om beset te raak en om die konseptus te versorg.

Nageslagstoetse op bulle kan eweneens deur hierdie tegniek aansienlik vergemaklik en verbeter word. Resultate sal baie meer betekenisvol wees as volsusters met mekaar en ook met groepe van half-susters vergelyk word. Diere wat net enkel afstammelinge per dragtigheid produseer kan gevolglik ook soos diere wat meer as een produseer, byvoorbeeld varke, beoordeel word. Die tydperk wat dit in beslag neem om 'n bul te toets sal ook aansienlik korter wees.

(c) Verhoogde produktiwiteit

'n Aansienlike toename in produksie van kalwers van geneties uitstaande diere word deur superovulasie en embrio oorplasings bewerkstellig. Geneties gesproke kan die minder waardevolle diere dien as ontvangerdiere en moeders vir die hoogs geselekteerde skenkerdier se eiselle. Op so 'n wyse kan 'n uitstaande dier tientalle afstammelinge in 'n leeftyd produseer. Na streng seleksie van sulke afstammelinge en superovulasie en oorplasings op ander diere kan binne 'n aantal jare met hierdie tegniek resultate behaal word wat nie in 'n eeu se teling onder normale omstandighede gedoen kan word nie.

(d) Inteling

Embrio-oorplasings sal van groot waarde wees om eenvormigheid in 'n kudde te kry. Erfdwang sal gevolglik bereik word teen 'n baie vinnige tempo. Teelpotensiaal kan ook bepaal word lank voordat sekere waardevolle diere hulle vermoë verloor om te reproduseer. Inteling van sulke diere kan gevolglik vergemaklik word.

(e) Verkorte generasie-interval

In die stadig ontwikkelende dier soos die bees sal 'n verkorte generasie interval die tempo van genetiese verbetering vinnig kan laat vermenigvuldig. Die dragtigheidsperiode van die bees kan egter nie verkort word nie maar 'n verskuiwing kan bewerkstellig word deur ova van verse te versamel voordat hulle puberteit bereik het. Baie praktiese probleme word nog in hierdie verband ondervind maar die resultate soos reeds gedokumenteer is baie belowend.

(f) In- en uitvoer van genetiese materiaal

Embrio oorplasings kan beskou word as 'n goedkoop en veilige metode om diere in te voer en kan ook help deur sekere probleme wat met konvensionele metodes opduik, uit die weg te ruim. Daar is egter nog nie helderheid oor die verspreiding van besmetlike siektes met inovulasie nie maar dit word voorsien dat hierdie metode minder gevaar as die invoer van lewendige diere sal inhou.

(g) Evaluering van letale en semi-letale genes

Om sulke genes uit te wys word die bul dikwels met sy eie dogter geteel. Vyftig persent van sodanige afstammelinge sal draers wees van alle ressesiewe gene. Hierdie toets alhoewel redelik spesifiek, het die nadeel dat die bul te oud word vir verdere gebruik en dat dit tot inteling kan lei. Hierdie probleme kan egter oorkom word deur gebruik te maak van inovulasie. Terwyl semen van 'n betrokke bul gestoor word kan hy veel vinniger getoets word vir ressesiewe gene. Die situasie kom nou nader aan dié by varke en die bul kan dus baie gouer as positief of as vry van ongewenste gene verklaar word.

ERKENNING

Dank word betuig aan dr A. du P Cuyler vir sy medewerking en ondersteuning.

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INFORMATION INLIGTING

CASTRATION WITHOUT CUTTING

Chemical castration of animals may one day replace the surgical method currently employed.

Drs. Phillip L. Senger and L.M. Koger reported their experiments which demonstrate that chemical castration of pigs is effective. The research involved injecting calcium chloride, a common salt, directly into the testicles of 4-day-old pigs. The chemical kills the tissue, chemically castrating the animals. Castration usually takes place before the pigs are 10 days old.

Dr. Senger said his research is still in an early stage, but that the results are promising. The advantages of chemical castration would include reducing the pain of castration, eliminating the possibility of infection, reducing the physical trauma of surgery and faster growing rates by delaying the time of castration.

The scientists also reported on chemical epididymectomy in rams. This involves injecting calcium chloride into the epididymis. Calcium chloride is also being used to dehorn calves and to remove warts, tumours and scar tissue. Dr. Koger explained that the salt destroys tissues.

("Castration Without Cutting"; Washington State University, College of Agriculture, Pullman, Washington State 99163)

PSEUDOPARKINSONISM IN THE DOG*

L. BOMZON**

CLINICAL HISTORY

A female Maltese Poodle, aged 9 m, exhibiting tremors of the whole body and limbs, was presented for examination and treatment. It had just completed its first oestrus cycle a few weeks prior to the presentation. The dog had been vaccinated at 3 m of age against canine distemper and hepatitis. The symptoms had a sudden onset some 24 h prior to presentation. The animal could still eat and carry out natural body functions without difficulty despite the tremors.

CLINICAL EXAMINATION

Clinical examination established no particular abnormality. In fact, the examination confirmed the owner's observation with regard the dog being able to walk freely without any derangement of balance as well as normal eating and drinking. As far as could be ascertained by a full clinical examination, all bodily functions were normal.

DIAGNOSIS

At this stage a tentative list of differential diagnoses was drawn up (Table 1). All the possibilities are presented in their widest scope. The various procedures and treatments that follow were primarily aimed at establishing a diagnosis.

Table 1: THE DIFFERENTIAL DIAGNOSES

Trauma
Toxin
Tumour
Encephalitis
Metabolic Disorder
Disturbance of the neuromuscular function
Disturbance of the lower motor neurone
Disturbance of the upper motor neurone

TREATMENT

Since the symptoms were not unlike that seen in eclampsia, intravenous calcium gluconate was administered but the symptoms persisted. At the suggestion of a colleague, phenytion at a dose rate of 100 mg/d was prescribed. After 24 h period the symptoms still persisted and the dose rate was increased to 100 mg three times per d and simultaneous therapy with chlorpromazine was prescribed. This treatment regime continued for 3 d without any effect on the symptoms.

At this stage it became necessary to begin to eliminate some of the possible causes listed in Table 1. Blood was taken for chemical analyses, particularly for electrolytes. The animal's head was X-rayed and an electroencephalogram (EEG) was taken.; The results of the laboratory findings and these procedures are listed in Table 2.

Further advice was sought and it was suggested that peripheral nerve block be given to establish whether the problem was at the neuromuscular junction or in the muscle itself. Radial nerve block caused relaxation of the limb. This result placed the lesion anterior to the peripheral nerve and muscle. The negative EEG finding placed the lesion posterior to the cerebral cortex. Further advice was sought and it was suggested that the problem might lie in the basal ganglia since further questioning of the owner had established that the tremors were not present when the animal slept. Atropine therapy was suggested and 1 mg atropine was administered subcutaneously. The tremors subsided following treatment. In the light of this result, a drug with anticholinergic properties used to treat disturbances of the basal ganglia in man was chosen as a therapeutic agent. Thrihexyphenidyl hydrochloride ('Artane', Lederle) was given at the dose rate of 2 mg four times per d together with 1 mg diazepam ('Valium', Roche) four times per d. The symptoms disappeared completely and treatment was stopped after 3 weeks. No recurrence of symptoms has occurred in the past 3 years.

Talbe 2: A SUMMARY OF THE RESULTS OF TESTS AND PROCEDURES

BLOOD	
Red cell count	6.69 x 10^6/mm^3
Haemoglobin	18.9 g%
PCV	54.3%
MCV	98 m^3
MCHC	35%
White cell count	11,600/mm^3
Neutrophils	55%
Monocytes	11%
Lymphocytes	32%
Eosinophils	2%
Basophils	0%
Platelets	Plentiful
CHEMISTRY	
Urea	47mg%
Sodium	142 meq/ℓ
Potassium	5.4 meq/ℓ
Chloride	105 meq/ℓ
Co_2	17.9 meq/ℓ
Calcium	9.2 mg%
Phosphates	4.3 mg%
Glucose	60 mg%
SGOT	10 mU/mℓ
CPK	78 mU/mℓ
LDH	204 mU/mℓ
Electroencephalogram	normal
Cranial x-rays	normal
Radial nerve block	relaxation of limb

*Paper presented at the Annual Congress of the Witwatersrand Branch. 1976.

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DISCUSSION

The most interesting aspect of this case were the procedures necessary to localise the site of the lesion. Three features in this regard are outstanding. Firstly, the absence of symptoms when the animal slept. Secondly, the negative finding on EEG examination which anatomically sited the lesion in a structure/s posterior to the cortex. Thirdly, radial nerve blockade inducing limb relaxation. This procedure placed the lesion anterior to the lower motor neurone and muscle. These findings, in conjunction with the results of the clinical examination and, in particular, the neurological examination, placed the lesion in a subcortical structure. Of all the subcortical structures a disturbance of the basal ganglia seemed the most obvious since the clinical symptoms were not unlike that of Parkinsonism in humans. Moreover, the disappearance of symptoms when the animal slept indicates possible basal ganglia dysfunction.

Several features of this case require clarification. These features include the aetiology the pathogenesis and the apparent self-limiting nature of the syndrome. Although no specific answer is available to these questions, the diagnosis of basal ganglia dysfunction is controversial since disturbances in function of these structures are rare. Moreover, the absence of a post mortem examination with supporting histology emphasise this aspect.

BRIEF AAN DIE REDAKTEUR — LETTER TO THE EDITOR

Geagte heer

KOSMETIESE OPERASIES OP DIERE
soos gemeld in Nuusbrief van Sept. 1977

Dit is komies dat ons so op loop kan gaan oor iets soos 'n oorkroepering en dit selfs wil afskaf. Dit komende van die spesies wat homself letterlik versnipper om mooi te lyk en selfs sy liggaam ontsier met aapharte is voorwaar prysenswaardig. Of is dit?

'n Kordektomie beteken slegs goeie buurmanskap en behoort genadedood nie eens in dieselfde asem genoem te word nie. Om dit as alternatief aan te bied is belaglik. 'n Soortgelyke operasie vir hoenderhane in stede behoort aanbeveel te word.

Ons moet die praktyk opbou en nie afbreek nie want dit beteken agteruitgang en hoe kan dit 'n tweede fakulteit regverdig?

In elk geval is dit 'n bietjie laat in die dag om sulke onnodige en drastiese stappe te wil neem. Wat professioneel gedoen kan word sal dan deur onkundige maar gewillige hande elders verrig word soos dit reeds te dikwels gebeur.

Die uwe

Dr. S.W. Petrick
Senior Lektor: Departement Chirurgie,
Fak. Veeartsenykunde.
Universiteit van Pretoria

New multi-action Valbazen* gives you 4-way worm control for the price of one!

Marchant Young 1982

Now Smith Kline brings sheep farmers the simple answer to the complex problem of worm control. Revolutionary new Valbazen, the world's first 4-in-1 worm remedy, kills roundworms, lungworms, tapeworms, plus adult liver fluke – giving you even more benefits per dose cost.

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PERINEAL URETHROSTOMY IN THE MALE CAT*

B. IRVINE-SMITH**

Perineal urethrostomy is often a successful and rewarding solution to urolithiasis in the male cat. The techniques of perineal urethrostomy are numerous but in our clinic the one described by Wilson and Harrison[1] has proved the most satisfactory. The following report details this surgical technique and discusses briefly its advantages and disadvantages.

Pre-operative Care

Initially, a full clinical and clinico-pathological assessment of the condition of the cat is made. Particular reference is made to renal function. Laboratory investigations performed include haematocrit, plasma urea levels and a complete urinalysis. If necessary, plasma potassium levels are also estimated. Any derangement in these parameters are corrected before any surgery is performed.

Operative Procedure

The anaesthetised patient is placed in ventral recumbency with the hip joint flexed and the pelvis raised approximately 7 cm. An elliptical skin incision is made with the dorsal apex on the midline below the scrotum. (Fig. 1).

The incision is deepened and the penis is isolated by blunt dissection. At this point, entire males are castrated. The 2 ischiocavernosus muscles on each side of the penis and the retractor penis dorsally are exposed. The retractor muscle is then severed. The penis is drawn laterally 45° to the midline. This now exposes the contralateral ischiocavernosus muscle (Fig. 2). This muscle is then severed as close to the *tuber ischii* as possible. The procedure is then repeated for the opposite side.

The penis is then freed from the region of the pelvic symphysis by careful dissection. This dissection is continued cranially to expose the bulbourethral glands. The degree of dissection required is to allow the bulbourethral glands to be level with the skin incision when no tension is applied to the penis. The proximal remnant of the retractor penis muscle is freed from the dorsal surface of the penis to expose the urethra. This dissection continues as far as the bulbourethral glands (Fig. 3).

The penile urethra is then opened up to the level of the bulbourethral gland, the incision is carried only far enough to just enter the pelvic urethra.

Using atraumatic non-absorbable sutures, preferably 4/0 monofilament nylon, the exposed urethral mucosa is sutured to the skin. The first suture on either side is placed at the dorsal end of the wound at 45° to the midline (Fig. 4). These sutures are used to sew the opened penile urethra to the skin. The last 2 sutures, which are ventrally located, are also placed at 45° to the midline to anchor the end and to spread the mucosal drain board maximally (Fig. 5). A mattress suture is placed around the body of the corpus cavernosus muscle. The penis is transected distal to this point and discarded (Fig. 6). The remainder of the skin incision is then sutured.

Post-operative Care

Intravenous fluids are used to maintain diuresis for 24–48 h postoperatively. Broad spectrum antibiotics are given for 5 d. The wound itself is dressed with furacin cream for 3 d. No litter is provided for 3 d. A normal diet is allowed. The sutures are removed at 7 to 10 d. The cat is discharged, after suture removal.

Discussion

The outstanding feature of this technique is that it obliterates the narrow penil urethra, and thus prevents recurrence of urolithiasis. Another advantage of this technique is that postoperative stricutres are minimised because there is no circumferential suture line. Other advantages are that the penile urethral-skin suture line heals by first intention and that the drain board, show in Fig. 5, prevents urine burn.

However, there are some disadvantages. The most important of these is that post-operative constriction can occur. This constriction usually arises following insufficient dissection of the penis and allowing its subsequent cranial contraction. Another disadvantage is that breeding ability is eliminated. Other disadvantages are that persistent licking by the cat can cause excessive granulation tissue and that intermittent haemorrhage can occur for the first 2–4 d postoperatively. The problem of persistent licking and selfmutilation can be controlled by use of an Elizabethan collar. Post-operative haemorrhage occurs if the *corpus cavernosus* muscle is penetrated while suturing. Parenteral coagulants, such as tranexamic acid, have proved useful should this arise.

To date, 25 such operations have been performed in our clinic. Of these, 23 have made uneventful recoveries. The other 2 animals died within 5 d of surgery. One of these animals died from uraemia and the second was euthanased at the owner's request when an iliac thrombosis was found.

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*Pape presented at the Annual Congress of the Witwatersrand Branch. 1976.

**Box 67092, Bryanston 2021

FIGURE LEGENDS

Figure 1: The position of the cat and the elliptical incision around the penis and scrotum.

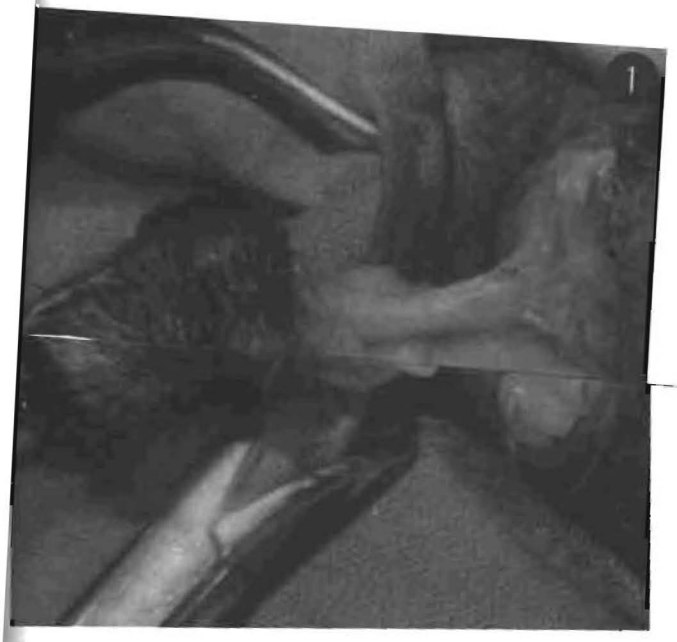
Figure 2: The isolation of the ischiocavernosus muscle is shown.

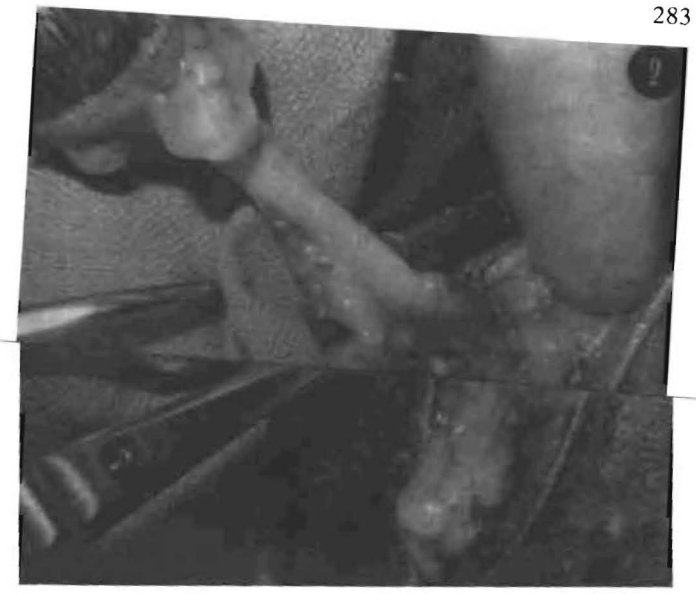
Figure 3: The retractor penis muscle is dissected from the dorsal surface of the penis.

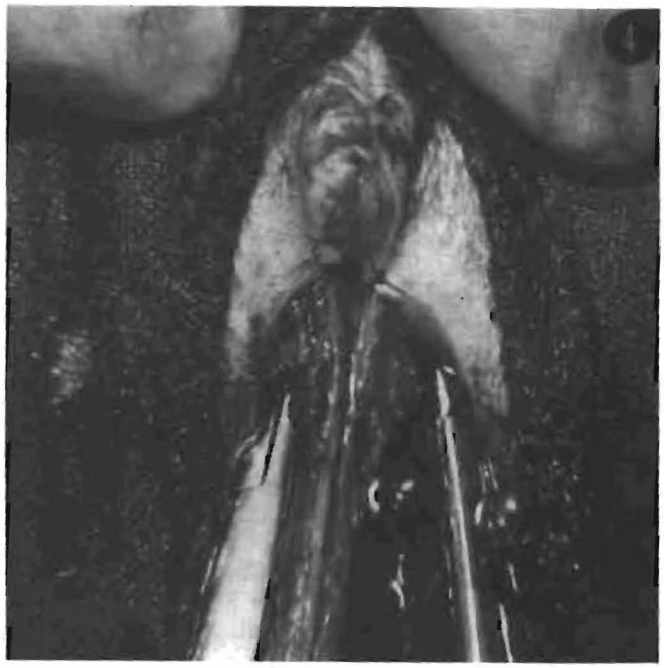
Figure 4: The position of the first sutures, one on either side of the urethral aperture and placed at 45°.

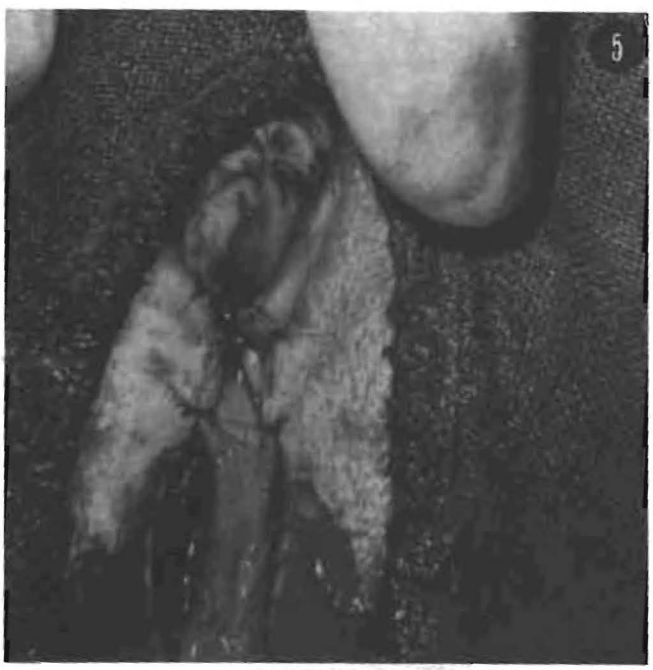
Figure 5: Urethral mucosa is sutured to the skin.

Figure 6: The penis is amputated. The last 2 sutures are to be placed at 45° to the midline to anchor the end and to maximally spread the mucosal drain board.









TO THE EDITOR

AAN DIE REDAKSIE

THE TOXICITY OF LEVAMISOLE AS A PARENTERAL TREATMENT FOR BIRDS

Sir,

A study was prompted by the difficulties experienced by owners in treating Psittacine birds for helminths by the oral route. These birds are reputed to be irregular in their water drinking habits and are notoriously difficult to dose. Budgerigars (*Melopsittacus undulatus*) in this laboratory have been

Bruynooghe, Thienpont & Vanparijs (1968) found tetramisole, at an oral dosage rate of 40 mg/kg body mass, highly effective as a treatment for *Ascaridia galli* in poultry. At an oral dosage rate of 160–640 mg/kg body mass the birds showed an increased frequency of defaecation. In our study we decided to use levamisole HCL (Ripercol-L)* intramuscularly (IM) in the central area of the pectoral muscle and subcutaneously (SC) at not less than 20 mg/kg body mass to determine its toxicity for birds. The different birds reacted to the treatment as follows:

1. Cockatiel *(Nymphicus hollandicus)*

Levamisole HCL was injected IM at a dosage rate of 25 mg/kg body mass. The reactions of the 3 birds treated varied from no reaction, to slight inco-ordination with regurgitation of food and complete recovery within 60 minutes.

2. Budgerigar *(Mellopsittacus undulatus)*

Two birds were injected SC at a dosage rate of 40 mg of levamisole HCL/kg body mass. One died within 8 minutes after treatment, while the other showed severe inco-ordination with regurgitation of food but recovered within 65 minutes.

In another experiment, IM application of levamizole HCL at 25 mg/kg body weight in 8 birds resulted in regurgitation in all of them, and only slight inco-ordination in one bird. All these birds were normal within 35 minutes of the treatment.

*Ethnor Laboratories (Pty) Ltd, PO. Box 273, Halfway House 1685.

3. Pigeon *(Columba livia)*

Five pigeons were treated IM with levamisole HCL at the following dosages: 20, 25, 35, 40 and 47 mg/kg body mass. The bird receiving 35 mg/kg IM died within 5 minutes without inco-ordination or regurgitation. Complete recovery within 60 minutes of the treatment.

4. Fowl *(Gallus domesticus)*

Four New Hampshire cockerels were treated IM at 40 mg levamisole HCL per kilogram body mass. Three of the birds reacted by panting which lasted 12–60 minutes.

Two New Hampshire cockerels, each treated IM at 20 and 25 mg/kg body mass, showed no visible reaction.

Conclusion

In a previous experiment done in this laboratory tetramisole when given *per os* at 40 mg/kg body weight caused regurgitation in cockatiels, budgerigars and pigeons.

When levamisole HCL was administered parenterally at 20–25 mg/kg body weight, some of the birds showed regurgitation with or without inco-ordination. Since these reactions do not seem to be much more drastic than those from the oral dosing of tetramisole, parenteral administration may therefore be considered as an alternative route of administration of the drug.

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FERTILITY AND INFERTILITY PROBLEMS IN SOWS*

R.K. LOVEDAY

ABSTRACT: Loveday R.K. **Fertility and infertility problems in sows.** *Journal of the South African Veterinary Association* (1977) **48** No. 4, 285 – 286 (En) Livestock and Meat Industries Control Board, Box 1357, 0001 Pretoria, Rep of South Africa.

The overriding economic importance of reproductive efficiency to successful pig production makes it necessary to collect and analyse performance records for the diagnosis and control of reproductive failure. Recently published production standards from the United Kingdom are related to the results obtained from 68 herds in the National Pig Health Scheme. It is concluded that more attention to the managerial aspects of weaning and rebreeding will do much to improve farrowing

INTRODUCTION

Reproductive failure exerts without doubt the most expensive effects on pig herd performance and profitability[1] Herd production level and the cash flow it generates is entirely dependant on the fertility pattern and the subsequent farrowing rate and fattening performance. The growth of larger and generally more intensified pig breeding units in recent years has brought new problems in this field together with the growing realisation by veterinarians of the adverse effects caused by the stresses of "industrialised" pig production on reproduction in large populations. The economic importance of the subject certainly justifies a high research priority [2]. Effective veterinary involvement in the diagnosis and control of these problems will require constant collection and analysis of performance records based on a "whole-herd" approach[3], together with regular data interpretation to provide the foundation for diagnosis, prognosis and control. Experience in this field during the past few years has led to the realisation that many farmers require guidance and motivation regarding the collection and collation of records which can usefully be employed for the above purposes. Problems revealed by the records are followed by further clinical, pathological and laboratory examinations as required.

PRODUCTION STANDARDS

Production standards are the norms associated with well-run herds for the various stages of the reproductive cycle and are useful guidelines for assessing the efficiency of reproduction. A recent set of normal reference data published in the United Kingdom[3] is given in Table 1 below for the 'white' breeds practising 5 week weaning.

For comparison with these standards, the 1976 averages of 5 parameters for 68 South African farmers with reasonable herd records are shown in Table 2.

From the range appearing in Table 2 it will be noted that herd reproductive performance among the 68 farms sampled varies from extremely good to very poor, and that the resultant averages tend to fall rather far below the Table 1 guidelines of Wrathall[3]. This suggests that too many of the farms involved have obtained sub-standard results. To place these results in another perspective they have been compared with similar averages from two other countries in Table 3.

*Presented at the Reproduction Group Session, Biennial National Veterinary Congress, SAVA, Grahamstown, Aug. 1977.

Table 1: NORMAL REFERENCE DATA AND FIGURES ABOVE/BELOW WHICH ACTION MAY BE NEEDED[3]

PERFORMANCE DATA Calculated from Records	REFERENCE FIGURE Or Normal Standard	DECISION BOUNDARY Above/below which action is needed
*Age at first Service	225±10d	≥240d
*Weaning-to-service interval	6–9d	≥10d
Regular returns (21 ± 3d)	10%	≥20%
*Conception rate to first service	90%	≤80%
Irregular returns (24d)	3%	≥6%
Abortions	1%	≥2,5%
Failures to farrow	1%	≥2%
*Farrowing rate	85%	≤80%
*Piglets born alive per litter	10,5–11	≤10
Piglets born dead	5%	≥7,5%
*Piglets weaned	9,5–10	≤9
*Litters per sow per year	2,14	
Age at culling	Varies, but usually after 3–5 litters	Depends on management policy

*Parameters indicated by stars are those most suitable for regular monitoring; the others may be needed for analysis of specific problems.

Table 2:AVERAGE REPRODUCTIVE PERFORMANCE IN 68 HERDS BELONGING TO THE NATIONAL PIG HEALTH SCHEME AND USING 5 WEEK WEANING (1976). (EXTREME RANGE IN BRACKETS)

PERFORMANCE DATA	$\bar{x}$ (n= 68)		REFERENCE FIGURE FROM TABLE 1
Farrowing rate	80,2%	(100 – 41,78)	85%
Piglets born alive per litter	9,84	(11,08 – 8,26)	10,5 – 11
Piglets weaned per litter	8,13	(9,40 – 6,19)	9,5 – 10
Preweaning mortality	17,59%	(31,37 – 3,26)	11,63 – 6,98
Litters/Sow/Year	1,85	(2,25 – 1,31)	2,14

COMMENT

The main problems affecting sow fertility in this country have been called "category B" problems by Wrathall[4] i.e. those problems associated with subnor-

Table 3: SOW FERTILITY IN COMMERCIAL HERDS IN 3 COUNTRIES

PERFORMANCE DATA	UNITED KINGDOM[1] (n = ± 1 200) (1973)	BELGIUM[2] (n = 48) (1974–1975)	SOUTH AFRICA[3] (n = 68) (1976)
Litters/sow/year	1,93	1,95	1,85
Piglets born alive per litter	10,3	8,82	9,84
No. live pig born/sow/year	19,88	17,25	18,20

SOURCES:
1. MLC data quoted by Wrathall[4] (5 – 6 week weaning)
2. BLIXLE A. Landbr. F.

mal piglet production and wastage of sows. He further points out that when the two major components of performance (farrowing frequency and litter size) are assessed separately, it is found that a greater proportion (approximately 60 versus 40%) of the deficit is attributable to low numbers of litters per sow per year. This component is more susceptible to the effects of good management than litter size.

Using this information as a guide it becomes necessary to pay particular attention to those factors which tend to lengthen the weaning to re-conception interval in particular and the interfarrowing period in general. Here may be mentioned particularly the need to educate managers into a clear understanding of the ideal environment (social, structural and climatic) required to provide sufficient comfort and normal endocrine function during weaning, oestrus, service and early pregnancy. The proper housing of weaned sows kept on a rising plane of nutrition in close proximity to active boars will do much to reduce the problems of delayed oestrus, suboestrus and anoestrus which delay re-conception. Supervision of properly timed double services and the regular use of ultrasonic pregnancy diagnostic methods will also markedly assist in reducing repeat breeding and promote the culling of infertile sows earlier.

A large proportion of the infertility problems in sows are attributable to stress-induced endocrine functional insufficiency resulting from poor management and in some cases downright neglect of the weaning and rebreeding processes. Apart from two specific infectious conditions viz. porcine parvovirus and letptospirosis, it does not appear that uterine infection plays a major role in causing sow infertility problems. In a survey some years ago the writer and a colleague found only two cases of endometritis in 504 non-pregnant uteri examined at heat. Pyometra or metrosepsis in 863 examined. Almost exactly 10% of the animals represented by their material, however, were adjudged to have been incapable of breeding as a result of cystic abnormality of the ovaries. This problem is particularly serious in older sows and the research of Liptrap[7] and others has clarified the effects of stress (increased ACTH) in the pathogenesis of follicular cysts via the inhibition of gonadotrophin secretion. Working in a very well-run herd Whyte[8] has recently shown the value of low doses of gonadotrophins given one day after weaning in improving both the conception rate and the litter size of treated sows.

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CASE REPORT **GEVALVERSLAG**

SURGICAL CORRECTION OF PREMATURE CLOSURE OF THE ULNAR GROWTH PLATE IN THE DOG

L.B. EVANS

ABSTRACT: Evans L.B. **Surgical correction of premature closure of the ulnar growth plate in the dog.** *Journal South African Veterinary Association* (1977) **48** No. 4 287-288 (En) Box 307, Kloof, Rep. of South Africa.

Successful correction of anterior bowing of the foreleg and severe lateral carpal valgus following on premature closure of the ulnar growth plate in a month old Great Dane bitch is described. The procedure involved stapling the radius across the distal growth plate and section of the ulna.

INTRODUCTION

A Great Dane bitch, 5 months old, was presented showing lameness resulting from severe lateral deviation of the right forepaw (Fig. 1). The dog had been given to the present owners with a suspected 'fracture' of the right forepaw but without history of trauma or any other possible cause.

Clinical examination of the dog revealed an anterior bowing of the foreleg and severe lateral carpal valgus. Premature closure of the distal ulna growth plate was suspected and this was later confirmed on radiological examination (Fig. 3).

Radiological examination of the right foreleg revealed the following:

(i) a shortened, thickened ulna;
(ii) marked A-P bowing of the radius in the distal third;
(iii) premature closure of the ulnar growth plate;
(iv) the presence of a core of cartilage in the distal ulna;
(v) a tendency towards sub-luxation of the radio-carpal joint;
(vi) a raised area (subperiosteal) on the posterior surface of the ulna, at approximately the junction between the middle and distal thirds of the bone. This may possibly have resulted from trauma to the bone, consequently adversely affecting the growth plates.

The diagnosis was premature closure of the ulnar growth plate. It was decided to attempt surgical correction by means of stapling the right radius across the distal growth plate and to section the right ulna. This method was chosen in preference to the more radical wedge osteotomy procedure (see discussion).

SURGICAL PROCEDURE

The dog was prepared for surgery in the usual way. Anaesthesia was induced using thiopentone sodium and maintained on a halothane/oxygen mixture. An incision ±5 cm long was made over the medial aspect of the right distal radius and the radius was reached by blunt dissection, great care being taken to avoid the

Fig. 1
Pre-operative lateral carpal deviation.

Fig. 2
3 months after surgical correction.

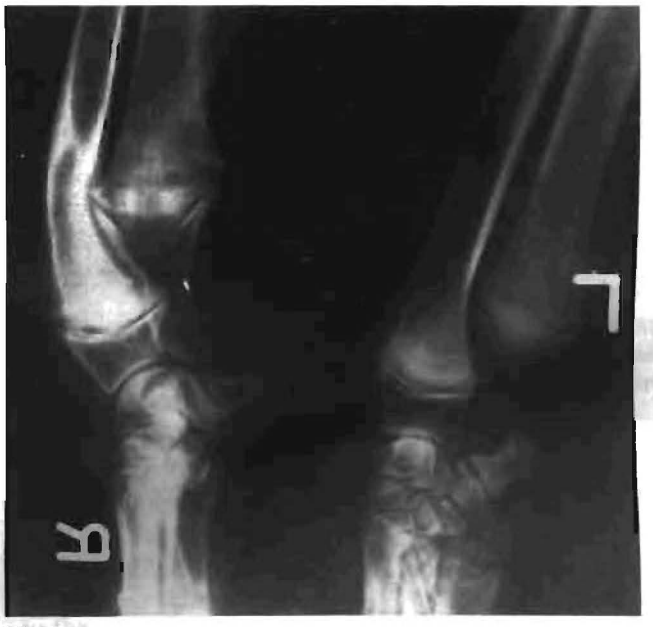


Fig. 3
Pre-operative X-rays.

cephalic vein which crosses the operating field. A size 04 epiphyseal staple was inserted across the epiphyseal line (growth plate) without incising the periosteum. The wound was then closed.

The procedure was then repeated through a second incision made on the anterior-medial aspect of the distal radius and a second staple inserted.

Once the second skin wound was closed, a third incision was made on the medial aspect of the right foreleg approximately over the junction of the middle and distal thirds of the ulna. The ulna was then exposed by blunt dissection and sectioned in its distal third. The wound was then sutured and the leg placed in a supportive half-cast of plaster of Paris (Fig. 4).

POST-OPERATIVE CARE

Antibiotic cover was given for the first week . and then discontinued. The dog was hospitalized for the first week then allowed to go home, together with a calcium supplement to be added to the diet. The cast was kept in place for the first two weeks and then removed. At this stage the leg was re-Xrayed. The radiographs showed a slight improvement in the abnormal curvature of the leg. In addition, the sectioned edges of the ulna had drawn apart. Calcification processes were also shown to be taking place between these edges. The cast was replaced with a supportive bandage.

Three months later the dog was returned showing a very marked improvement in both gait and the position of the paw. The paw had rotated medially and consequently the earlier marked lateral deviation had now disappeared and the paw was held in a position similar to that of the opposite forepaw (Fig. 2).

The right foreleg was Xrayed and the following observations made:

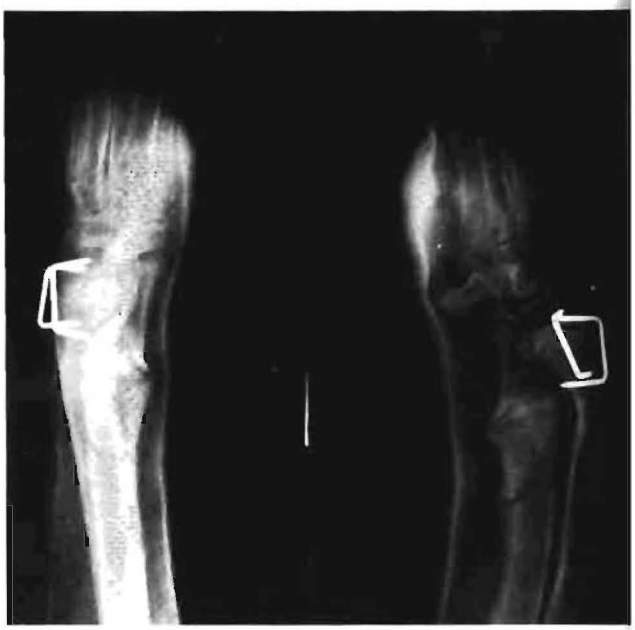
(i) the osteotomized ulna had healed well;
(ii) the radius had straightened, but some slight degree of ant-post bowing was still evident;
(iii) the sub-luxation of the radio-carpal joint was no longer present;
(iv) the growth plates of both radius and ulna appeared to have closed;
(v) the persistent core of ulnar cartilage was no longer evident.

The dog was then prepared for surgery and both staples were removed.

DISCUSSION

It was decided to attempt surgical correction of the defect by means of stapling rather than performing a wedge osteotomy for the reasons that (a) it would be far simpler to perform, causing relatively little surgical interference with the body tissues and (b) consequently it would be less expensive to the owner.

The procedure itself is very straight forward, provided suitable instruments are used. It is far less time-consuming than the wedge osteotomy procedure



Immediately post-operative X-rays showing the 2 staples an the sectioned ulna.

and provided the patient is presented soon after th abnormal angulation is noticed and both growth plate are not yet closed, it is reported to give good results i straightening the limb. Our experience agrees with this

Should the results achieved not be satisfactory i would still be possible to perform the more radica wedge osteotomy operation which entails the plating o the cut bone.

Once the limb growth plates have closed, the lim can only be straightened by means of osteotomy. I cases of severe angulation of the limb (as in this case the ulna is sectioned in its distal third to prevent i having a splinting effect on the radius.

The disadvantage of the stapling procedure is that i tends to shorten the radius but this is not usually seriou and the dogs lead normal active lives. The cas described above did not appear to have any problem with regard to radial shortening. Osteotomy, on th other hand, does not have this disadvantage but is major operation.

ACKNOWLEDGEMENTS

I acknowledge the invaluable assistance of Dr S Burrows and thank Hospital Products (Pty) Limited fo the loan of their instruments.

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THE SYSTEMIC THERAPY OF CLINICAL BOVINE MASTITIS*

W.H. GIESECKE

ABSTRACT: Giesecke W.H. **The systemic therapy of clinical bovine mastitis.** *Journal of the South African Veterinary Association* (1977) **48** No. 4, 289-291 (En) Veterinary Research Institute, Onderstepoort, 0110, Republic of South Africa.

The general feasibility of systemic therapy of clinical bovine mastitis is briefly discussed. Unsatisfactory situations resulting from the both the dairy farmer and veterinarian and attitude of limiting full realisation of the importance of systemic therapy of mastitis in South African dairy herds are pointed out. A routine procedure for the detection and emergency treatment of clinical mastitis is suggested and the veterinarian's dual role in mastitis control is emphasized.

INTRODUCTION

Literature covering almost a century of research attests to the considerable attempts that have been made to successfully treat bovine mastitis. A wide range of therapeutic compounds have been used to this end. Fortunately, sufficient dairy cows have survived the onslaught to ensure the production of milk and to remind us that mastitis therapy has not been as successful as might be assumed. Research has, no doubt, provided the means to successfully destroy the more common mastitogenic bacteria (e.g. *Streptococcus agalactiae, Staphylococcus aureus* and *Escherichia coli,*. On the other hand, it is clear that little progress has been made on the therapeutic suppression of clinically acute mastitic reactions and that there is great need for a concerted effort by dairy farmers and veterinarians to improve on the present therapy of clinical mastitis.

This paper will, hopefully, arouse interest in and lead to a solution of the problem which concerns South African dairy herds in particular. This discussion will attempt to determine whether clinical mastitis can be treated successfully by means of systemically administered antimicrobial chemotherapy and whether such therapy is of any particular importance under South African conditions.

THE SUCCES OF SYSTEMIC THERAPY OF MASTITIS

Systemic chemotherapeautic treatment of acute clinical mastitis affecting women, rabbits, bitches, sows and mares may result in considerable but not absolute success. Similar results follow the systemic therapy of bovine mastitis. Research aimed at improving the success of such therapy has unfortunately been seriously affected by controversy on crucial issues such as, for instance, the definition of mastitis and therapeutic success, the accurate diagnosis of conditions other than the clearly recognizable types of septic mastitis and the delayed initiation of pharmaco-dynamic evaluation and design of drugs specifically formulated for mastitis therapy.

There is, nevertheless, sufficient data on the resorption of antibiotics from treated udders and the excretion in milk of antibiotics and sulphonamides administered by various routes which suggest that certain chemotherapeutics readily cross the blood-udder barrier of the normal and especially, the mastitic mammary gland.

*Presented at the Annual Congress of the Pretoria Branch of the SAVA, Pretoria, 1977.

Systemic therapy of bovine mastitis and particularly of clinical septic mastitis, seems thus feasible in principle. It is apparently of considerable value especially in cases where the parenteral use of broad-spectrum antibiotics or sulphonamides is indicated. It is, however, essential to administer doses of chemotherapeutics which will be excreted with the udder secretion at levels at least reaching but preferably exceeding the minimum inhibitory concentrations (MIC) of 0,05 to 1,0μg/ml and 1,0 to 5,0μg/ml usually required to eliminate mastitogenic Gram positive and negative micro-organisms respectively.

Levels effective against common Gram-positive microorganisms can be reached and maintained by administering benzylpenicillin, ampicillin, cloxacillin, oxytetracycline and erythromycin intramuscularly at doses of 10 to 20 mg/kg body mass, and methacycline, lincomycin and spiramycin at 5 mg/kg body mass, every 24 h. Against the more resistant Gram-positive micro-organisms the former group of chemotherapeutics should be administered every 6 h at 20 mg/kg body mass and the latter every 12 to 24 h at 20 to 25 mg/kg body mass.

Dihydrostreptomycin sulphate may be administered every 6–12 h against Gram-negative bacteria at 10 to 20 mg/kg body mass, whereas chloramphenicol requires a dose of 50 to 100 mg/kg body mass every 12 to 24 h to maintain a level of 2,5 to 5,0μg/ml in the udder secretion.

THE IMPORTANCE OF THE SYSTEMIC THERAPY OF BOVINE MASTITIS

How important is systemic mastitis therapy under South African conditions where the therapy of clinical mastitis is generally grossly inefficient?

In this paper, *clinical mastitis* means any type of mastitis characterized at least by clinically abnormal udder secretion and *systemic treatment* means all treatment administered by routes other than the teat canal. Both fairly broad definitions are intended as reminders of the fact that there exists a considerable range of –

(i) clinically mastitic reactions in the cow and udder, and
(ii) systemic treatments worthy of consideration when dealing with clinical mastitis.

Neither of these facts is known or fully appreciated by the average dairy farmer. They are especially important to the veterinarian who all too frequently finds himself at a disadvantage when having to deal with mastitis cases already inexpertly treated by the farmer.

South African dairy farmers frequently and of necessity treat their own cases of clinical mastitis. Often the veterinarian is, in fact, only consulted when cases of mastitis fail to respond to the farmer's treatment. The chances of successfully treating such cases are, of course, very limited. Only where the veterinarian is wary of a stereotyped approach to the disease can such a situation be alleviated.

Enquiries are regularly received from veterinarians as to the best treatment for cases of clinical mastitis. Often these have not even been examined by them but merely described by the farmer. It appears, therefore, that many South African veterinarians have only a very limited interest in mastitis and approach the problem of clinical mastitis – not to mention subclinical mastitis – in a manner not significantly different from that of the dairy farmer. The veterinarian thus denies his training. He also loses the initiative and opportunity of teaching the farmer a professional approach to clinical mastitis and of securing the farmer's cooperation not only during the emergency but also in subsequent attempts to eliminate the major predisposing causes of mastitis by improving herd mangement.

All the aforementioned suggests that the systemic therapy of clinical mastitis is at present of limited significance under South African conditions not because this type of therapy as such is disadvan tageous but rather due to ignorance and disinterest on the part of both the dairy farmer and, unfortunately, many veterinarians.

VETERINARY STRATEGY AGAINST CLINICAL MASTITIS

It is evident from the preceding remarks that the problem of clinical mastitis in South African dairy herds must involve the following strategy, namely –

(i) stimulating and securing the farmer's cooperation and teaching him a professionally acceptable emergency approach;
(ii) following this with treatment by the veterinarian himself or under his close supervision, depending on the farmer and the type of mastitis concerned;
(iii) after checking the herd management, motivating the farmer to eliminate the major deficiencies, and
(iv) encouraging the farmer to regularly monitor the ' efficiency of his management by means of somatic cell counts properly established elsewhere.

Veterinary measures should always include an estimation of the economic loss caused by mastitis in the herd under consideration and the placement of emphasis on clinical mastitis being an indication of managemental deficiency.

For the early detection and correct handling of clinical mastitis, the farmer should be taught to adhere strictly to the following procedures:

(i) the strip-cup test at each milking and the regular recording of milk yield;
(ii) the daily repetition of this procedure on all animals that are strip-cup negative and show normal milk yields;
(iii) the additional determination of the rectal temperature on all cows showing a positive strip-cup test and/or a sudden reduction of milk yield;
(iv) the diagnosis in such cows of –
(a) *localized clinical* mastitis where the body temperature is normal and pus floccules are found either alone or accompanied by reduced milk yield;
(b) *generalized clinical mastitis* where the body temperature exceeds 39,2°C and the udder shows pus floccules and reduced milk yield, and
(c) *other febrile conditions* where the body temperature exceeds 39,2°C and the milk yield is suddenly reduced without the secretion being clinically abnormal;
(v) the collection of aseptic quarter milk samples from all cows with mastitis before administration of any therapy by –
(a) vigorously but gently swabbing the teat tip and orifice of each of the four quarters of an udder by means of cotton wool moistened with methylated spirit;
(b) taking great care not to re-contaminate the teat tips;
(c) aseptically taking a milk sample from each quarter into a neatly labelled, separate, sterile container that can be tightly closed and
(d) handling the samples collected as instructed by the veterinar practitioner;
(vi) identification of the mastitic cow by means of a clearly visible marker;
(vii) administration of an approved mastitis remedy according to the following emergancy procedure –
(a) *localized mastitis:* preventive treatment should be administered to each of the apparently unaffected quarters by means of one tube of a common intramammary mastitis remedy and curative treatment to each of the affected quarters by means of two tubes of the same remedy;
(b) *generalized mastitis:* affected cows should be separated from the herd and restricted to a readily accessible place where shelter, water and food are available; tetracycline or other readily available broad-spectrum antibiotics should be administered parenterally at the highest dosage recommended for infectious disease; treatment should not be delayed since its success depends largely on its administration immediatly after the occurrence of the first symptoms of mastitis; thereafter the udder secretion of all quarters of the mastitic udder should be gently but completely removed at least every two hours or even more frequently and this should be followed by vigorous massage of the udder tissue, each quarter being massaged downwards from its attachment to abdominal wall towards its teat; milking and massaging should be continued throughout the day and care must be taken that the milker disinfects his hands and utensils before handling any other cow; the udder should be protected overnight by means of therapy as mentioned above for localized mastitis;
(viii) whatever the type of clinical mastitis, details of strip-cup tests, rectal temperatures, other symptoms and treatment should be accurately recorded;
(ix) before treatment of any type of clinical mastitis, or immediately thereafter, the veterinary prac-

titioner should be notified of the problem and asked for further instructions; these must be strictly followed;

(x) the veterinarian should arrange to visit the farm to evaluate the management of the herd;

(xi) managemental dificiencies should be corrected and the managemental status of the herd assessed monthly by means of the California Mastitis Test (CMT) on each cow, performed as instructed by the veterinarian;

(xii) accurate records should be kept on the identity of each cow, the corresponding CMT-reaction on each of the four quarters of the udder, the number of inactive (i.e. dead) quarters, milk yield and date; alternatively the producer should subscribe to a monthly electronic bulk milk cell counting service;

(xiii) the veterinarian should analyse such data in terms terms of the total loss of milk;

(xiv) from the veterinarian's estimation the farmer may then decide on whether he can afford the mastitis problem and managemental deficiencies affecting the herd or whether regular veterinary assistance is required.

CONCLUSIONS

It would seem that the success of the therapy of clinical mastitis in South African dairy herds depends mainly on extension and professional work of the veterinarian. His efforts in both capacities will determine whether the systematic therapy of clinical bovine mastitis will remain as unsatisfactory as it is today or will develop into a pattern of successful cooperation between scientist and farmer. If mutual trust is developed between farmer and veterinarian the systemic therapy of clinical mastitis would probably also stimulate closer cooperation on the control of other disease problems, reduce competition between dairy farmer and veterinarian on the therapeutic level, encourage enquiry and advice and pave the way for the urgently needed prevention and control of bovine diseases at the herd level.

LETTER TO EDITOR

BRIEF AAN DIE REDAKSIE

RABIES VACCINATION OF PREGNANT BITCHES

Sir,

During September 1976 there were a number of confirmed cases of rabies in dogs in the Pretoria North area. This necessitated large scale vaccination of all dogs in the area, the vast majority of which had never been vaccinated.

The opportunity arose to ascertain whether such vaccination would have an effect on pregnant bitches or the litter subsequently produced and if so, what.

The vaccine used was the low egg passage, Flury strain type produced by Onderstepoort.

2 000 questionnaires were sent out to all owners of female dogs to find out:

1. whether the bitch was in fact pregnant at the time of vaccination
2. oestrus and service dates
3. previous breeding history
4. previous vaccination history
5. behavioural and other changes post-vaccination
6. full details of the litter produced immediately post-vaccination.
7. a request was made to submit any abnormal or dead pups to us for investigation.

Only 327 replies were received; of these only 48 were relevant. The details are summarized in Table 1.

Table 1

	Trimester of gestation during which bitch was vaccinated			
	1st	2nd	3rd	Total
No. of bitches	20	17	11	48
No. of pups born live	55	67	36	158
No. of stillborn pups	5	8	4	17
Percentage of stillborn pups	9,0	11,9	11,1	10,75

All dead, abnormal or weak pups submitted were initially examined by us and then sent to the Department of Infectious Diseases for virus and other isolations.

Only 17 pups were submitted and the examination revealed causes such as congenital defects, babesiosis and, in one case, typical symptoms of Herpes virus infection. In no single case was any significant organism isolated.

Table 1: CAUSES OF STILLBIRTH AND DEATH OF PUPS WITHIN THE FIRST WEEK OF LIFE

	Trimester of Gestation during which bitch was vaccinated			
	1st	2nd	3rd	Total
Stillborn	4	2	2	8
Suspected Herpes	–	–	8[1]	
Hereditary/Congenital Defects	1[2]	1[2]	–	2
Babesiosis	–	6	–	6
Premature births	–	1[3]	–	1
Died shortly post partum, no reason	1[4]	1[4]	–	2
Maternal	–	–	2[5]	2
Dystocia	2[6]	–	–	2

1. Suspected Herpes, typical symptoms, 8 pups born, 4 dead or died soon after birth and 4 dying within the first 5 days.
2. Both cases – cleft palate.
3. Partus occured 10 days premature, no reason.
4. Died shortly after birth – runts – so informed by owner.
5. According to owner, bitch had no milk and pups died after 3 days.
6. Dystocia – foetal oversize, necessitating veterinary intervention some time after the onset of partus.

In 14 of the pups described above the results are based purely on the owners' observations, thus there are a number of unknown factors.

According to various sources (Kuhne, Prescott, Anderson) mortalities of up to 30% can be expected in pups up to weaning age for a variety of reasons, up to 80% of which can occur within the first week of life, i.e. 24% of all neonatal deaths. The figures obtained in survey fall well within these limits – 10,75%.

It can be surmised, therefore, from the figures obtained in this limited survey that the Onderstepoort rabies vaccine administered to the pregnant bitch apparently had no significant effect on the bitch or the litter.

We would like to thank Prof. P.G. Howell of the Department of Infectious Diseases of this Faculty for his work on the pups submitted for isolation of infectious agents.

Yours faithfully

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ANTHRAX IN THE DAIRY HERD*

R.G. Baxter

ABSTRACT: Baxter R.G. **Anthrax in the dairy. herd** *Journal of the South African Veterinary Association* (1977) **48** No. 4. 293 –295 (En) City Health Dept, Box 293, 6000 Port Elizabeth, Rep. of South Africa.

This paper discusses the dangers of human infection via the milk during an outbreak of anthrax in a dairy herd. Reference is made to reports in the literature and to an extensive outbreak in a local herd. Methods of control and procedure are discussed.

INTRODUCTION

Anthrax is a disease of animals occasionally transmitted to man. Because of the severe symptoms it occupies a foremost position amongst the zoonoses. Statements such as "Respiratory and alimentary anthrax are almost invariably fatal"[11] stress the danger of contact with the disease. In recognition of the hazard, many laws controlling the keeping and movement of animals and the processing of their products have been enacted to protect the public. It should be remenbered, however, that infection of man usually only results from exposure to numerous organisms[3]. Dahlgren and co-workers are cited as having estimated that non-immunised persons could inhale some 1300 spores in an 8 h period without ill effects[12]. The fact that anthrax holds a real danger for human life is emphasised by the occurrence, particularly of malignant pustules, in some individuals.

There has been a report of the death of a 68 year old related to cutaneous anthrax where the source of infection could not be traced[8]. It may be assumed that there had been exposure to a limited number of organisms or that the time of contact with a reservoir of infection was so brief as to remain undetected.

Transmission of anthrax to man

There is always a danger that man, although one of the more resistant species, *can* contract anthrax from the infected animal, it's products or the environment it may have contaminated.

Human anthrax arising from the consumption of infected meat has often been reported but reports of milk-borne anthrax are extremely rare. Bryan[2] cites 2 reports in which **Bacillus anthracis** was recovered from the milk of infected animals and one report where infected milk produced a case of intestinal anthrax in an individual.

Anthrax infection in cattle and contamination of the environment.

The bovine animal is highly susceptible to anthrax and many outbreaks have been recorded in dairy herds. Vaccination has proved useful in avoiding occurrences and limiting spread in the face of high levels of challenge. Hyperimmune sera and antibiotics used therapeutically have a more immediate effect. Feeding of bone meal and tallow has been implicated in many outbreaks in non-immunised herds. Similarly, soil from anthrax burial sites, contaminated fertilizers and effluent from tanneries have been found to be infective.

*Paper presented to the Veterinary Public Health Group session at the Biennial Congress of the SAVA, Grahamstown, Aug. 1977.

Contamination of the farm environ threatens the health of both livestock and the consumers of farm produce.

Correct handling of any dead animal and management of the situation it produced is the first and most important step in preventing build up and spread of infection. The dangers of inadvertent post mortem examinations, particularly by farmers, are well known. The danger may persist even after carefully controlled disposal. Some authors have suggested possible hypotheses for the initiation and spread of anthrax during an outbreak which they investigated[5]. They suggest that the epizootic in cows could have started from an old anthrax burial or previous contamination and spread through direct or indirect contact with the first carcass. They noted that anthrax bacilli could still be isolated from the site of the first death despite expeditious diagnosis, cremation of the unopened body, burial of the ashes and liberally soaking the area with lysol.

Dying cows may excrete the organisms in dung, urine and saliva. Furthermore, blood has been seen to exude from the skin just prior to death. Contamination of the surfaces of soil, farm fixtures and equipment by anthrax organisms must therefore be expected in areas where one or more cows have died. It was the experience of Hugh-Jones & Hussaini[5] that the infection present in contaminated surface soil could be recovered for a period extending up to 8 months. Periods for as long as 50 years are given for the survival of anthrax spores buried in soil.

Cleaning the environment

The recovery of *B. anthracis* from burial sites emphasises the advantages of burning the cadavers. Suitable trenches must be dug to allow the fire to burn under the cadaver. Surface soil about the area, especially that contaminated by discharges, shoul be carefully burnt. Finally ashes and burnt soil should be buried.

The construction of a fence around a site must only be expected to prevent immediate access. In an area where many cows have died, the organisms may be widely distributed. When such an area is adjacent to a milk shed or parlour, removal of the top soil should reduce the level of infection which may be carried by the wind or by the feet and hair of cows to the milking facility. The upper surface of the area should be sprayed with disinfectant to settle dust before being mechanically scraped to remove the top 15 cm to prepared pits. Prior to scraping, fences and surface drainage channels may need to be lifted.

Fixtures in the area such as concrete troughs and fence posts should be scrubbed with a solution of

detergent or 10% washing soda as a defatting agent before disinfection. Wooden posts can be scorched with the heat from a flame gun. Flat concrete surfaces must have holes and broken areas sealed with cement following disinfection.

Milk-borne infection

Like all acute septicaemic diseases, anthrax results in rapid cessation of milk yield. There is also a good chance that milk from cows with anthrax will be discoloured by blood and thus rejected by the dairyman. These two facts probably help to keep the chance of milk-borne infection to a low level. The routine examination of all in-contact animals prior to milking facilitates control by identification and isolation of the sick. Obviously no cow showing any signs of illness should enter the milking shed and milk from such a cow should be discarded.

The Report of the joint FAO/WHO Expert Committee on Milk Hygiene[6] stresses the dangers of milk infection transmitted from the highly contaminated environment and warns that precautions must be taken to prevent transmission to the milk. Furthermore, the Committee points out that warm milk provides a good medium for the multiplication of the anthrax bacillus and formation of the spores. It would appear that the greatest danger to the consumer results from spore contamination of the milk.

Bryan[2] cites Steele who reported that Edelmann and co-workers stated that vegetative forms are rapidly destroyed in the human stomach and intestines, while spores would survive the action of the gastric juices.

When anthrax organisms have been introduced into a milk supply they may multiply and sporulate under suitable conditions. Fortunately milk for human consumption is normally cooled rapidly and held at 7°C or below. Multiplication is therefore limited and according to Minett, cited by Hugh-Jones & Hussanini, sporulation does not occur below 21,9°C[5]. The danger is thus limited under normal production procedures but growth may readily occur in milk residues particularly within milking machines and factory equipment.

Cleansing of the Milk Facility

Cleansing and disinfection of the milking facility is important to prevent the establishment of infection in the milk. These operations must be designed to be effective without destroying the equipment, rendering the facility uninhabitable or endangering workers. These prerequisites, along with the need to use the facility twice daily, limit the choice of methods. Disinfection procedures must, as far as possible, result in destruction of spores.

The initial cleansing of the parlour can be considered from three aspects: the buildings, the milking equipment and the ancillary equipment such as stalls and feeders.

The building must be scrubbed clean from roof to floor, with particular attention being given to removal of dust from beams. Washing soda or detergent may be used to remove grease. Disinfection and repainting to seal the surfaces can follow.

Milking machines should be stripped. All rubber or plastic tubes with cracks or holes should be destroyed and replaced. Cleansing and disinfection need to begin with the vacuum line and include the release valve and sanitary trap. After all the parts of the machine have been treated it may be reassembled and re-disinfected using an "inplace" cleaning system.

Small pieces of ancillary equipment, for example rope hobbles used to prevent kicking, must be burnt along with scrapings from the food hoppers or mangers. Scrubbing with a defatting agent should be followed by disinfection. Severe pitting of staunchion pipes necessitates the use of heat to disinfect these parts. Repainting seals the surface.

Disinfection of the Dairy Facility

The disinfectants usually recommended, for example lysol and washing soda, require long contact periods to kill anthrax spores. Formalin and caustic soda are both dangerous to use and may make the building uninhabitable for a period. Phenol and its derivatives taint milk. The application of wet heat to kill spores has a place in dairy disinfection. Bryan cites Stein & Roger who noted that of 43 strains of *B. anthracis* tested, all were killed by vigorous boiling for 3–5 minutes[2]. Sykes quotes destruction times for anthrax spores as 2–15 minutes at 100°C[9]. Similarly disinfectants containing halogens, e.g. chlorine and iodine are active against anthrax. Sykes records the work of Tilly & Chapin who noted a "total kill" of anthrax spores with 10 ppm of available chlorine at pH of 8 in 30 minutes[10]. The many factors that influence the activity of disinfectants such as pH value, temperature, spore concentration and the presence of organic matter emphasise the importance of cleaning before applying disinfection.

Water Supply

The implementation of washing and disinfection procedures at the milking facility puts a considerable demand on water supplies. Water from nearby roofs or in adjacent open dams must be considered suspect, but may be used for preliminary washing procedures. Following disinfection of any suspect water holder a fresh unquestionably clean supply should be introduced.

Drainage

The volume of water used for cleaning may carry bacilli to adjacent streams. Prevent this by diverting drainage to the pits prepared for burial of ashes. When choosing the sites avoid possible contamination of underground water sources.

The cow and anthrax

Complete resistance of milch cows to anthrax is ideal in preventing outbreaks with the attendant dangers, losses and need for disinfection. Regrettably, regular vaccination, while proving of great value, is not always infallible. Perseverance is necessary for many years on a farm with a known anthrax record. Brunsdon recorded a death in a Friesian dairy cow 8 months after the use of a live attenuated spore vaccine[1]. Others have reported the outbreak of anthrax in a reconstructed herd after a previous occurrance[5]. The reconstructed herd had been vaccinated for a period of 15 years

before the practice was stopped. The disease reappeared after an absence of 30 years to kill 6 cows.

The use of hyperimmune serum and antibiotics during an outbreak can interfere with the efficacy of concurrent vaccination using a live spore vaccine. Notwithstanding, therapy may be essential to prevent massive losses and heavy contamination of the farm environment. Cows treated with antibiotics may die later of the disease. In this case it may be assumed that either effective immunisation was prevented by the chemotherapeutic treatment or therapy did not sterilize of the infection.

During fulminating outbreaks associated with high mortality rates and concurrent vaccination and antibiotic therapy, the cows should be examined for chronic forms of anthrax infection. Reports of such chronic cases of anthrax are rare. Mc Culloch reported chronic lesions of anthrax in the lungs with no concurrent clinical signs in the course of investigations into contagious bovine pleuropneumonia[7]. Bryan cites Eichhorn who noted an anthrax pustule on the udder[2]. During a recent severe outbreak in a dairy herd of 396 cows, 33 died and 83 were treated. Later the milk from each cow was examined bacteriologically prior to release for human consumption. The negative results indicate the absence of chronic udder lesions[4].

DISCUSSION

Any action taken under health regulations during an outbreak of anthrax in a dairy herd must minimise the chance of transmission to the public. At the same time financial loss and material waste must be kept as low as possible. Full consideration must be given to the conditions present on the farm and the implications of any decision made.

The degree to which controls must be applied depend primarily upon the level of danger. The advantage of regular annual vaccination and the maintenance of an effective immunised state cannot be overstressed.

The occurrence in a vaccinated herd of anthrax in a dry cow located on a part of the farm remote from lactating animals does not introduce much danger to the public's milk supply. Disposal of the cadaver, disinfection of the site and isolation of the contact group, quarantine and revaccination of farm stock should control the situation.

In a vaccinated herd the death of a cow in milk introduces a threat through direct contact with the milk supply. The degree of danger may well depend on the position of the cadaver in relation to the milking facility. Control measures should be extended to routine clinical examination of all cows prior to each milking.

In an unvaccinated herd the death of a cow may well be followed by a severe outbreak during which the planned control measures are overwhelmed. The urgent needs for labour to collect combustible material, burn cadavers, dig burial pits and inter the remains cannot always be met. Clinical examinations are rushed and sick cows may be overlooked and milked with the healthy. Under these and similar circumstances the movement of milk off the farm should be prohibited and rigorous control measures introduced. Some two weeks later milk may again be marketed for human consumption, provided control measures are effective and the outbreak has subsided.

ACKNOWLEDGEMENT

The author is indebted to the Medical Officer of Health, Port Elizabeth, for permission to present this paper and to Dr. B. Mc Culloch and Professor L.W. van den Heever for help and advice.

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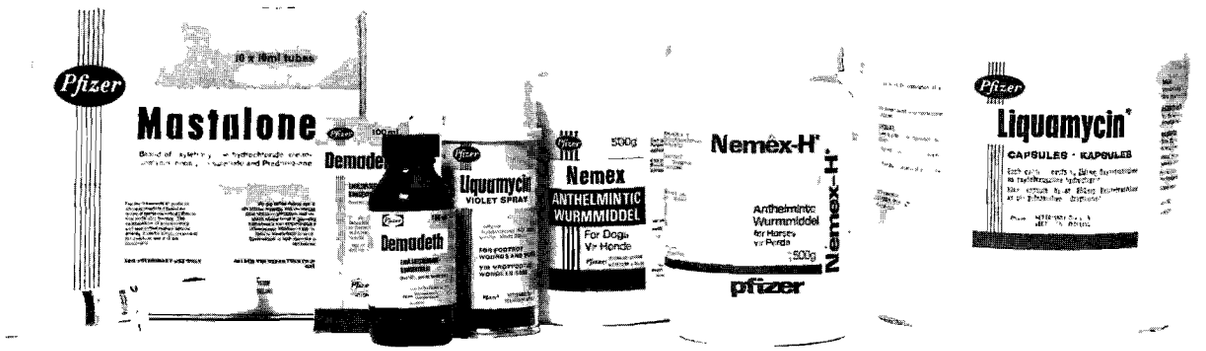
Other Ethical Remedies

A variety of remedies including topical preparations, anthelmintics, an intramammary formulation and capsules, for use in domestic animals.



Liquamycin Capsules 5000. Nemex-H 500 g. Liquamycin Violet Spray 142 ml. Terramycin Ophthalmic Ointment 3,5 g. Terracortril Eye/Ear 4 ml. Mastalone 10 x 10 ml. Demadeth 100 ml.

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CASE REPORT **GEVALVERSLAG**

A CASE OF WHITE MUSCLE DISEASE IN AN ADULT HORSE*

D.H.G. IRWIN

ABSTRACT: Irwin D.H.G. **A case of white muscle disease in an adult horse.** *Journal of the South African Veterinary Association* (1977) **48** No. 4 297-298 (En) Box 4107, Alrode 1451, Transvaal, Rep. of South Africa.
A six year old entire Thoroughbred collapsed and died immediately after a race. Autopsy revealed white muscle disease: this is the likely cause of short gait in life and to have been contributary to fatal epistaxis when racing.

HISTORY

A six year-old entire Thoroughbred showed variation in form in different races and was not striding out at intervals over a period of several months. The attending veterinarian found *inter alia,* that the potassium level of the serum was lower than that normally found in his laboratory, and that giving a potassium salt per os improved the horse's performance on the race track. There being no clinically detectable pathology in the fore limbs to account for the shortened gait, the attending veterinarian injected a vitamin E and selenium preparation about two months before the horse died. In his last race this horse ran very poorly and upon reaching the collecting ring he fell, rose once and collapsed again before dying. Examination within a few minutes revealed that the mucous membranes were very pale or blanched. Autopsy was conducted about three hours later.

AUTOPSY

There were no skin lesions. The mucous membranes had assumed a deep purple colour and thich blood-stained froth was present at the nostrils. The abdominal cavity and its organs presented nothing remarkable; the spleen was slightly enlarged, extending to within 10 cm of the pelvic inlet, and its edges were blunt. The thoracic organs presented marked changes. There were multiple petechial haemorrhages under the parietal and visceral pleurae. The red foci were practically confluent under the pleura of the caudal lobes of the lungs. All the space in the respiratory tree was filled with thick red froth, but no macroscopic lesion could be found in the epithelial lining of the bronchi, trachea, pharynx, larynx, gutteral pouches or nasal passages. The epi-, endo-, and myocard showed petechial haemorrhages as well as various white and grey areas. These were elongate in the direction of the long axis of. the heart, and around 4 cm long and 2 cm across. The edges of the left atrio-ventricular valves presented two circumscribed, hard (almost bony)enlargements about 12 × 6 × 4 mm and 10 × 10 × 4 mm. The cut surface of many skeletal muscles on the left side of the body presented elongate grey-whitish areas varying in size from 75 mm long and 30 mm wide to 20 mm long and 3 mm wide. These were particularly evident in the *Mm. supra-* and *infra-spinatus,* and to a lesser degree on the lateral neck muscles and *M. longissimus.* The tongue showed similar grey-white areas up to 25 × 15 mm. The blood had not clotted 5 hours after death, at which time the heart, lungs, trachea, larynx, pharynx and tongue were removed from the cadaver and put aside overnight. Next morning when the heart was opened, no clots were present in the blood lying in the heart and great vessels.

*Presented to the Equine Practitioners Group of the SAVA in May, 1976.

HISTOPATHOLOGY

The following report was received from the laboratory. 'Microscopic changes can be noted in the various muscles. The muscle changes in the heart represent degeneration and fragmentation of the muscle fibres as well as hyalinisation and perivascular fibrosis. A diffuse inflammatory infiltrate can also be noted. Some of the lesions are recent and show essentially a perivascular inflammatory infiltrate. The pericardial blood vessels appear normal. In the older lesions especially in the striated muscles, dense fibrosis with some stagnant vascular channels can be observed. One of the cardiac lesions shows the presence of a haemorrhagic visceral pericarditis overlying one of the lesions. There is no evidence of malignancy and no evidence is suggestive of infarction or of any drug-induced change.

The features would be consistent with 'White-muscle disease' of the myocardium, tongue and skeletal muscles'.

The enlarged and hardened edges of the left A-V valves were not submitted for histological examination.

PATHOGENESIS AND DISCUSSION

The clinician faces difficulty in distinguishing between the 'tying-up' sydrome and mild forms of paralytic myoglobinuira[2].

Writers on muscular diseases in the horse do not mention a condition known to horsemen and practitioners as 'cold back'. This sometimes responds to injection of vitamin E and selenium. When it does not, one thinks in terms of friction between the dorsal spines of the thoracic and lumbar vertebrae or other spondylitis. One is not able to make a confident diagnosis of primary muscle difficulty through the detection of elevated muscle enzymes. It has been our experience that spavin will cause stiffening of the muscles of the loins and quarter sufficient to give elevated muscle enzyme readings in serum analysis.

It is generally accepted that muscular exertion, glycogen and lactic acid content of muscle cells, and vitamin E and seleium deficiencies all play a role in muscle derangements. Not all of these need be contributary to a single clinical case. In the case described in this report one can reasonably eliminate the vitamin E and selenium deficiency aspect as being of primary or sole aetiological importance, at least subsequent to the therapy described. No feed analyses were conducted so one cannot be sure of the feed intake of these materials.

The immediate cause of death appears to have been anoxia associated with, first, blood and then froth in the respiratory passages. The absence of one large rhexis indicates multiple focal haemorrhage by diapedesis from capaillaries into alveoli.

At full gallop the peripheral blood pumping mechanisms clearly exert a considerable circulating effect on the blood and from lack of venous engorgement in everything but the spleen in the abdominal cavity, one assumes that the right heart remained competent. However, several aspects of the findings suggest that the left heart failed. First, the hard enlargements on the free borders of the left A-V valves are likely to have produced some valvular incompetance. Secondly the abnormal myocard is also likely to have adversely affected the cardiac output. Finally the capillary haemorrhage into the lungs fits the picture of vessels bursting under pressure. Incidentally, the site of the greatest capillary leak described, is stated as being the commonest site of haemorrhage in 'epistaxis' of the racing Thoroughbred[4]. With this picture in mind one can imagine what was happening inside the horse when his competitors were drawing away from him during the race. Possibly blood perfusing the lungs yielded its clotting agents in a vain attempt to seal the leaks. Because the exciting cause was not relaxed, namely exertion, the entire blood volume perfused the lungs several times in the presence of that aetiological factor. Presumably the circulating blood was denuded of at least one clotting factor agent. This would account for the lack of blood clotting after death. In similar cases one can agree with Rooney that a common finding in asphyxia is lack of clotting after death[3]. However, this should be distinguished from the asphyxia following fatal flatulence and colic or acute gastric dilation where tiny petechial haemorrhages occurr in the airways, but in which there is no impediment to blood clotting after death.

When a horse collapses and dies either during or immediately after the race, the mucous membranes almost invariably appear blanched. The unwary may be inclined to the view that some massive haemorrhage has occurred as from rupture of the aorta. However, within 30 minutes the mucosae assume a deep purple colour. Presumably the initial pallor is associated with peripheral vasoconstriction to be followed by capillary relaxation in a body with a vast oxygen debt, hence the colour.

It is difficult to describe the normal size of the spleen of the horse: it has been palpated rectally by the writer over many years, even in horses presenting no change from normal recognisable by clinician or astute stablemen. In horses with clinically recognisable gastric problems, and in biliary fever, the spleen is usually reached caudally to abut upon the brim of the pelvis. In such cases the border is rounded. In a large majority of horses the spleen is palpable at about the level of the 17th rib and the border of the organ is sharp.

DIAGNOSIS AND CONCLUSION

A diagnosis of WMD is justifiable in view of the findings of white or grey-white focal areas in skeletal, cardiac and lingual muscle, especially when the histological findings include hyaline changes[1]. No disease besides WMD is described with lesions similar to those in the present report.

One wonders how many short striding horses are suffering from this or a closely similar disease. Possibly an ECG might have disclosed some form of cardiac abnormality. Assuming that both heart and skeletal muscles are affected in WMD, a particular tracing along with a shortened gait in the absence of other recognisable pathological states may encourage one to take multiple biopsy specimens in searching for a diagnosis of WMD during life.

ACKNOWLEDGEMENTS

Dr P. van Drimmelen kindly conducted and reported on the histological examination. Dr D.W. Howell assisted in carrying out the autopsy. Dr M. Azzie attended the horse clinically.

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TOEKENNING — AWARD

AVV – GOUE MEDALJE
Sesde Toekenning

Die Raad het in 1977 voorstelle ingewag vir hierdie hoogste toekenning deur die Vereniging. Eenparig is besluit om die Medalje 'VIR UITMUNTENDE DIENS AAN DIE VEEARTSENY-PROFESSIE' toe te ken aan

SAVA – GOLD MEDAL
Sixth Award

The Council invited proposals for the SAVA's premier award in 1977 and unanimously voted to award the medal 'FOR DISTINGUISHED SERVICE TO THE VETERINARY PROFESSION' to

PROF. (Emeritus) JOHN HENRI ROOSEGAARDE BISSCHOP

Die President van die SAVV, Dr A.P. Schutte, het die oorhandiging op 26 Augustus 1977 tydens die Amptelike Opening van die Tweejaarlikse Nasionale Kongres te Grahamstown gedoen.

The presentation by the President of the SAVA, Dr. A.P. Schutte, took place on 26 August 1977 at the Official Opening of the Biennial National Congress at Grahamstown.

Prof. Bisschop is aan die veeartsberoep en veetelers in Suid-Afrika goed bekend. Gebore te Pretoria op 20 Desember 1898 het hy die Oost Eind skole bygewoon en na matrikulasie die Landboukollege te Elsenburg, waar hy in al die vakke vir sy landboudiploma met lof geslaag het. In 1920 verwerf hy 'n BSc (Agric) graad, met hoofvak Veeteelt, aan die Transvaalse Universiteitskollege van die Universiteit van Suid-Afrika. Daarna skryf hy in vir die pas ingestelde kursus in Veeartsenykunde te Onderstepoort. In 1924 word hy een van die klein groepie van agt wat die eerste BVSc grade ontvang het. Hy en Dr J.G. ('Hardy') Williams is tans die enigste oorlewendes.

Prof Bisschof het 'n veelsydige en luisterryke loopbaan agter die rug. Die rol wat die veearts moet speel in die produksie en reproduksie van die *normale* dier het hom besiel en daarvan is hy terdeë die baanbreker in Suid-Afrika. Na graduering het hy met Prof J.B. Quinlan in die departement Ginekologie en Chirurgie van die NIV te Onderstepoort gewerk. In 1927 het 'n keerpunt gekom toe hy verantwoordelike beampte vir die proefplaas 'Armoedsvlakte' naby Vryburg geword het. Hy het die betrekking tot 1958

Prof. Bisschop requires no introduction to veterinarians and animal scientists in South Africa. Born in Pretoria on 20th December, 1898 he received his schooling at the Oost Eind schools. At the Elsenburg Agricultural College he passed all subjects during the two year diploma course with honours. He returned to the Transvaal University College of the University of South Africa where he obtained a BSc (Agric) degree in 1920, majoring in Animal Husbandry. He continued his education by following the newly established course in veterinary science at Onderstepoort and graduated in 1924 as a member of the first class of 8 students to obtain the BVSc degree in this country. Prof. Bisschop and Dr. J.G. ('Hardy') Williams are the only surviving graduates in this group.

Prof. Bisschop's versatile career as veterinary scientist is studded with achievements. He was consumed with the ideal that the veterinarian has an important role to play with regard to the production and reproduction of the *normal* animal and must be regarded as a pioneer in this field in Southern Africa.

He started his career with Prof. J.B. Quinlan in the Gynaecology/Surgery department of the Veterinary

behou alhoewel hy self net 3 jaar voltyds op die plaas gewoon en gewerk het. Hier het hy sy eerste spore as 'diereproduksieveearts' getrap. Sy studies i.v.m. fosfaatbyvoeding in hierdie lamsiektegeteisterde gebied (die plaasnaam is hiervan sprekend) het geweldig bygedra tot omskepping daarvan tot die beesparadys wat dit vandag is. Hy het die gereelde bepaling en optekening van 'n wye reeks parameters m.b.t. produksie en reproduksie van beeste van verskillende rasse en kruistelings onder heersende redelik harde klimaatsomstandighede ingestel. Die data het o.a. betrekking gehad op massa en ander groeikenmerke, hematologie, geslagsfisiologie en die invloed van fosfaatbyvoeding op hierdie parameters. In sy werk is hy bygestaan deur Drs. T.A. Adelaar en H.P. Steyn. Alles is opgeteken op die nougesette wyse waarvoor hy bekend geraak het. Sy energie en entoesiasme vir hierdie veeleisende taak was sonder perke en dit het bewondering van sy tydgenote afgedwing.

Gaandeweg het sy adviserende en opleidingstake meer en meer van sy tyd in beslag geneem en kon hy nie al die massas aangesamelde data self verwerk nie. Nadat hy in 1959 as Assistent Direkteur van die NIV afgetree het, is hy in tydelike hoedanigheid eers te Onderstepoort en later aan die NIVS te Irene aangestel en kon hy sorg dat ander wetenskaplikes ook toegang tot sy data verkry deur dit vir die rekenaar te verwerk. Verskeie nagraadse studente in veeteelt en ook navorsers het die data sedertdien met goeie gevolg ontleed.

Prof. Bisschop het self twee proefskrifte vir 'n D-graad voorberei. Een het gegaan oor die byvoeding van fosfate aan beeste maar dit op die rak geplaas weens gebrek aan 'n geskikte promotor. Veel daarvan is egter as wetenskaplike publikasies en departementele verslae gepubliseer. 'n Tweede oor geslagsfisiologie van die bees is weens druk van amptelike werk en 'n toenemende vraag na sy adviserende dienste nooit voltooi nie.

Sy uitgebreide kennis van die inheemse rasse en diereproduksie het daartoe gelei dat die regerings van verskeie Afrika-state hom genooi het om hulle te besoek en te adviseer oor ontwikkeling van hulle veebedryf met hulle inheemse rasse as grondslag. So het hy besoek afgelê aan lande soos Swaziland (1943), Kenia (1945), Bechuanaland (1946), Oeganda (1949), Soedan (1951), Basoetoeland (1952) en Njassaland (1953). Tereg kan hy as die 'vader' van die Nguni-ras van Swaziland beskou word. Hy het ook geadviseer i.v.m. die 'Nooitgedacht'-Basoetoepoon teel projek.

Hy het in die jare 1950-1955 gedien op die Kommissie vir die Sosio-ekonomiese ontwikkeling van die Bantoegebiede van Suid-Afrika (die sg. 'Tomlinsonkommissie'). In hierdie onderwerp stel hy steeds belang.

Prof. Bisschop is 'n gesaghebbende en bekende beoordelaar van 'n wye reeks van sowel inheemse as uitheemse rasse van plaasvee en tree nog met tye as sulks op. Hy het 'n wêreldkongres in 1964 as verteenwoordiger van SA Diereproduksievereniging bygewoon en was ook lg. se President in 1968. Sy lang lys van publikasies reflekteer sy wye belang in diereproduksie.

'n Hele reeks van die ouer geslagte van veeartse in die land sal aan hom dink as 'n wyse en gerespekteerde dosent in Soötegniek. Hy is reeds in 1925 as dosent aan die Fakulteit Veeartsenykunde van die Universiteit van

Research Institute, Onderstepoort. A turning point came when he was placed in charge of the experimental farm Armoedsvlakte, near Vryburg in 1927. He held this position until 1958 although he lived and worked fulltime on the farm for only three years. It was here that he first made his mark as a 'veterinary animal production man'.

His studies on the supplementation of phosphates in this lamsiekte-stricken area made a tremendous contribution to its conversion to the paradise for cattle it has now become.

He initiated the regular measuring of a wide range of production and reproduction parameters of various cattle breeds and crosses under the prevailing, fairly harsh climatic conditions. Data collected included mass and other growth characteristics, the haematology, sexual physiology and the influence of feeding phosphates on these parameters. He was assisted in this work by Drs. T.A. Adelaar and H.P. Steyn. All this information was carefully recorded in the meticulous way for which he has become renowned. His energy and enthusiasm for this painstaking work was boundless and greatly admired by his contemporaries.

He was himself unable to analyse all of the wealth of information which he had accumulated. His many other advisory and teaching activities became too demanding as time progressed. He has however, ensured that these data are available to others. He accomplished this enormous task after his retirement as Assistant Director of the VRI at Onderstepoort in 1959 when he worked in a temporary capacity at Onderstepoort and later at the Animal and Dairy Science Research Institute at Irene. There some of the information was analysed and the rest computerised. Data converning various aspects of the vast field covered by his studies have now been analysed by post-graduate agricultural students research workers.

Prof. Bisschop wrote two theses which he intended to submit for doctorates. The first one emerged from his work on the supplementation of phosphates to cattle. This he shelved on account of the lack of a suitable promotor. However, much of the work was published as scientific articles and departmental reports. The second thesis was written in the early forties on bovine sexual physiology, but was never finalised on account of his numerous other obligations and assignments which escalated as he became more widely known.

His extensive knowledge of indigenous breeds and animal production led to invitations from the governments of numerous other African countries to investigate and advise them on their stock industries, with particular reference to indigenous animals. He was seconded to countries like Swaziland (1943), Kenya (1945), Bechuanaland (1946), Uganda (1949), Sudan (1951), Basutoland (1952) and Nyasaland (1953). He can be regarded as the 'father' of the Nguni breed in Swaziland and also acted as advisor to the 'Nooitgedacht'-Basuto Pony Breeding Project.

From 1950 to 1955 he served on the Commission for the Socio-economic Development of the Bantu areas in South Africa, i.e. the 'Tomlinson Commission,. He is still immensely interested in this subject at a personal level.

Prof. Bisschop is an authority on a wide variety of indigenous and exogenous breeds of farm animals. He is a qualified show judge and still serves as such from time to time. In 1964 he attended a World Congress as

Pretoria aangestel en in 1936 het hy professor en hoof van die departement geword – 'n betrekking wat hy tot aftrede in 1962 beklee het. Hy het derhalwe 'n geweldige invloed gehad op die vorming van gedagtes en houdings t.o.v. die werksgebied. Sy studente kon voordeel trek uit sy intieme onge-ewenaarde en eie kennis van lewende hawe in die land. Ook sy mede-dosente het vir hom baie hoë agting tehad en in 1957/58 het hy as Dekaan ageer.

'Baas' Bisschop het altyd intens en onbaatsugtig in die veeartsberoep belanggestel. Vanaf 1963 tot 1965 was hy 'n verkose volle lid van die Raad van die SAVV en in 1967 word hy verkies tot Ere-lewensonderpresident. As een van die oudste en langsdienende lede stel hy steeds aktief belang in die werksaamhede van die Raad en woon hy op eie koste soveel as moontlik van die vergaderings by. Hy was vanaf 1966 tot 1971 een van die deur die SAVV genomineerde lede op die Veeartsraad. In 1975 is die jongste spruit van die SAVV, nl. die Staatsveeartsgroep grootliks a.g.v. sy inisiatief gestig.

'Baas' Bisschop was nog altyd 'n heer. Vir ons professie en ons land het hy voorwaar diep spore getrap. Hy is 'n waardige ontvanger van die Goue Medalje vir 1977, – die SAVV se top-toekenning.

the official delegate of the South African Society for Animal Production and he served as president of the Society in 1968. His substantial list of publications reflect his widely ranging interests in animal production.

Several older generations of veterinarians in this country will remember him as a wise and respected teacher in Zootechnics. He was appointed lecturer at the Faculty of Veterinary Science in 1925 and Professor of the University of Pretoria in 1936, a position which he held until retiring in 1962. He has therefore had a tremendous influence on formulating veterinary thoughts and attitudes in this sphere. His intimate first-hand knowledge of the characteristics of a wide variety of breeds of stock, probably unequalled in this country, has been of the greatest benefit to his students. He was also widely respected by fellow teachers and acted as Dean of the Faculty in 1957/58.

'Jack' Bisschop has always had a consuming and selfless interest in the veterinary profession of this country. He served on the Council of the SAVA from 1963 to 1965. He served as a nominee of the SAVA on the Veterinary Board from 1966 to 1971 and was made Honorary Life Vice-President of the SAVA in 1967. Although one of the oldest and longest-serving veterinarians on Council he is still actively engaged in its work and rarely misses the Council meetings held in Pretoria. All this is done at his own expense for the good of veterinary profession in South Africa. The latest fledgeling of the SAVA, the State Veterinarian Group, resulted directly from his initiative and personal circular letters and culminated in its establishment in 1975.

Always a gentleman, 'Jack' Bisschop has done great things for his profession and his country and is a most worthy recipient of the SAVA's top award – the Gold Medal for 1977.

AWARD **TOEKENNING**

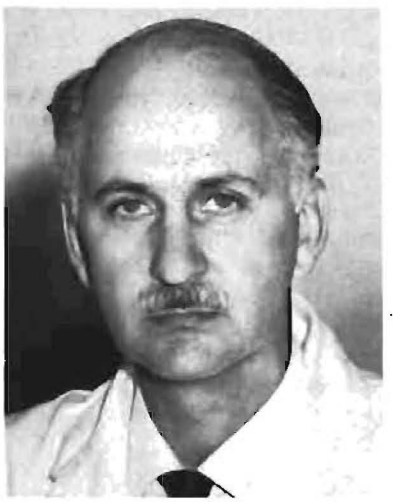
THE BOSWELL AWARD

At the suggestion of Dr. J.G. 'Jack' Boswell and supported by his generous donation, the Council of the SAVA decided to make an

ANNUAL AWARD IN ACKNOWLEDGEMENT OF DEDICATED SERVICE.

The first award took place at the Biennial National Congress of the SAVA in Grahamstown in August, 1977. To mark the occasion, twin awards were made and these were presented by Dr. Bosswell, on behalf of the SAVA, to

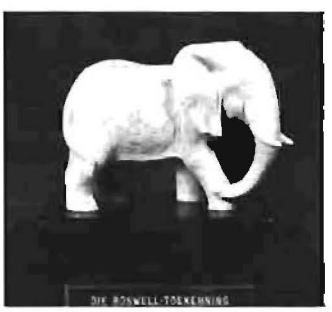
Dr. Charles Osrin and Prof. L.W. v.d. Heever



Dr Osrin was born in 1897 and after graduating at Onderstepoort in 1925 has led a distinguished professional life as State Veterinarian (previously 'Government Veterinary Officer' or GVO) in De Aar, Vryburg, Port St Johns, Pietermaritzburg, Lydenburg, Eshowe, Grahamstown, Johannesburg and finally Port Elizabeth. He went on pension in 1958 but remained as SV until 1968 when he was finally retired. Since then he has continued to carry out tuberculin tests and has by now certainly tested more cattle than any other person in South Africa. He also still serves as official veterinarian to the St Andrews Racing Club in Port Elizabeth.

Prof. Louw v d Heever was born in Pretoria in 1923 where he obtained the BVSc degree *cum laude* in 1944 and received the Theiler Medal (S A Biological Society). After a spell in government service he entered practice in Pretoria and three years later began a career in veterinary public health. In 1959 he was awarded a WHO fellowship to study food hygiene in Europe and returned in 1960 to take up research and teaching at Onderstepoort. In 1973 he became professor of Veterinary Food Hygiene and Public Health at the Veterinary Faculty of the University of Pretoria. He has served on Council since 1956, was Vice President from 1966 to 1969 and President from 1969 to 1972. He has been a member of the Editorial Committee since 1953 and has been its chairman since 1975. He has represented the SAVA on the Veterinary Board since 1971. He served on numerous Government Commissions and Committees of Inquiry and was a member of the Abattoir Commission from 1973 to 1977.

Both awardees continue to serve their professions. The Awards for 1977 took the form of a beautifully carved African elephant in ivory, mounted on a verdite slab and positioned on a base of heavy tambotie-wood bearing a suitably inscribed silver plate.



The 1977 Boswell Award

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