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JOURNAL OF THE SOUTH AFRICAN VETERINARY ASSOCIATION

TYDSKRIF VAN DIE SUID-AFRIKAANSE VETERINÊRE VERENIGING

MARCH 1984/MAART 1984

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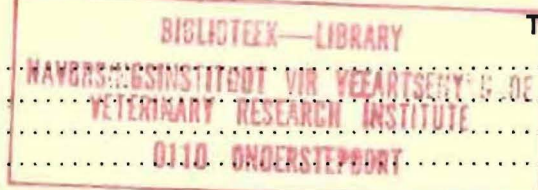
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TYDSKRIF VAN DIE SUID-AFRIKAANSE VETERINÊRE VERENIGING – MAART 1984

ADDRESS

VOORDRAG

KONGRESVOORDRAG/CONGRESS ADDRESS*

DEUR/BY

C.F.GARBERS*

Vergun my om u opreg te bedank vir u vriendelike uitnodiging om vanaand enkele gedagtes met u te wissel. U sal begryp dat ek met my opleiding in chemie en my betrokkenheid by die wetenskap in die algemeen, groot leemtes in my akademiese mondering sal blootlê indien ek sou trag om onderwerpe rakende die veeartsenydisipline aan te sny. Ek beweeg wel so na aan die gebied as wat my selfvertroue my toelaat.

Hoe dit ook al sy, ek beplan om ongeveer 200 miljoen jaar gelede te begin, te vorder tot by die hede en ook 'n blik op sekere aspekte in die toekoms te waag.

In the distant past of at least 200 million years when the African continent was part of the once great Gondwanaland, Southern Africa's geological history reflects violent upheavals. During this formative time in the earth's history, Africa became separated from its neighbours South America, Antarctica, India and Madagascar; the land masses drifted and indeed are still drifting apart slowly, moved by the forces released as a result of volcanic activity along the mid-Atlantic and other sub-oceanic ridges. The modern Southern African landmass reflects its volcanic history with the spectacular diamondiferous magma pipes, the basalts and the massive volume of magma in the Karoo intrusions, estimated at between 200 000 and 400 000 cubic kilometres. At Calvinia and Hopetown individual dolorite sheets are quoted as 9 100 and 13 000 square kilometres in area respectively. Following the cooling and before the separation of the land masses a wide diversity of flora and faunas evolved. The southern hemisphere Gondwana flora, well represented in the South African fossil beds, was unusual in that the main tree species were deciduous. The annual leaf fall of the *Glossopteris* in due course gave rise to our massive coal deposits, which at present puts us in the enviable position of being the third largest exporter of coal in the world and of being able to generate 75 % of our energy requirements from coal. Not all the trees were changed to coal and excellent petrified trunks bear witness to times long past.

Possibly due to a variety of interacting factors, not least of which was the climate, South Africa is in the fortunate position of having a particularly well preserved and continuous fossil record which reflects the history of past milleniums!

Deductions made about the plant and animal life based on the study of these fossilized remains of the now extinct taxa reveal a saga of successes and failures with the emergence and decline of many varied forms of life. In parts of the country like the Karoo, the fossil records for 50 million years are largely unbroken so that

the intricate evolutionary pathways can and have been studied in parallel with the study of the palaeoclimate. What has emerged from all of this? – ice ages, flooding, volcanic activity, desertification, lush growth, etc.

At present South Africa is a waterscarce high plateau largely surrounded by the warm Mozambique current in the East and the cold Benguela current from the Antarctic in the West which supports a rich and varied sea-life. Within its borders climatic conditions vary from the driest and oldest desert – with strange life forms adapted to a limited water source from the sea fog which moistens the desert air occasionally – to subtropical forests. South Africa, as such, can be subdivided into distinct regions with their own climatic conditions, for example, the winter rainfall area, the Karoo, Grassland, and Bushveld regions. Resulting from its past history and its climatic diversity, it is not surprising that South Africa can boast an exceptionally varied fauna and flora.

South Africa can also be subdivided into distinct regions according to the type of vegetation, such as the high mountain flora in the south-western Cape region, the typical and unique fynbos of the south-western Cape winter rainfall region, grasslands which cover vast areas in the high plateau interior, the scrub of the Karoo, the dry Namaqualand area which blooms in early Spring after rain, etc.

Parts of our country are second only to the tropics in species richness and diversity. Our flora has not yet been fully studied but it is estimated that there are upward of 18 000 species of plants in South Africa – the richest areas are in the south western Cape in the fynbos, a very interesting and endangered vegetation *which represents one of the six world vegetation types*. On the Cape Peninsula alone, an area smaller than the Isle of Man off the coast of England, there are more different plant species than in the whole of the United Kingdom which has some 2 600 species. The great Swedish botanist Linnaeus, writing to Governor Ryk van Tulbach at the Cape in the 1770's said:

"May you be fully aware of your fortunate lot, not only in being permitted by the Supreme Disposer of events to inhabit but also enjoy the sovereign control of that paradise on earth, the Cape of Good Hope, which the Beneficent Creator has enriched with his choicest wonders. Certainly if I were at liberty to change my fortune for that of Alexander the Great, or of Solomon, Ceresus or Tulbagh, I should without hesitation prefer the latter".

Many a chemist who came to the Cape in the last century, was captivated by the interesting flora and some became well-known botanists. Fortunately many remained steadfast to their discipline and set about to

*Delivered at the Biennial National Congress of the South African Veterinary Association which was held in Bloemfontein during September 1983.

**President, Council for Scientific and Industrial Research.

study the chemistry of the natural products around them. The main stimulus for the study of natural products emerged from the problems encountered with organised agriculture and human health.

The expansion of the Cape Colony, the occupation of the Eastern Cape by the 1820 Settlers from England and the Great Trek northwards by the Boers led to extensive farming of previously uncultivated lands. This meant the introduction of domestic animals to new environments and which added to the privations experienced by the pioneers in the form of new diseases of their animals due to toxic plants. Systematic studies then started at the Veterinary Research Institute which was founded in 1908 with Sir Arnol Theiler as Director. The latter brought some experience from Europe to this part of the African continent. With his young team radiating enthusiasm, progress was rapid. This team included D.G. Steyn, C. Rimington, H.L. de Waal and C. Marais. By 1926 D.G. Steyn had screened about 300 plants and established the toxicity of 150 species in 34 families! A case is on record where H.L. de Waal had to sacrifice 100g of his purified alkaloid for pharmacological testing as the only test animal used was the horse! The Second World War slowed down the scientific progress but it was during this period that J.S.C. Marais successfully isolated and identified the elusive monofluoroacetic acid from *Dichapetalum cymosum*, an extremely toxic plant which has been responsible for severe stock losses in parts of South Africa. It is claimed that three or four leaves of this plant contain sufficient monofluoroacetic acid to kill an ox!

Die geskiedenis van vee-produksie in Suid-Afrika is gekenmerk deur periodes waar uitsonderlike hoë veeverlies as gevolg van giftige plante voorgekom het. In hierdie opsig verwys T.W. Naudé na die jare 1926 – 1927 toe nagenoeg 600 000 stuks kleinvee as gevolg van geeldikkop in Noordwes-Kaap gevrek het en 1929 – 1930 toe vermeersiekte tot die verlies van een miljoen skape gelei het. Die verskynsels is nie iets van die verlede nie en so onlangs as 1966 is na raming 5 000 grootvee aan gousiekte dood in die Ventersdorp-Lichtenburg area en vrek 70 000 skape in 1969/70 aan geeldikkop in Middelburg (Kaap).

Nie al die veevrektes word deur plante veroorsaak nie. Bydraes word ook gelewer deur die sogenaamde mikotoksien, d.w.s. giftigstowwe gevorm deur swamme. In hierdie verband kan daarop gewys word dat bepaalde streke deur bepaalde toestande gekenmerk word. Intensiewe studie, nie alleen in Suid-Afrika maar ook oorsese, het tot beter begrip van sommige verskynsels gelei alhoewel die situasie nog nie as opgeklaar beskou moet word nie. Sover dit geeldikkop aangaan word 'n soortgelyke hepatogene fotosensitisering by skape in Nu-Seeland waargeneem waar dit geassosieer word met die voorkoms van die fungus, *Pithomyces chartarum* op die gras. Hierdie fungus produseer die mikotoksien spori-desmien wat lewerskade in skape veroorsaak en gevolglike gewigsverlies, geelsug en liggevoeligheid. Die fotosensitiwiteit word toegeskryf aan die ophoping van 'n klorofiel-afbreekproduk in die bloed a.g.v. die lewerskade.

Die vermoede bestaan dat die Karoo dubbeltjie, *Tribulus terrestris*, tesame met die fungus *Pithomyces chartarum* 'n aanleidende oorsaak vir geeldikkop is.

As 'n verdere voorbeeld kan verwys word na lupinose, 'n siekte reeds lank bekend maar van sporadiese voorkoms. Dit word veroorsaak deurdat skape lupiene

vreet wat deur klam of nat weer met die fungus, *Phomopsis leptostromiformis* besmet raak. In 1969 was daar 'n ernstige uitbraak van lupinose in die Wes-Kaap. In Australië is lupinose 'n ernstige probleem. Dit is dan ook nie verrassend dat skeikundiges van Suid-Afrika (die Nasionale Chemiese Navorsingslaboratorium, WNNR) en van die CSIRO in Australië in 'n gesamentlike poging die identiteit van die uiters giftige toksien kon ontrafel. Van die gifstof homopsien A (LD 50) is 37,5 mg/Rg genoeg om 'n skaap te dood. Die struktuur daarvan besit unieke strukturele eienskappe.

Danksy die bydraes van wetenskaplikes uit vele dissiplines en hier wil ek die bydraes van die veeartsenykundiges in die besonder uitlig, is ons begrip van bg elendes wat die boerderygemeenskap teister uitgebou en alhoewel die probleem as sodanig nie verwyder kan word nie, kan die skadelike effekte deur die nodige beheer grootliks verminder word. Hierdie probleemgebiede het voortgespruit hoofsaaklik uit die invoering van plaasdiere geselekteer onder Europese omstandighede in die vreemde Suid-Afrikaanse omgewing.

Ek wil nou graag na die tweede faset van hierdie gebeure beweeg omdat ek glo dat dit van deurslaggewende belang vir die langtermyn-toekoms van Suidelike Afrika is. Dit is: wat was die effekte van die boerderymetodes op die Suid-Afrikaanse omgewing? Moontlik is u bewus daarvan dat die WNNR 'n nasionale navorsingsprogram vir omgewingswetenskappe in noue samewerking met veral die Departemente van die Omgewing en van Landbou, sowel as ander belanghebbende partye bedryf. Die program is nou 10 jaar oud en ongeveer 'n maand gelede is 'n terugblik oor die afgelope 10 jaar gehou met pogings om prioriteite vir die toekoms te identifiseer. Die sitting is ook deur die nuutgestigte Raad vir die Omgewing bygewoon. Ek wil hier net een spreker se bydrae, wat met sy onderwerp verband hou, aanhaal t.w. prof S.A. Hulme:

“Nagenoeg 80% van die naastenby 86 miljoen hektaar landbougrond in die blanke gebiede van Suid-Afrika is tans onder natuurlike weiding. 'n Verdere 5 miljoen hektaar is onder houtplantasies, bosse en natuurreservate. Natuurlike plantegroei is baie belangrik.

Op die natuurlike weiding hoofsaaklik word tans 9 miljoen beeste, 28 miljoen skape en om en by die 2 miljoen bokke aangehou. Dit is egter betekenisvol om daarop te let dat niesteenstaande beter voeding en gebruik van mielies, oliesade en die nuwe produkte, verbeterde veebestuur, verbeterde teling en siektebeheer, die totale groot- en kleinveegetalle gedurende die afgelope 30 jaar nie in die RSA toegeneem het nie. Met ander woorde, al hierdie verbeteringe het maar bloot gegaan om te kompenseer vir die agteruitgang in ons natuurlike veld. Dit het by ons 'n valse gerustheid begin skep. Daar is oorweldigende getuienis dat die veld oor die hele Suid-Afrika besig is om agteruit te gaan. Selfs voor die huidige droogte was ons weiveld hopeloos oorlaai met vee. Nou is die toestand baie erger. Ons is besig om van hierdie land 'n woestyn te maak. Dit hou nie alleen gevare direk vir veeproduksie in nie, maar ook vir grondstabiliteit.”

Mr Chairman, mankind has become a major evolutionary force. Although we do not have the knowledge to control the biosphere, we have the power to change it. We are morally obliged – to future generations and other creatures – to act wisely. As we are also a part of evolution it would not make sense for us to destroy the

substances that keep us alive.

Allow me to briefly analyse some of our ecosystems. Generally, one can say that poorly managed land has led to invasions of indigenous and exotic weeds which have severely reduced the land's capacity to support livestock. Swarthaak has invaded about 2 million ha of grazing land, with some areas so densely covered that they cannot be grazed at all. In addition, overgrazing in the Black homelands, where 33% of the country's population occupy 12% of its land area, has severely reduced the agricultural and conservation value of large areas.

One of the most important and most threatened life support systems in South Africa is the semi-arid areas for agriculture, e.g. the Karoo. This area has been the subject of extensive study. It covers nearly a third of South Africa and overgrazing has done more damage to the plant cover within the Karoo than to any other vegetation type in South Africa.

Dit kan toegelig word met die rekonstruksies deur Acocks in 1975 en die veldagteruitgang deur groot-skaalse veranderinge sedert ongeveer 1450. Ontstellend is dat indien die tendense voortduur feitlik die totale verspreidingsgebied van kleinvee (die Karoo) as sogenaamde woestyn bestempel sal kan word. Hier moet dadelik toegegee word dat die begrip "woestyn" 'n wye betekenis het en tot dusver nog nie bevredigend gedefinieer is nie (maar wat in RSA gedefinieer word as dele wat droë met tot dor oppervlaktes, skraal bedek met plantegroei, waar stofstorms, kaal kolle en moontlik bewegende sand voorkom en waar weiding en water uiters skaars is). Die aanduidings is 'n geleidelike verwoestyning. Waar volgens rekords die grense van die Karoo teen ca 1450 by die 24ste lengtegraad gelê het, is dit tans by die 26ste lengtegraad. Die term verwoestyning dui aan waar die plantbedekking deur die toedoen van die mens so vernietig dat dit die skyn van 'n woestyn aanneem, waar verwoeste kolle veldgedeeltes saamsmelt om groter sogenaamde verwoestynde oppervlaktes te vorm. Veral ontstellend is wanneer huidige tendense na 2050 ekstrapoleer word.

Dit wil voorkom asof die sketskaarte deur Acocks 'n betreklik getroue beeld weergee van die aftakeling van die weidingskapasiteit van die veld en nie soseer van die uitbreiding van woestyn toestande nie. Uit 'n landboukundige oogpunt moet plantegroei veranderinge beskou word as 'n afname in gewenste spesies met 'n toename in ongewenste spesies wat vergesels gaan met 'n afname in weidingskapasiteit. Twee manifestasies wat hiermee gepaard gaan is veeverliese a.g.v. die inname van giftige plante en fisiologiese afwykings veroorsaak deur een-tonige diëte op minderwaardige veld.

Hierdie is 'n komplekse probleem, is intensief deur Roux bestudeer en kan nie in die bestek van so 'n voordrag behandel word nie. Feit bly staan dat hierdie verwickelinge van enorme belang vir ons toekoms is. Ekologiese navorsing, gemik op die effektiewe benutting van ons natuurlike hulpbronne, is noodsaaklik om die pad vorentoe aan te dui en dan riglyne uit te stippel hoe langs daardie pad beweeg sal moet word. Die behoud van ons natuurlike plantegroei is onontbeerlik vir die voorsiening van voedsel en die verskaffing van lewensruimte aan 'n toenemende bevolking. Mens is egter dankbaar indien mens kan terugkyk op die bydrae wat Onderstepoort tot die verligting en voorkoming van vele probleme gelewer het. Hierdie veeartsenykundige instelling, wat van sy beskeie begin in moeilike tye onder die dinamiese leiding van Arnold Theiler ontwikkel het tot

'n grootse nasionale – en internasionale bate, vier vanjaar sy vyf-en-sewentigste verjaarsdag. Mens is dankbaar ook vir die bydrae wat dié instansie in die toekoms sal maak in die ingewikkelde legkaart van probleme wat tussen nou en die jaar 2000 die hoof gebied moet word.

Dames en here, die probleme is enorm en alle wetenskaplikes sal saam deur oorspronklike denke, navorsing en skeppende vernuwing hul bydrae moet lewer in die vind van die nodige oplossings. Dominerend ten opsigte van die toekomsbeplanning is die toename in en die verandering in die samestelling van die bevolking. Teen die jaar 2000 sal die blanke bevolking nagenoeg 7 miljoen wees, terwyl die Swart bevolking nagenoeg 40 miljoen gaan beloop. Teen die jaar 2000 sal die Swart skool- en studentebevolking by benadering die 7,5 miljoen kerf bereik, dit wil sê, meer as die totale Blanke bevolking. Die geprojekteerde analise van die Suid-Afrikaanse bevolking toon die dramatiese toename in die Swart bevolking. Alhoewel die getal motorvoertuie in 1981 in besit van die Swart, Asiër en Bruin gemeenskappe slegs 21% van die getal privaatvoertuie beloop het, word die Suid-Afrikaanse mark gesien as één met potensiaal wat in die toekoms nog stewig kan groei. Volgens een vooruitskatting kan die 650 399 motorvoertuie wat in 1981 in besit van die Swart, Asiër en Kleurlingbevolkingsgroepe was teen die jaar 2000 styg tot 2,8 million.

In 1980 was die besteding van die Swart verbruiker nagenoeg R9 000 miljoen terwyl dié van die Blanke verbruiker nagenoeg R18 500 miljoen was, dit wil sê nagenoeg twee maal meer, maar volgens skatting sal Swart verbruikersbesteding teen die jaar 1992 die van die Blankes verbysteek. Die potensiaal van die Swart mark word duidelik weerspieël in die vinnigste groeiende gebiede van besteding van die stedelike Swartes gedurende die periode 1970-1980, veral indien na aspekte rakende kommunikasie, pensioen en versekering en mediese en tandheelkundige dienste gekyk word. Hoe dit ook al sy, verbruikersgoedere en dienste sal teen die jaar 2000 toenemend op die Swart mark ingestel wees. Belangrik in hierdie samehang is die groter meganisering op plase, die vermindering van werksgeleenthede aldaar en die vergrote verstedeliking, wat volgens skatting 'n verhoging in die stedelike bevolking met 13-21 miljoen tot gevolg kan hê. Voeg hierby dat volgens berekeninge van prof Jan Lombaard, Swart behuising alleen vanaf die 15 000-20 000 per jaar in 1970 na 150 000-200 000 eenhede per jaar in die negentiger jare moet opskuif. Dit is alles magtige taal. Maar indien verder daarop gelet word dat in die dekade vorentoe 'n investering van R65 000 miljoen aan nuwe en uitbreidende projekte bestee gaan word in 'n waterskaarsland, sal groot eise aan ons wetenskaplike en tegniese vermoëns gestel word. 'n Vinnig-groeiende meer welvarende gemeenskap, soekend na ontspanning, stel groot eise aan ons pragtige kus, rivier-mondings en ander natuurskoongebiede. Voordurende studie en beplanning word vereis indien ons die erfenis vir ons nageslag wil bewaar. Hernude belangstelling heers in ons omringende oseane waar aantygings oor uitputting van visbevolkings gemaak word op 'n stadium waar ons kennis van hul migreringstendense, reproduksie en afhanklikheid van omgewings – en klimaatstoestande erg beperk is.

'n Energiehonger wêreld koop ons veredelde steenkool en dit lei tot 'n akkumulasie van tien talle miljoene ton lae-graad steenkool waarvoor sinvolle gebruike ge-

vind moet word. Nuwe kragstasies word met gereëelde reëlmaat opgerig en van hierdie reuse stoot meer as 1 000 tonne SO₂ per dag in ons atmosfeer in brandende, uitgewerkte mynhoop dra by tot ernstige besoedelingsprobleme. Water vir die kragstasies van die toekoms is nie meer beskikbaar nie. Lugverkoeling moet vervolmaak word, wat hittebesoedeling en selfs effekte op ons weer kan uitoefen. In ons goudmyne slaag ons reeds daarin om goud uit rots met relatiewe hardheid van sewe by rotstemperatuur van tot 65°C te ontgin maar die gouddraende erts lae duik teen 'n hoek van nagenoeg 20°C dieper die aarde in na hoër temperatuur. Voeg hierby die navorsing op die gebied van die ruimtewetenskappe, die soeke na nuwe metodes vir ertsopsporing, mynwese en die veredeling van ertse, uitdagings op die gebied van mikro-elektronika, die materiaalwetenskap, gesondheid en voeding, ens en dit is voor-die-hand-liggend dat 'n volgehoue verhoogde navorsingsaktiwiteit noodsaaklik is. In hierdie samehang moet ook gewys word op die bevindings van die Eenheid vir Toekomsnavorsing wat daarop wys dat ons voedselsurplusse op vele terreine in tekorte teen 1995 omskep word. Verder kan mens nie nalaat om te wys op die bedreiging op ons grense in die wete dat moderne oorlogsvoering gereduseer word tot vernuf teen vernuf. Daarby is Suid-Afrika oor 'n breë front uitgesluit van militêre aankope en gevolglik in 'n hoë mate op eie kundigheid aangewese. Die tipe voorbeelde kan uitgebrei word. Daarby is ons, as 'n gemeenskap wat varieer van Eerste tot Derdewêreld komponente, deel van 'n groter internasionale gemeenskap en kan ons aan tegnologiese ontwikkelings in die Eerstewêreld land nie ontkom nie. Die snelle tegnologiese ontwikkeling het reeds tot 'n mate gelei tot die "tegnologiese kolonialisering" van Derdewêreldlande. Veral drie ontwikkelings gaan ons almal se lewens in die volgende dekades ingrypend beïnvloed:

1. Robotics

There is no single technological advance that is more important today than robots in determining which nation will win the fight for technological heights in the 1980's. The energy induced inflationary boom combined with the micro-electronic revolution eliminated the cost difference between robots and labourers. These steel collar workers can cope with 2-3 shifts per day, don't take coffee breaks, ask for raises, come in on Mondays with hangovers or complain about unsafe working conditions. They mean higher productivity, lower costs, better quality with an accuracy which is beyond anything that a human can achieve and with an unmatched endurance. Robots hold tremendous promise for the future but they will bring great pain as well. Many men and women will be disemployed, with no chance of finding a job without retraining. The implications of this for South Africa is obvious.

2. Telecommunications

This is an area fairly commonly known to us all. The list of possibilities opened up by this technology is endless and international competition in computers and communications is becoming very intense and the supporting technology extremely sophisticated which demands constant training and upgrading exercises.

3. Bio-Engineering

This emerging technology holds tremendous promise

for the future and could influence many of the areas mentioned earlier. With such a promising future, bio-engineering is rapidly becoming commercial in the United States, Japan and Europe. Developments could transform the pharmaceutical, food and chemical industries; it could alter mining, decrease dependence on non-renewable materials, with potentially very significant applications in agriculture.

Allow me some concluding remarks with regard to veterinary science. Some 46 animal vaccines as well as diagnostic antigens and antisera are produced at Onderstepoort and are exported to many countries in Africa and the rest of the world at a total cost of some R10,5 m, exports amounting to R4,5 m. Since the important impact of the Boyer and Cohen reporting on the isolation of restriction enzymes which heralded the beginning of the new era of molecular biology using recombinant DNA techniques, research has been going apace. One of the first breakthroughs in the United States using these new techniques was the production of foot and mouth disease vaccine by genes spliced into bacteria. The vaccine will shortly be commercially available and the product will eventually be commercially competitive. Related research is already in progress in South Africa and the question might rightly be asked: Why must this research be continued here? Because unique strains/races of both the disease virus and the domestic animals as well as environmental factors make local development important. In addition, the potential now exists to produce polyvalent vaccines. The South African farmer will certainly be delighted if the number of inoculations they have to administer to farm animals can be reduced by combining the number of vaccines.

The standard of biological research and the status of biologists in South Africa is high and with a large number of economically important problems which are intellectually exciting the stage is set for a new surge in biological research, particularly at a molecular level using the exciting recombinant DNA-techniques. The stage is set to strengthen the funding of biological research which is the responsibility of the Department of Agriculture, the Medical Research Council and the CSIR. Full exploitation of our biological research expertise is required to retain our position high up the list of world leaders in animal vaccine production. Not only is recombinant DNA technology bringing a new dimension to biological research especially veterinary but so too are new embryo transplant techniques. Australian scientists have estimated that all the new molecular biology techniques which are often referred to as biotechnology, will influence animal production by 1990 by some 30% and with the present annual South African production figure at about R2 000 million this will mean a considerable rand value at today's prices.

Ladies and gentlemen, the South African Veterinary Association and its members have played a pivotal role in the development of South Africa which may be regarded as an awakening industrial giant. However, there is no room for complacency and the future shall certainly be more challenging and more demanding than the past if we want to preserve our proud heritage for those who come after us. I wish your Association with its members and their interest in promoting veterinary science a future that will be even more illustrious than your past. My very best wishes for a successful and stimulating conference!

Thank you, ladies and gentlemen!

NEW VENTURES IN FOOD ANIMAL MEDICINE*

J.G. MILLER**

The Need for Food Animal Veterinarians

Promotion and maintenance of animal health, in all its parametres throughout life, is the single largest cost item in the production of animal protein. It outranks all other factors and is estimated at 15 % per annum. An even greater cost is that of the lost opportunity. Livestock operations that seek to use more intensive management, to establish livestock enterprises in new regions or to take advantage of new feedstuffs, are all limited by the ability to solve the unpredictable equation of health productivity. Veterinary medicine is not only an integral part of the present, it is truly indispensable as we project future trends in livestock production.

Present Status in the United States of America

Need does not translate to demand, nor does a shortage of veterinarians translate to demand. The number of veterinarians in full time equivalents involved in food animal medicine has declined. The large animal practice has become mixed – and only slightly so – retaining only old food animal clients because of long social relationships and adding few, if any, new livestock operator clients.

It is estimated that the number of full time equivalent veterinarians in livestock production is probably nearer 10%. This number plays no part in the shortage/surplus equation. This is, in part, the inevitable consequence of the actions of a profession that, for the last 20 years, has sold 90% of its research capacity and some of its best minds to projects outside the food animal area.

As a profession we have successively withdrawn or diminished our presence in the sheep, swine and poultry industries and have not yet acquired a position in aquatic animal medicine. In addition, the profession is becoming feminized, 50% of almost all classes are now females, most of whom prefer to go into areas of veterinary medicine other than those concerned with food animal production.

Perhaps the ultimate blow has been the increase in the cost of individual animal diagnosis and therapy as new, more sophisticated and expensive procedures are developed. These are economically irrelevant to the individual food animal and are destined for only the most valuable members of the species. Much of the individual food animal medicine still practiced is driven by the desire to reduce pain and suffering in those animals entrusted to our care – the human/animal bond – at an untenable cost to the owner.

As a profession, we still direct and seek to deliver our

expertise to the individual animal. The role of the health advisor is being assumed more and more by the nutritionist and other specialists, although not adequately. Furthermore, medication is now readily available to the user and his advisers.

It would appear that the veterinarian's retreat from cattle practice is also underway. If this trend continues, veterinary medicine will never be the same. We will lose the reason for our franchise with society and a direct link to economic relevance; a link that South African veterinarians have enviably exercised in this country over the last 80 years. From the vantage point of academic veterinary medicine it is discouraging, it is 5 minutes to midnight.

What of the New Initiative?

New trends and new initiatives have rarely started in institutions. We follow, we try to catch-up but are rarely, if ever, leaders.

The Bovine Practitioners Meeting in December 1982 had 2 200 veterinarians in attendance. An enthusiastic meeting was held with much individual participation by those present. Many high technology topics, such as embryo transfer, infectious diseases, internal medicine, biochemical characterization of disease states, etc. were discussed.

The income of large animal practitioners has begun to accelerate faster than that derived from mixed and small animal practice. Graduating students going into large practice lead their class mates in salaries. There appears to be a rejuvenation in this branch of veterinary medicine. How or why has this come about?

In the western states, there is some \$7 – 9 million of livestock income per large animal practitioner – or 15 000 animal units. The earning capacity of the veterinarian is linked to the calving rate, calving interval, weaning weight, backgrounding programmes for feeders, etc. of these 15 000 units, as opposed to intervention in acute illness of a portion of the 1 000 odd animals that may become ill.

Who, then, are the "New Breed"? What can they offer?

1. They are not trained by the colleges.
 2. They are 10 years out of veterinary school.
 3. They are well established and respected in the community.
 4. They have multi-man practices with a food animal component.
 5. They have developed their management skills, are not intimidated by computerised production records and have inserted their own health and production triggers and values in such programmes.
 6. They have acquired additional training and expertise on their own initiative and often from each other.
- However, they can only do so much. Thorough

*Address presented at the Biennial Congress of the South African Veterinary Association which was held in Bloemfontein during September 1983.

**Dean, College of Veterinary Medicine, Mississippi State University, Mississippi U.S.A.

technical investigation on a comprehensive scale is beyond the individual. Every encounter is unique. These individuals are, by necessity, representatives and agents of the breadth of veterinary expertise. There is an indispensable part of food animal medicine. The practitioner is the trained scientific observer, the pathfinder who does not clutter and obscure the problem with associations of irrelevant events of insufficient data. Furthermore, he is the most effective scientist in the development of the response plan incorporating management and immunological and therapeutic factors.

In Mississippi, as we in the Faculty of Veterinary Science seek to utilize veterinary medicine in order to break through self-inflicted economic barriers, we cannot await the gradual process but are seeking to accelerate it. This year there are 39 separate livestock operations that have enrolled in our total health production programme. By and large, these are operations with sufficient bookkeeping records to establish past economic inputs and costs.

The college provides a total, model health programme intended to increase their profitability. The operator has to designate a local veterinarian who becomes familiar with our programme, the scope of our back-up technology and the health profile for the operation. The practitioner provides emergency health services on call. We do

not charge for our services, but enter into the production costs – the fair value of the professional services as if provided by the practitioner. In the first year of operation, the net increase in profitability has been highly significant.

At the 24th month we intend to withdraw our services from these herds, while continuing to make available to the practitioner site visits by teams of faculty and full laboratory surveillance and investigation at no cost.

It would appear that it is possible that food animal medicine will assume a central role in the management of many of the more productive enterprises and that the practitioner, because of the economic impact of his skills, may well be in the upper levels of income.

Admittedly the numbers, initially, will be small. In this type of practice, geography is not a limiting factor. We have practitioners from Kansas with clients in Maryland and feedlot practitioners from the Pan Handle of Texas practicing in Florida.

However, when we look at the historical role of veterinary medicine in South Africa, the large numbers of livestock involved, the long distances and the harsh economic realities, we will have much to learn from you and perhaps in some modest way, also to share with you.

BOOK REVIEW

BOEKRESENSIE

CLINICAL PATHOLOGY AND DIAGNOSTIC PROCEDURES

D.L. DOXEY

2nd edn. Baillière Tindall 1983 pp 320, Figures 150, Tables 71, ISBN 0-7020-0956-3 £15-95

The book, which has been written primarily with the generalist in mind, follows a systems approach and aims to give practitioners a guideline to the involvement of diagnostic techniques in confirming a clinical diagnosis. Each chapter deals firstly with the normal structure and function of the particular organ system, pathological changes thereof and antemortem investigations of particular conditions. An extensive reference list concludes each chapter.

Separate chapters on the collection and preservation of samples and on techniques have also been included. Local

readers are cautioned that the requirements may not necessarily apply to local laboratories.

The book attempts to cover a wide range of conditions of all the domestic species – an approach which does not allow an in-depth discussion of the various topics.

The generalist South African veterinary practitioner may find the book of some use but species-specialists such as equine or canine specialists would probably find it of very little practical value.

J. van Heerden

ADDRESS

VOORDRAG

THE ROLE OF THE VETERINARY SURGEON IN THE SMALL STOCK INDUSTRY*

P.W. VAN ROOYEN**

The small stock industry, and I refer in particular to the woolled sheep industry, is one of the most important agricultural industries in the Republic of South Africa. In 1982 the total sheep population was 31,5 million which consisted of 26,1 million woolled sheep of which 20,0 million were Merino's. There is a further 2,7 million sheep in the National States. The wool clip for the 1982/83 season amounted to 107,3 million kg which was sold for R265,9 million. Approximately 85% of the South African clip is exported which makes wool, in terms of an agricultural product, the largest nett earner of foreign exchange. A total of 8,25 million small stock are slaughtered annually with the value amounting to roughly R340 million.

Sheep farming, and to a lesser extent goat farming, is practised to a large extent in the vast extensive and semi-extensive farming regions of the country where no other form of farming can be practised. Many sheep are kept in the higher summer rainfall, grassveld and mixed farming areas of the Orange Free State, Transvaal and Natal as well as in the winter rainfall regions. The latter mentioned regions also have a large potential for the development and expansion of sheep farming.

Large amounts of capital are invested in land, farm improvements and stock in the sheep farming regions. Thousands of farmers and farm labourers make a living directly out of the small stock industry. Added to this are large capital investments and labour in connection with the marketing and processing of wool and mutton and in the trade through which the final product is marketed.

From the above-mentioned facts it is very clear what the economic importance of the small stock industry is in Agriculture for the Republic of South Africa. As in the case with all other agricultural industries, as a result of inflation, the sheep farmer is also subjected to continually rising production costs. The price of land, other production resources and labour costs, increase daily. The sheep farmer is caught more and more in the grip of increasing production costs. The sheep farmer, as is the case with all other farming enterprises, has very little control over his most important production resources, namely climate conditions which remain a large risk factor. Added to this is the price of the product, namely wool and mutton, over which there is also only limited control.

Efficient production and marketing methods offer the only hope for the future. For efficient production the application of sound breeding, feeding and management practises are the only key to success. It is when I come to efficient management practices, especially animal health, that the important role of the veterinary

surgeon in the small stock industry becomes evident.

The small stock industry is threatened daily by, inter alia, internal and external parasites, feed deficiencies, poisoning, lamb mortality, blowfly attacks on woolled sheep and many other diseases. The administration of preventative stock remedies and inoculation programmes, as well as suitable treatment programmes, is of the utmost importance for the sheep farmer. Veterinary surgeons can play a positive role in the present and future well-being and development of the small stock industry. The training programme of veterinary surgeons covers all aspects of the large as well as small stock industry. At the different agricultural faculties and the Faculty of Veterinary Science of the University of Pretoria as well as in the Department of Agriculture, research has been done for many years on the management of the small stock industry and the various small stock diseases. The results achieved by Onderstepoort especially, can be used as an example. All this knowledge as well as that developed in countries overseas is available to the veterinary surgeon.

The best result can, however, be obtained by the veterinary surgeon who devotes himself to the multiple problems of the small stock industry. The interest of the veterinary surgeon who serves the small stock industry must not be restricted only to animal diseases. To be of value to the farmer he must have a broad knowledge of all aspects of small stock production. If he has this broad knowledge, he can assist the farmer by increasing the level of animal production and introduction of preventative disease measures. To be of the most value to the farmer the training programme of veterinary surgeons must thus be more specialized in small stock. The veterinary surgeon who plans to treat domestic animals in a city or mainly care for large stock, cattle and horses, or to do research, does surely not require the same training as the man who desires to concentrate on the small stock industry. At present the veterinary surgeon has a wide field he can serve after qualifying. The result is that an industry such as the small stock industry which possibly is not financially so remunerative is not served as effectively as other industries.

A farmer only expects a quick solution from a veterinary surgeon in cases of acute mortalities but for his production problems he expects a sound detailed programme which can be implemented in practice. The stringest test for any programme is whether the farmer derives any direct financial benefits. The number of veterinary surgeons which serve the small stock industry are not sufficient to serve the farmers individually. Valuable information is furnished by veterinary surgeons during lectures and demonstrations at farmers' days but individual services are also of cardinal importance during outbreaks of general diseases, parasite problems in a flock, and more so in the case of valuable stud animals.

*Address delivered at the Biennial Congress of the South African Veterinary Association which was held in Bloemfontein during September 1983.

**Chairman S.A. Wool Board.

One of the largest problems of the small stock industry in general is the low percentage of lambs weaned. This causes a low selection intensity and therefore retards breeding progress. The number of animals that can be sold is therefore decreased, as is the profit of the enterprise. For various sound practical reasons many farmers do not mate their ewes during the optimal oestrous period, namely March/April. The result is a low conception rate. It rests mainly with the researchers concerned with the small stock industry to find a solution for this problem.

There exists a wealth of information in relation to the causes of lamb mortality mostly within 3 days after birth. The veterinary surgeon thus has a large commitment to establish the reasons for the mortality of newly born lambs in co-operation with farmers and to determine solutions for the problems on specific farms.

Internal parasites cause tremendous losses in the small stock industry. The large number of worms responsible for parasitism and the large selection of remedies available for the treatment create confusion amongst many concerned with the small stock industry. It is surely necessary for veterinary surgeons to accurately determine which parasites occur under different circumstances on different farms and then prescribe the most effective treatment. It is also necessary to verify the effect of the treatment.

A very important aspect of the small stock industry is the use of vaccines against the most general diseases. For the sake of saving administration costs and for the most effective results, it is necessary for veterinary surgeons to work out programmes for preventative inoculation so that disease are prevented before they strike.

Certain problems of the small stock industry for which there are no prompt solutions available, cause large losses. Of special importance is ophthalmia, abortions and blowfly attacks.

These conditions still require a vast amount of research and it will be necessary for the practical veterinary surgeon concerned with the small stock industry to maintain the necessary liaison with the research worker to develop an acceptable solution.

A new development in the small stock industry is the creation of systems for intensive sheep farming. These systems have problems peculiar to themselves and where mortality and disease occur, the economic implications are large. Prevention in such cases is of greater importance than treatment.

The high winter and summer rainfall regions and especially the coastal areas of the country offer a large potential for the expansion of sheep farming on artificial pastures. Parasite control under these conditions is of greater importance than in the drier regions and this therefore will be an important task that the

veterinary surgeon will have to undertake in these regions.

Over the years millions of rand have been invested in the development of the Veterinary Research Institute at Onderstepoort where research is done on diseases and vaccines are developed and manufactured. Onderstepoort is internationally known for the outstanding work done at this centre. This work and the financing thereof is done by the Department of Agriculture with the main objective to serve agriculture. The sheep farmer has made a large contribution to this development. There are serious shortcomings when the actual veterinary services rendered to the sheep farmer on the farm is taken into account. For one or other reason it is not profitable for private veterinary surgeons to serve the industry and on the other hand, the sheep farmer, especially the flock farmer, cannot afford a veterinary surgeon. The Government service does not function in such a manner that veterinary services can be rendered to the individual small stock farmer. The sheep farmer further competes with the city dweller and the private sector for the services of the veterinary surgeon.

Providing a service for domestic animals in the city is apparently more profitable and attractive for many veterinary surgeons. Unless a formula can be found to overcome this shortcoming, I foresee that the backlog of services rendered to the small stock farmer will just become greater to the disadvantage of the industry and agriculture in general over the long term. Serious attention must be given to attempt to solve this problem.

The important role of the veterinary surgeon in the promotion of the small stock industry has been sketched. I wish to convey my thanks to the Department of Agriculture and the private sector, i.e. remedy and dip manufacturers and distributors as well as private veterinary surgeons for services which are rendered for the promotion of the small stock industry. Research in relation to disease control must be done continually and the knowledge propagated because parasites build up a resistance against effective remedies which then from necessity, must be replaced. The private sector is fully aware of the spiralling costs in which the farmer is trapped and the farmer cannot recoup costs as easily from other instances. This aspects should be taken into account with the rendering of veterinary services of whatever nature.

In conclusion, it is pleasing to note that a wide series of subjects in the interest of the small stock industry will be dealt with by experts at this congress. It is also pleasing to note that it has been attended by so many interested parties. May it all result in the promotion of the scientific knowledge of the small stock industry.

I wish you every success with the proceedings.

POSSIBILITIES AND LIMITS OF BREEDING FOR IMMUNE RESPONSIVENESS*

H. KRÄUSSLICH**

ABSTRACT: Kräusslich H. Possibilities and limits of breeding for immune responsiveness. *Journal of the South African Veterinary Association* (1984) 55 No. 1, 11-17 (En). Lehrstuhl für Tierzucht, L-M-Universität München, Veterinärstraße 13, 8 München 22, FRGermany.

Studies on defence mechanisms in mice and farm animals are demonstrated. The results indicate that selective breeding might become a more important tool in disease control. But intensive research work is required before a "General Disease Resistance Index" can be used in animal breeding. More common efforts of research workers in veterinary medicine and animal breeding are necessary.

Key words: Phagocytic activity, antibody response, mice, farm animals.

INTRODUCTION

Heritability of viability is generally low, mainly because of a large environmental variance component and it is a common erroneous belief that low heritability automatically implies poor prospects for genetic improvements¹¹. According to Gavora⁷, it would seem useful to utilize a "genetic co-efficient of variation" in addition to heritability to characterize disease resistance traits. It also seems likely that the heritability of well defined resistance or resistance-related traits will be higher than that of total mortality⁶. Standardization of challenge conditions and pathogen dosage would also be expected to reduce environmental variation and improve heritability. In monotocous species, such as cattle, most disease-caused mortality takes place early in life (from birth to 2 months), but as a rule, performance and progeny testing systems start recording data at a much later age of surviving animals. In such systems, introduction of complete recording of mortality will be critical for any work to commence on the improvement of disease resistance and survival of young animals.

Improvements of general disease resistance is too ambitious a goal if viewed as an attempt "to improve on evolution". However, viewed as an effort to speed up adaptation of animals to modern production conditions, it appears less formidable. To undertake the task, much more knowledge of defence mechanisms, their interrelationships and relationships to disease resistance and to production traits will be needed in order to formulate breeding techniques and strategies for achieving this complex goal. Very little is known about the parallel evolution of a host and multiple pathogens, an understanding of which is essential for general disease resistance.

The research group at the L-M-University Munich (Institute für Mikrobiologie, Buschmann, and Lehrstuhl für Tierzucht of the Veterinary Faculty in Munich) studies systems of defence mechanisms that phenotypically behave as quantitative traits. The following lecture is mainly based on experimental results obtained by this group.

STUDIES OF DEFENCE MECHANISMS IN MICE

General approach

In general, 2 approaches have led to our existing

knowledge of genetic differences in immunoresponsiveness.

- (1) Selective breeding of high (H) and low (L) responder lines. Biozzi of the Institute Curie, Paris, France, has contributed considerably to our understanding of the quantitative genetic control of the immune response. Our group (Buschmann, Meyer, Kräusslich) at the L-M-University Munich has also use the method if bidirectional selective breeding of outbred mice for quantitative immune response traits.
- (2) The discovery that all mammals and birds probably have a so called Major Histocompatibility Complex (MHC) controlling a large number of resistance factors. This field is of considerable importance, but will not be dealt with in this paper.

The 2 methods used to select high and low responder lines were the carbon clearance rate and the ability to produce antibodies.

Selection on carbon clearance rate

Carbon clearance rate was measured by means of injection of Indian ink and subsequent blood sampling and measuring the decrease of carbon concentration in the blood. Briefly, 20 mg carbon/100 g body mass were injected intravenously and the clearance rate in the blood was measured. Carbon clearance rate was used as selection criterion. The carbon clearance rate measures the phagocytosis of the mononuclear phagocytic system. In Fig. 1 strain differences in the carbon clearance rate in inbred strains of mice and their reciprocal crosses are shown. The inbred lines used were bred at the mice laboratory of the "Lehr- und Versuchsgut der Universität München"⁹. Sample regression lines of log of the carbon concentration, against time of blood removal adjusted to one starting point on the ordinate are drawn. From the measurements of carbon concentration in the blood samples a granuloplectic index (Kr-value) was calculated.

Heritability estimates of the Kr-values in females varied between 0,36 and 0,92 in inbred strains and reached 0,11 in non-inbred NMR-mice. Based on these findings a two-way selection experiment with an outbred population of laboratory mice was carried out using carbon clearance rate as a means of selection⁹. Realized heritabilities were 0,30 in the high line (H) and 0,25 in the low line (L) as is shown in Fig. 2 and 3.

Some correlated selection responses were also found. The absolute and relative liver and spleen weights differed significantly between the lines (Fig. 4) indicating that the number of phagocytosing cells was increased by

*Lecture given at the Faculty of Veterinary Science, University of Pretoria, 22 March 1983.

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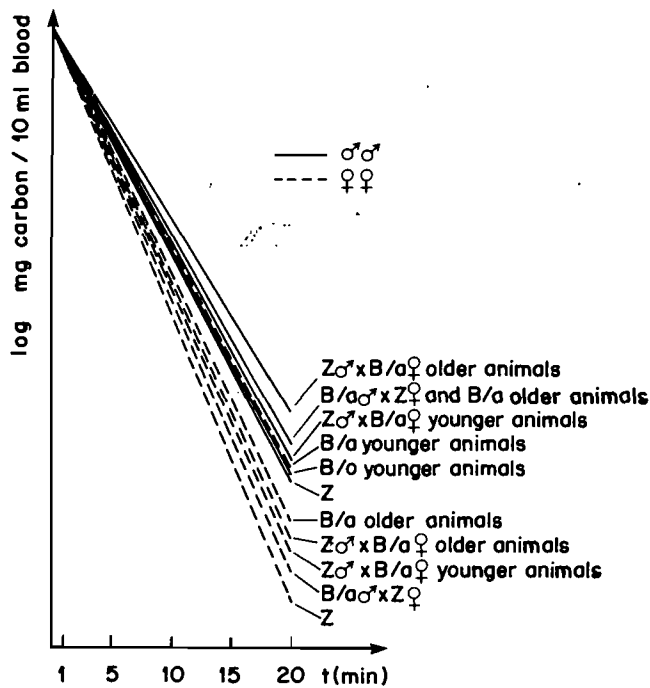


Fig. 1: Carbon clearance rate of inbred strains of mice.

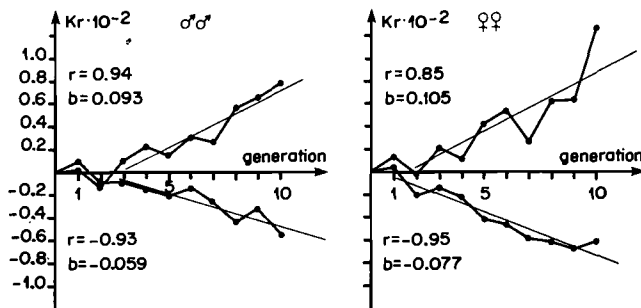


Fig. 2: Selection response per generation. (Mean values per generation and regression lines are pooled over both sexes Kr = granulopetic index).

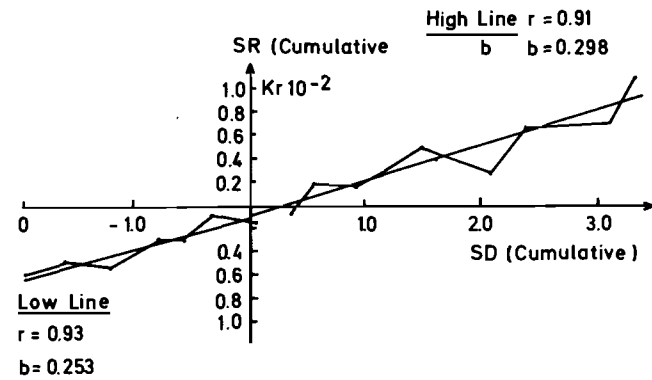


Fig. 3: Regression of cumulated selection response on cumulated selection difference.

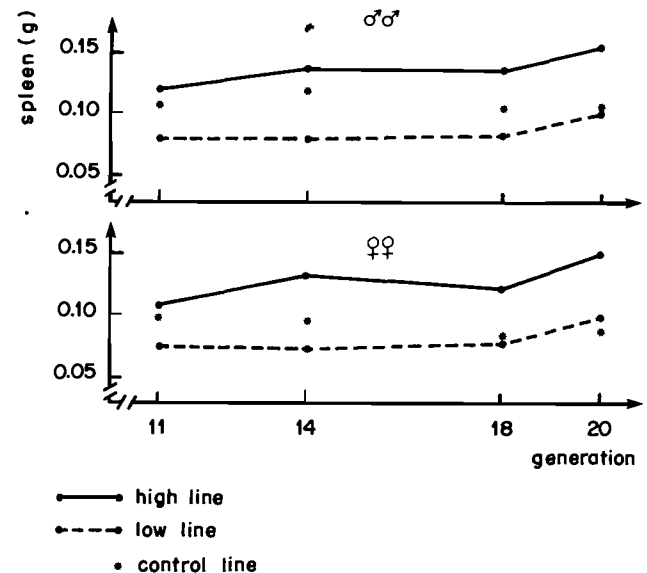


Fig. 4: Mean values of spleen weight in generation 11 under selection and in generation 14, 18 and 20 without selection on carbon clearance rate.

the selection for carbon clearance rate. The in vitro phagocytic activity in the single cell, however, remained unaltered. This was measured by in vitro uptake of labelled *Listeria monocytogenes* bacteria in blood leukocytes and peritoneal exudate macrophages from mice⁵.

The study of the immunological characteristics of H and L lines is not yet completely finished. The results found may be summarized as follows:

- (1) After immunizing the mice with sheep erythrocytes higher titres of specific mercaptoethanol-sensitive as well as mercaptoethanol-resistant hemolysins and haemagglutinins were detected in the H line⁵ (Fig. 5). On a single cell basis, however, there were no differences in antibody production between lines. The lines did not differ significantly in the number

of plaque forming cells/ 10^6 spleen cells. This supports the assumption that the increase or decrease of the spleen weight was the most important correlated selection response.

- (2) Resistance against *Listeria* infection was significantly better in the H line, but no difference was found in resistance against *Salmonella typhimurium*.
- (3) Lines differed significantly in the frequency of spontaneous mammary tumours and benzo-a-pyrene induced tumours (Fig. 6 and Fig. 7). This finding favours the hypotheses that the spleen is the major site for the production of factors which enhance blocking. These would then allow the tumours to multiply.
- (4) By Generation 16 there was a difference in the longevity and reproductive rate of the 2 lines.

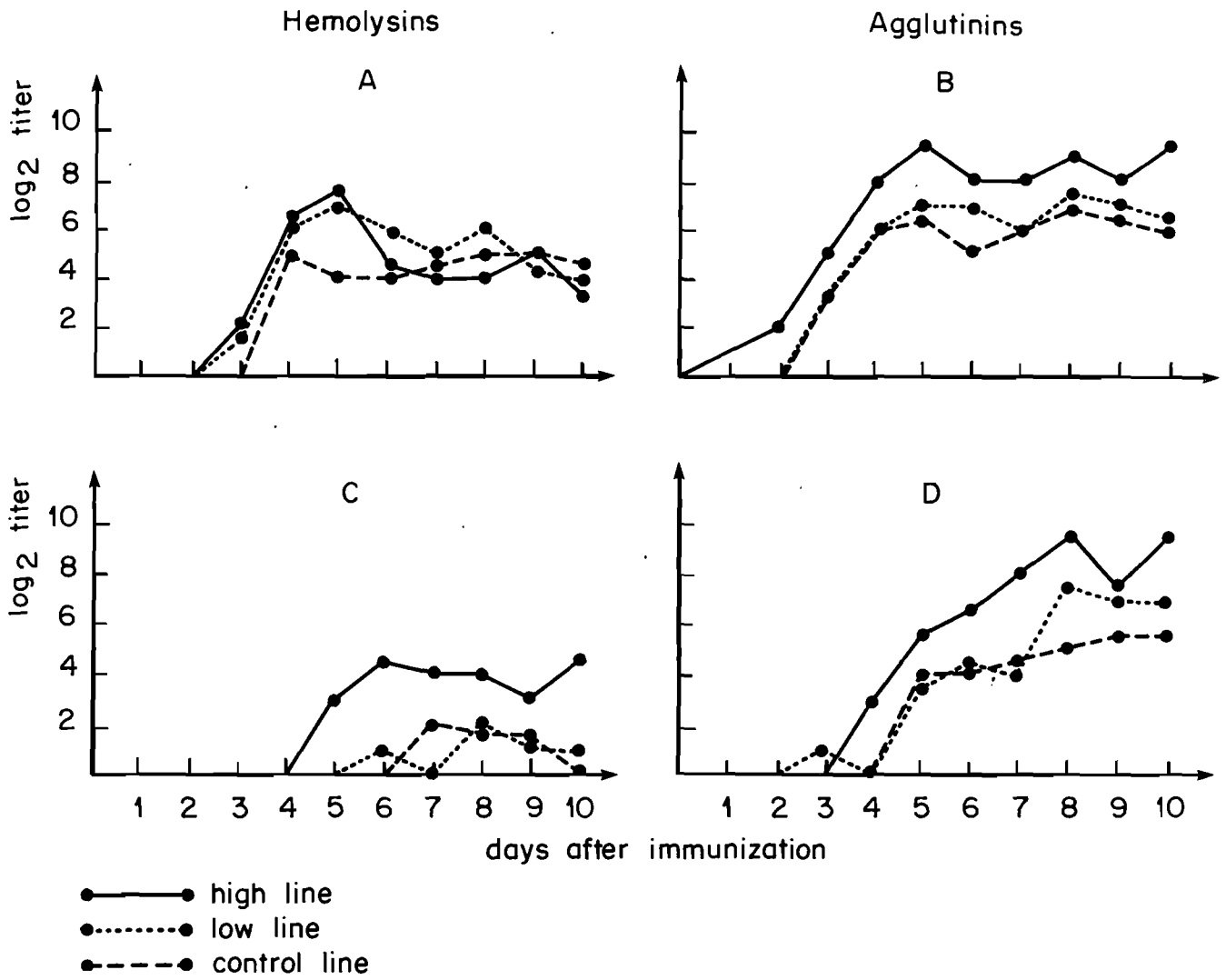


Fig. 5: Titres of mercaptoethanol-sensitive and mercaptoethanol-resistant hemolysins and hemagglutinins after injection of sheep erythrocytes.

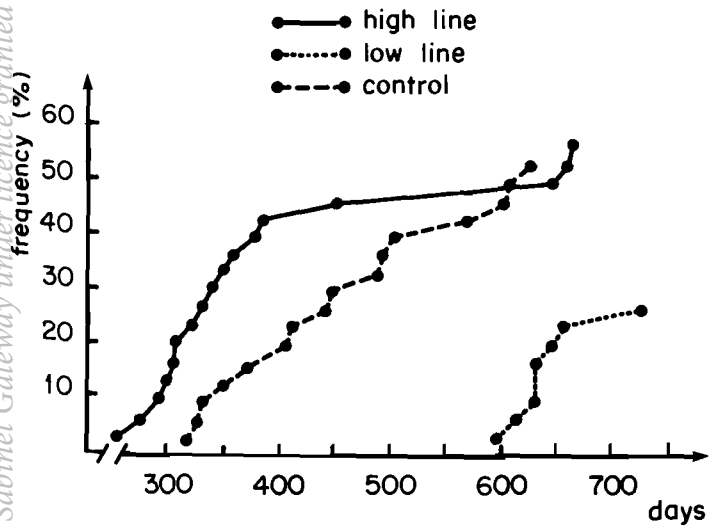


Fig. 6: Line differences in 3,4-benzo(a)-pyrene induced tumours.

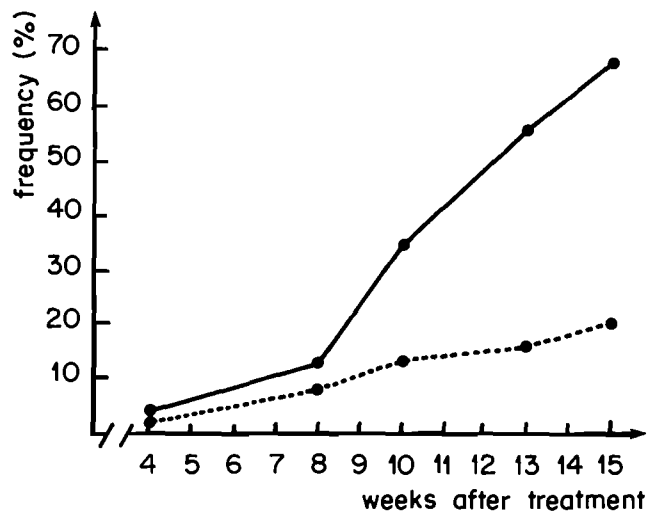


Fig. 7: Line differences in spontaneous mammary tumour incidence.

Character	Line		
	High	Control	Low
Lifetime (days)	399,17	457,18	585,71
Reproduction Time (days)	215,96	266,30	201,73
Litters (number)	7,53	8,97	8,10
Offspring (number)	80,13	86,27	78,67

Selection on antibody titre

Biozzi et al.² recently reviewed the results of 5 selection experiments on antibody production. The results are summarized by Biozzi et al. as follows:

- (1) Realized heritabilities were about 0,20 and the number of independent loci determining antibody production were estimated between 2 and 11. Interline differences range between 85 fold and 310 fold.
- (2) H and L mice differed significantly in immunoglobulin (Ig) concentrations and in spleen weight. These 2 findings suggest that the selection has modified antibody production at a general level.
- (3) It was demonstrated that the genetic control of high and low characters includes the responsiveness to all the antigens tested whatever their specificities or chemical structures: proteins, haptens, bacteria, transplantation antigens with the exception of levan and dextran.
- (4) The phagocytic activity is similar in both lines, however, the antigen handling or presentation is more favourable to antibody production in H than in L mice. The rapid catabolism of antigens in macrophages of L mice is an important factor determining the poor antibody response of these mice since antigen shortage was recognized as a negative regulatory mechanism.
- (5) Genes regulating antibody responsiveness have no effect on the T-cell mediated immunity.
- (6) H mice are more resistant to infections which are mainly counteracted by antibody production and vice versa L mice are more resistant to infections which are mainly counteracted by macrophages.
- (7) In most infections, the line which is spontaneously the more resistant is also the better protected by vaccination.

Conclusions which can be drawn from studies on high and low responder lines.

The results of selection experiments on antibody production and on phagocytic activity show that selection has not resulted in a general advantage in terms of resistance to infections, of one or the other of the selected lines since in all lines mice are highly susceptible to certain types of infections. This illustrates the failure of increasing by selection the resistance to infection in a multidirectional way. Moreover, it emphasizes the risk of obtaining by selection for resistance to certain types of infections, a strain of animals highly susceptible to other diseases considered as relatively harmless in unselected animals. The results indicate a negative genetic correlation between macrophage activity and antibody production (Fig. 8). In this situation the animal breeder may consider a "General Disease Resistance Index". There are examples of simultaneous improvement of negatively correlated traits through multitrait selection techniques e.g. milk yield and solids contents, egg number and size.

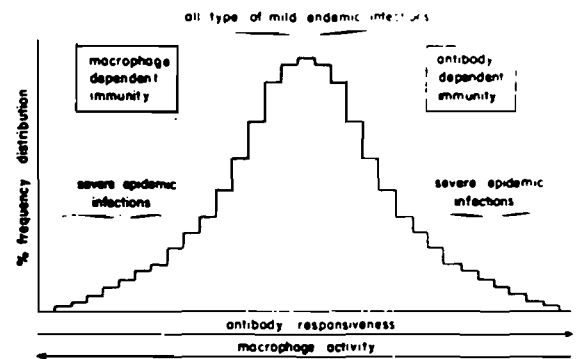


Fig. 8: Schematic representation of host-parasite interaction (Biozzi et. al. 1982)².

STUDIES OF DEFENCE MECHANISMS IN FARM ANIMALS

Phagocytic activity in pigs

Significant breed differences in the activation of the glucose metabolism during phagocytosis of particles (killed bacteria and Latex particles) in the blood leucocytes of 254 male pigs from 9 different breeds were found³. The technique for measuring glucose $-1-^{14}C$ oxidation rate was the same as that described by Keusch et al.⁸. The ^{14}C -glucose oxidation rate in the whole blood was considered as a measurement of the phagocytic activity of the polymorphonuclear (PMN) leukocytes. The ranking of the breeds correlated highly with the ranking of the same breeds according to their immune response to sheep erythrocytes as measured by plaque forming cells in the spleen (Fig. 9). The following rankings were obtained:

- (1) P/R ratio (ratio of glucose $-1-^{14}C$ metabolism by phagocytizing (P) compared to resting (R) blood cells):

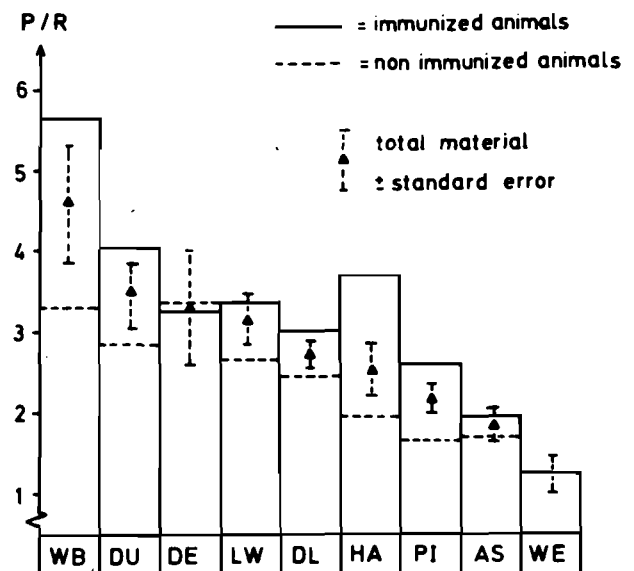


Fig. 9: Mean ratio (P/R) of ^{14}C production from glucose-1- ^{14}C by phagocytizing (P) compared to resting (R) blood cells in different breeds of pigs.

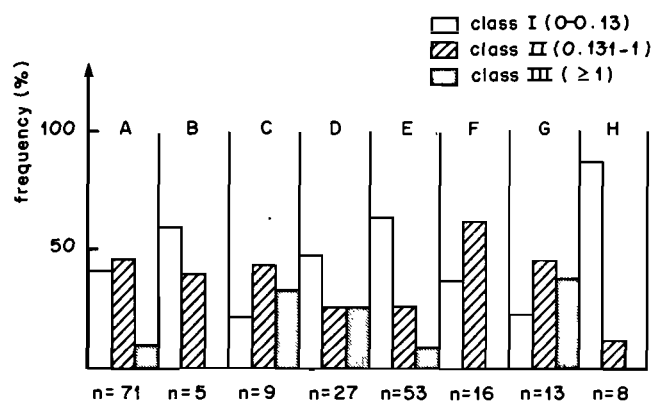


Fig. 10: Immune response of different pig breeds to DNP-Hapten.

Frequency: I Class – No response
II Class – Low response
III Class – Good response.

Belgian Landrace > Duroc > German Large White
> Large White > German Landrace > Hampshire
> Pietrain > Angler Sattelschwein > Welsh.

- (2) Antibody response to sheep erythrocytes (number of plaque forming cells in the spleen): Duroc > German Large White > Large White > Hampshire > German Landrace.

Antibody production

Lie¹⁰ demonstrated genetic variation in humoral immune response in bulls. The antibody titres against human serum albumin (HSA) and the total serum immunoglobulin levels were evaluated. Heritability estimates ranged between 0.14 and 0.56. The primary response (peak at 15 days after first injection) seems to be under stronger genetic influence than the secondary response (peak at 8 days after second injection). Lie assumes that the primary response reflects the genetic control of antigen recognition (ability to respond) and the secondary response reflects the magnitude of response (a quantitative character).

In pigs, genetic variation in immune response was first demonstrated by Radzikowsky et al.¹². The experiment showed breed differences in the immune response to sheep erythrocytes measured by the number of plaque forming cells (PFC) of the spleen. High levels of cross reacting antibodies, however, were found in sera of non-immunized pigs. To avoid these crossreactions, immune response of different pig breeds to DNP-Hapten (2,4 Dinitrophenylsulfonic acid – Bovine Serum Albumin) was investigated⁴. Fig. 10 demonstrates the differences between 8 pig breeds. The genetic determination of the anti-DNP response in pigs could be verified in a selection experiment over 4 generations (Fig. 11).

The main results of the selection experiment on immune response to DNP-Hapten are:

- (1) The antibody response to DNP seems to be a polygenic character.
- (2) A correlated selection response against the unrelated antigen T4-phages was observed.

- (3) Parameters of cellular immunity which were investigated showed no differences to the control line. The following parameters were tested: phagocytic activity of PMN, stimulation of lymphocytes by mitogenes, percentage of rosette-forming cells in the blood.

- (4) Indications for a correlation between anti-DNP antibody forming capacity and lymphocyte antigens were found. Thus, it might be possible to find markers for the antibody forming capacity in the Major Histocompatibility-Complex.

Siegl & Gross¹³ selected 2 lines of chickens on the basis of antibody response against sheep red blood cells. They found a genetically determined variation in antibody titres after an antigenic stimulation.

Almlid et al.¹ found in a two way selection experiment with goats a difference between selected lines in humoral response to diphtheria toxoid and human albumin.

Summarizing the results on antibody production in farm animals it can be concluded that they are in close agreement to the results found by the Biozzi group in mice.

TENTATIVE APPROACH TO A "GENERAL DISEASE RESISTANCE INDEX"

The research group at the L-M-University Munich is trying to develop an immunocompetence profile for pigs, by means of single tests in blood samples taken from live pigs. The first approach is demonstrated in Fig. 12. The "Index" is aimed at determining the following immunological parameters.

- (1) Number of leukocytes and percentage of lymphocytes in the blood.
- (2) Percentage of B and T lymphocytes in the blood (rosette formation, detection of surface immunoglobulins on lymphocytes).
- (3) Phagocytic capacity of blood granulocytes.
- (4) Reactivity of the cellular immune system (stimulation of lymphocytes by mitogens).
- (5) Primary and secondary antibody forming capacity.
- (6) Immunoglobulin concentration in blood serum (IgG, IgM, IgA).

At present only preliminary results are available (Table 1). The pigs used for the experiment consist of 5 sub groups (4 piglets per group) of different breeds or crossings (German Landrace; Pietrain; German Landrace X German Large White; German Landrace X European Wild Pig). The purpose of the first analysis is to screen parameters which show significant individual variation. The F-values in Table 1 demonstrate that parameters measuring the reactivity of the cellular immune system show on significant individual variation. Thus, these parameters will be excluded in further experiments. Subsequently genetic variation of parameters showing significant individual variation will be analysed as well as genetic correlations between immune response parameters and between immune response and production parameters. In addition all piglets are tested for lymphocyte antigens in the hopes of finding genetic markers for immune responsiveness.

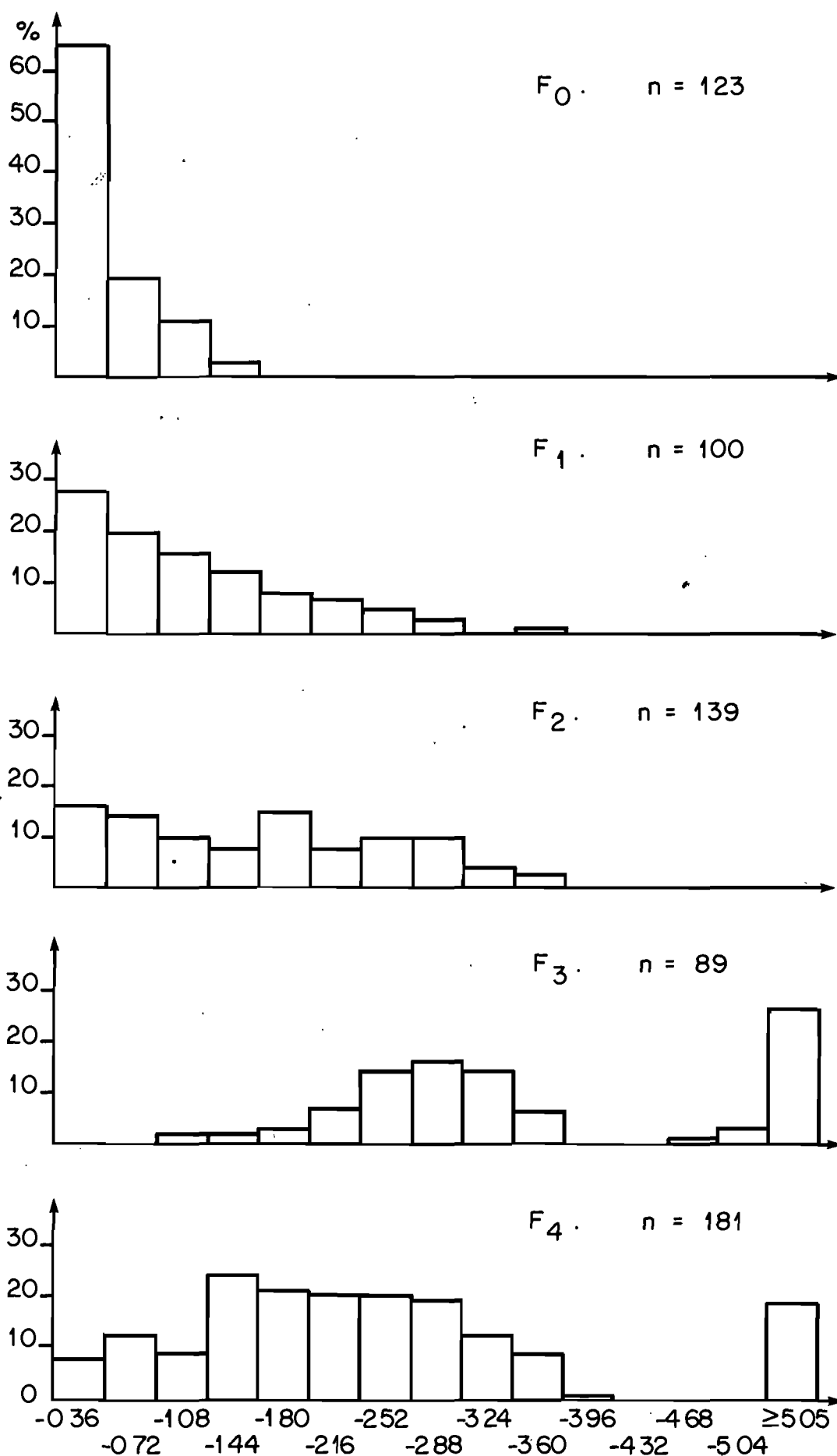


Fig. 11: Frequency distribution of pigs selected for high antibody-forming capacity to DNP-Hapten.

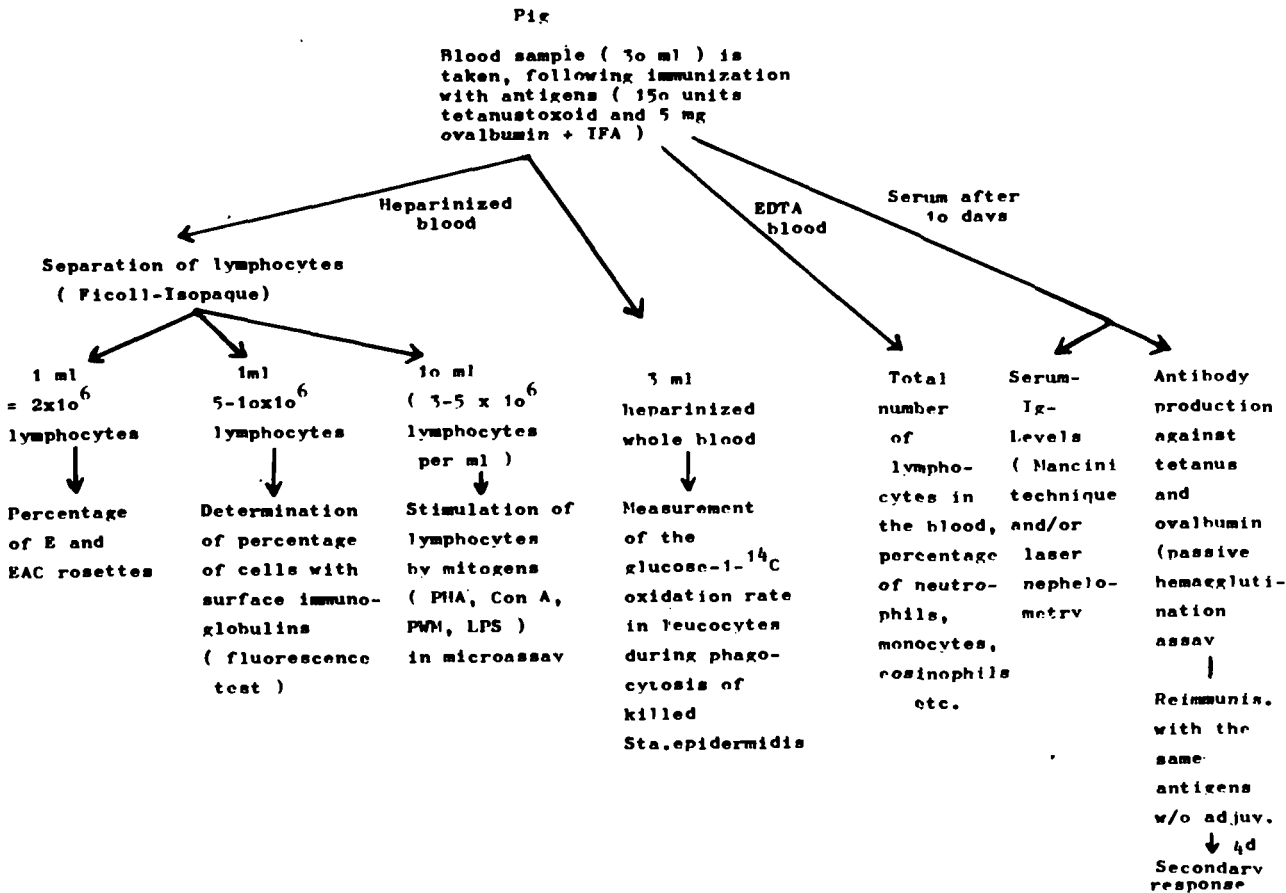


Fig. 12: Tentative approach to a "Disease Resistance Index" in pigs.

Table 1: ANALYSIS OF VARIANCE OF IMMUNOLOGICAL DATA OBTAINED FROM 20 PIGS. THREE BLOOD SAMPLES WERE TAKEN FROM EACH PIG ON DIFFERENT DAYS WITHIN TWO WEEKS.

Parameter	F
Percentage of lymphocytes in the blood	1,74 (at the border of 5% signif.)
Total number of leucocytes/ml blood	6,32 (p < 1%)
Percentage of E rosettes in the blood	51,76 (p < 1%)
Percentage of EAC rosettes in the blood	2,07 (p < 5%)
Percentage of lymphocytes with surface IgG	2,55 (p < 1%)
Phagocytosis of <i>Staph. epidermis</i> (P/R)	1,78 (N.S.)
Phagocytosis of latex	3,21 (p < 1%)
Mitogenic stimulation of lymphocytes by PHA (S.I.)	1,03 (N.S.)
by Con A	0,82 (N.S.)
by PWM	2,13 (Border of 5% S.)
by LPS	1,36 (Border of 5% S.)

Variance ratio F = $\frac{\text{Mean square between individuals}}{\text{Mean square between determinations within individuals}}$

N.S. = Not significant

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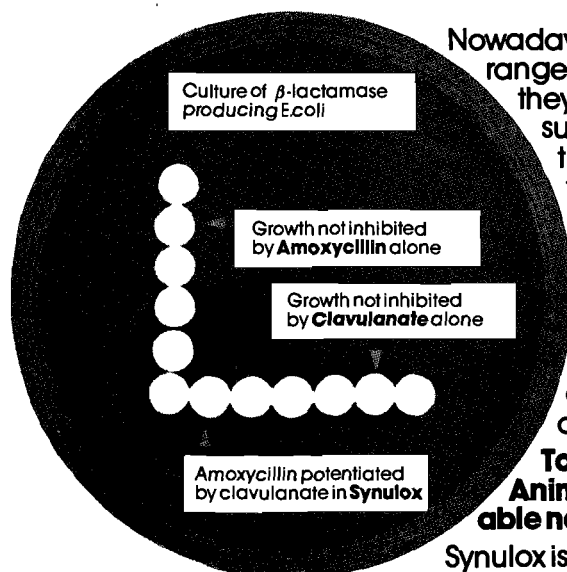
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ULTIMATE PH OF VEAL AND BEEF: EFFECT OF DISTANCE TRAVELLED AND REST PRIOR TO SLAUGHTER

K.J.E. McLEAN*

ABSTRACT: McLean K.J.E. **Ultimate pH of veal and beef: Effect of distance travelled and rest prior to slaughter.** *Journal of the South African Veterinary Association* (1984) 55 No. 1, 19-22 (En). Cape Town City Council Abattoir, P.O. Box 11, 7405 Maitland, Republic of South Africa.

The ultimate (± 24 hour) muscle pH of 305 veal and 99 young beef carcasses was measured by direct electrometric method. The pH ranged from 5,0 to 6,1 in calves which had travelled less than 349 kilometres by road or rail to the abattoir, irrespective of whether they were rested overnight at the abattoir prior to slaughter or not.

In calves which had travelled 1550 to 1733 km by road or rail prior to slaughter, the pH ranged from 5,50 to 6,10 when rested overnight at the abattoir and from 5,65 to 6,25 when not rested prior to slaughter. In cattle which had travelled less than 349 km by road or rail the pH ranged from 5,20 to 6,0 irrespective of being rested or not. In the cattle which had travelled 1550 to 1733 km by road or rail, the pH ranged from 5,40 to 6,1 irrespective of being rested or not.

The values determined for veal indicated that rest overnight did not affect the pH but that distance travelled did, especially for distances of 1550 to 1733 km. The cattle showed similar results, but as this survey was conducted mainly to test veal, the number of cattle tested was not substantial enough to draw definite conclusions from the latter results.

Key words: Ultimate pH, veal, beef.

INTRODUCTION

According to the Standing Regulations⁴, no animal may be slaughtered which has not been rested overnight in the lairage: provided that the veterinary meat inspector may authorize the slaughter of an animal at any time, if in his opinion, the slaughter is necessary to prevent suffering or if, in the case of a calf or pig transported to the abattoir by motor vehicle, he is satisfied that such calf or pig is not fatigued or excited. It also states that no person shall slaughter a calf, lamb, kid, pig or other animal unless it is at least 21 days old and is in a well nourished condition. An animal is deemed 3 weeks old when: the umbilical ring is closed and does not show a fresh navel wound and all incisor teeth have appeared and reached the same height.

The ultimate pH is the lowest level that the muscle pH reaches in the carcass (± 24 hours) after slaughter. The Standing Regulations⁴, Schedule 6 Section IIB, state that pH readings above 6,1 in the case of horses, 6,3 for cattle, sheep and goats and 6,4 for pigs are considered as evidence of a low keeping quality of the meat, and that the veterinary meat inspector will have to re-evaluate the state of freshness of the carcass. Provided the bacteriological tests are negative such meat, carcasses or viscera may be passed or conditionally passed by the veterinary meat inspector. A low ultimate pH is a very desirable trait in meat as it is inhibitory to bacterial growth⁵, which in turn makes meat more durable and brings about the conversion of the collagen connective tissue into gelatine and the meat when cooked is more tender. "Alkaline" carcasses, with high pH levels, are difficult to cut up (dark, firm and dry meat, D.F.D.³), joints lose their shape and there is more waste. "Acid" meat is light cutting, of open structure and easily releases its flavour on cooking, readily absorbs sugar, salt, brine and smoke in a curing process⁹. Thornton & Gracey⁸ state that it is an unfavourable indication if the pH does not fall to 6,1 or below within 24 hours after slaughter. Dark cutting beef occurs when the ultimate pH is high and opinions vary as to when this occurs. Some

authors^{1,7} consider that pH 6,0 is the critical point, while other (Dempster 1974, Scheper 1976, Gallwey & Tarrant 1978 and Manojlovic & Rahelic 1978 according to Newton & Gill 1980 – 1981³) consider that 6,2 or 6,3 is more accurate. There is obviously no consensus of opinion as to the lowest critical ultimate pH. Wirth et al., according to Newton & Gill 1980 – 1981³, stated that the choice of the critical pH depends on the type of meat and the use to which it will be put. Known reasons for inadequate ultimate pH (mostly high ultimate pH) are:

1. Exhaustion prior to slaughter² (Bergström & Hultman 1966 and 1967, according to Tarrant & Sherington⁷),
2. Inadequate rest^{7, 8},
3. Abnormal metabolism⁸,
4. Trauma prior to slaughter, e.g. bruising in transit (Bergström et al., according to Tarrant & Sherington⁷),
5. Poor feed quality during latter stages of growth prior to slaughter. Tarrant & Sherington⁷ reported a progressive decline in muscle glycogen in grass fed cattle during late summer and autumn,
6. Fever and/or disease, e.g. peritonitis, arthritis, enteritis, difficult parturition and sepsis⁸.

Most common of these is transport stress, which includes trauma sustained during transport and psychological stress depleting the muscle glycogen and blood glucose (Hedrick, according to Van den Heever⁹).

In Australia, Howard & Lawrie (1965), according to Tarrant & Sherington⁷, observed that prolonged starvation followed by enforced exercise, failed to raise the mean pH (pH _{μ}) although steers slaughtered in an excited condition after prolonged transport had high pH _{μ} values. Thornton & Gracey⁸ state that in animals which have travelled for long periods there is evidence that the stress of excitement rather than continued fasting and exercise is the most significant factor and, although all cattle do not react alike to a given stress, they must be subjected to such conditions for a day or longer as it is only when stress is prolonged that muscle glycogen is depleted and dark cutting beef occurs. When stress has been severe, cattle may require rest and feeding in

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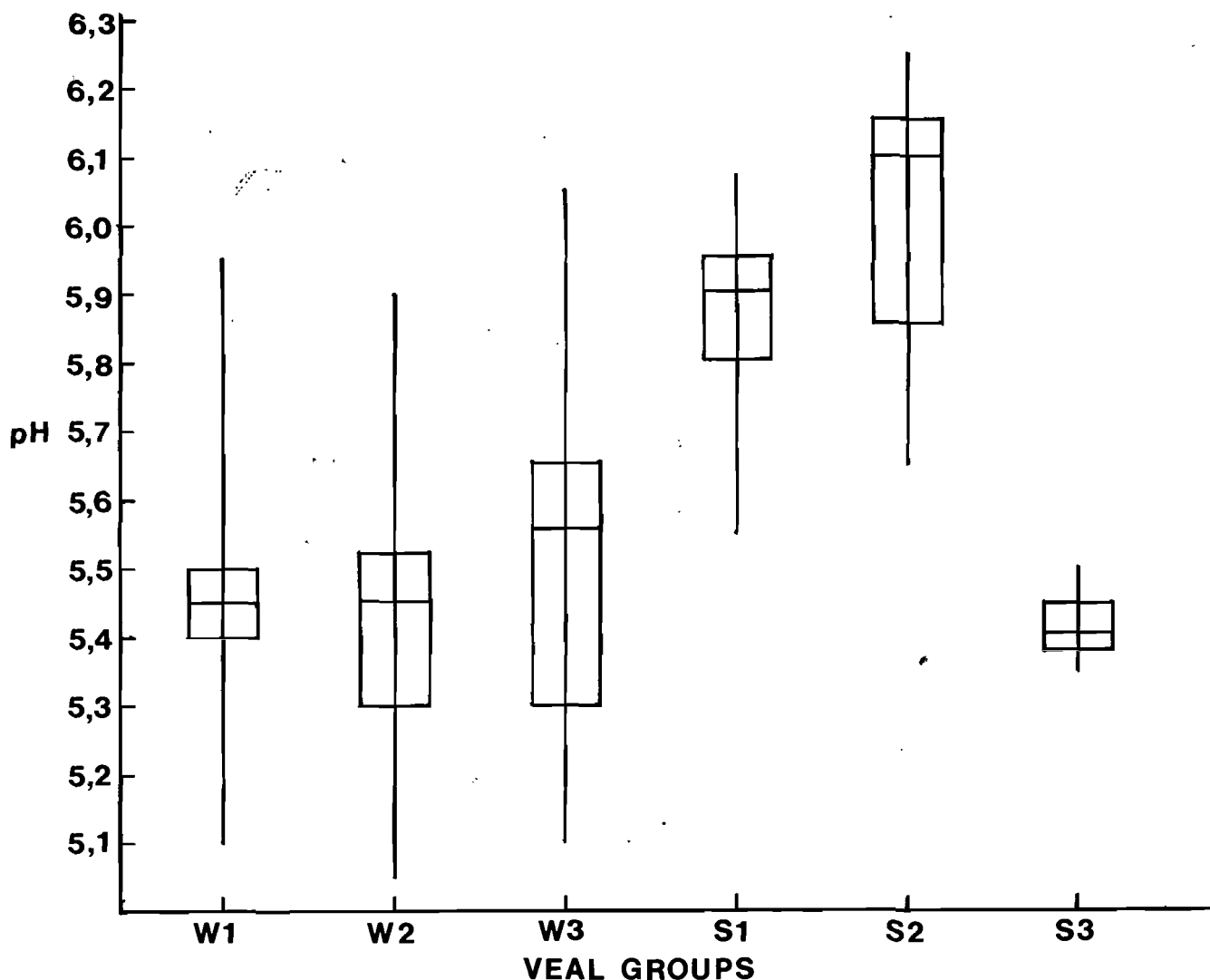


Fig. 1: Box-and-whisker plots of pH_F of each veal group

lairage for several days before they regain physiological normality.

Meara, according to Van den Heever⁹, stated that glycogen levels in pigs tend to be low and easily depleted. Cattle react differently to fatigue and starvation and their need for rest and feeding preslaughter is much less important than in pigs⁹.

Tarrant & Sherington⁷ found seasonally abnormally high pH only marginally in forequarter muscle groups but substantial increases were recorded in hindquarter muscle groups.

This survey was therefore undertaken to try to ascertain what effect distance travelled prior to slaughter had on the ultimate pH of the meat of calves and young cattle and therefore on the durability and quality of veal and young beef carcasses.

MATERIALS AND METHODS

The ultimate pH (pH_F) of 305 veal (meat derived from cattle of which no part of a fourth molar in the upper jaw has erupted, according to the Standing Regulations⁵) and 99 beef carcasses was measured at Maitland Abattoir over a period of 2 months during the spring of 1981. All readings were taken from *Musculi triceps*

brachii to minimise carcass mutilations due to routine inspection incision having already been made there in accordance with the Standing Regulations⁴ and for convenience⁹. Ages ranged from approximately 21 days³ to approximately 6 months (the upper limit aged on eruption of the fourth permanent molar in the upper jaw^{4 6}). Masses ranged from 11 – 121 kg in calves, and from 37 – 141 kg in cattle. Grades of veal carcasses ranged from 3rd to super and of beef carcasses from 4th to super. Males numbered 256 and 148 were females. On arrival at the abattoir data was collected on lots of calves and young cattle arriving to be slaughtered. The lots were subjected to ante mortem inspection as prescribed⁴. Mode of transport, distance travelled, size of lot and breed was noted. The lots were re-examined during and after slaughter to ascertain serial numbers, age and post mortem findings or conditions likely to affect pH readings, vide supra. Carcasses were sampled after having been chilled for approximately 18 hours (± 2 hours) at a chiller room temperature of approximately 2°C. The carcasses were sampled at this time by excising approximately 100 g from *M. triceps brachii*. The samples were numbered and stored at room temperature long enough for the pH to be measured at least 24 h post slaughter but not more than 28 h post slaughter. A pH

meter (Metrohm Herisau E488) with a glass electrode was used to measure the pH of the meat directly, after the meter had been checked in 2 buffer solutions pH = 4,0 (Merck art 9435, citric salt acid) and pH = 7,00 (Merck art 9439, phosphate). In addition, a second meter (Zeiss 300 digital pH meter) was used initially to check the readings.

The animals tested were divided into 12 groups:

Calves:

There were 6 groups:

W₁: calves which had travelled less than 349 km by road to the abattoir (M < 349 km) and which had rested overnight in the lairage of the abattoir prior to slaughter (R); number tested in group (N) = 124.

W₂: M < 349 km; and which had not rested (NR) overnight at the abattoir prior to slaughter; N = 124.

W₃: calves which had travelled less than 230 kilometer by rail to the abattoir (T < 230 km); and which had rested overnight at the abattoir prior to slaughter (R); N = 45.

S₁: M = 1550 to 1733 km; R; N = 5.

S₂: M = 1550 to 1733 km; NR; N = 7.

S₃: T = 1572 km; R; N = 3.

Cattle

There were 6 groups:

W₄: M < 349 km; R; N = 63.

W₅: M < 349 km; NR; N = 7.

W₆: T = 190 to 221 km; R; N = 11.

S₄: M = 1550 to 1733 km; R; N = 5.

S₅: M = 1550 to 1733 km; NR; N = 3.

S₆: T = 1572 km; R; N = 10.

RESULTS

Fig. 1 shows the median (middle horizontal line of the box), quartiles (upper and lower horizontal edges of the boxes), highest and lowest pH readings (upper and lower ends of the vertical lines) of the various groups. The box-and-whisker plots for veal are shown below. (Fig. 1).

It is obvious that W₁, W₂, W₃ and S₃ fall roughly in the same area of the graph while S₁ and S₂ are definitely on a higher level. The T-values were calculated for the veal groups as shown in Table 1.

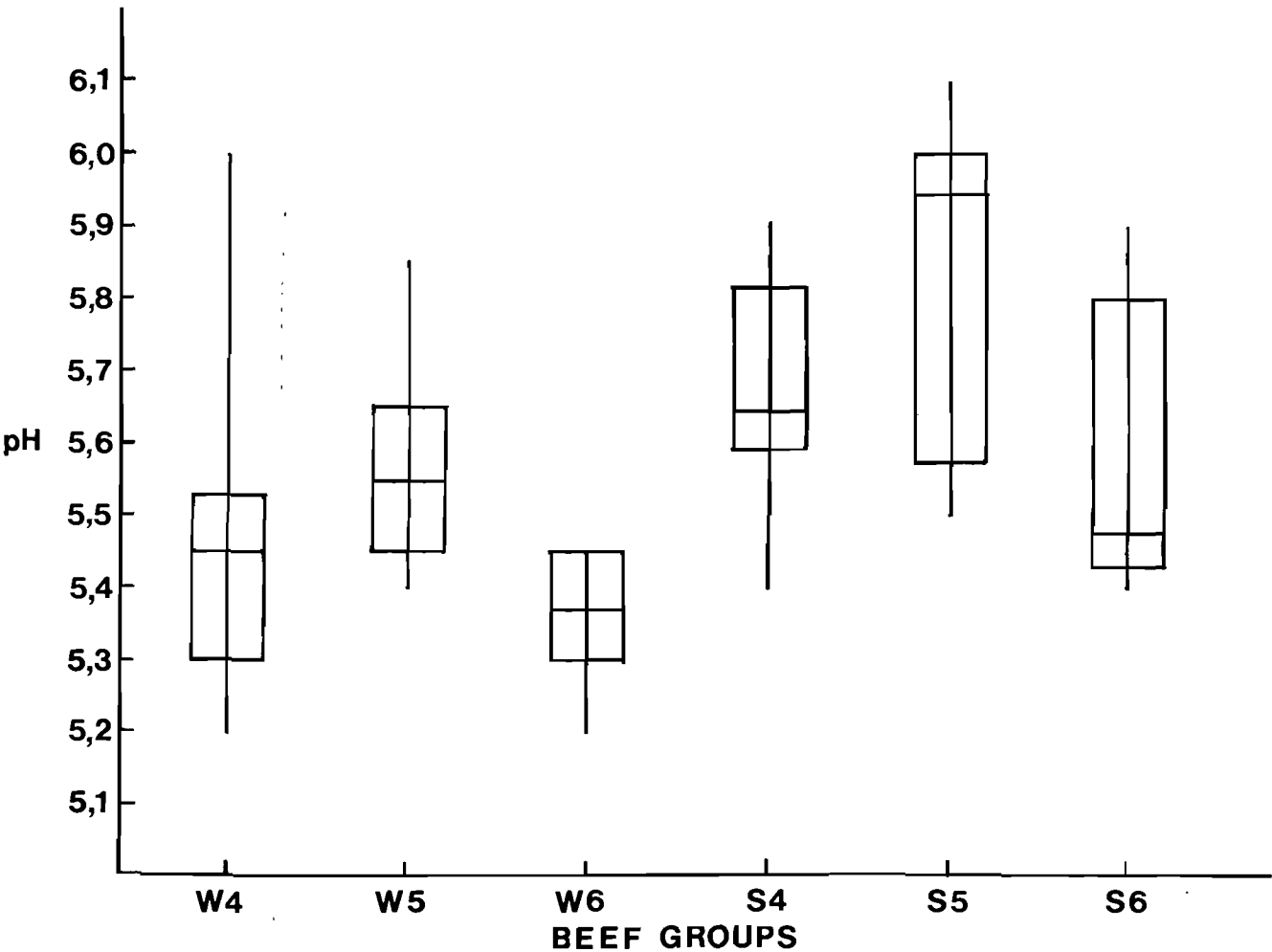


Fig. 2: Box-and whisker plots of pH_F in beef groups

Table 1: TESTING HYPOTHESIS OF THE EFFECT DISTANCE TRAVELLED AND REST HAS ON pH_F OF VEAL

Hypothesis	Estimated t-statistics	Tabulated t-values	Decision
W ₁ vs W ₂	1,8689	$t_{\infty}^{0,025} = 1,960$	Accept H ₀
S ₁ vs S ₂	1,1602	$t_{10}^{0,025} = 2,228$	Accept H ₀
W ₁ vs S ₁	3,8945	$t_{\infty}^{0,025} = 1,960$	Reject H ₀
W ₂ vs S ₂	6,3292	$t_{\infty}^{0,025} = 1,960$	Reject H ₀

Acceptance of hypothesis (H₀) means that effect under consideration (i.e. distance travelled on rest) does not matter, while rejection means it does matter.

The decision was reached that overnight rest did not matter but that the distance travelled prior to slaughter did effect the pH_F.

The beef box-and-whisker plots (Fig. 2) show similar distribution to the calves for each of the 6 groups.

Due to the small number of cattle tested, the survey being primarily conducted to test veal, a definite conclusion could not be drawn from these latter results.

DISCUSSION

The results would seem to agree with those reported by Meara, according to Van den Heever⁹, i.e. that cattle react differently to fatigue and starvation and that their need for rest and feeding preslaughter is much less important than in other species, as reflected in the pH_F levels.

Howard & Lawrie (1956), according to Van den Heever⁹, measured the pH of steers driven 240 km on the hoof, then trucked 1 000 km without rest or feed and then forcibly exercised for 1,5 hours after arrival, immediately before slaughter and found a rise in pH, with pH_μ = 6,38; 6,47 and 6,12 in various muscle groups tested. However, in this survey, as the object was not to slaughter excessively fatigued animals, the pH range was well within limits laid down in the Standing Regulations⁴. It would appear that it is mainly in distances of the magnitude of 1 000 km and further that transport stress due to inclement weather, fever, psychological stress, trauma and other effects deleteriously affect the ultimate pH. Rest overnight after travelling that far does not significantly improve the pH_F and several nights rest in the lairage prior to slaughter would seem necessary⁸.

It further appears that transport over distances of 350

km and less does not necessitate resting of the calves prior to slaughter as reflected in the pH_F of the veal. This distance appears to have had a low stress effect on the calves and young cattle tested and significant for the slaughter of local stock emanating from nearby areas of production.

Unfortunately for the survey very few calves travel distances of the magnitude of that travelled by groups S₁, S₂, S₃. Group S₃ was not substantial enough in numbers to draw a conclusion but calves travelling over such distances to the abattoir by train for 4 – 5 days are usually fed and watered more regularly and better protected from inclement weather than is the case in calves transported by road over similar distances. Consequently further testing would be interesting especially in the light of the findings of Tarrant & Sherington⁷ reporting on the occurrence of D.F.D. meat at pH values ≥ 6,00 and it would seem to question the tolerant pH_F level of 6,3 for calves and cattle in the Standing Regulations⁴.

Especially significant is the fact that the hindquarter muscle groups, which are seldom tested routinely, generally had higher pH_μ values with a correspondingly greater occurrence of D.F.D. meat⁷.

Finally, the veterinary meat inspector would naturally use his or her discretion whether rest overnight is beneficial to the individual animals inspected at ante mortem inspections.

ACKNOWLEDGEMENTS

The author thanks Mrs. G. Kotze for the very skilled technical assistance, Drs A.J. Louw and W.W. Van Heerden for advice and help during testing and Mr R. Van den Honert for help with the statistics.

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AN EXPERIMENTAL STUDY ON THE USE OF A CARBON FIBRE PROSTHESIS FOR THE REPAIR OF THE CRANIAL CRUCIATE LIGAMENT IN THE DOG

D.G. STEYN*

ABSTRACT: Steyn D.G. An experimental study on the use of a carbon fibre prosthesis for the repair of the cranial cruciate ligament in the dog. *Journal of the South African Veterinary Association* (1984) 55 No. 1, 23-28 (En). Department of Surgery, Faculty of Veterinary Science, University of Pretoria, P.O. Box 12580, 0110 Onderstepoort, Republic of South Africa.

The severed cranial cruciate ligament of Beagles was replaced with a carbon fibre tow. Post-operatively the animals were evaluated clinically and radiographically. The animals were sacrificed and specimens collected for histology. There was marked infiltration of the implant by granulation tissue which matured into longitudinally orientated collagen fibres to form a new ligament. A foreign body reaction which occurred at about 12 weeks subsided after a few more weeks. Fracture of the implant was present in a high percentage of knees. The advantages and disadvantages are discussed and technical errors identified.

Key words: Carbon fibre, prosthesis, cruciate ligament, knee, dogs.

INTRODUCTION

The canine knee joint relies on a complex system of ligaments for stability. Rupture of one of these ligaments, the cranial cruciate ligament, is a frequent cause of stifle joint lameness. The first clinically acceptable repair technique was developed by Paatsama⁸, who used a strip of fascia lata to replace the cruciate ligament. Numerous techniques have been developed since that first method. The development of all these methods and modifications of methods is an indication that there is not a single method that is totally satisfactory⁵. Degeneration, fracture, fragmentation, rupture and stretching of synthetic and autogenous materials lead to joint laxity which is later followed by restabilisation as a result of fibrosis. This, however, is frequently accompanied by an osteoarthritis which, once it has started, is a progressive condition.

Because of the failure of the synthetic and autogenous materials, the search for a more reliable and durable material and method of repair goes on. It has been established that carbon fibre implants are biocompatible and under ideal circumstances can serve as a scaffold for the ingrowth of fibrous tissue to form a neo-ligament which can take over the function of the ruptured ligament^{4,7,9,10}. Carbon fibre implants provide immediate stability of the joint. Thereafter fragmentation should be slow enough to allow the ingrowth of fibrous tissue and maturation of collagen, which should be completed before disintegration of the carbon fibre tow takes place. The presently described experiment was designed to determine whether the implant could serve as a temporary ligament in the replacement of the severed cranial cruciate ligament, to test the ingrowth of fibrous tissue and to evaluate the technique for clinical purposes.

MATERIALS AND METHODS

A carbon fibre tow consisting of 20 000 filaments and coated with gelatine was used as a prosthesis to replace the severed cranial cruciate ligament^{**}. The carbon fibres were 98,5% carbon and had a tensile strength of 2 500 megapascals.

Three male and 6 female Beagles between 8 months and 1 year old with a mass ranging from 8 – 12 kg were used. They were dewormed, inoculated against distemper, canine infectious hepatitis and leptospirosis and were in good condition and general health. The animals were divided at random into 3 groups consisting of 3 animals each. The left stifle joints of each group were prepared for surgery. After thiopentone sodium induction and intubation the animals were maintained on halothane anesthesia. The surgical area was scrubbed, sprayed with betadine and draped in a sterile manner.

The joint was approached through a lateral parapatellar incision and the patella reflected to the medial side. The cranial cruciate ligament was identified and severed. A method similar to the Paatsama⁸ technique was used to repair the cruciate ligament. A hole was drilled from the lateral femoral epicondylar area to emerge on the lateral wall of the intercondylar fossa. Another hole was drilled from the point of insertion of the cruciate ligament on the tibial plateau to the medial side of the tibial crest. A wire loop was used to thread the carbon fibre tow through the tunnels. A T-piece at one end of the tow prevented it from being pulled into the tunnel and served as an anchor for securing it. The distal end of the carbon fibre tow was reflected proximally and sutured to the straight patellar ligament while the joint was held in full extension. The joint capsule, wound and skin were closed in a routine fashion. The animals received antibiotics for 5 days post-operatively.

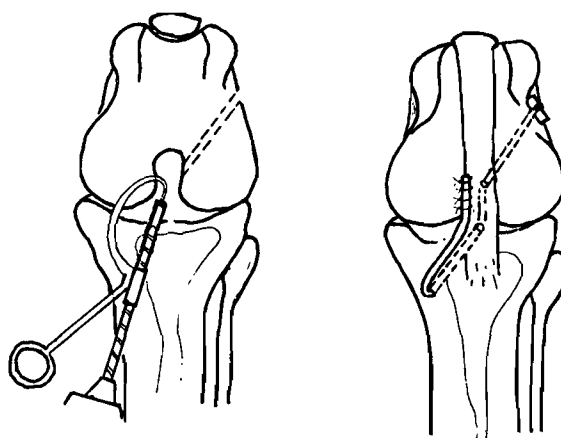


Fig. 1: a. The tunnels are being drilled through the femur and tibia
b. The carbon prosthesis is threaded through the tunnels and sutured to the straight patellar ligament.

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The animals were evaluated at weekly intervals for pain, joint instability and their ability to bear weight on the operated leg. Radiographs were taken at 4 weeks intervals. The right knees were done in a similar manner 4 weeks later. The animals in Group 1 were sacrificed 24 weeks after the first operation (i.e. operations were performed 20 and 24 weeks previously), those in Group 2 after 16 weeks (i.e. operations 12 and 16 weeks previously) and those in Group 3 after 8 weeks (i.e. operations 4 and 8 weeks previously). The joints were again examined for stability, opened, inspected and specimens collected for histological examination. The histological specimens included lymph nodes, bone tunnels with the carbon fibre tows, soft tissue, synovial membrane, articular cartilage and neo-ligaments.

RESULTS

Post-operative observations

Wound healing was uneventful and sutures could be removed at 12 days. A slight temperature reaction lasting about 3 days was seen in 10 of the animals post-operatively. All animals carried the leg for about 2 weeks after surgery. Thereafter limb function improved gradually. At the time of the second operation 4 weeks later, lameness was still present but all animals could support themselves well on the operated leg. Lameness disappeared between 6 and 10 weeks although 1 animal in each of the 12, 16 and 20 week sub groups had persistent lameness in one leg. Slight and acceptable joint laxity could be detected post-operatively. This laxity increased in 6 joints during the observation period. The degree of instability, however, was not more than the instability found after the ligament had been severed and prior to reconstruction. The 6 animals that showed instability were represented by 1 animal in the 8 and 12 week sub groups and 2 each in the 16 and 20 week sub groups.

Macroscopic pathology

In 10 joints the carbon fibre tows were intact, covered by fibrous tissue and had the appearance of a normal somewhat thickened ligament as can be seen in Fig. 2. In 8 joints the carbon fibre tow was fractured with pieces of fibre visible in the joint cavity particularly in the suprapatellar pouch. Fracture of the carbon fibre implant occurred at the articular end of the femoral bony tunnel. In 4 animals with broken tows a distinct connective tissue band was seen running in the same direction as the neo-ligament. In the remaining 4 animals only the carbon fibre stumps could be seen with no fibrous connections between tibia and femur. The synovial membrane was mildly inflamed in all cases where fracture of the implant occurred and also in the joints of the 4 and 8 week sub groups.

Radiography

The radiography of the joints revealed very little change in the joint except for an enlargement of both the femoral and tibial bony tunnels in some animals. This enlargement was progressive over a period of 12 weeks after which no further enlargement occurred. The enlargement was unchanged after 24 weeks. Slight osteofibrosis occurred on the walls of the tunnels. No evidence of an osteoarthritis could be found on any of the radiographs.



Fig. 2: The prosthesis covered with fibrous tissue is visible at the tip of the scalpel blade in the intercondylar space.

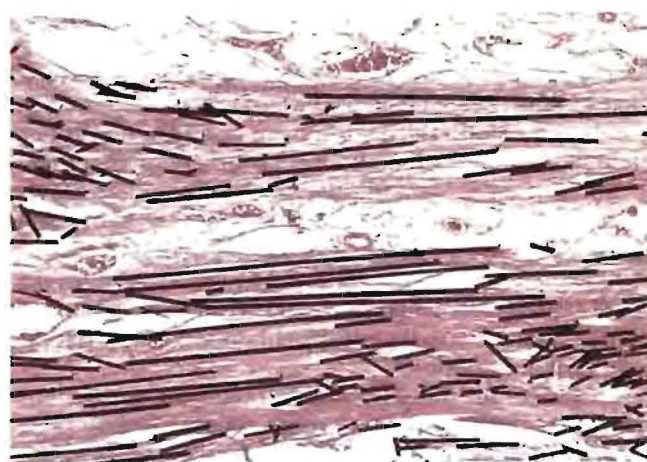


Fig. 3: The carbon fibre filaments run longitudinally and are fragmented during processing of the sections. Note the longitudinal alignment of the collagen fibres.

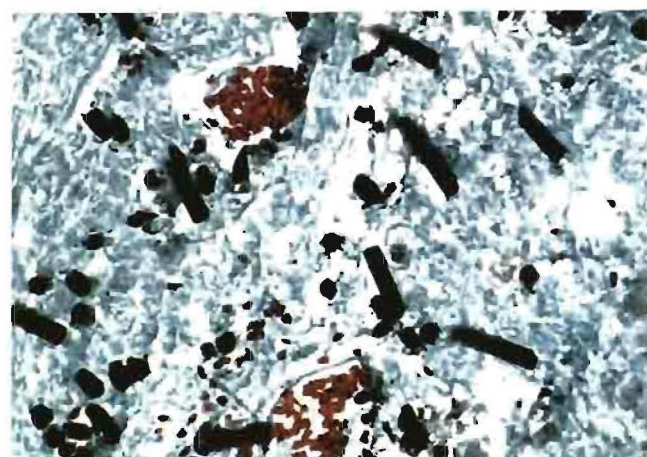


Fig. 4: A blood vessel is present in the fibrous tissue indicating vascularization of the neo-ligament. The carbon fibre filaments have been pushed apart by the fibrous tissue.

Histopathology

The carbon fibres were clearly visible as bundles of black fibres which fragmented easily into irregular lengths during the production of histological sections. Even at 4 weeks a marked fibroplasia was evident at the periphery of the implant advancing towards the centre of the fibre bundle. Collagen fibres could already be demonstrated in sections stained with Masson's trichrome stain. A light to moderate cellular infiltrate was also seen. Macrophages were present although not in large numbers. In later sections the typical pattern reported by other authors was seen. The carbon fibre implant was infiltrated by fibrous tissue with well developed mature collagen fibres. These fibres were aligned parallel to the filaments of the implant as can be seen in Fig. 3. The infiltration of new tissue caused spreading of the fibres, thereby increasing the cross-sectional area of the original carbon fibre tow. Vascularization of the neo-ligament was demonstrated by the presence of vessels within the newly formed fibrous tissue (Fig. 4).

In time the connective tissue matured and mature collagen was clearly demonstrated with MT staining. At 12 weeks lymphocytes, macrophages, epithelioid cells and foreign body giant cells were commonly observed in contact with the carbon fibres and in the tissues surrounding the implant. At the point of exit in the joint, the articular cartilage appeared to be normal. No carbon inclusions could be found in sections of the articular cartilage.

A mild to moderate synovitis was present in the early stages (Fig. 5). This subsided in the course of time although it was still present to some degree after 20 weeks. Carbon fibre particles were regularly demonstrated in the regional lymph nodes but no other significant changes were observed in the lymph nodes (Fig. 6).

In the 20 and 24 week specimens mature collagen replaced the granulomatous reactions seen earlier during the experiment. The carbon fibre filaments retained their longitudinal arrangement and were still intact. A large amount of this newly formed material was present causing separation of the filaments. However, in areas where the fibres were densely packed, less infiltration took place.

DISCUSSION

Jenkins was the first to use carbon fibres to replace tendons and demonstrated that carbon fibre induced progressive ingrowth of fibrous tissue⁴. Initially the carbon fibre acted as a replacement for the ligament. In the meantime it acted as a scaffold for the ingrowth of new tissue which would eventually take over the function of the implant to serve as a new ligament. He soon proceeded to apply the technique to human surgery. Good results were also reported from operations where carbon fibre was used for the repair of torn cruciate ligaments in canine clinical cases².

The present study confirmed previous reports that carbon fibre induces the ingrowth of sufficient fibrous tissue to serve as a new ligament. The fibrous tissue infiltrated the implant aligning along the axis of the carbon filaments. Even in cultures of fibroblasts the cells aligned themselves almost parallel to the fibres³. Eventually the fibres were completely enveloped in cells

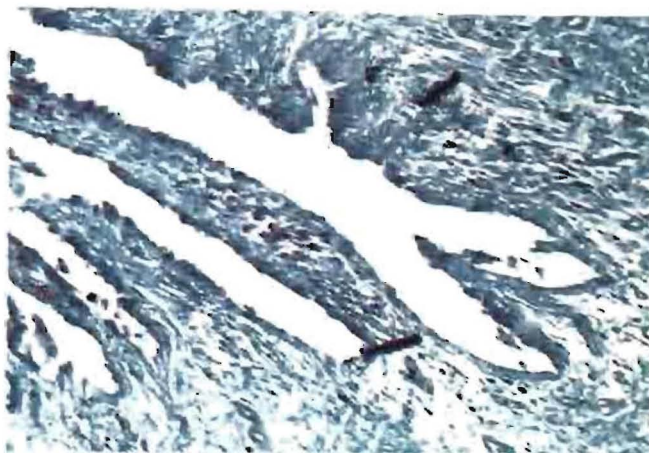


Fig. 5: A synovitis is present. The epithelium is hypertrophic and a marked round cell infiltration is present.

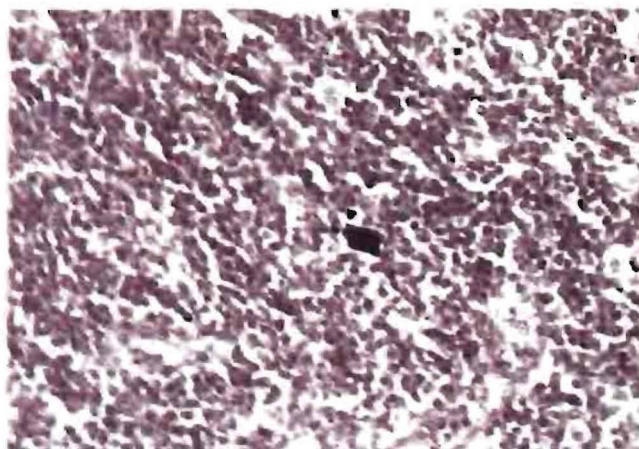
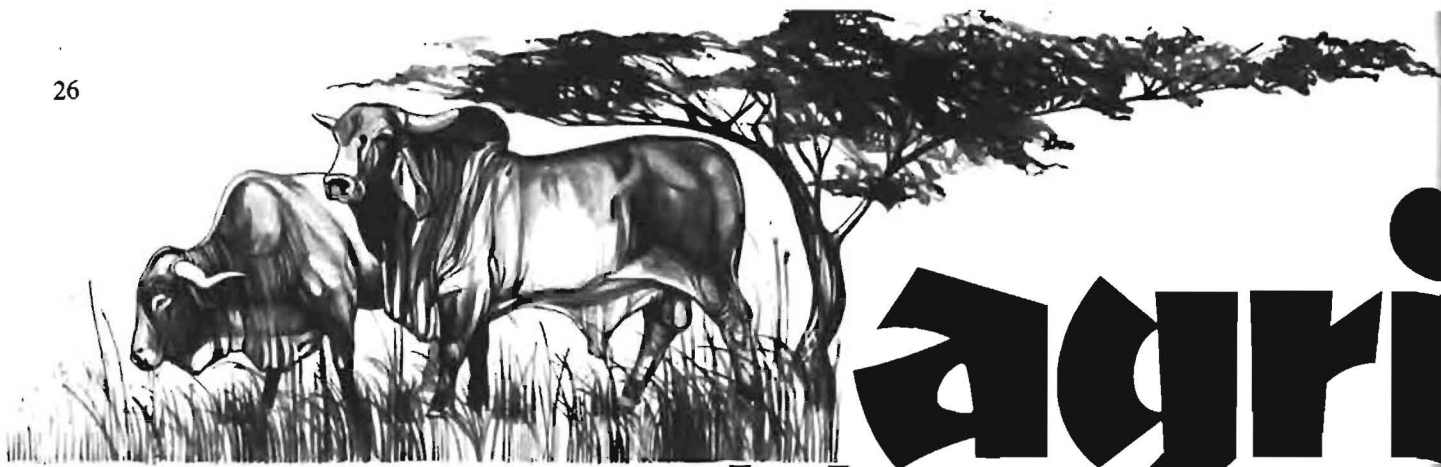


Fig. 6: A carbon particle is present in the lymph node. No marked changes are seen in the lymph node.

which formed tubes around them, similar to what happens in tissue. This infiltration was responsible for an increase in the diameter of the original fibre bundle and was in agreement with previous findings¹. The ingrowth of blood vessels into the neo-ligament could be demonstrated. This is a significant finding as this is important in establishing and maintaining a functional ligament.

A few negative aspects need further investigation and elucidation. In some of the specimens a foreign body reaction occurred at about 12 weeks. This seemed to retard the formation of mature collagen. Even at 24 weeks post-operatively there was still evidence of this reaction but to a much lesser degree. Even 2 – 3 years after implantation of the material foreign body giant cells were still present in relation to the fibres⁶. This did not seem to have any detrimental effects on the function of the ligament.

(Continued on page 28)



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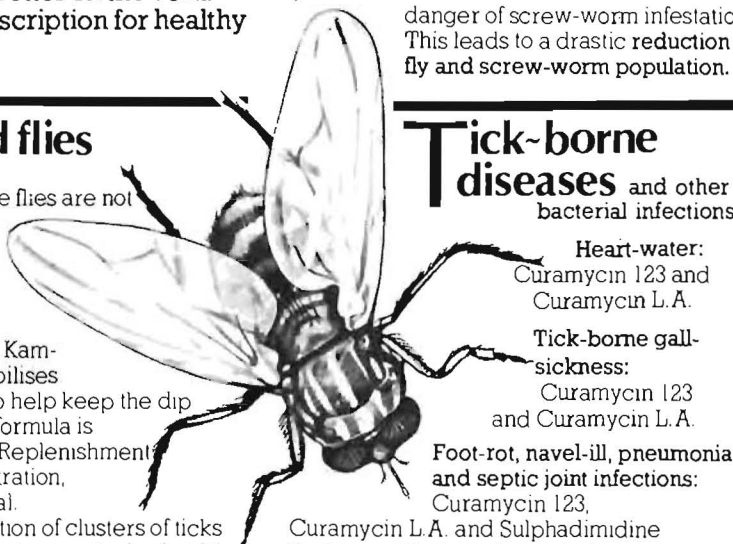
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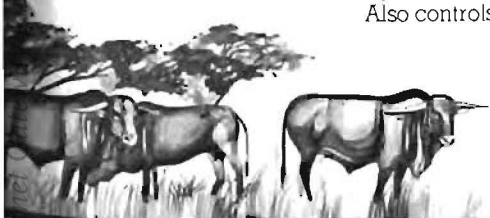
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The fact that only 10 of the 18 implants were intact at the termination of the experiment was disappointing. Fracture of the implants occurred at the exit point in the joint of the femoral bony tunnels. Because of the very stiff nature of the material and the complete absence of ductility, there is a tendency for carbon fibres to break when tied or when they go around sharp corners such as occur at the edge of a hole. This property of carbon fibres makes handling difficult. For this reason the implant was coated with gelatine which is quickly absorbed after implantation. The handling of the implant was thereby facilitated. There was little contamination of the joint with carbon fibre fragments after this precaution was taken. This, however, was no safeguard against fracture of the tow during movement of the joint while the carbon fibre tow was under tension. At the exit point of the femoral tunnel the tow changed direction to enter the tibial tunnel. Overstressing of individual fibres may have occurred so that they failed in succession. Stiffness of the material contributed to the failure of the carbon tow. The edge of the bone tunnel was worn away by the carbon fibres, causing slight laxity to develop. This was due to faulty technique and will have to be eliminated before the technique can be used with confidence in clinical cases.

Another problem that was encountered was the enlargement of the bony tunnels as demonstrated by radiography. It has been suggested that this could be as a result of the increase in thickness in the carbon fibre tow after infiltration by fibrous tissue⁷. Movement of the implant seems to be a more likely explanation of this increase in diameter of the bony tunnels. The attachment of the carbon fibre implant to soft tissue is not satisfactory because movement cannot be completely eliminated. In time the soft tissue stretches allowing more movement resulting in greater instability. This was probably partly responsible for the post-operative joint laxity in some of the experimental cases. A better method of attachment is, therefore, essential before the technique can be recommended for general clinical use.

In spite of the fact that rupture or fracture of the prosthesis occurred in such a high percentage of cases and laxity could be demonstrated in some joints no degenerative joint disease was seen on radiographs. Even in naturally occurring ruptures of the cruciate ligament osteoarthritis is seldom seen in the smaller breeds. This explains the absence of this condition in these dogs because they were rather on the small side. The neo-ligament that formed around the prosthesis also covered that part of the implant that ran through the joint cavity. There was doubt as to whether the fibrous tissue would grow through the synovial cavity and that a condition similar to the poor healing of tendons within a synovial sheath would result.

Aseptic technique is of paramount importance when carbon fibre implants are used. Because of its multifilamentous nature it has great capillary action and should be used under aseptic conditions. Aseptic technique and a non-infected site are essential prerequisites for the successful implantation and use of carbon fibre³.

CONCLUSIONS

1. This study confirmed previous findings that carbon fibres induce the formation of a neo-ligament 2-3 times the thickness of the implant. This ligament will also develop where the prosthesis span the synovial cavity
2. The degradation of the scaffold formed by the prosthesis is sufficiently slow to allow adequate in-growth and maturation of the fibrous tissue to take over the function of the ruptured ligament.
3. Technical difficulties will have to be eliminated before satisfactory results will be obtained. Acceptable and practical solutions will have to be found for the problem of anchoring the fibres to bone and the damage to the prosthesis by the edges of the bony tunnels.
4. Aseptic technique is of paramount importance. The filamentous carbon fibres can harbour infection which cannot be cleared up with antibiotic treatment.

ACKNOWLEDGEMENTS

The financial assistance of the University of Pretoria is gratefully acknowledged. Dr W.S. Botha and Mr D. Hourahane are thanked for the histopathological examination of the specimens and for advice and the supply of carbon fibre respectively. The services of the technical staff of the Department of Surgery are appreciated.

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THE USE OF CARBON FIBRE TO REPLACE THE TORN CRANIAL CRUCIATE LIGAMENT IN THE DOG – A CLINICAL PROCEDURE

D.G. STEYN*

ABSTRACT: Steyn D.G. The use of carbon fibre to replace the torn cranial cruciate ligament in the dog – a clinical procedure. *Journal of the South African Veterinary Association* (1984) 55 No. 1, 29-32 (En). Department of Surgery, Faculty of Veterinary Science, University of Pretoria, P.O. Box 12580, 0110 Onderstepoort, Republic of South Africa.

Carbon fibre implants were used on 52 knees to repair the torn cranial cruciate ligament. A surgical technique similar to the "over-the-top" method utilizing carbon fibre instead of fascia lata was used. The advantages and disadvantages of this technique are discussed. It is, however, necessary to do long term assessment of the results.

Key words: Carbon fibre, prosthesis, knee, cruciate ligament, dog.

INTRODUCTION

Rupture of the cranial cruciate ligament as a result of trauma or trauma combined with degeneration is a well known clinical condition. There is a wide variety of accepted techniques that can be used to repair the ligament. Basically the ligament is replaced with natural or synthetic materials or the joint is stabilised by one of the many techniques described in the literature. Numerous synthetic materials have been used including rubber, nylon, teflon, dacron, polyester, steel and others. These materials are either rejected or they do not have the required mechanical properties which are compatible with the function of the joint⁴.

The use of carbon fibre to repair cruciate ligaments, collateral ligaments, superficial and deep flexor tendons in small and large animals has received much attention since 1977 when Jenkins et al.⁵ published their work on the induction of tendon and ligament formation by carbon implants. The carbon implant acting as a scaffold for tissue ingrowth, stimulates the formation of fibrous tissue which is longitudinally orientated. The fibroblasts grow along the filaments and collagen fibres are aligned along the line of natural stress encountered within the tendon.

Fragmentation of the carbon implant occurs when it is used to replace the cruciate ligament. This is particularly so when the fibre tow is introduced in the same fashion as the fascia lata in the Paatsama technique. In an experimental study on the use of this material, it was found that rupture or fracture of the entire ligament occurred in some of the experimental animals at the point where the ligament emerged from the femoral tunnel in the intercondylar space. This was due to the change in direction of the fibres leading to bending and fracture of the filaments. The techniques had to be changed to overcome this technical problem. This modified technique which is now used in clinical cases will be described.

MATERIALS AND METHODS

The carbon fibre implants consist of 20 000 filaments for small breeds and 40 000 filaments for large breeds. At the one end a toggle consisting of short lengths of carbon fibre embedded in polysulphone is attached to the carbon tow. The toggle end is covered by a 10 mm long sheath of polyethylene. At the other end a piece of wire is attached to the carbon tow to make handling easier.

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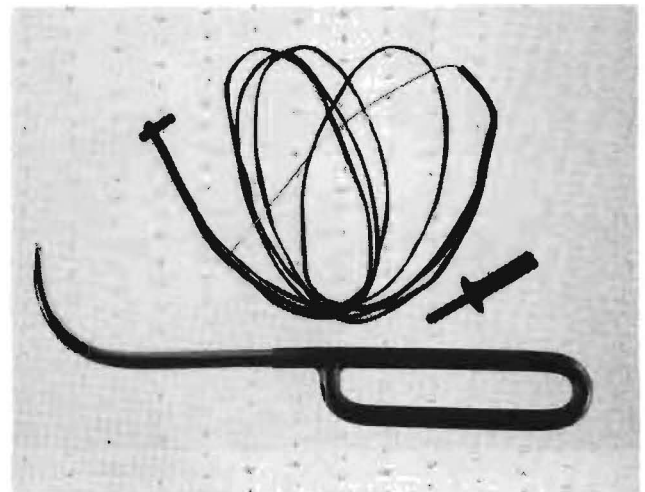


Fig. 1: The carbon fibre prosthesis is shown with the toggle at the one end and a piece of wire attached to the other end. The bollard and the hook are also illustrated.

SURGICAL TECHNIQUE

After the animal has been anaesthetized, intubated, prepared and draped, a cranio-lateral incision is made over the knee starting from about 30 mm proximal to the patella. The incision is extended to about 30 mm distal to the proximal end of the margo cranialis (crista tibiae). The subcutaneous tissues and the joint capsule are incised to expose the intra-articular structure. The patella is reflected medially to allow inspection of the joint. The damaged cruciate ligament is removed. If the menisci are damaged, the damaged portion should be removed. Osteophytes lateral and medial to the femoral trochlea are also removed. Particular attention is given to the proximal part of the trochlea. Any osteophytes in this area should be removed to prevent irritation of the patella during movement of the knee.

The M. tibialis cranialis is dissected free from the lateral surface of the tibial crest. A transverse hole is drilled from the lateral to the medial side of the tibial crest. The wire attached to the carbon tow is introduced from the lateral side and pulled through so that the toggle at the other end lies flat against the lateral side of the margo cranialis. With the joint flexed maximally a small pair of artery forceps is introduced from as far caudally as possible through the fat pad so that it emerges on the cranial surface of the tibia. The wire is caught with the artery forceps and pulled through.



Fig. 2: Cranial view with ligament through tibial crest, through fat pad and coming out in the joint.

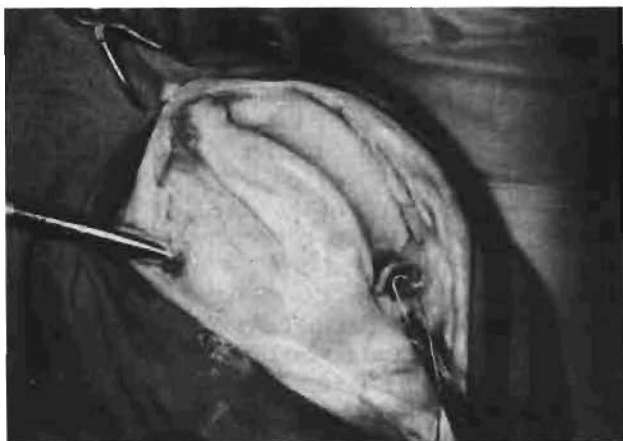


Fig. 3: The hook is pushed through the joint. The wire at the end of the carbon tow is threaded through the hole in the hook.



Fig. 4: The position of the implant is shown at the end of the operation. Note the position of the bollard and the carbon fibre tow being secure to the bollard.

On the lateral side of the femoral condyle the joint capsule and the M. biceps femoris are separated. The lateral fabella is exposed by blunt dissection. It can be felt where it lies within the lateral head of the M. gastrocnemius. The finger is introduced until it lies caudal to the intercondylar space. A probe is introduced from the cranial side through the intercondylar space in a caudal direction until the tip of the probe can be felt. Marked resistance is encountered when the probe is pushed through the relatively tough joint capsule. As soon as the tip of the probe can be felt it is grasped with a needle holder. The wire end of the prosthesis is introduced into the eye of the probe and the probe is pulled out on the lateral side of the femoral condyle. A specially designed hook as shown in Fig. 1 works even better than the probe. The carbon fibre tow now runs over the cranial end of the tibia, through the intercondylar space, round the back of the lateral femoral condyle and over the lateral fabella. This is similar to the way the fascia lata is introduced in the over-the-top method¹. A suture is placed around the fabella to incorporate the carbon tow. The carbon tow is then pulled in a distal direction and sutured to the lateral surface of the patellar ligament. The suture technique can be slightly modified in large dogs with marked medial rotation of the tibia and in small breeds in which the torn cruciate ligament is accompanied by patellar luxation. Instead of suturing the prosthesis to the patellar ligament, it is introduced from the lateral side of the tibial crest through the same hole as where it was started. The tow is then sutured to that part of the tow that lies on the craniomedial surface of the tibia before it disappears underneath the fat pad. A bollard can be used for anchoring the carbon tow to the lateral side of the femoral condyle. This is standard procedure in human surgery.

The joint capsule and fascia are sutured. When closing the incision on the lateral aspect of the patellar ligament the prosthesis which is already sutured to the patellar ligament is included in the stitches apposing the wound edges. This lends additional support to the attachment of the prosthesis. The subcutaneous tissues and the skin are closed in a routine manner.

Post-operatively the knee was tested for stability. Antibiotic treatment was continued for 5 days after the operation. The animals were confined to a cage for 5

days. No dressings or external support were used. In the exceptional cases where the patient interfered with the wound a bucket was put over its head.

Fifty-two knees were operated upon with this technique. Twenty-one breeds were represented. The patients' mass ranged from 5,5 kg to 65 kg (average 19,1). The average age of this group of animals was 5,23 years. Bilateral rupture occurred in 10 dogs and unilateral rupture of the cruciate ligament in 46 dogs. Bilateral repair was only done in 6 cases because the owners failed to return the animals for the second operation. In 2 dogs with bilateral rupture both knees were operated upon at the same time because these animals could not bear weight on their hind legs. The average duration of the condition before surgery was performed was 4,5 weeks. This, however, was difficult to assess because the history was not always reliable. It was not possible to re-examine the animals at regular intervals post-operatively. The owners were contacted by telephone to obtain information about return of function or persisting lameness.

RESULTS

Recovery and return of function were relatively rapid. At about 5 days after the operation the majority of the patients started to use the leg. The better the stability on completion of the operation, the sooner the animals used the leg. In the 2 cases with bilaterally operated ruptured cranial cruciate ligaments, a French Poodle and a Beagle, the animals could walk out of the hospital when they were discharged 6 days post-operatively. Patients of the large breeds used the operated leg sooner than small animals.

The follow-up periods varied from 8 weeks to 18 months. The results can be classified as good in 43 cases. These patients use the operated leg normally with no signs of lameness or discomfort. In 7 patients intermittent lameness is still present. These patients show slight to marked lameness when getting up or after exercise. In 2 dogs the operation must be classified as a failure. Both animals refused to use the leg and an arthrodesis had to be performed on the knees.

DISCUSSION

Since Jenkins et al.⁵ introduced the use of carbon implants for the repair of tendons, the use of this material has found wide application in the field of orthopaedic surgery. Several reports on the use of carbon fibre in the repair of tendons in horses have been published^{3 5 12}. The material has also been used in dogs for the repair of patellar tendons, collateral ligaments and cruciate ligaments^{2 12}. In the human field it is gaining extensive use for tendon repair⁸. The use of semi-rigid carbon fibre-reinforced plastic plates for fracture fixation is also being investigated⁹. No adverse effects of the carbon implants on soft tissue could be demonstrated¹⁰.

Apart from the fact that synthetic materials do not stand up to the stresses encountered in the moving knee joint, the use of fascia lata and synthetic materials is time consuming. The technique described here has the advantage that it can be performed quickly and it gives very good joint stability post-operative. Medial rotation of the tibia which is frequently pronounced in cases with cruciate rupture can also be stabilized. In suturing the carbon fibre tow to the lateral surface of the patellar

ligament or to the tibial crest the tibia is rotated to the lateral side and stabilized in this position. In cases of simultaneous patellar luxation and a ruptured cruciate ligament medial tibial rotation can also be improved with this technique.

According to previous reports recovery post-operatively took as long as 2 months²⁷. In the technique described in these reports the carbon fibre tow was passed through pre-drilled holes through the femur and tibia. With the new technique limb function was regained in 3 to 4 weeks. The animals started to bear weight on the leg within a matter of 4 or 5 days. This was clearly demonstrated by the 2 animals with simultaneous bilateral repair. Although the joints were still painful they could walk 6 days after the operation. The persistence of intermittent lameness in some of the animals is due to the presence of osteoarthritic changes in the joint. These changes usually occur in the neglected cases, particularly of the large breeds. The presence of a severe osteoarthrosis was the reason for complete failure in the 2 dogs in which an arthrodesis of the stifle had to be done.

The implanted carbon fibres stimulate the ingrowth of fibrous tissue. In the end the carbon fibres are broken up and are surrounded by natural tissue. A new biological ligament takes the place of the synthetic material. This should give better long term results. The technique described eliminates the necessity of drilling tunnels through the femur and tibia except for the small transverse tunnel through the tibial crest. It, therefore, also prevents loosening of the implant and recurrence of joint instability.

Long term assessment of the performance of the operated knee is essential. The results as reported by the owners of the 18 months cases have been very satisfactory. It is not clear whether the stimulation of fibrous tissue ingrowth is a characteristic of carbon fibre or whether this will also occur in other materials with a filamentous nature. It will be interesting to investigate the possibilities as newer fibre types become available.

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BOOK REVIEW

BOEKRESENSIE

PHARMACOLOGICAL BASIS OF LARGE ANIMAL MEDICINE

Edited by J.A. BOGAN, P. LEES and A.T. YOXALL

1st Edn. Blackwell Scientific Publications, Oxford OX2 OEL. 1983 pp XIV and 565, numerous figures and tables, Price £29.50 (ISBN 0-632-01055-X).

This new text includes 25 chapters which have been grouped into 6 parts. Part I comprises 2 chapters in which the principles of drug absorption, distribution and elimination are reviewed. The second part, entitled "Antibacterial drugs" covers systemic and intramammary antimicrobial therapy, antibiotics in equine practice, addition of antibiotics to feeds and antibiotic resistance. Part 3 has 4 chapters covering basic and clinical immunology and anthelmintics. Part 4 has 2 chapters, one on treatment of reproductive disorders in the mare and another on the pharmacological control of reproduction in farm animals. Part 5 includes 5 chapters covering equine nutrition, bovine metabolic disorders, use of anabolic agents, fluid therapy in calves and therapeutic agents in the treatment of diarrhoea in young farm animals. The final section, Part 6, has 7 chapters where anti-inflammatory agents, corticosteroids, chemical restraint of large animals, drugs affecting equine performance, and drugs used for cardiovascular and respiratory conditions of horses are discussed.

This book is a summary of a refresher course in large animal (cattle, horses, pigs, sheep and goats) therapeutics

held in the UK in 1978. The 28 authors subsequently revised their contributions so that the contents are reasonably up-to-date. This book is not a comprehensive guide to large animal pharmacology and therapeutics. Topics have been chosen by the authors and have been covered in variable detail. Some topics are considered inappropriate for a text book on pharmacology, e.g. the chapters on immunology, equine nutrition and bovine metabolic disorders.

The chapters on the pharmacological treatment of reproductive disorders in the mare, on anti-inflammatory agents and on the chemical restraint of large animals deserve special mention for their completeness and potential usefulness.

This text will be useful to large animal practitioners, to veterinarians in the drug industry and to those academics involved in teaching pharmacology, therapeutics, medicine, anaesthesia and theriogenology to veterinary students. Its expense is too great to justify its purchase by the average veterinary student.

C. Button

CASE REPORT

GEVALVERSLAG

A REPORT ON THREE CASES OF FEMINISING SYNDROME IN THE DOG

GILLIAN DAVIS*

ABSTRACT: Davis G. *A report on three cases of feminising syndrome in the dog.* *Journal of the South African Veterinary Association* (1984) 55 No. 1, 33-34 (En). 16 Ashmore Crescent, Chase Valley Heights, 3201 Pietermaritzburg, Republic of South Africa.

Three cases of feminising syndrome are described in the male dog. All cases showed similar symptoms, alopecia being the most noticeable. Differential diagnosis is discussed. The beneficial effect of castration is recorded.

Key words: Alopecia, castration, feminising syndrome, dog.

INTRODUCTION

Dermatological problems inevitably form a large proportion of the case load of the veterinarian working in urban practice. The variety of the problems provides a continuing stimulus to the dedicated clinician. However, because of the similarity of clinical signs arising from different aetiologies this same variety can be a source of frustration. This is particularly true of alopecia and other signs relating to various hormonal imbalances.

In the following report feminising syndrome, which is of interest to the small animal clinician is described in 3 male dogs.

The first case is described in detail and illustrates the problem of accurate diagnosis. The second, briefly described case, illustrates the rapid response resulting from early diagnosis. The third case, also briefly described, is of interest because of the age of the patient.

CASE 1

History

This case was presented as a referral in December 1980. The animal was a 10-year-old male Pomeranian that had shown progressive loss of hair during the 18 months previous to presentation.

Professional advice had first been sought in July 1979 when a diagnosis of hypothyroidism had been made. Treatment with a thyroid preparation at what was stated to be 'maximum' dosage had been prescribed. Five weeks later a slight improvement in the patient's condition had been recorded and the continuation of the same treatment was advised. This therapy was continued intermittently over the following 11 months.

In June 1980, professional advice had again been sought. On this occasion a diagnosis of hormonal alopecia had been made and what was stated to be a 'maximum' dosage of a testosterone propionate and stilboestrol mixture (Stilberone, Centaur) had been prescribed. This treatment was continued for 3 months with no change in the animal's condition.

In November 1980 a further deterioration had been observed and the diagnosis amended to that of hyperadrenocorticism. A second opinion was requested at this stage.

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On 2 December 1980 the case was presented to this practice. The history as outlined above was supplied by the referring practice.

Clinical Examination

The general bodily condition of the patient was good. Appetite, thirst and gastrointestinal function all appeared to be normal. The animal's behaviour appeared normal, there being no evidence of either lethargy or hyperactivity. The heart rate and respiratory rate were within normal limits. The testicles appeared to be of normal size.

The patient showed extensive bilaterally symmetrical loss of hair. The areas affected were the abdomen, the dorsum, the posterior aspect of the thighs, the flanks, the chest wall, the neck, the upper part of the forelimbs and the dorsal aspect of the tail. In these affected areas marked pigmentation and seborrhoea was present. The hair remaining on the rest of the body had a distinctly greasy texture. A slight lichenification was present on the dorsal aspect of the body. There was a mild degree of seborrhoea present in the external auditory meatus. Slight but generalised gynaecomastia was present. According to the history supplied by the owner the patient appeared to be sexually attractive to the other male Pomeranian in the household.

Diagnosis and Treatment

The differential diagnosis detailed in Table 1 was carefully considered and the diagnosis of feminising syndrome made. Castration was recommended and performed on 5 December 1980. First intention healing followed and the sutures were removed 7 days later. Betamethasone (Betsolan, Glaxo) at a daily dosage of 0,125 mg per os was prescribed. The patient was re-examined 2 weeks post operatively when a slight growth of very fine hair along the back and flanks was apparent. The betamethasone dosage was reduced to 0,125 mg twice weekly for a further 2 months. At about this time the patient was again examined and a significant hair growth on all the alopecic areas was apparent.

At 7 months postoperatively the patient's coat was extremely thick, growing in length and standing erect, giving the patient the appearance of a miniature Chow. At 11 months the patient's tail and feathering developed and the hair distribution was normal apart from a slight alopecia on the dorsal aspect of the tip of the tail.

Tabel 1: DIFFERENTIAL DIAGNOSES*

Symptom	Conditions					
	HT	HAC	SCT	EP	FS	CP
Bilateralism	+	+	+	-	+	+
Pruritus	-	-	-	+	-	-
Pigmentation	+	+	+	±	+	+
Calcinosis	-	±	-	-	-	-
Weight gain	+	-	-	-	-	-
Fatigue	+	+	-	-	-	-
Increased appetite	+	-	-	-	-	-
Seborrhoea	+	-	+	±	+	+
Hyperkeratosis	-	+	+	-	+	+
Lichenification	-	-	+	-	+	+
Otitis	+	-	-	-	-	±
Muscle weakness	-	+	-	-	-	-
Polydipsia	-	+	-	-	-	-
Gynaecomastia	-	-	+	-	+	±
Testicular enlargement	-	-	+	-	-	-
Sexual attraction to other males	-	-	±	-	+	+

*"Adapted from Muller & Kirk¹"

HT Hypothyroidism
HAC Hyperadrenocorticism
SCT Sertoli cell tumour
EP External parasites
FS Feminising syndrome
CP Case presented

CASE 2

The patient was a 6-year-old male Terrier-cross with similar symptoms to Case 1 except that the hair loss had only been apparent for 3 months. Complete hair restoration occurred within 3 months after surgery.

CASE 3

The patient was a 7-month-old male Boxer. The animal showed a patchy bilateral symmetrical hair loss giving a moth-eaten appearance. This case was interesting as the animal was a bilateral cryptorchid and both testicles were in the abdomen. An unusual fact of this case was that the alopecia developed at such a relatively young age.

The testicles, on removal, were found to be small with no macroscopic evidence of tumefaction. Once again hair growth was rapid after surgery.

DISCUSSION

One of the objects of this article is to demonstrate that with the careful study of the case history, presenting clinical signs and the use of clinical acumen and experience it is often unnecessary to resort to biochemical tests.

It is felt that in these 3 cases biochemical tests which are not readily available to all practitioners, would give little further information of value in addition to that gained in the consulting room.

Diagnosis was made as a result of the careful evaluation of the presence or absence of clinical signs. External parasites were immediately ruled out by thorough examination and the absence of both reported and elicited pruritus. A diagnosis of hypothyroidism was eliminated as the patient showed no sign of weight increase, fatigue or hypophagia. The possibility of hyperadrenocorticism was rejected since there was no recognisable evidence of polydipsia, muscle weakness or abdominal distension. It was recognised that Sertoli cell tumours can cause exactly the same clinical syndrome but in the cases presented no abnormality of the testes could be discerned.

The fact that the patient in Case 1 appeared sexually attractive to its male companion was considered to be an important diagnostic sign. If, however, the patient had been receiving stilboestrol, in low dosage, this may have contributed to some of the clinical signs. This possibility was investigated and it was established that the stilboestrol and testosterone propionate mixture (Stilberone, Centaur) had not been given regularly and not at all for 2 months prior to initial examination as referral. Therefore such medication could be ruled out as the cause of the sexual attraction and other clinical signs.

Post operative corticosteroid therapy was instituted in Case 1 according to Muller & Kirk¹. These authors question the usefulness of this additional treatment but it was felt that every possible aid to recovery should be used. However, following the successful outcome of Case 1 it was decided not to use corticosteroids in Cases 2 and 3. The satisfactory outcome of these 2 cases support the view that this post-operative medication is not always necessary for rapid and complete resolution of feminising syndrome in the male dog.

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PRIMARY RENAL CELL CARCINOMA IN A HORSE

S.R. VAN AMSTEL*, D. HUCHZERMAYER**, and F. REYERS*

ABSTRACT: Van Amstel S.R.; Huchzermeyer D.; Reyers F. Primary renal cell carcinoma in a horse. *Journal of the South African Veterinary Association* (1984) 55 No. 1, 35-38 (En). Department of Medicine, Faculty of Veterinary Science, University of Pretoria, P.O. Box 12580, 0110 Onderstepoort, Republic of South Africa.

A case of primary renal cell carcinoma in a 16-year-old mare is reported. The main presenting signs of chronic weight loss and diarrhoea as well as the initial laboratory examination did not directly indicate renal involvement. Follow-up investigations were strongly suggestive of avain tuberculosis. Further laboratory investigation revealed neoplasia, which was confirmed at autopsy.

Key words: Primary renal carcinoma, horse.

INTRODUCTION

Primary renal tumors are rare in the horse. One retrospective analysis of 32 389 equine necropsies recorded 2 cases of primary renal cell carcinoma². We believe this to be the first reported case in the Republic of South Africa. Clinical diagnosis of the condition can be difficult due to the presence of varied symptoms which may not implicate the urinary system. Symptoms associated with renal cell carcinoma include chronic weight loss, colic, abdominal distention, limb oedema, palpable abdominal masses and haematuria^{1,2}. The diagnosis in the case described in this communication was complicated because evidence suggested that the animal might have been suffering from avain tuberculosis.

HISTORY

A 16-year-old thoroughbred mare with a 6-week-old foal at foot was referred to the Department of Medicine, Faculty of Veterinary Science, University of Pretoria with a history of chronic weight loss which had become noticeable after foaling, an indifferent appetite, intermittent bouts of diarrhoea and a lowgrade endometritis from which an *Escherichia coli* was isolated. Treatment instituted by the referring veterinarian included a course of potentiated sulphonamides as indicated by the antibiogram and a broad spectrum anthelmintic.

CLINICAL SIGNS

The mare was in poor condition (Fig. 1), but appeared alert and interested in her surroundings and her foal. The rectal temperature was 37,4 °C, heart rate 52 min⁻¹, and respiratory rate 22 min⁻¹. Her mucous membranes and skin showed signs of mild dehydration. The faeces had a cow dung consistency and there was increased borborygmi present on abdominal auscultation. No abnormalities were palpable on rectal examination. Initial laboratory investigations revealed a top normal haematocrit of 0,44⁶, an increased total leukocyte count

of 17,8 x 10⁹/ℓ, with 75% segmented neutrophils, no immature neutrophils and 17% lymphocyte as well as a hyperglobulinaemia of 48,2 g/ℓ. Platelet clumping was noticed in the EDTA blood collecting tube and on the blood smear. Sorbitol dehydrogenase (SDH) levels of 2,5 U (26°C) indicated mild acute liver pathology. Urinalysis showed a slight proteinuria but the blood albumin level was normal. No cellular elements of renal origin were noticed in the urine. Zinc sulphate faecal flotation revealed no helminth ova. Abdominocentesis produced 5 m of non-turbid peritoneal fluid with a dark brown colour and a specific gravity of 1,020, a total leukocyte count of 2,2 x 10⁹/ℓ consisting predominantly of mature neutrophils and lymphocytes.



Fig. 1: General loss of body condition

DIAGNOSIS AND TREATMENT

Considering the above chemical pathological results, the initial differential diagnosis considered included a chronic infection and toxæmia based on the leukocytosis, hyperglobulinaemia and platelet clumping; primary liver disease based on the raised SDH levels and malabsorption syndrome based on the history of chronic intermittent diarrhoea, weight loss and the slightly abnormal appearance and increased specific gravity of the peritoneal fluid⁵.

Alimentary neoplasia and granulomatous enteritis such as that due to tuberculosis were considered despite

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the absence of a hypoalbuminaemia since the latter disease is still endemic in both the human and certain animal species of South Africa.

Rectal speculum and bacteriological examinations eliminated the uterus as a source of chronic infection. Increasing liver involvement was shown by continued increases in liver enzyme determinations during a period of 12 days.

Enzyme increases were recorded for SDH, glutamate dehydrogenase (GLDH) and gamma glutamyl transferase (γ GT). Aspartate transferase (AST), however, was not elevated which at this stage could not be explained. A bromsulphthalein half-life test was within normal limits indicating a normal liver conjugation and excretion capacity. An oral glucose absorption test was carried out which gave a normal absorption curve, thus eliminating a diffuse infiltrative condition in the intestine. A comparative bovine and avian intradermal tuberculin test was carried out. After 48 hours there was an increase of 8,2 mm in skin thickness caused by the avian tuberculin and the superficial lymphatics in the area became distended (Fig. 2). The bovine tuberculin caused an increase of 2,6 mm in skin thickness. There was a corresponding systemic reaction associated with these skin reactions. The temperature rose from 38,0°C to 39,5°C over a 6 hour period and the heart rate increased from 40 to 48 per minute during the same period. From these results the presence of avian tuberculosis was strongly suspected. To eliminate the possibility that the reaction could have been caused by sensitisation to *Mycobacterium paratuberculosis*, a complement fixation test for infection with this organism was carried out. It yielded negative results. In order to further strengthen the diagnosis, chest radiographs were taken to establish the possible presence of miliary lung lesions. These radiographs revealed numerous small focal nodules which could have been consistent with miliary tuberculosis lesions (Fig. 3). The evidence of liver pathology and persistent leukocytosis also appeared to fit a diagnosis of tuberculosis.

Throughout the hospitalisation period the horse was given supportive fluid and electrolyte therapy as well as antibiotic treatment. Despite this there was a progressive deterioration in her habitus and general condition. From the 4th day in hospital the mare developed a ventral and sternal oedema, the origin of which was unclear as there was no signs of cardiac failure or hypoproteinaemia present. At this stage it seemed reasonable to make a final diagnosis of tuberculosis. It was, however, decided to repeat the abdominocentesis because of the slightly abnormal findings in the peritoneal fluid. The second abdominocentesis was carried out 7 days after the first. A relatively large amount of fluid was present which was dark yellow in colour and had a specific gravity of 1,026 and a total cell count of $3,3 \times 10^9/\ell$. Many clusters of neoplastic cells were seen, some of which were undergoing necrosis and were associated with many mature neutrophils and macrophages. The neoplastic cells were relatively large and contained prominent round nuclei with multiple nucleoli, some showing abnormal shapes (Fig. 4 & 5). In considering the possible origin of these tumour cells, the liver seemed a likely source. However, the raised serum enzymes could also have been of renal origin. This seemed likely as the AST was within normal limits. The possibility of renal involvement was strengthened due to the presence of elevated serum creatinine levels. A final



Fig. 2: Skin swelling and local lymphatic distention caused by intradermal avian tuberculin injection.



Fig. 3: Lateral chest radiograph showing numerous small nodules.



Fig. 4: Clusters of neoplastic cells found in the peritoneal fluid.

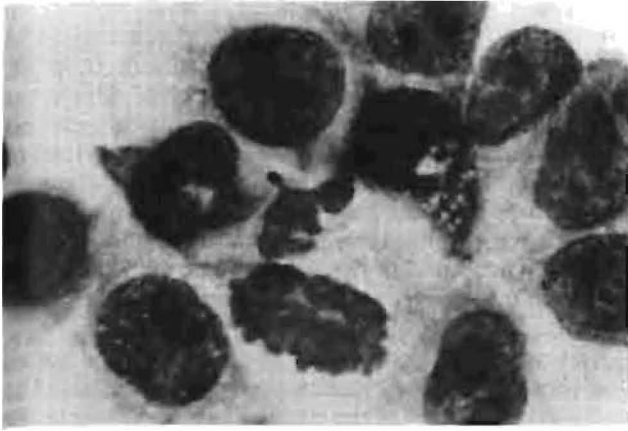


Fig. 5: Neoplastic cells from the peritoneal fluid showing multiple and irregularly shaped nucleoli.

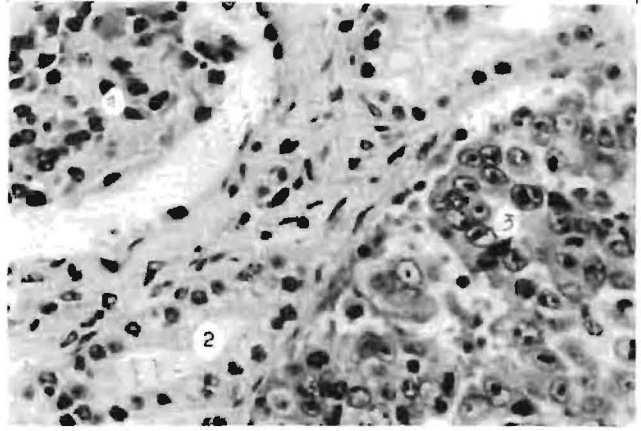


Fig. 8: Section of the right kidney showing a glomerulus (1), normal renal tubules (2) and neoplastic cells (3).

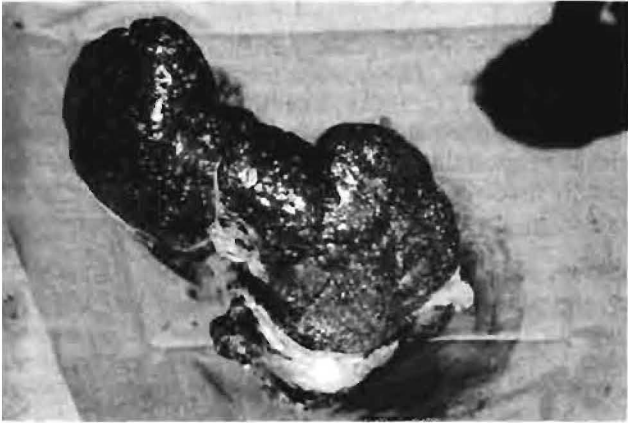


Fig. 6: Metastatic lesions in the liver.

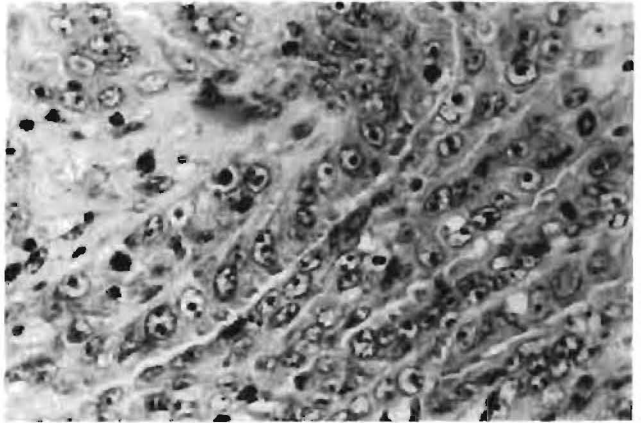


Fig. 9: Tubular nature of the neoplastic cells.

diagnosis of an adenocarcinoma involving the liver, kidneys and lungs was made and the horse was euthanased.

PATHOLOGY

Macroscopic pathology showed a tumour mass at the base of the cranial mesenteric artery which incorporated the major part of the right kidney and was attached to the right lobe of the liver. Multiple smaller lesions of similar appearance were disseminated in the liver (Fig. 6) and remnant of the right kidney, and occurred focally along the aorta replacing the regional lymph nodes and in the mediastinum cranial to the heart. Numerous small tumours were present in both lungs. Macroscopically the tumour masses were lobulated, greyish in appearance and contained caseous areas.

Microscopically the tumour masses consisted of well defined neoplastic tubular structures, the centres of many having undergone necrosis with loss of all cellular detail (Fig. 7, 8 & 9). Many of the neoplastic tubules were in various stages of necrosis with focal round cell infiltrations, and numerous neutrophils and macrophages. The neoplastic cells were arranged in single layers of cuboidal to columnar cells and appeared to be of renal origin.

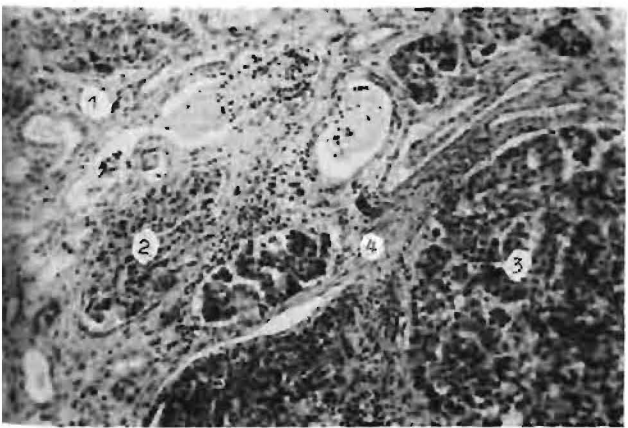


Fig. 7: Section of the right kidney showing relatively normal tubules (1), glomerules (2) and neoplastic tubules (3) with attempts at encapsulation (4). There is also a marked round cell infiltration.

The tumour seems to have originated in the right kidney and then infiltrated surrounding tissues and metastasised via the blood and lymph to the other affected organs.

CONCLUSION

The rapid loss of condition of the mare must have been due to the rapidly invading metastasising tumour. The marked ventral oedema which developed was probably due to interferences with lymphatic drainage of the area, rather than a hypoproteinaemia as albumin levels were consistently normal.

SDH, γ GT and GLDH are enzymes all normally present in renal cells, but are usually excreted in the urine when damage to the renal cells occurs. Further supporting evidence for their raised levels being from renal cell origin is the fact that the levels of AST remained normal. The serum creatinine level was elevated which implicated the kidney pathology.

Although there were many metastatic lesions throughout the liver, they were small and focal with a lot of normal liver tissue between them. It thus seems likely that the primary and metastatic neoplastic renal cells undergoing necrosis were the source of the enzyme elevations.

The areas of necrosis within the tumours were probably partly responsible for the persistent neutrophilia. The absence of a left shift is explained by the relatively chronic development of the tumour giving the body time to adjust to a higher output of neutrophils with the release of mainly mature forms.

Platelet clumping can be caused by endotoxaemia in the equine⁴. The reason for the continuous clumping seen in this case is not clear. There may, however, have been secondary invasion of some of the necrotic areas by bacteria. This would help explain some of the neutrophilia, the hypergammaglobulinaemia and possibly the platelet clumping.

DISCUSSION

A high percentage of non-specific reactions may provoke a positive intradermal avian tuberculin test in the horse³. Swelling of the lymphatics in the region of the test site and a systemic reaction, however, are of importance. Huitema mentions that a rectal temperature rise of 0,9 – 2,5 °C and an increase in pulse rate are significant in animals suffering from avian tuberculosis³. In

this case all 4 of these changes were present. Apart from infection with *avium*, other causes of apparent positive reactions to avian tuberculin are sensitisation to *M. avium* or *M. paratuberculosis*, the latter of which was excluded in this case. The positive avian tuberculin test which occurred in this case can probably be ascribed to sensitisation by *M. avium* which is fairly ubiquitous in this country. This case has clearly shown that interpretation of a positive intradermal avian tuberculin test may be very difficult and misleading since no evidence of *M. avium* or other mycobacterioses were found despite a very detailed autopsy.

Three cases of primary renal carcinomas in horses have been described in the recent literature¹². The macroscopic picture of the renal adenocarcinoma in the case described by Berggren is very similar to that found in our horse¹. A more detailed histological description is given by Haschek et al.² who described 2 cases of primary renal cell carcinomas in horses. One of these showed pleomorphic cuboidal to columnar epithelial cells forming irregular tubules in the neoplasm which was diagnosed as a tubular renal cell carcinoma, while the other was a papillary renal cell carcinoma consisting of tubules lined by pseudostratified epithelium with papillary projections.

Renal cell carcinomas generally appear to develop from one pole of the kidney, arising from undifferentiated epithelium. They always seem to occur unilaterally and grow by expansion. The tumour may metastasise both by the haematogenous and lymphogenous routes with the regional lymph nodes and lungs being most frequently involved².

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VLEKSPIERSIEKTE IN 'N BROEISEL VOLSTRUISKUIKENS

B.J. VORSTER*

ABSTRACT: Vorster B.J. **Nutritional muscular dystrophy in a clutch of ostrich chickens.** *Journal of the South African Veterinary Association* (1984) 55 No. 1, 39-40 (Afrik). P.O. Box 33, 3421 Upington, Republic of South Africa.

Six 1½-month old ostrich chickens in the Upington district of the Cape Province developed lameness. Two died and pathological examination of one of them revealed lesions identical to those of white muscle disease in the larger muscle groups. Vitamin E-selenium therapy cured the other 4. The diet of the animals consisted mainly of lucerne (alfalfa).

Key words: Nutritional muscular dystrophy, white muscle disease, myopathy, vitamin E, selenium, deficiency, lucerne, alfalfa, ostrich.

GESKIEDENIS

'n Volstruispaar met 'n broeisel van 6, 1½-maand oue kuikens het in 'n kamp ongeveer 'n halwe hektaar gewei. Die kamp was in die Upington-distrik en het tipiese rooi Kalaharisand bevat. Die voer het hoofsaaklik bestaan uit droë en groen lusern, wat gekweek was op landerye onder besproeiing vanuit die Oranjerivier. Bykomende voeding het bestaan uit geel mielies, dissels, ander onkruid en gras wat langs die besproeiingslande gegroei het.

KLINIESE TEKENS EN PATOLOGIE

Toe hulle vir die eerste keer ondersoek is, het die volstruisies almal verskillende grade van mankheid getoon. Een van hulle het na 'n paar dae gaan lê en kon nie weer opstaan nie. Hy het 'n dag later gevrek. Die twee volwasse volstruise het normaal voorgekom.

Tydens die nadoodse ondersoek op die dooie volstruisie was die enigste betekenisvolle letsels duidelik waarneembare areas van spierdegenerasie en -nekrose in die dyspiere, veral die mm. gastrocnemius en quadriceps, en in die rugspiere. Die grootte van die letsels het gewissel van dun strepe ongeveer 1 mm wyd tot aantasting van hele spierbondels. Die aangetaste spiere was baie bleek en gepaardgaande petegie en ekchimoses was teenwoordig. Geen letsels kon makroskopies in die hart waargeneem word nie. Tydens histologiese ondersoek van die aangetaste skeletspier is letsels identies aan dié van vlekspiersiekte gevind, maar geen veranderinge was teenwoordig in die hartspier nie.

BEHANDELING

Die 5 oorlewende volstruisies is met ml van 'n middel wat 150 mg vitamien E en 0,5 mg seleen per ml bevat, (Injacom E-Selenium, Roche) binnespiers ingespuut. Met die uitsondering van een, het almal volkome herstel. Die fleksorspiere van die bene van een volstruisuiken het permanent saamgetrek sodat hy op sy polse begin loop het. Ongeveer 7 dae na behandeling is hy 'n genadedood toegedien aangesien sy polse deurloop was.

*Privaat praktisyn, Posbus 33, 3421 Upington.

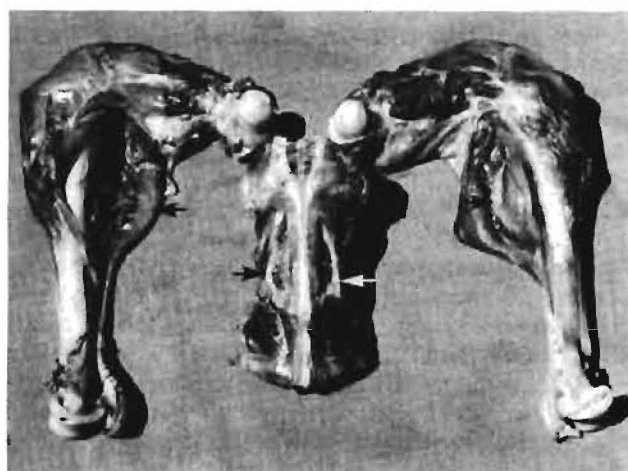


Fig. 1: Verskeie spiere wat letsels van vlekspiersiekte aantoon (peile)

BESPREKING

Die kliniese tekens, makro- en mikroskopiese patologie en die bevredigende reaksie op die behandeling met vitamien E-seleen ondersteun die diagnose van vlekspiersiekte (of voedingsspierdistrofie), alhoewel geen vitamien E of seleen bepalinge op voermonsters of weefsels van die diere uitgevoer is nie. Dit kan dus nie vasgestel word watter van hierdie 2 stowwe 'n rol in die etiologie van die toestand gespeel het nie. Dit is 'n alombekende feit dat die seleenheid van peulgewasse geneig is om laer te wees as dié van grasse en dat baie ander faktore tot 'n tekort by diere mag bydra! Die volstruisies het 'n dieët wat hoofsaaklik uit lusern bestaan het ontvang. Van Heerden et al. het 'n miopatie in 2 en 4-maande oue volstruisies, vermoedelik ook as gevolg van vitamien E-seleentekort beskryf³. Hierdie voëls het 'n dieët van hoofsaaklik gebreekte mielies ontvang. Vitamien E-tekort by hoenderkuikens word met enkefalomalassie, eksudatiewe diatese en miopatie geassosieer² en seleentekort met eksudatiewe diatese en pankreatiese fibrose¹. Indien hoenders byvoeding van seleen ontvang, verbeter die eierproduksie en uibroeibaarheid van die eiers.

ERKENNINGS

Professor R.C. Tustin word bedank vir die histopatologiese ondersoek van die spiermonsters en hy, dr A.L. Lange en mev V. Käber vir hulp met die voorbereiding van die manuskrip.

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BOOK REVIEW

BOEKRESENSIE

CONSTITUTIONAL DISORDERS AND HEREDITARY DISEASE IN DOMESTIC ANIMALS
DEVELOPMENTS IN ANIMAL AND VETERINARY SCIENCES II

D. HÁMORI

2nd Edn. Elsevier Scientific Publishing Co, Molenwerf 1 P.O. Box 211, 1000 AE Amsterdam. In USA/CANADA: P.O. Box 1663, Grand Central Station, New York, NY 10163. 1983 pp 728, illustrations 307, Price Dfl 295.00 (ISBN 0-444-99683-4).

This hardcover edition is the revised English version of "Háziállatok öröklődő alkati hibái és beteg ségei" first published in Budapest in 1974. It deals with congenital and hereditary abnormalities and diseases which are most relevant economically in cattle, horses, swine, sheep, goats and in poultry. These are discussed as they effect the different organ systems. The influence of environment on the inheritance of performance limiting characters and on hereditary characters in general is dealt with. An excellent account of the role of breeding hygiene in selection is also included.

The new approach to large animal production systems and A.I. breeding has resulted in an increase in genetic abnormalities. This study thus includes methods applied in

the identification and culling of carriers of recessive genes especially in A.I. bulls. The importance of cytogenetics and its application in animal husbandry is stressed. The last chapters include a review of resistance to diseases and the problems encountered in multifactorial diseases and genetic resistance to these.

The book is sufficiently illustrated with black and white photographs, is written in an easy style and includes long lists of references. It is a book which can be highly recommended, in fact it is a "must" to all veterinarians and especially to animal breeders and researchers interested in maintaining high standards of excellence in animal production.

W.H. Gerneke

CASE REPORT

GEVALVERSLAG

BORRELIA SP. INFECTION IN A HORSE

J. VAN HEERDEN* and F. REYERS**

ABSTRACT: Van Heerden J.; Reyers F. *Borrelia sp. infection in a horse*. *Journal of the South African Veterinary Association* (1984) 55 No. 1, 41-43 (En). Department of Medicine, Faculty of Veterinary Science, Medical University of Southern Africa, 0204 Medunsa, Republic of South Africa.

The clinical signs, response to treatment and features of the spirochaete, *Borrelia theileri* as was found in a horse with suspected borreliosis are described.

Key words: *Borrelia theileri*, equine.

INTRODUCTION

The bacterium *Borrelia theileri* (Laveran) (= *Spirochaeta theileri* Laveran 1903), was first found by Theiler in the blood of cattle, a horse and a sheep in the Republic of South Africa¹⁰. Since 1902, borreliosis, as caused by *B. theileri* has been reported from other parts of Africa, Australia and elsewhere in the world^{1,4,6}. These reports were mainly on borreliosis in cattle. The organism has also been recovered from a donkey⁵ and several species of antelope⁷.

Several species of tick have been listed as vectors or possible vectors of *B. theileri*, namely *Boophilus decoloratus*, *B. australis*, *B. microplus*, *B. annulatus*, *Rhipicephalus evertsi* and *R. decoloratus*^{2,9,11}.

In cattle, sheep and horses, infection with the organism, has been associated with a fever reaction^{1,2,6,9,11}. In cattle and in a horse and donkey the infection has also been found in association with an infection with *Babesia* sp.^{4,5,10}.

Relatively little is known on borreliosis in horses. The following report is a brief account of such an infection in a horse.

CASE REPORT

A 15-year-old American Saddle mare was referred to the Department of Medicine, Faculty of Veterinary Science, University of Pretoria with a history of partial anorexia, mild depression and an elevated rectal temperature (39°C). A clinical examination confirmed the above mentioned findings and no further clinical abnormalities were recorded. Examination of a peripheral blood smear stained by the Diff-Quik method (Harleco) did not reveal the presence of any bacterium and/or protozoan. A haematological examination yielded negative results.

Twenty-four hours after admittance the rectal temperature rose to 39,6°C. The horse was mildly depressed and showed slight anorexia. Examination of a smear prepared from venous blood and stained as mentioned before, failed to demonstrate the presence of any bacterium and/or protozoan. A haematological examination yielded normal results.

After another 24 h the animal was depressed, restless,

showed complete anorexia and the rectal temperature was recorded as 40,5°C. The horse felt hot and it was sweating profusely with sweat dripping from its legs. Examination of a blood smear prepared from venous blood demonstrated the presence of numerous spirillums, presumably *Borrelia theileri* (Fig. 1.). A single trophozoite of *Babesia equi* was found. The mare was subsequently treated with 25 ml of Euflavine (Centaur) intravenously. Within 24 h the rectal temperature dropped to 38°C and the appetite and habitus of the animal returned to normal.

Details of parasite: Photomicrograph transparencies were prepared of the parasites in methanol fixed blood smears made from the patient's venous blood collected in EDTA and stained by the Diff-Quik method (Harleco). These were projected onto a white wall and the image measured by superimposing string over it (in order to accommodate the irregular shape of the organism). The length so established was compared with the diameter of 13 of the most perfectly circular erythrocytes in the same field. The final calculation was based on the mean erythrocyte diameter being 5,5 µm for a horse with a mean cell volume of 45,5 fl⁸. These dimensions were again verified with a ruled grating micrometer (Zeiss). The mean cell volume was determined on the EDTA preserved blood sample by a Coulter Model FN cell counter. Eleven spirochaetes were measured in this manner. The mean linear length, the mean total length and the mean number of spirals for eleven spirochaetes are presented in Table 1.

DISCUSSION

The presence of a trophozoite of *B. equi* makes it impossible ascribe the clinical condition of the patient to an infection with *B. theileri* only. The rapid response of the patient to treatment with a babesicide makes it even more difficult to put a name to the febrile condition of the horse. The following points should, however, be considered: a) profuse sweating at the height of the fever reaction. This is not routinely observed in clinical cases of equine babesiosis and is perhaps to be expected more of a bacteraemia. b) coincidence of a severe bacteraemia with *Borrelia theileri* with a low parasitaemia with *B. equi*. As speculated by Theiler¹⁰ such a high bacteraemia might well be responsible for a break in premunity of the patient to *B. equi* and therefore allowing the latter to multiply. Even a relative-

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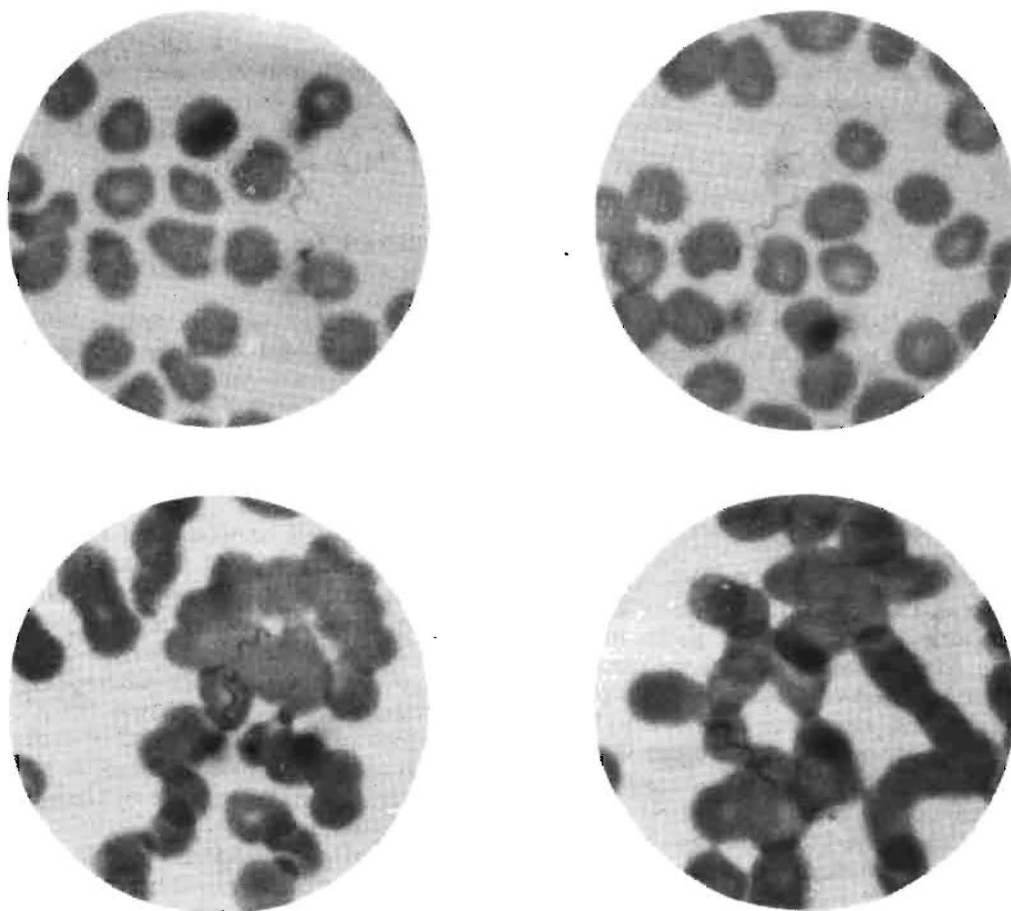


Fig. 1: Spirillums of *Borrelia theileri* in a blood smear.

ly non-pathogenic bacterium might thus become an important factor in triggering off equine babesiosis. c) the bactericidal properties of Euflavine. Nothing could be found in the literature on the effect of the acridine dyes on *B. theileri*.

Euflavine is, however, known to possess some bactericidal activity and the rapid recovery of the animal might well have been due to these effects³.

Bryson & Wells¹ treated a horse with confirmed borreliosis successfully with sulphadimidine and acetylarosan. In a case described in a donkey where *B. theileri* occurred concurrently with *B. equi*, a spontaneous recovery was observed⁵.

The average measurements obtained on the spirochaetes in this investigation differs from that published for measurements obtained from organisms obtained from South African cattle². The parameters however closely resemble measurements as obtained by Callow on spirochaetes from a South African horse². The apparently smaller size of the spirochaetes isolated from horses as well as the reported preference of a larger spirochaete for bovine hosts suggest a re-examination of the taxonomic status of the equine spirochaete. *B. theileri* has, however, been transmitted from equids to bovinds^{4,5}.

In conclusion then, borreliosis in horses is probably not of great importance and most horses may well recover spontaneously from the infection. It is also possible that it is often overlooked and might well be the cause of unexplained fevers in horses.

Table 1: THE TOTAL AND LINEAR LENGTH, NUMBER OF SPIRALS AND SPIRAL AMPLITUDE OF *BORRELIA* ORGANISMS

	Mean	s.d.	n	Range
Total length* μm	9,718	2,710	11	6,0 – 14,2
Linear length μm	6,578	2,168	9	3,7 – 10,2
Number of spirals	3,028	1,208	9	1,75 – 5
Spiral amplitude	2,170		27,75	

*Excluding 2 looped forms (one with a single and one with a double loop) with an average loop diameter of 2,0 μm (1,9 and 2,1 μm)

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BOOK REVIEW

BOEKRESENSIE

VETERINARY NEUROANATOMY AND CLINICAL NEUROLOGY

A. DE LAHUNTA

2nd ed. W.B. Saunders, Philadelphia 1983 pp XVI + 471 Figs 123 Tables 12 ISBN 0-7216-3029-4 Price R70.68

Dr. A. De Lahunta is a neuroanatomist with an active interest in clinical neurology. His aim in this book is therefore to relate structure to normal and abnormal nervous system function. An excellent blend of neuroanatomy, neurophysiology and clinical neurology results. Food animal, equine and small animal neurological examinations and the full spectrum of neurological disorders are covered. A great advantage to this book is the large number of concise, ac-

curately described and relevant case descriptions. These are in addition to up to date disease descriptions appearing in appropriate chapters. The book is well indexed and therefore a valuable desk reference for practitioners in the field of neurology. This is a work of very high standard intended for serious students of neurology. It is a valuable addition to the shelf of clinical veterinary texts.

P. Bland-van den Berg



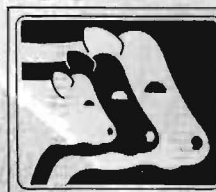
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 **SYNTEX**

CLINICAL COMMUNICATION

KLINIESE MEDEDELING

OBSERVATIONS ON THE SYMPTOMATOLOGY AND DIAGNOSIS OF CLINICAL CASES OF JOHNE'S DISEASE

S.R. VAN AMSTEL*

ABSTRACT: Van Amstel S.R. *Observations on the symptomatology and diagnosis of clinical cases of Johne's disease.* *Journal of the South African Veterinary Association* (1984) 55 No. 1, 45-46 (En). Department of Medicine, Faculty of Veterinary Science, University of Pretoria, P.O. Box 12580, 0110 Onderstepoort, Republic of South Africa.

Two clinical cases of Johne's disease are reported. There was a total absence of diarrhoea in one case despite a clinical course of the disease of more than 18 months. Typical gut lesions found on necropsy were confined to the small intestine. The diagnosis was confirmed on histopathological examination, and the finding of acid fast staining organisms and a retrospective complement fixation test on stored serum. The result of an intravenous avian tuberculin test conducted on the second case was inconclusive. This was attributed to the animal's temperament.

Key words: Johne's disease, diarrhoea, intravenous avian tuberculin test, bovine.

INTRODUCTION

Johne's disease has been introduced into the Republic of South Africa on a number of occasions by importation of infected animals⁴. The disease has spread on farms where climatic and geological conditions are suitable for the survival of the bacilli for long periods⁴ (H R Huchzermeyer 1983, Veterinary Research Institute, Onderstepoort, personal communication). In South Africa the disease has been reported in the Jersey, Shorthorn, Santa Gertrudis and Brahman breeds of cattle⁴ (S Herr 1983, Veterinary Research Institute, Onderstepoort, personal communication). The symptomatology of Johne's disease is well documented with chronic emaciation and an intermittent diarrhoea being the most outstanding clinical signs^{2,3}. Total absence of diarrhoea may, however, occur as is shown in the first case report of this communication.

Confirmation of the diagnosis of clinical cases of Johne's disease remains a problem. The use of mesenteric lymph node biopsy can give a definite diagnosis in all cases⁷. This procedure, however, has practical limitations. Comparison between the intravenous Johnin test, the intradermal avian test or Johnin and the complement fixation tests, showed the intravenous Johnin test to be the most reliable⁵. The success of this test will greatly depend on the animals resting temperature which in turn is influenced by its temperament as can be seen from the second case report.

CASE REPORTS

Case 1

A mature Brahman cow was presented with a history of a capricious appetite and chronic weight loss over a 18 month period. During this time she had been operated on for suspected traumatic reticulitis with negative results.

The animal appeared alert and aggressive despite her poor condition. A clinical examination showed no specific abnormalities except that her rumen felt smaller than normal and was apparently quite empty. A small

amount of firm, mucous covered faeces was present in the rectum. She was 2 months pregnant. Consideration of the history and clinical signs included the possibility of malnutrition, chronic liver disease, traumatic reticuloperitonitis, internal abcessation, tuberculosis and pyelonephritis. Haematological and repeated urine examinations excluded pyelonephritis. A comparative bovine and avian tuberculin test gave negative results. Internal abcessation was excluded on the results of the haematology and serum protein electrophoresis.

A second left sided laparotomy was carried out to exclude traumatic reticuloperitonitis. A liver biopsy, liver enzyme determinations and a liver function test indicated that no gross liver pathology was present. A persistent mild hypoalbuminaemia and hyperphosphataemia were the only abnormalities found during laboratory investigations. Throughout her 3 week hospitalisation period the consistency of her faeces remained firm. At this stage the animal had deteriorated significantly and was now very thin and weak. Due to a poor prognosis and the lack of a specific diagnosis, the animal was euthanased.

Macroscopic pathology showed severe diffuse thickening and corrugation of the mucosa of the duodenum, jejunum and ileum.

The mucosa of the caecum was only very mildly affected. The mesenteric lymph nodes were enlarged. Some areas of arteriosclerosis were present in the aorta. Microscopically there was a diffuse infiltration of epithelioid cells into the gut mucosa. Clusters of acid fast bacilli were present in many of these cells. A retrospective complement fixation (CF) test carried out on stored serum was positive for Johne's disease.

Case 2

An adult Brahman cow was presented with a history of chronic weight loss and a profuse diarrhoea. The animal was very excitable and strongly resisted any attempts at handling. On rectal examination hard lumps, suspected to be mesenteric lymph nodes, were palpable. Based on the clinical signs and rectal examination a preliminary diagnosis of Johne's disease was made. An attempt to confirm the diagnosis was carried out by using the intravenous Johnin test as described by Larson⁵, using 2 ml of the antigen. Great difficulty was encountered in restraining the animal for this procedure. The cow's ex-

*Department of Medicine, Faculty of Veterinary Science, University of Pretoria, P.O. Box 12580, 0110 Onderstepoort.

citement and aggression caused her to develop severe muscle tremors. Once the Johnin had been administered and her rectal temperature recorded, she was left in the crush for the full duration of the test. Her rectal temperature was taken 3, 4½ and 6 hours after the first recording.

The results of the test can be seen in Table 1.

Table 1: RESULTS OF THE INTRAVENOUS JOHNIN TEST CARRIED OUT ON CASE 2

	Temperature recordings Time in hours after Johnin administration			
	0	3	4½	6
BODY TEMPERATURE °C	39,0	39,1	39,3	39,6
AMBIENT TEMPERATURE °C	24	25	26	27

The results of the intravenous Johnin test in this case were regarded as inconclusive. The diagnosis of Johne's disease was confirmed on an impression smear from a mesenteric lymph node biopsy.

CONCLUSION

Diarrhoea is usually a very constant sign associated with advanced clinical cases of Johne's disease^{2,3}. The diarrhoea can be intermittent and may only develop some months after the onset of the clinical disease^{2,3}. In general, diarrhoea can be due to deranged intestinal motility, decreased absorption and increased secretion⁸. Deranged intestinal motility includes increased propulsive movements, decreased segmentation and pendular and reverse peristaltic movements⁸. Decreased absorption can result from changes in the intestinal absorptive surface, including mucosal loss, cellular infiltration or the presence of excessive amounts of osmotically active material in the bowel lumen⁸. Increased secretion can be an active or a passive process. In the latter instance it is usually associated with an increased gut permeability⁸.

There are several possible mechanisms which may produce diarrhoea in Johne's disease⁸. Increased secretion has been shown to occur^{1,6}. This occurs through an increased pore size in the junctions between epithelial cells, resulting in a protein losing enteropathy^{1,6}. This and malabsorption through cellular infiltration will result in an increase in osmotically active substances in

the bowel lumen which in turn leads to interference with water reabsorption, thus leading to a diarrhoea. Increased intestinal fluid caused by a primary mucosal derangement could also secondarily stimulate increased peristalsis⁶. This could also be a contributory mechanism in the pathogenesis of the diarrhoea associated with Johne's disease.

Several of these factors causing diarrhoea were present in the first case reported on here. The hypoalbuminaemia indicated the presence of a protein-losing enteropathy. Thickening and cellular infiltration of the small intestine probably resulted in malabsorption. The increased fluid content of the small intestine could have caused a greater number of propulsive movements. The large intestine of this animal was, however, virtually unaffected which probably explains the absence of a diarrhoea in this case due to normal water resorption in this area. In fact it could be speculated that an increased amount of reverse peristaltic movements occurred which would explain the continuous dry consistency of the cow's faeces.

A positive Johnin test is based on a body temperature rise of 0,9 °C or more over the pre-injection temperature provided the highest temperature recorded was at least 39,6 °C⁵. In the second case reported here the temperature did rise to 39,6 °C after 6 hours but this was lower than the pre-injection temperature. The initial high temperature in this cow can be attributed to her temperament. The use of the intravenous Johnin test as a practical test is severely restricted in this country due to the high ambient temperature and the poor temperament of Brahman cattle who so far have shown the highest incidence of the disease.

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GOUE MEDALJE VAN DIE SAVV VIR 1983

BAREND CORNELIS JANSEN



Die Goue Medalje van die Suid-Afrikaanse Veterinêre Vereniging vir voortreflike of hoogstaande wetenskaplike prestasie en/of 'n betekenisvolle bydrae tot die vooruitgang van die wetenskap is vanjaar aan prof. Ben Jansen toegeken.

Barend Cornelis Jansen is op 12 Augustus 1921 in Cradock, Kaapprovinsie gebore, waar hy ook skoolgaan. Hy presteer as skolier deurgaans en bekroon sy skoolloopbaan deur in 1939 met eerste klas te matrikuleer en die Dux-medalje te verower. Hy sit sy akademiese loopbaan aan die Fakulteit Veeartsenykunde, Universiteit van Pretoria te Onderstepoort voort en verwerf in 1944 die B.V.Sc.-graad (cum laude), terwyl die gesogte Theiler – medalje ook aan hom toegeken word.

Hierna volg een van die mees briljante en veelsydige veterinêre loopbane wat Suid-Afrika nog geken het. Prof. Jansen presteer inderdaad uitsonderlik in elke sfeer van wetenskaplike aktiwiteit waarin hy hom begeef, hetsy as navorser, akademikus, leermeester en leier van wetenskaplike instellings en wetenskaplike bedrywighede.

Sy loopbaan as veearts neem in Johannesburg 'n aanvang waar hy vir ongeveer 5 jaar praktiseer. Daarna begeef hy hom na die Navorsingsinsinstituut vir Veeartsenykunde, Onderstepoort en begin sy navorsingsloopbaan op 'n hoë noot in die Afdeling Protoosoölogie waar hy ontdek dat tetrasikliene 'n chemoterapeutiese werking teen die moeilike behandelbare *Babesia equi* besmetting het.

Daarna word hy na die Afdeling Bakteriologie oorgeplaas waar hy hom in dié vakgebied verdiep en heel gou navorsingswerk van internasionale gehalte verrig. Aanvanklik gee hy heelwat aandag aan bloednier. Sy werk op die oorsaak, eksperimentele verwekking en, veral, die immunologie van die siekte en die ontwikkeling van

'n baie doeltreffende entstof, vorm die fondament waarop die beheer van die siekte, soos dit tans in Suid-Afrika daar uitsien, gebou is. Op sterkte van hierdie en ander werk word die gesogte "Nuffield Fellowship for Research in Biological Sciences" vir studies in Brittanje in 1956 aan hom toegeken.

Voorts wend hy hom ook tot navorsing op lamsiekte. Onder andere karakteriseer hy deur middel van besonder gesofistikeerde, basiese navorsing die antegeniese toksien-fraksie van die veroorsakende mikroöbe, *Clostridium botulinum*. Hierdie inligting is nie net van groot waarde vir die vervaardiging van 'n entstof of antiserum teen lamsiekte nie, maar werp ook lig op die genetiese samestelling van die organisme, wat op sy beurt die taksonomie van die organisme toelig. Hy gee ook heelwat aandag aan ander aneroöbe-siektes soos tetanus.

Sedert 1978 is hy in 'n heelwat nuwe hoedanigheid op Onderstepoort werksaam, naamlik as hoofnavorser van die SA Wolraad. Toegewyde navorser wat hy is het hy in 1978, terwyl hy as Hoofdirekteur werksaam is, besluit dat hy die laboratoriumbank bo die pen van administrerender, al is dit op die hoogste vlak, verkies. Sy taak is om onvrugbaarheid by skape, veral epididimitis by ramme te ondersoek. Hy het reeds goeie vordering met hierdie navorsing gemaak en het proefondervindelik bewys hoe die organismes wat betrokke is, aangehelp deur hormonale invloede, die epididimis bereik deur van die omgewing buite die liggaam 'n opstygende infeksie te bewerkstellig. Hierdie bevinding geniet internasionale belangstelling.

Benewens die 41 wetenskaplike publikasies van besondere gehalte wat reeds uit sy navorsing voortgevloeit het, het prof. Jansen reeds 3 doktorsgrade op sterkte van sy navorsing in S.A. verwerf:

1. In 1960, die D.V.Sc. (cum laude) aan die Universiteit

Pretoria.

2. In 1966, die D.Sc. aan die Potchefstroomse Universiteit vir CHO.
3. In 1971, die Ph.D in Mediese Wetenskap aan die Universiteit Stellenbosch.

Sy akademiese opleiding en kwalifikasies is by enige standarde gemeet uitsonderlik.

Hierdie is enkele hoogtepunte uit sy navorsingsloopbaan wat vermag is ten spyte van die feit dat hy op relatiewe jeugdige ouderdom deur bevordering in 'n bestuursrigting gekanaliseer word waar hy 'n besonder hoë verantwoordelike slas moet dra en dus min tyd vir navorsing beskikbaar het.

Hy word in 1961 op 41-jarige ouderdom as Direkteur van die Navorsingsinstituut te Onderstepoort aangestel, een van die jongste direkteure in die geskiedenis van die Instituut en sal hy onthou word as een van die mees dinamiese leiers wat Onderstepoort ooit gehad het. Ten spyte van die groot administratiewe verpligting wat op sy skouers rus en die tyd wat dit in beslag neem, sit hy sy navorsing met groot welslae voort en slaag hy in 'n verstommende mate daarin om steeds op hoogte met die vele nuwe ontdekkings en ontwikkelings in sy wye belangstellingsveld te bly.

In 1958 word hy tot Hoofdirekteur van Veearsenydienste in die Departement Landbou-tegniese Dienste bevorder en in 1974 word Vee-teelt en Suiwel bygevoeg. Hy dien met onderskeiding op die topbestuur van die Departement.

Die wetenskaplike en ander prestasies van die instellings wat betrokke is, naamlik die Navorsingsinstituut vir Veeartsenykunde, die Navorsingsinstituut vir Vee-en-Suiwelkunde en die Afdeling Veeartsenydiens, getuig van die positiewe en versierende leiding tydens sy diensteryn. Enkele voorbeelde hiervan is: die konsolidering van die diagnostiese laboratoria van die Afdeling Veeartsenydiens in uiters doeltreffende instellings en die uitbouing van die entstofproduksiefunksie van die NIV Onderstepoort in 'n volwaardige fabriek met internasionale aanvaarbare standarde van doeltreffendheid en veiligheid.

Terwyl hy as Hoofdirekteur werksaam is word hy in sy persoonlike hoedanigheid tot die salaris van 'n Departementshoof bevorder, 'n bewys van die besonder hoë aansien wat hy in die Departement geniet. Met 'n enkele uitsondering is dit die hoogste sport in die hiërargie van die Departement van Landbou wat 'n veearts nog ooit bereik het.

Prof. Jansen is seker een van die bekendste dosente aan die Fakulteit Veeartsenykunde van die Universiteit van Pretoria. Sy loopbaan as dosent begin in 1958 toe hy as senior lektor in Bakteriologie aangestel word. In 1963 word hy bevorder tot Professor en Hoof van die Departement Infeksiesiektes, 'n posisie wat hy tot in 1973 met uitlywing van die Fakulteit Veeartsenykunde behou. In 1963 terwyl hy Direkteur van die Instituut is word hy ook verkies tot Dekaan van die Fakulteit, 'n pos wat hy vir 6 jaar met die grootste onderskeiding vul. Hy het dus ook in hierdie faset van sy loopbaan die hoogste sport bereik. In 1976 val die besondere eer hom te beurt om as Ere-Professor in die Departement Infeksiesiektes van die Fakulteit aangestel te word. In 1980 volg nog 'n prestasie toe hy in die nuwe stoel van Professor in Kleinveesiektes aan die Fakulteit aangestel word.

Prof. Jansen is allerweë bekend as een van die beste dosente wat die Fakulteit Veeartsenykunde gehad het. Sy entoesiasme vir sy vak, die lewendige en interessante wyse waarop hy sy lesings aanbied en die streng maar regverdige manier waarop hy die studente hanteer en beheer, het menige student in die veeartsenykunde geïnspireer. Sy bydrae tot die uitbouing van Suid-Afrikaanse veeartse as wetenskaplikes van formaat, of hulle nou navorsers, diagnostici, voorligters, dosente of praktisyns is, is onteenseglik groot. Prof. Jansen het dus ook op die gebied van veterinêre onderwys 'n enorme bydrae tot die bevordering van die veterinêre wetenskap gemaak.

Dit is verder betekenisvol dat hy sedert 1961 die aangewese voorsitter van die Veeartsraad, die hoogste statutêre liggaam van die veterinêre professie, was. Sy bekwaamheid in hierdie amp word daardeur reflekteer dat hy verder in 1983 tot President van die "nuwe" Veeartsraad verkies word. Hy was vanaf 1975 tot 1978 vise-president van die Wêreld Veeartsenykundige Vereniging. Sedert 1960 is hy reeds 'n Volle Lid van die S.A. Akademie vir Wetenskap en Kuns. Hy was vanaf 1961 tot 1978 Raadslid van die S.A. Veterinêre Vereniging, eers as verkose lid en later as gekoöpteerde lid. Vanaf 1969 is hy lid van die Uitvoerende Komitee van die Mediese Navorsingsraad en sedert 1970 is hy lid van die Komitee vir Biologiese Wetenskap van die S.A. Atoomkragraad. Van dieselfde datum is hy Raadslid van die Transvaal Museum. So kan mens voortgaan om voorbeelde van liggame te noem waarop hy funksioneer en op dié wyse gedurig besig is om die wetenskap in Suid-Afrika te dien en te propageer.

Die flinkheid van sy optrede, die wysheid wat hy openbaar en die oorwoënhed van die opinies wat hy uitspreek, het hom in wetenskaplike kringe een van die mees gerespekteerde veeartse in die land gemaak. In hierdie opsig het hy in die afgelope twee dekades die beeld van die veearts in die hoogste wetenskaplike kringe bevorder soos min ander veeartse in die land dit kon vermag. In die buiteland is hy seker ook een van die bekendste Suid-Afrikaanse veeartse.

Dit is verstaanbaar dat ander eerbetonings en toekennings nie agterweë gebly het nie. In 1975 is die Havenga prys van die S.A. Akademie vir Wetenskap en Kuns, 'n goue medalje, aan hom toegeken. Die Goue Medalje van die Suid-Afrikaanse Mediese Navorsingsraad verwerf hy in 1980.

Hy is dwarsdeur sy loopbaan deur sy uiters bekwame en ewe briljante vrou, Joyce, bygestaan tot sy hom in 1982 ontval het. Haar bydrae tot sy loopbaan kan nie onderskat word nie. Hy is pas weer getroud met Magda Duvenhage en die Vereniging wens hulle 'n baie gelukkige samesyn toe.

Hierdie dinamiese, besonder talentvolle, veelsydige veearts, wat die hoogste sport in feitlik elke sfeer van veeartsenykundige bedrywigheid waaraan hy aandag gegee het bereik het, kan waarskynlik saam met die heel grootste veeartse in S.A. gereken word. Hy het nie net dwarsdeur sy loopbaan hoogstaande wetenskaplike prestasies gelewer nie, maar ook die wetenskap op 'n besonder toegewyde wyse dien. Hy voldoen dus by uitstek aan al die vereistes wat vir die Goue Medalje van die SAVV gestel word.

JACK BOSWELL AWARD FOR 1983

ROBERT DOUGLAS SYKES



The Jack Boswell award for 1983 in acknowledgement of dedicated outstanding service to the veterinary calling and/or the veterinary profession and/or the South African Veterinary Association, was awarded to Dr Bill Sykes in recognition of his unstinting efforts both directly for the veterinary profession as well as on behalf of the profession.

He was born on 17 September 1939 and matriculated in 1956 at Marist Brothers, St. Davids, Inanda. After qualifying as a veterinarian at Onderstepoort in 1963 he immediately joined the SAVA while seeing private practice in Natal with Drs Paine, Solomon and Canham. In 1966 he became a committee member of the Natal branch of the SAVA, a position which he held until 1970. At the end of 1972 he left private practice for full time MBA studies at the University of Cape town. He obtained a first class pass in 1973.

In 1974 he joined the pharmaceutical industry – specifically Ciba-Geigy as head of Veterinary Technical Services – a position which he held for one year. He then very successfully pioneered a new direction in the veterinary field in South Africa, namely that of an independent veterinary advisor to pharmaceutical companies. He was also chairman of the Veterinarians in Industry Group of the SAVA in 1976/77.

At this time he again participated in SAVA affairs, firstly being appointed to the Finance Committee and then precipitously being appointed as Chairman of the Committee. In this role he was co-opted onto the SAVA Council and has not missed a single Council meeting to date. He still holds this position.

As head of the Finance Committee, he initiated the system of budgeting, drawing up the first budget with no previous record. He was one of the prime movers in motivating for the appointment of a Director. As such he had to propose the financial viability of such an ap-

pointment and at the time undertook to retain annual SAVA subscriptions at the same level for 5 years. This he achieved. Due to unfortunate circumstances the Director resigned and in his absence Dr Sykes and his partner Dr Catton participated greatly in the further management of the Association's affairs until the situation had been rectified. However, no member of the SAVA can discredit the significant progress in all spheres that was made by this appointment. Our current financial position is very strong and due credit must go to the Chairman of the Finance Committee. Finance is one of the most limiting factors in the success of any organisation in its attempts to achieve its objectives. Due to the current financial strength of the Association's affairs, it can and does today subsidise delegates of Council and its subcommittees' expenses. This has significantly increased the effectiveness of the Association's office bearers and generally improved the level of communications throughout the profession.

In his role as head of the Finance Committee, Dr Sykes was also co-opted onto the SA Veterinary Foundation and he still remains in this capacity. As a part of the Foundation's efforts to promote the profession, he recognised the plight of the rural practitioner. In 1979, as a result of his extensive contact with rural practitioners, he brought the dire straits of this branch of our profession to the attention of both the Foundation and Council. He suggested an in depth study of the veterinary profession in South Africa with particular reference to rural practitioners. He later devised the scheme of local 'think tanks' and offered to chair these. He dedicated an enormous amount of time to this task, attending at least 8 meetings throughout the country and SWA. At the end of these meetings he drafted a report from which the 'Herd Health Scheme' was born. This concept has changed the course of veterinary

education in South Africa, and unquestionably transformed rural practice from an introverted, non-aggressive service to one of the strongest arms of the profession. This re-orientation did not only have an impact on rural practice but on all segments of the profession. Dr Sykes provided the ideas, the drive and leadership for one of the most successful projects ever undertaken by the SAVA.

Dr Sykes is married and has 3 children. Despite the obvious significant amount of time devoted to SAVA affairs, he is also active outside the profession. He is a

keen golfer and Committee member of Nomads (E. Transvaal), Vice Chairman of the Kempton Park SPCA, represents the SAVA on the board of the Professional Provident Society of SA (and has done so for 6 years) and retains his hobbies of squash, swimming, trail walking, reading and amateur dramatics.

Here is a man who has dedicated an enormous amount of his time and life to the benefit of our profession. He has been an ambassador both within and outside our profession, and we believe he deserves our recognition.

BOOK REVIEW

BOEKRESENSIE

ATLAS OF SKIN DISEASES OF THE HORSE DIAGNOSIS AND TREATMENT IN EQUINE DERMATOLOGY

L.F. MONTES and J.T. VAUGHAN

1st Edn. W.B. Saunders Company, Philadelphia, Pennsylvania 1983 pp 202, Plates 70 (colour), Price US \$ 36.50. ISBN 0-7216-6436-9

Sover bekend is dit die eerste boek wat in sy geheel handel oor die vel en veltoestande van perde. 'n Groot leemte word dus hierdeur aangeraak.

Dit is nie 'n teksboek nie, maar bestaan uit opgetekende gevalle wat die skrywers self gesien en hanteer het. Daarom word alle veltoestande van perde dan ook nie in die boek gedek nie, maar na my mening wel die algemeenste en dus belangrikste, aangesien dit kliniese gevalle was.

Inleidend word die struktuur en funksie van die vel kortliks bespreek, gevolg deur definisies van terme wat makroskopiese en mikroskopiese veranderinge van die vel beskryf en 'n kort bespreking oor die neem van velbiopsies. Daarna volg 9 hoofstukke wat 42 verskillende veltoestande

van perde dek. Van elke toestand is een of soms meer kliniese gevalle opgeteken onder die hoofde van klinies, histopatologies, mikrobiologies of mikoties waar van toepassing en behandeling. By elke geval is daar ook fotos van beide die makroskopiese en mikroskopiese letsels. Die boek word dan afgesluit met 'n bespreking in die algemeen oor sistematiese, lokale en chirurgiese behandeling van veltoestande by perde.

Hierdie boek het na my mening beslis baie waarde as 'n verwysingsbron vir studente en praktisyns wat met perde te doen het en hul te help om velprobleme by perde makliker en beter te kan diagnoseer en behandel.

P. Stadler

NAVORSINGSTOEKENNING VAN DIE SAVV VIR 1983

JACOBUS ANDRIES WYNAND COETZER



Die derde ontvanger van hierdie toekenning is dr Koos Coetzer van die Navorsingsinstituut vir Veeartsenykunde, Onderstepoort.

Hy kwalifiseer in 1973 aan die Fakulteit Veeartsenykunde, Onderstepoort en aanvaar in 1974 'n pos as patoloog aan die Navorsingsinstituut vir Veeartsenykunde. Hy maak vinnig opgang as patoloog en word in 1982 bevorder tot Assistent-Direkteur in beheer van die Patologie- en Elektronmikroskopieseksie. Hy behaal die grade B.V.Sc. (Hons) in 1980 en M.Med Vet.(Path) in 1982.

Sy besondere belangstellingsveld is lewerpatologie met navorsingswerk op infeksiesiektes (veral Slenkdalkoors en Wesselsbronsiekte) en op plantvergiftigings (soos pithomikotoksikose en geeldikkop). In 1982 spandeer hy 'n jaar aan die Armed Forces Institute of Pathology in Washington, V.S.A., waar hy hom verder verdiep in lewerpatologie in die algemeen veral die elektronmikroskopie van bogenoemde siektetoestande.

Gedurende 1982 het nie minder nie as 8 artikels waarvan hy outeur of mede-outeur was verskyn. Die toekenning word gemaak vir sy omvattende studies op veral lewerpatologie wat in die onderstaande 5 artikels wat in die Onderstepoort Joernaal en 'n boek van internasionale standaard, gepubliseer is:

Coetzer J.A.W., Ishak K.G. 1982. Sequential develop-

ment of the liver lesions in new-born lambs infected with Rift Valley fever virus. I. Macroscopic and microscopic findings. *Onderstepoort Journal of Veterinary Research* 49: 103-108.

Coetzer J.A.W., Ishak K.G., Calvert R.C. 1982. Sequential development of the liver lesions in new-born lambs infected with Rift Valley fever virus. II. Ultrastructural findings. *Onderstepoort Journal of Veterinary Research* 49: 109-122.

Coetzer J.A.W. 1982. The Pathology of Rift Valley fever. II. Lesions occurring in field cases in adult cattle, calves and aborted fetuses. *Onderstepoort Journal of Veterinary Research* 49: 11-17.

Coetzer J.A.W., Theodoridis A. 1982. Clinical and pathological studies in adult sheep and goats experimentally infected with Wesselsbron disease virus. *Onderstepoort Journal of Veterinary Research* 49: 19-22.

Ishak K.G., Walter D.H., Coetzer J.A.W., Gardener J.J., Gorelkin L. 1982. Viral Hemorrhagic Fevers with Hepatic Involvement: Pathologic Aspects with Clinical Correlations. In: Popper, Schaffner F (ed.) *Progress in liver diseases*. Vol VII, Chap. 29 New York: Grune & Stratton.

Vir hierdie reuse poging van 'n relatief jong kollega word die toekenning met groot vrymoedigheid gemaak.

KLINIESE TOEKENNING VAN DIE SAVV VIR 1983

JOSEPH VAN HEERDEN



Die derde ontvanger van hierdie toekenning is prof. Joseph van Heerden van Medunsa en die toekenning word gemaak vir die beste kliniese artikel wat gedurende 1982 verskyn het.

Prof. van Heerden kwalifiseer in 1970 aan die Fakulteit Veeartsenykunde, Onderstepoort en vestig hom in privaat praktyk te Welkom tot 1975. Sy intense belangstelling in natuurlewe lei daartoe dat hy in 1976 die graad B.Sc.(Hons) Natuurbeheer met lof aan die Universiteit Pretoria, verwerf. Vanaf 1977 is hy Senior Lektor in Geneeskunde aan die Fakulteit Veeartsenykunde, Universiteit van Pretoria en verwerf hier die Dip. Med. Vet. in 1978 en die M.Med.Vet.-graad in

1982. In 1982 word hy aangestel as die eerste Professor en Hoof van die Departement Geneeskunde aan die Fakulteit Veeartsenykunde, Medunsa.

Die Kliniese Toekenning word aan hom gemaak vir die hoë wetenskaplike standaard van 'n artikel wat lig werp op 'n tergende, moeilike diagnoseerbare en moeilike behandelbare siekte by honde wat in die warmer dele, en veral in die operasionele gebiede, 'n wesenlike probleem is:

Van Heerden J. 1982. A retrospective study on 120 natural cases of canine erlichiosis. Journal of the South African Veterinary Association 53: 17 – 22