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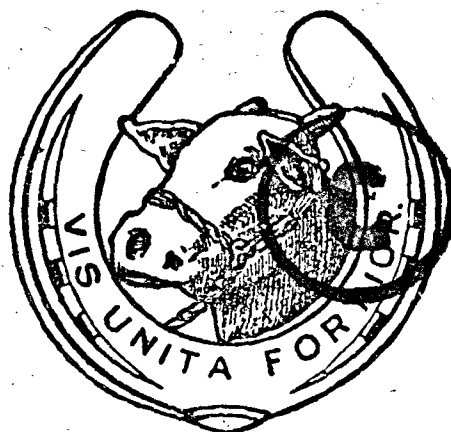
Vol. 37, No. 9

SEPTEMBER, 1960

THE INDIAN VETERINARY JOURNAL

(The Journal of the Indian Veterinary Association)

*A Monthly Record of
Veterinary Science*



(ESTD. 1924)

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Vol. 37

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[THE JOURNAL OF THE INDIAN VETERINARY ASSOCIATION]

PUBLISHED MONTHLY

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A Monthly Record of Veterinary Science
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Veterinary Profession

★

EDITOR

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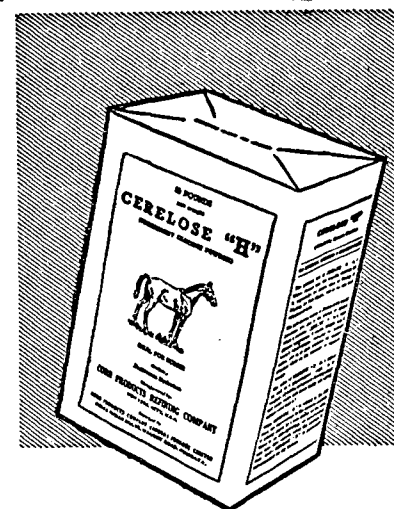


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The Indian Veterinary Journal

(The Journal of the Indian Veterinary Association)

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THE

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Editorial

SOUTH AFRICAN HORSE SICKNESS

It is highly unfortunate that this disease should have made its appearance in this country, at a time when the whole question of racing and horse-breeding is still in the melting pot. We are afraid it will hamper the progress of the tireless efforts of a none too large a number of enthusiasts in the field. It will dampen their feelings no doubt, but they should soon learn to say '*nil desperandum.*' The Veterinary profession in India is solidly behind the livestock industry and is sufficiently well-equipped to take up any such challenge in the field of Veterinary Medicine. Immediate steps have already been taken to control this disease. The speed and alacrity with which this was done speaks volumes for the efficiency of Veterinary service in India.

This disease is a virtual 'dark horse' from a dark continent and it may be helpful to all concerned to review briefly the literature available so far on this disease.

Though this disease was first recorded as early as 1719, it was only in 1900, McFadyean demonstrated the cause to be a filterable virus which is highly resistant to putrefaction (2 years) but is soon destroyed by sunlight or drying. It has been demonstrated that the blood of recovered horses may retain the virus as long as 90 days. It has been claimed that there are as many as 28 immunologically distinct types of virus. That should indicate the rugged path that one has to traverse in preventive work.

The principal home of this disease is South and Central Africa and the Nile Valley in Egypt, though it has been recorded in the Middle East in 1944 and now in India. Horses are the most susceptible, though

mules and donkeys are also affected—but to a lesser extent. Experimentally, cattle, sheep, goats, dogs, guinea-pigs and mice have been infected. Dogs eating the flesh of horses dead of this disease, contract the disease.

The disease generally makes its appearance in heavy rainfall areas, in warm moist places such as swamps, valleys and river beds, where mosquitoes abound. There is no absolute proof of its means of communication from animal to animal. It is not conveyed by direct contact. It is surmised that mosquitoes and some flying insects are the probable vectors. Certain species of *Culicoides* are incriminated. It is this uncertainty as to its method of spreading that makes this disease difficult to tackle. The incubation period is from 7 to 9 days and may even go up to 14 days. Animals exposed at nights in open fields to the bite of insects, appear to get the disease more often than those that are stabled and are comparatively better protected.

The disease may run an acute or sub-acute course. In the acute course (*Dunkop*) the disease assumes a pulmonary form with oedema of the lungs, acute emphysema, hydrothorax, infiltration of the interlobular tissue, occasional cough, and running from the nostrils which increases in volume and becomes frothy as the disease progresses. Breathing is hurried and laboured with legs apart and becomes abdominal. There is rise in temperature and the conjunctiva is purple in colour.

In the sub-acute form (*Dikkop*), there is oedema of the head, neck, shoulders, sternum and abdomen. A mild form of the disease and a mixed form have also been recorded. There is no known specific cure for this disease. One has to depend mainly on preventive measures for the control of this disease. These measures consist in the proper disposal of carcasses, stabling the horses before sunset, preferably in mosquito-proof stalls, smoking the stalls from time to time, applying or spraying some form of repellent dressing on the horses to keep off the flies and having recourse to preventive vaccination. The vaccine used is a polyvalent freeze-dried one, incorporating eight different strains attenuated by intracerebral passage in mice. It is said that it takes at least a month before immunity develops and that complete immunity develops only three months after vaccination. Thus the vaccination should be properly planned to tide over the 'season.' The vaccinated animals should not be worked for three weeks at least after vaccination. Mares in foal may be inoculated 14 days before or after foaling.

We are glad to learn that the I.V.R.I., Mukteswar, has already taken up this problem. The Indian strain of virus needs to be typed and studied. The vectors and all possible hosts require their special attention. We would advise a special squad or two of Research Workers being sent round the affected areas. Our equine industry is as yet undeveloped. It can't withstand the ravages of this terrible disease. It is not a matter to be treated in a casual manner. Both Pakistan and India should tighten their import regulations with regard to the import of horses from foreign lands. The outbreak in the Middle East in 1944 was tackled in the following manner :—

- (1) Slaughter of affected animals and proper disposal of carcasses.
- (2) Stabling of animals at night.
- (3) Prevention of import of animals from affected areas.
- (4) Disinfection of aircrafts arriving from infected areas.

Let us hope India will successfully stamp out this disease, before it takes a foothold in this country.

AN EXAMPLE TO BE EMULATED

The British Veterinary Journal has been our model ever since the inception of this journal though we can by no stretch of imagination lay claim to its high standard. In a leaflet enclosed with the July 1960 issue of our esteemed contemporary, we find the following announcement from the publishers :—

“For many years the *British Veterinary Journal* has had one or two Editors who alone have borne the whole burden of the Editorship. It has for some time been obvious that a change in this somewhat exacting method was desirable and it was therefore decided to appoint an Editorial Board. As will be seen from the cover this has been done, and we are happy to be able to report that Mr. J. N. Ritchie has accepted the Chairmanship of the Board and has gathered round him representatives from all the British Veterinary Schools and from the British Commonwealth. We are also glad to be able to report that Professor J. A. Laing has accepted appointment as Editor”.

Those who know the inside working of the *Indian Veterinary Journal*, will not hesitate to admit how very similar conditions were and continue to be with regard to this *Journal*. May we point out that it is not only "exacting" but highly detrimental to the proper development of professional journalism to keep it going as a 'one-man's show'. It is difficult to maintain standards much less to improve on them. We have been urging on the management from time to time to take up the question of reorganisation of running this *Journal*. But they have been up against the wall every time they got down to brass tacks. True it is, conditions in India differ vastly and there is nothing like an Independent Veterinary profession in this country. Those in Government service are cribbed and cabined by rules and regulations and are not able to associate themselves with non-official Journalism, even though that Journalism is mainly professional in character. But some way has to be found and things cannot continue as they are to-day. We have in fact submitted our resignation eight months ago, asking to be relieved from January 1961. As could be seen from the proceedings of the Managing Council published elsewhere, the evil day is being postponed. "How long?" is the question.

Now comes this good example from our British contemporary. The Editors have been changed and an Editorial Board has been set up. May we suggest that immediate steps should be taken to bring about a similar change with regard to this *Journal*. The *I. V. J.* should be broad based and made constitutionally fool-proof. We cannot afford to lose it after 37 years of its existence. When once we lose it, either by accident or due to lack of proper planning, the profession would have lost much. It would be difficult to retrieve the lost ground. This *Journal* was founded, nurtured and brought up under extremely difficult conditions by a handful of selfless workers. With pardonable pride, we wish to state that as the last of the Romans, we find it difficult to desert the *Journal* in spite of our advancing age and failing health. But this cannot last long. The spirit is willing but the flesh is weak. There is a limit for human endurance. Will not the present times produce similar selfless workers as in the past to take up this journalistic work? Let such men volunteer and inform the management.

Long live the *I. V. J.* !

An Announcement

No. F. 6-71/60-G.

INDIAN VETERINARY RESEARCH INSTITUTE,
IZATNAGAR, U. P.

Dated the 6th September 1960

Sir,

You will be aware that South African Horse Sickness has gained entry into our country having first struck the equine population at Jaipur. Prior to this, the disease was reported to have reached Pakistan *via* Persia.

Since the disease was unknown in this subcontinent till recently to the profession, the veterinary workers in India did not have any experience of dealing with this fatal equine epizootic. Now it has shown tendency to spread to the different parts of the country, it would be very desirable that the field workers should know about the disease, and particularly the procedure of collecting the material for laboratory diagnosis.

South African Horse Sickness is primarily the disease of the horses, although it might as well attack the donkeys and the mules. It is known to occur in many clinical forms, although the present outbreak in the country appears to be only the cardiac manifestation. It is caused by a virus in which plurality of strains is known to exist. At least seven immunologically distinct types have been recognised by the South African workers who are the pioneers in this field.

In order to render necessary laboratory help and also to study the biological characteristics of the virus involved with a view to define strain differences if any, the Indian Veterinary Research Institute has established a separate laboratory for investigation and research on this disease. This can be facilitated only if the field workers would despatch the right type of materials under proper conditions of preservation and storage. For this purpose, I would consider it appropriate that the Veterinary Disease Investigation Officers of the respective states undertake this duty of sending the material to the Indian Veterinary Research Institute, Mukteswar and not Izatnagar.

The material should be collected in the form of blood from the affected cases, especially at the height of the febrile reaction in O. C. G. (Oxalate Carbollic Glycerine) mixture. The formula for the O. C. G. stock mixture is as follows:

Potassium oxalate	...	5 gramme.
Carbollic	...	5 gramme.
Glycerine	...	500 ml.
Water	...	500 ml.

Add blood in equal quantities.

Spleen collected from the freshly necropsied animals and preserved in glycerine buffer phosphate solution of pH 7.2 to 7.6 can also be sent.

It would be preferable if the material collected as above is despatched to this Institute in thermos on ice.

Yours faithfully,
P. G. PANDE, M.Sc., M.B.C.V.S.,
Director.

Notice

THE INDIAN VETERINARY JOURNAL

The Year 1960 is coming to a close. We appeal to our subscribers to clear their arrears before the year is out. Subscription is strictly payable in advance and the amount is to be paid "nett" without deducting the M. O. commission.

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The Managing Council has recently decided to supply the *I.V.J.* to all *bonafide* students of Veterinary Colleges at a concessional rate of Rs. 6/- per annum, if they apply through their respective Principal. It is hoped the students will come forward to avail of this concession.

Editor, I. V. J.

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General Articles

NOTES ON THE INCIDENCE OF HARD TICKS OF THE SUB-FAMILY AMBLYOMMINAE SALMON ET STILES, 1901 IN MADRAS

By

V. S. ALWAR, B.V.Sc., M.Sc.,
Madras Veterinary College.

Though the tick fauna in India is rich in species as well as in number, literature on this important group of parasites is not adequate enough. Knowledge of Indian ticks dates back to the time of Linnaeus and Rudow who described a few species in 1758 and 1870 respectively. Neumann, Stiles and Hassal, Christophers, Warburton, Nuttall, Patton and Sharif (Sharif, 1928) contributed considerably to the study. Almost all the available information on the morphology and incidence of ticks in India is found in the publications of Nuttall, Warburton, Cooper and Robinson (1908-1926), Sharif (1928) and Sen (1938). The routine examination of ticks in the Parasitology Department of the Madras Veterinary College has revealed some interesting facts about the hosts and incidence of the genera *Dermacentor*, *Amblyomma*, *Aponomma* and *Haemaphysalis* which comprise the sub-family Amblyomminae and they are recorded in this note.

Dermacentor auratus Supino, 1897. This is the only species of the genus *Dermacentor* recorded in India. It has been found to attack wild mammals as bear, boar, deer and leopard besides human beings in Assam, Bengal, Bihar, Uttar Pradesh and Bombay. One ♂ of this species off a cow in Coimbatore district was received for identification in the laboratory. This is the first record of its occurrence in Madras State and it also reveals a new animal host other than the ones mentioned above.

Amblyomma integrum Kavsich, 1879. The incidence of this species is confined to Orissa, Bombay and Madras and its chief hosts are cattle and buffaloes, though it has also been found infesting pigs, fowls, fishing cats and wild animals. Robinson (1928) recorded its occurrence on calves in Guindy and Saidapet only in Madras whereas our collections are from Sivagiri (Madras), Palghat (Kerala) and Jangareddigudam (Andhra) from cattle and buffaloes.

Amblyomma mudaliari Rao, Hiregaudar and Alwar, 1960. This new species was encountered in the collections of ornate ticks from cattle and buffaloes and it resembles *A. integrum* to some extent.

Amblyomma testudinarium Koch, 1844. This species has so far been recorded from Assam, Bengal, Bombay and Coorg off cattle, tiger, Sambhar deer and wild boar. Sen (1938) considered the goat and the bear also as probable hosts. One ♀ tick of this species was found amongst a collection of *Rhipicephalus haemophysaloides* off a hyaena from Coimbatore district. This finding is the first record of the incidence of this species in Madras State and hyaena is a new host for this tick.

Amblyomma sp. A few nymphs were collected from an elephant. The only previous record of *Amblyomma* off the Indian elephant *A. elephantinum* (*Acarus elephantinus*) was considered as a doubtful species by Neumann (Sharif, 1928). African elephant however has been found infested by a number of species of *Amblyomma* (Neveu Lemaire, 1938).

Amblyomma crenatum Neumann, 1899 was mentioned by Patton and Cragg (1913) as occurring in South India while Robinson (1926) considered it as an African species off Rhinoceroes. This tick has not been encountered in Madras State so far by us.

Aponomma gervaisi (Lucas, 1847). Patton and Cragg (1913) noticed it commonly off the rat snake - *Zamensis mucosus* and the lizard *Varanus bengalensis* in Madras. The specimens in this Laboratory are listed as from iguana and it is felt that it may refer to only *Varanus* sp. as iguana is a New world reptile.

Aponomma pattoni Neumann, 1910. This species was described from the specimens collected by Patton off a rat snake at Saidapet in Madras. To the author's knowledge no further information on its incidence in India is available. The specimens with us were collected from a cobra in Hosur Cattle Farm. A few ticks of this species have also been received taken from a cow. Similar interesting records of infestation of mammals by the reptile ticks have been made by Sharif (1928) Henry 1938 and Hoogstraal (1956).

Aponomma laeve Neumann, 1899 recorded by Sharif (1928) from cobra in Coimbatore has not been encountered in this laboratory.

Haemophysalis bispinosa Neumann, 1897. This common tick of India has been found to infest a fowl. This unusual incidence reminds the author of a similar record in Singapore by Scott (Nuttall and Warburton, 1915).

Haemophysalis leachi var. *indica* Warburton, 1910. This species was obtained from a cow, a panther and a mongoose. It is of interest to note that Patton secured specimens of this species from the last named host in 1909 (Nuttall and Warburton, 1915) and since then no record of its occurrence in Madras is available.

Haemophysalis parva Neumann, 1908. This species has been recorded so far only from wild animals as tiger, panther and *Lepus* sp. in Orissa and from cattle in Mysore. The present collections are from sheep, a cat and a hare. *Haemophysalis* sp. mentioned by Patton and Cragg (1913) on South Indian hare might probably be of this species.

Haemophysalis turturis Nuttall and Warburton, 1915. This species has been recorded only in Cochin off Nilgiri wild goat and in Uttar Pradesh off cattle. All the collections so far made contained only males and hence the description of the female of this species has not been made. The ticks collected from a barking deer at Topslip by the author are referable to this species and both the sexes are represented in the collection. The description of the female will form a separate paper.

Haemophysalis flava Neumann, 1897 was collected from a dog in Madras by Phadke in 1906. This species has not been met with in the course of our examination.

Acknowledgments

The author is highly grateful to Dr. Carleston M. Clifford of the Rocky Mountain Laboratory U.S.A. for his help in the determination of the ticks and to Dr. Bertie A. D'Souza, Principal, Madras Veterinary College for the facilities afforded.

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BULL AS A SPREADER OF CONTAGIOUS ABORTION WITH SPECIAL REFERENCE TO THE METHODS OF DIAGNOSIS OF BRUCELLOSIS IN BULL

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Almost simultaneously with the discovery of the *Brucella* bacteria, suspicion was aroused that the bull was the spreader of infection. This suspicion became stronger when Buck *et al* (1919) and other research workers showed that the bulls often give positive blood reactions and that the *Brucella* organisms not infrequently produce specific inflammation in the testes and the epididymis and specially in the seminal vesicle. *Brucella* organisms were also found to be excreted with the semen. On the other hand, the observations of Hadley and Lothe (1917), Cotton (1919), Simms and Miller (1921) and Thomsen (1943) indicated that the theory of the bull's infectiousness was hardly of universal validity. The research has produced no proof that copulation infection has any influence on the spread of the disease in spite of the fact that some of the bulls, which were used for the experiments at the time of service, excreted abortion bacteria with the sperm. Recent research, in Denmark and the United States has again brought up the question of the bull as a spreader of infection, specially in connection with artificial insemination. A particularly heavy *Brucella* infection was demonstrated in the presence of acute vesiculitis, ampullitis, and epididymitis; in 5 bulls suffering from such involvement it was proved that the infection was passed on by artificial insemination to a large number of healthy herds, at least 73, and probably more. In 12 of the herds the inseminated animals had abortions. Brandly and Jungherr (1957) think that in certain circumstances bulls can transmit Brucellosis with the sperm during copulation or through artificial insemination, in spite of the many negative research results. But it is not a common occurrence. The danger of spread of infection on a large scale by semen in artificial insemination has been pointed out by them. As *Brucella* organisms are excreted in the semen very irregularly, the natural service by bull excreting *Brucella abortus* only rarely infects the served cows. Kelser and Schoening (1948) discussing about the natural mode of infection with *Brucella abortus* remarked that investigators, generally, are agreed on the fact that infection readily takes place through the alimentary canal as a result of ingesting contaminated food and water, while the possibility of infection by way of the genital tract has been denied by a number of prominent workers. In contending

against the bull as a transmitter of the infection, it is held that if copulation between a normal cow and an infected bull is permitted only on "neutral" ground, transmission of the disease will be avoided. The view is taken that the infection will not take place through the genital tract; but where semen, dripping from the penis of the bull or leaking from the vagina of the cow, contaminates pastures, food, or water, animals may subsequently become infected through the alimentary tract.

Diagnostic Methods

The diagnostic methods may be broadly classified into (A) Clinical, and (B) Bacteriological.

- (A) *Clinical*:—Evidences of orchitis, epididymitis, seminal vesiculitis, and synovitis commonly involving knee joints are suggestive of Brucellosis in bulls. There are no other means of clinical diagnosis.
- (B) *Bacteriological*:—Out of the many tests recommended by various workers, those which are commonly adopted are (i) Serum agglutination test, (ii) microscopical, cultural and biological tests of bull semen, and (iii) tests as under (ii) for synovial fluid, if any.

Serum agglutination test has its limitations. Thus, Brandly and Jungherr (*loc. cit*) refer to the recent Danish observations which indicate that the blood samples from the bulls do not suffice as a means of diagnostic evaluation. The blood samples from known infected bulls can fail, though this is rare. It must be borne in mind that even a low titre of 1 in 10 is suspicious in bulls. It is even characteristic for *Brucella* infections in the chronic stage where a titre of 1 in 20 is to be regarded as positive, when the 50% agglutination end-point is adopted and the office of International Epizootics Standard dried serum is tested with the antigen. They further refer to a case of acute *Brucella* infection of the pars glandularis ductus deferentis in a bull. Large numbers of *Brucella* bacteria were demonstrated in the semen; at the same time there was an agglutination titre of 1 in 20.

Commenting on the limitations of the bacteriological examination of semen of bulls known to be suffering from Brucellosis, Brandly and Jungherr (*loc cit*) observed that the excretion of the bacteria in semen is very irregular and repeatedly interrupted. That makes the diagnosis by cultural and biological methods somewhat difficult. Such bulls have to be subjected to the blood agglutination test. It, therefore, appears that the experienced workers prefer blood agglutination test to the semen examination for the reasons stated above. Although tube agglutination titre is more indicative than the result of the plate agglutina-

tion test, the Veterinarians commonly adopt the latter method for convenience in dealing with the ferocious and unmanagable stud bulls. Wherever possible the plate agglutination test should be followed by the tube agglutination test.

Arthritis with hygroma commonly in the knee joints of the bulls is a symptom of chronic Brucellosis. The synovial fluid should be aseptically tapped and subjected to the microscopical, cultural and biological tests. The present author diagnosed a case of Brucellosis in one aged A.I. Centre Bull belonging to Bengal Veterinary College in 1956 by examination of synovial fluid tapped from a No. 1 foot ball-sized hygroma of the hock joint (hock-joint involvements are uncommon). Biswal (1956) reported that on one occasion *Brucella* organisms were isolated from the synovial fluid of the knee from one of the animals of Jharsuguda Goshala.

Results of Tube Agglutination Tests with Sera from Bulls Conducted at the Bengal Veterinary College

Investigation of Brucellosis in bulls was started since 1956 by the present author after the positive diagnosis of Brucellosis in one A.I. centre bull, referred to above. Tube agglutination tests with sera collected from 50 stud bulls stationed at Bengal Veterinary College and at various private farms and Pinjrapoles in and near about Calcutta were done during this period. In compliance with an I.C.A.R. circular, serum samples from 20 stud bulls stationed at various A. I. centres in West Bengal were also sent by the Livestock Officers, thus increasing the total number of samples examined to 70. In one bull out of 70, there was direct evidence of Brucellosis, but its tube agglutination end-titre was only 1 in 40 (complete). 2 bulls gave end titres of 1 in 20 (complete). 12 bulls gave end-titres of 1 in 10 (complete), 10 bulls gave end-titres 1 in 10 (partial). The rest gave no titre at all. Suitable steps have been taken to dispose off the bulls which gave end titres of 1 in 20 (complete) and above. Out of 45 bulls which gave no titre at all, 15 were in herds from which contagious abortion in cows was reported.

Discussion

Experiences of various workers indicate that agglutination titre in the serum of bulls known to be suffering from Brucellosis is not comparable with that obtained in cows declared positive for contagious abortion. Diagnosis based on agglutination titre of bull serum should be arrived at in accordance with the data presented by Brandly and Jungherr (*loc cit*). Workers overlooking this fundamental difference between the agglutination titres of *Brucella* infected bulls and cows will fail to discharge their duties of detection, control and eradication of Brucellosis in breeding bulls. In these days, A. I. centres are very important

for the livestock improvement in the country. We should know the agglutination titres of the bull serum which will allow us to declare a 'positive', 'doubtful' or 'negative' result.

It may be mentioned that workers who, after careful studies, have declared the specific agglutination levels in the blood of *Brucella* infected bulls, have refrained from commenting on the possible reason of this disparity between the specific agglutination levels of *Brucella* infected cows and bulls. It appears that the *Brucella*, which are very slow in their antigenic action, are localised in such tissues of the bull which are not so plentifully supplied with responsive cells associated with antibody formation. In the absence of any indication in the available literature, the explanation given above seems to be the only answer to this immunological paradox.

Summary

(1) Available literature on the subject of bull as a spreader of Contagious abortion in cows has been reviewed.

(2) Limitation of the diagnostic tests for detecting Brucellosis in bulls have been discussed.

(3) Results of tube agglutination tests with sera from 70 stud bulls conducted at Bengal Veterinary College are recorded.

Acknowledgment

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EXPERIMENTAL STUDIES ON TRAUMATIC RETICULITIS IN CATTLE

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Traumatic reticulitis in bovines is an acute problem in the field of Veterinary Medicine for diagnosis of the condition at the earliest possible time in order to take up the effective line of treatment. In villages very early symptoms of the disease are generally overlooked by the farmers and the patients are presented to the clinician at a later stage of the disease when the complications have already started. Hence the Veterinarian is very much troubled as to how best he could help the farmers in the effective treatment of the condition since the remedy does not prove very successful in advanced stage of the disease. Early diagnosis of traumatic gastritis is not so easy in the field cases whereas it is easier in well-managed herds with correct records under the farm conditions. However, no one can deny the importance of the following symptoms associated with cases of "wire-disease".

- (1) Temperature rise.
- (2) Neutrophilia with shift to left.
- (3) Expiratory grunts when pressure applied over the thoracic spine and below the xiphoid cartilage of the sternum.

Other additional factors need to be studied which help in recognition of the condition, are constipation with pelleted faeces, stoppage of milk flow in cows and indigestion. It is a fact that all these symptoms may not be detected in all the cases but good history with some of the symptoms may be recorded to suspect or even to identify the disease. Sometimes, in the absence of typical symptoms one may get confused with indigestion. If the veterinarian is not alert such indigestion cases in the absence of unknown etiology and no response to ordinary treatment may be real cases of traumatic reticulitis. It is recorded that the patients in the early stages of traumatic gastritis *i.e.* about 48 hours from the onset of symptoms and when the lesion is limited to the wall of the reticulum and the sharp metallic object is still lying in the lumen of the organ, the treatment is most effective.

Foreign bodies like long metallic objects when ingested reach the reticulum after a variable time because they are propelled along with the food in the rumen due to the contractions of the rumen. On the other hand small metallic pieces due to their action of gravity settle on to the floor of the reticulum easily and thus produce lesions on the wall

of the reticulum. We also know that the contributory factors for the production of such lesions on the reticular wall depends on factors such as nature, shape, length and position of the metallic objects and movements of the diaphragm, abdominal muscles and pressure from the gravid uterus. Kingrey (1955) performed experimental studies of Bovine traumatic gastritis on 10 healthy cows kept under normal conditions and environment and studied the initial diagnostic symptoms in all cases. The clinical symptoms developed in such experimental animals are on the average of 30 hours after the ingestion of foreign bodies. Surgery (rumenotomy) was performed on an average of 48 hours after the onset of symptoms and he recovered the foreign bodies from the reticulum of such animals. All had complete recovery following the operation. To those experimental animals he administered 30 foreign bodies 2" long and recovered 25 from the reticulum, 3 on the anterior dorsal sac and 2 on the floor of the rumen. Out of 25 only 19 were puncturing the reticulum. Bearing all these valuable informations and references from the previous studies the author intends to study the following points from the experiments conducted.

1. Actual time taken for the appearance of the general clinical symptoms of traumatic reticulitis in cattle after experimental ingestion of sharp metallic objects.
2. To follow up the fate of the foreign bodies in the experimental animals.
3. To record any other clinical observations in the absence of typical symptoms of traumatic gastritis.

Materials and Methods

Two brahmini bulls aged about 6 years and two young bullocks of about 3 years of age were selected for the purpose of the experiment. They were thoroughly examined for the evidence of any disease and were kept under normal diet, the best care and management. Observations were made for a period of 25 days and were made sure that they were maintaining perfect health before the actual experiment was commenced.

To one experimental bull No. 1 two metal pieces 1½" long sharp at one end and coiled at the other were introduced into the stomach in gelatin capsules by the help of a cattle balling gun. To the other bull No. 2 two sharp straight sewing needles 4" long were introduced into the rumen through a canula at the point of trocarisation.

To the other two experimental bullocks one metallic piece for each bull, 1½" long sharp at one end and coiled at the other were introduced in gelatin capsules by a balling gun. After ingestion of the foreign

bodies, all the animals were tested with the metal detector to confirm the presence of the metal pieces in the reticulum.

Clinical Examinations on four animals were done on the following points before the commencement of the experiment :—

- (1) Temperature — ranging from 100 F to 101.6 F.
- (2) Pulse — do. 60–70 per minute.
- (3) Respiration — do. 15–20 do.
- (4) Appetite — Good throughout.
- (5) Faeces — Usual consistency (no constipation or pelleted faeces).
- (6) Rumen and reticular contractions :—
Rumen — 9 to 10 contractions in 5 minutes.
Reticulum — 1 contraction in 45 seconds.
- (7) Expiratory grunts on pressure over the spine and below xiphoid cartilage of the sternum :—Negative.
- (8) Use of metal detector—No metallic substance detected in the stomach.
- (9) Total W.B.C. count — 8000 to 10500/cubic M.M.
- (10) Differential Leucocyte count —
(Range of 4 animals)
(a) Neutrophils — 23 to 26%
(b) Eosinophils — 6 to 8%
(c) Basophils — 0 to 1%
(d) Lymphocytes — 60 to 65%
(e) Monocytes — 4 to 6%

Results

The results of the experiment on the bull No. 1 were watched carefully for a period of 40 days and on the 12th day of the experiment the animal had symptoms of indigestion for a period of 3 days. During the period of sickness the bull had no appetite for grains and there was marked dullness. Both the eyes were lachrymating but the temperature rise was not appreciable. The quantity of paddy straw ingested was less than usual. There was marked disturbance in the rumen and reticular contractions with depression in the number and force of the contractions. No expiratory grunts or holding of breath could be detected by indirect pressure on reticulum and diaphragm. The faeces were constipated and there was reduction in the volume of the dung passed. Blood pictures taken on two occasions were within the normal range. The condition gradually passed off from the 3rd day and the animal was normal from the 4th day without any treatment.

On the 40th day, exploratory ruminotomy was performed and both the sharp objects could be recovered from the floor of the reticulum. The operation was successful and the animal had uneventful recovery. Later, the bull was under the same diet, care and management but did not reveal any such digestive disturbances within a period of 120 days.

Bull No. 2 was discarded since it developed localised circumscribed peritonitis at the point of trocarisation and masked the results of the experiment.

The bullock No. 1 was observed for a period of 120 days and had the onset of digestive disturbances of above nature for a period of three days from 15th day and again for two days from 55th day of the experiment. The clinical symptoms were similar to the symptoms observed in bull No. 1. Each time, the mild digestive disturbances passed off without any treatment. Ruminotomy was performed on 120th day of the experiment and the ingested metallic substance was recovered from the floor of the reticulum.

The other experimental bullock No. 2 had no disturbed appetite or any sort of mild digestive disturbances within a period of 140 days. Ruminotomy was performed and the ingested foreign metallic substance could not be recovered from the reticulum. The bullock was destroyed and the post mortem examination was done. A thorough search was made in the viscera and organs of the dead animal but in vain. It is most probable that the ingested foreign body might have been escaped through the gut along with the faeces. It is not known as to when and after how many days after ingestion material has escaped from the reticulum.

Discussion

From the results of the four experimental animals of which one was rejected due to the appearance of localised circumscribed peritonitis at the point of trocarisation, it is found out that there is variable time that elapses between the ingestion of the foreign bodies and the appearance of the typical diagnostic symptoms of traumatic gastritis in ruminants.

From the experimental studies it is seen that animals harbouring sharp metal objects are likely to cause the disease at any time, subject to the nature, shape, length, position of the metallic objects and movements of the diaphragm and the abdominal muscles. Two experimental animals even though kept under normal diet and perfect environmental conditions showed only mild digestive troubles at irregular intervals without the typical symptoms of traumatic gastritis, which may be attributed to the presence of sharp metallic pieces in the reticulum.

Those animals after ruminotomy and removal of the metallic pieces from the reticulum did not reveal any digestive upset within a considerable period. One experimental bullock did not suffer from any digestive trouble during the period of study, since the ingested foreign body had escaped the reticulum. From this it is presumed that the irregular mild digestive upset in ruminants without any change in feeds or management may be due to the pricking of pointed foreign bodies on the reticular wall.

Summary and Conclusions

Experimental studies on traumatic reticulitis was performed on two brahmini bulls and two young bullocks to study the usual time taken for the appearance of the clinical symptoms after the ingestion of sharp metallic objects. Efforts were also made to follow up the fate of the foreign bodies after ingestion. Other atypical symptoms were also noted in animals while harbouring the foreign bodies in the stomach. Out of four experimental animals one had to be rejected due to the appearance of localised peritonitis at the site of the trocar wound. The following observations were noted carefully :

(1) There is variable time that elapses before the appearance of typical clinical symptoms of traumatic gastritis after ingestion of sharp pointed foreign bodies. It may not be usual that the general symptoms of traumatic reticulitis may appear within 3 days as worked out by Kingrey. (loc. cit.)

(2) Animals exhibiting mild digestive disturbances while harbouring the sharp metallic pieces in the reticulum may be attributed to the presence of such objects in the organ and may be pricking the reticular wall without penetrating.

(3) During the period of such digestive upset there is gross suppression of the activity of the rumen and reticulum leading to the reduction in the rate, and force of contractions.

(4) Other typical symptoms of traumatic gastritis are absent during the period of experiment.

(5) Out of the four foreign bodies given to 3 animals, 3 foreign bodies could be recovered from the floor of the reticulum and the one perhaps escaped through rectum.

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A STUDY OF CALVING-SEASON IN MURRAH BUFFALOES

By

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A limited number of findings are available to prove the fact that seasonality in the reproductive functions of buffaloes is more pronounced. It is also not fully known whether the season of calving has any influence on the economic traits of buffaloes or not. Arunachalam *et al* (1952) and Rao and Murari (1956) observed that most frequent calvings in Murrah Buffaloes occurred during September to November. Ragab and co-workers (1954) in a study with the Egyptian buffaloes found that milk production in buffaloes was highest when they calved in February and March and was lowest in the summer calvers. In a study of the intercalving period, Singh *et al* (1958) observed that the calving months of June to November resulted in the lowest calving interval.

Materials and Methods

The present study was conducted with the College buffalo herd and efforts were made to observe the effect of the month and the season of calving on lactation period, milk yield, inter-calving period, calving frequency and the sex of the calf born. The data comprised are for the period, 1944 to 1959.

Results

1. Effect of the season of calving on lactation period :—

356 lactation periods of 88 Murrah buffaloes were studied. The analysis of variance revealed that there was a significant effect of the month of calving on the duration of lactation period (Table I). The

average lactation period was found to be 337.8 ± 6.335 days. It was observed that the buffaloes calving in April maintained the highest lactation period (428 days) while those that calved in July pursued the shortest duration (294 days).

The season of calving was grouped into two seasons favourable and unfavourable. The period from February to May proved the best and was significantly superior by 52.67 days to the second season (Table V). The monthly distribution of the lactation period has been given in Table IV. It is also seen that the buffaloes which calved in rainy season maintained the shortest lactation period. The winter and summer calvers, however, maintained the highest duration of lactation (Table VI).

2. Effect of the season of calving on milk yield:—

The average milk yield of 356 lactations was found to be 4350.3 ± 72.692 lbs. (Table IV). The analysis of variance showed that the month of calving did not affect the milk yield (Table II). However, the highest milk yield was given by those buffaloes, which calved in the month of March (4993 lbs.). The calving month of September proved the most unfavourable. The average milk yield for this month was 4037 lbs. (Table IV).

The period of February to May was the most favourable (average milk yield 4753.91 lbs.). It recorded 446.05 lbs. more milk yield and was significantly superior to the second season (Table V). It was also noticed that the winter and summer calvers produced more or less equally higher yields, while the rainy season calvers yielded significantly less milk (Table VI).

3. Effect of the season of calving on the intercalving period:—

370 intercalving periods of 111 buffaloes were analysed. The average period between two subsequent calvings was found to be 476.8 ± 9.185 days (Table IV). The month of calving was found not to have any significant effect on the intercalving period (Table III). The monthly distribution of the calving intervals (Table IV), however, reveals that the calving month of July was the best to result in shortest intercalving period (418.45 days). The longest intercalving period (577.57 days) was observed in the case of buffaloes, which calved in April.

On the whole rainy season proved favourable to shorten the intercalving period to the average of 461.42 days. The summer calvings, however, were unfavourable and the average intercalving period reached 529.37 days (Table VI). The period of January to May, however, was significantly superior (by 72.86 days) to the period of June to December (Table V).

4. Effect of the season of calving on the calving frequency:—

477 calvings of 111 buffaloes were studied. To expect the equal frequency of calvings throughout the year chi-square test was applied. The result showed that there was highly significant effect of the month of calving on the frequency of calvings (Table VII). The highest percentage (23.27%) of calvings occurred in September. The month of May, however, recorded the lowest frequency of calvings (1.47%).

The most favourable months for calving were from July to November (77.77%).

5. Effect of the season of calving on the sex of the calf born:—

The chi-square test of 477 calvings revealed that the month of calving did not have any effect on the sex of the calf born. The sex ratio remained more or less uniform throughout the year (Table VII). The month of October, however, proved to be distinct and recorded 72.72% male calvings, which approached the significant level at 5% probability.

TABLE I

Analysis of variance of the effect of the month of calving on lactation period.

Sources of variation	D.F.	S.S.	M.S.S.
Total ...	355	5141719.63	—
Between the months ...	11	282288.85	25662.62*
Within the months ...	344	4859480.78	14126.25

* $P < 0.05$.

TABLE II

Analysis of variance of the effect of the month of calving on milk yield.

Sources of variation	D.F.	S.S.	M.S.S.
Total ...	355	692469665.27	—
Between the months ...	11	14077642.27	1279785.66 N.S.
Within the months ...	344	678892613.00	1972100.61

N.S.—Not significant at $P < 0.05$.

TABLE III
Analysis of variance of the effect of the month of calving
on intercalving period.

Sources of variation	D.F.	S.S.	M.S.S.
Total	369	11467657.53	—
Between the months	11	458422.13	41674.73 N.S.
Within the months	358	11009235.4	30752.05

N.S.—Not significant at $P \angle 0.05$.

TABLE IV
Distribution of lactation periods, milk yield and intercalving periods
in relation to the month of calving.

Months	Average lactation period in days	Average milk yield lbs.	Average intercalving period in days
January	358.36	4374.93	501.13
February	402.58	4676.41	522.77
March	349.89	4993.22	533.88
April	428.00	4691.5	577.57
May	365.00	4627.42	562.85
June	319.86	4186.57	443.2
July	294.09	4161.00	418.45
August	333.4	4194.51	466.71
September	336.95	4037.02	488.08
October	319.19	4381.00	472.46
November	381.79	4627.76	484.33
December	333.22	4576.94	432.06
Total records	356	356	370
Average	337.8 ± 6.335	4350 ± 72.692	476.8 ± 9.185

TABLE V
Seasonal distribution of lactation period, milk yield and intercalving period.

Season	Average lactation period in days	Average milk yield lbs.	Average intercalving period in days
February to May	385.44 ± 19.606	4753.91 ± 192.479	
June to January	332.77 ± 9.578	4307.86 ± 80.677	
January to May	—	—	539.5 ± 23.221
June to December	—	—	466.64 ± 11.304
Difference between two seasons	$52.67 *$	$446.05 *$	$72.86 *$

* $P \angle 0.05$.

TABLE VI
Seasonal distribution of lactation period, milk yield and intercalving period.

Season	Average lactation period in days	Average milk yield lbs.	Average intercalving period in days
Summer (March to June)	365.69	4624.68	529.37
Rainy (July to October)	320.91	4193.38	461.42
Winter (November to February).	369.97	4564.01	492.57
Difference between summer and rainy seasons	$44.78 *$	$431.3 *$	$67.95 *$
Difference between rainy and winter seasons	$49.06 *$	370.63	31.15
Difference between winter and summer seasons	4.28	60.67	36.8

* $P \angle 0.05$.

Discussion

In our present study with the Murrah buffaloes, it was observed that the month of March was most favourable for calving in order to produce the highest milk yield and this result confirms the findings of Ragab *et al* (1954), who found similar results with the Egyptian buffaloes. It was also observed that the winter and summer calvings were equally well so far as the high milk yield was concerned, but the difference between the yields of the summer and rainy season calvers was statistically significant and the rainy season calvings were unfavourable for high milk production. The period of February to May was significantly superior to the rest of the months.

Simultaneously the results showed that the period of February to May was also significantly superior to other periods in prolonging the lactation period. The rainy season was significantly inferior in maintaining the lactation period to a longer duration.

The higher milk yield in the case of winter and summer calvers, therefore, seems to be a direct result of the longer lactation period, which itself is affected by the month of calving.

Ashsaq and Mason (1954), working with Nili and Ravi buffaloes, and Singh *et al* (1958), in a study of the Murrah buffaloes found the average intercalving period to be 467 days and 444.1 days respectively. The present findings, however, recorded the intercalving period to be 476 days.

TABLE VII
Monthwise distribution of the sex and calvings and their chi-square values.

Months	Male calvings.	% Male calvings	Female calvings	% Female calvings	Total calvings	% calvings	Chi-square of male calvings	Chi-square of female calvings	Chi-square of total calvings
January	7	41.176	10	58.823	17	8.563	0.146	0.944	13.02
February	8	42.105	11	57.894	17	3.983	0.119	0.874	10.831
March	4	28.571	10	71.429	14	2.935	1.062	1.512	16.68
April	3	37.5	5	62.5	8	1.677	0.168	0.337	25.86
May	4	57.142	4	42.858	7	1.467	0.032	0.752	26.982
June	9	45.0	11	55.0	20	4.192	0.587	0.209	9.812
July	28	40.35	34	59.65	57	11.949	0.625	1.158	7.485
August	46	46.938	52	59.062	98	20.545	0.0007	0.036	85.86
September	51	45.945	60	54.055	111	23.27	0.062	0.08	134.982
October	40	72.727	15	27.273	55	11.53	7.672	6.627	5.85
November	26	52.0	24	48.0	50	10.482	0.201	0.184	2.643
December	7	33.333	14	66.667	21	4.402	0.894	0.818	8.844
Total	227	—	250	—	477	100	11.568*	13.526*	347.849**

** P < 0.01

* Not significant at P < 0.05

Our study also indicated that the month of calving does not affect the duration of intercalving period. However, when the months were grouped into different seasons and periods the intercalving periods varied significantly. The rainy season calvings resulted in shorter intercalving periods and the period of June to December was much superior in yielding shorter intercalving periods. This result is in confirmation of the finding of Singh *et al* (1958), who observed that the period of June to November was superior.

In the present study, it was noticed that the rainy season calvings were unfavourable for longer durations of the lactation periods, but they were more favourable for shortening the intercalving period. The result also revealed that the month of calving had no effect on the duration of the intercalving period, but it was found significantly effective in prolonging the duration of lactation periods. It appears quite evident, therefore, that the longer duration of lactation period affects the oestrus cycle of the buffaloes, *i.e.*, due to high and continuous milk yield for longer duration, the buffaloes either do not come in heat or their heat period passes undetected with the result that insemination and conceptions are delayed.

The results could not reveal any significant effect of the calving-month on the sex of the calf born, but the month of October appeared to be quite distinct in favouring the birth of male calves.

There was a highly significant effect of the month of calving on the calving frequency. Arunachalam and co-workers (1952) and Rao and Murari (1956) observed that most frequent calvings in Murrah buffaloes occurred during the period of September to November. Asfaq and Mason (1954), however, observed that the calvings were most frequent in July and least during the period of January to April. In the present case we observed that the most frequent calvings occurred during July to November, while the least frequent calvings were found during April and May.

Summary

A study of lactation period, milk yield, intercalving period, sex of the calf born and the calving frequency of Murrah buffaloes in relation to the month of calving and season of calving was made.

The average lactation period in Murrah buffaloes was 337.8 ± 6.335 days.

The average milk yield per lactation was 4350 ± 72.692 pounds.

The average intercalving period was 476.8 ± 9.185 days.

The month of calving was found to have a significant effect on the duration of lactation period. The highest lactation period (428

days) was observed in the case of buffaloes, which calved in the month of April and it was lowest (294.09 days) in the case of buffaloes, which calved in the month of July. The period of February to May (385.44 days) was found significantly superior in maintaining the lactation duration.

The milk yield was found not to be affected by the month of calving. The period of February to May, however, proved significantly superior in producing higher milk yield (4753.91 lbs.).

The month of calving could not affect the intercalving period. The period of June to December, however, was significantly superior (466.64 days) in reducing the duration of intercalving period. The rainy season calvers were significantly superior in having the shorter intercalving periods (461.42 days).

The month of calving was found to have a highly significant effect on the frequency of calvings. The highest number of calvings were recorded during the period of July to November (77.77%). The month of September recorded the highest number of calvings (23.27%), while the least numbers were observed during May (1.47 %).

The sex of calf born was found not to be affected by the month of calving. The month of October proved distinct and recorded the highest number of male calves (72.27%)

It may be suggestive that the longer duration of the lactation period affects the oestrous cycle of the buffaloes and results in delayed heat.

Acknowledgment

The authors are thankful to Shri C. V. G. Choudary, Principal, U. P. College of Veterinary Science & Animal Husbandry, Mathura for providing facilities.

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A METHOD OF NEPHRECTOMY IN CANINES

BY

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Total removal of a kidney may be necessary for the following conditions provided, of course the other kidney is present and is functional. The conditions indicating nephrectomy are:—

1. Calculous pyonephrosis when it is unilateral and when renal parenchyma is affected.
2. In the treatment of unilateral malignant or pyaemic affection of the kidney.
3. Traumatic lesions causing rupture or disintegration particularly if complicated by extensive laceration of the surrounding tissue and damage to the peritoneum.
4. Advanced cases of unilateral hydronephrosis where atrophy of the kidney has taken place.
5. Rupture and fistulation of ureter when other methods of closure have failed.
6. Experimental surgery for observations on physiological studies and collection of other experimental data.

Mayo (1912) working on the human subject advocates the lumbar route, the incision being 2 to 2½ inches lateral to the dorsal spines near the outer margin of the erector spinae over the twelfth rib or even higher. The incision is made downward and forward along the anterior margin of the quadratus lumborum to a point about one inch above the crest of the ilium. From this low point the incision is continued forward parallel to the iliac crest as far as necessary.

Binnie (1910) working also on the human subject quoting Langenback and Rutherford-Morrison suggests an alternative anterior abdominal route if the kidney to be excised is very large. In this method the kidney is reached through the abdominal cavity, the animal lying in dorsal recumbency.

Robinson (1947) advocates an abdominal thoracic approach in man because when the mass to be removed is big, the lumbar route may not be enough and the abdominal route dangerous.

Sames (1950) is also of the same view.

McCunn (1953) suggests removal of kidney in dog through the median line in thin animals and in larger patients suggests the flank approach, the incision being made high up in the flank just below the lumbar transverse process.

O'Connor (1956) advocates the lumbar route and the abdominal route both as equally good but prefers the lumbar route as the only suitable site for large animals. In the case of very enlarged organs he advocates that the abdominal method is more convenient.

Methods and Material

The position and relations of the kidney both right and left were studied experimentally on dogs under anaesthesia which were subsequently sacrificed. A method for the removal of both the right and left kidney was studied. In other animals the kidney was removed experimentally and the recovery of the animal was watched. Recovery of the animals from the operation was observed to be uneventful. The operations were done under general anaesthesia by inhalation using nitrous oxide, aether, and oxygen administered through the Boyles' apparatus. The approach made to reach the kidney both in the left and right side was a modification of the lumbar route.

Procedure

An incision was made from very near the angle formed posteriorly by the last rib with the spinal column in a backward and slightly outward direction, the incision being about an inch and a half lateral to the midline at its most posterior end. The incision may vary from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches in length depending on the size of the kidney to be removed and is clear of the lumbar transverse processes. In case of five dogs operated upon it was not found necessary to resect the last rib as suggested by Robinson. After incising the skin, the abdominal oblique muscle layers and then the transverse abdominis was cut through exposing the kidney in the anterior part of the incision. The kidney moves back and forth with the respiratory movements and was grasped when its position is most posterior during the movement. In case of the left kidney the difficulty was even less as the kidney is situated much posteriorly and could easily be picked up. The kidney was picked up by inserting the index finger into the wound after retracting the edges well out. A spoon might also conveniently be used. After the kidney was brought outside it was kept there in position by wrapping gauze soaked in warm saline and the layers of peritoneum adherent to its sides were peeled off, the two ends being held by Allys' forceps. This was done to ensure that these folds of peritoneum did not subsequently get lost. The ureter and the renal artery were then separated out from the folds of peritoneum and some

fat and when separate they were very carefully and securely ligated. Particular care was necessary to ligate the renal artery which was ligated at two points and cut in the middle using artery forceps to hold both ends. Before being released the cut ends should be carefully checked to see that no bleeding is present. The next step was to stitch the cut ends of the peritoneal folds previously held by tissue forceps. Suturing was done by continuous Lambert suture using chromic catgut or Vitafil. The muscular layers were then sutured separately by Vitafil or chromic catgut and then the skin by silkworm gut sutures.

Results

The operation was tried out on a number of animals which were sacrificed immediately they recovered from the anaesthetic after the operation was completed. In two cases the animals were kept alive and under observation and recovery was found to be uneventful. Healing by first intention took place in both cases and the wound completely healed by the tenth day which was normal for such kind of wounds. Particular care was taken to see that the animal did not bite off the sutures for which a collar was put on the animal. For the first few days the diet of the animal was restricted to bread and biscuits with very little protein in the diet.

Discussion

Although the kidneys are extraperitoneal in position it is observed that they are partly covered by folds of peritoneum at their inferior parts and cannot be picked up without touching the peritoneum. In the normal kidneys in dogs it is found that any kidney can be operated on without interfering with the ribs. It is easier on the left side where the kidney is situated almost at the middle of the lumbar region. Although both the kidneys are extraperitoneal, the peritoneal folds cover the hilus side of the kidney and envelope more than two thirds of the organ and are intimately adherent to the capsule of the kidney. Excision of any of the two kidneys requires peeling the peritoneal folds which need to be stitched afterwards. This condition is perhaps due to the normal ectopic mobility of the kidney in this animal. When done under aseptic conditions healing is uneventful and when one kidney is removed the animal recovers completely from the operation and lives a normal life afterwards.

Acknowledgment

Thanks are due to Dr. G. Biswal, Director of Animal Husbandry and Veterinary Services, Orissa for facilities provided and to Sri J. Mohanty and other members of the Surgery department who assisted me.

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THE NORMAL BODY TEMPERATURE, RESPIRATORY FREQUENCY AND HEART RATE OF THE CAMEL

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Introduction

The body temperature and the rates of respiration and pulse of an animal go a long way in determining its physiological state and are in fact an index of its health and disease. The temperature, pulse and respiratory rate vary during the course, progression and resolution of a disease. Apart from this, they also undergo distinct variations in the normal animals during the different hours of the day. These are known as diurnal variations and have been studied by many workers in different domestic animals. In general, the body temperature is lowest in the early morning, rises during the day to reach its maximum in the evening and falls again in the night (1). The rates of pulse and respiration are intimately related to the body temperature but the clear cut details and the structure of these relations in domestic animals still remain to be worked out.

The diurnal rhythm in the body temperature exhibited by the camel is similar to that in other domestic animals but the range of variation is much more marked and wide. Leese (1927) has observed a difference of about 3°F between the temperatures taken at 7 a.m. and 7 p.m. (3).

The respiratory frequency and pulse rate of camel have also been reported to be variable by Leese (3).

As the information available on the subject is rather meagre, the present work was undertaken to establish certain standards of normal body temperature, respiratory frequency and heart rate of the camel.

Review of Literature

According to Leese the average normal body temperature of the resting adult camel at sunrise is 97°F and at sunset 100.3°F. He has reported a mean range of 95°F to 99°F in the early morning and 99°F to 101.6°F in the evening in this species during hot weather (3). Malkmus (1949) has described the range from 95°F to 101.4°F (4). Knut Schmidt-Nielson and his co-workers (1957) state that the rectal temperature of normal healthy camels at rest varies from about 34°C (93.2°F.) to more than 40°C (104.0°F) (2).

Leese states that the pulse rate in camel varies from 32 to 44 per minute in the early morning and from 36 to 50 per minute in the evening. Evening average at 6 p.m. was 44 per minute (3). The pulse rate has not been reported by Malkmus (4).

The range of the normal frequency of respiration in camel as worked out by Leese in hot weather is from 5 to 12 per minute (3). Malkmus has also reported the same range (4).

Methods and Materials

The work was done in the month of May 1959. One hundred healthy adult male camels aged 8 to 16 years were selected for the study. The observations were made twice a day in the open shed between 6 to 7 a.m. in the morning (before the animals were left for exercise) and 6 to 7 p.m. in the evening. The feeding and watering were withheld during the period of making the observations and the animals were kept perfectly calm and resting without being frightened or disturbed.

The temperature was taken by placing thermometer (Zeal-½ min) in the rectum for not less than 2 minutes, with the camel in sitting position and tail grasped firmly in one hand.

The respiratory rate was recorded by watching the rise and fall of the flank, keeping the animal in standing position.

The heart beats were recorded by placing the stethoscope (B.D.) over the 5th intercostal space on the left side of the chest in the sitting animal with left leg extended forward.

The readings on the body temperature, respiratory frequency and heart-rate were taken for three consecutive days (both morning and evening) on the each selected animal and average values recorded.

Results

The results obtained are reported in the table No. 1 below :—

TABLE I

Showing the morning and evening body temperature, respiratory frequency and heart-rate of the camel.

Sl. No.	Findings	Body temperature		Respiratory frequency		Heart-Rate	
		Morning	Evening	Morning	Evening	Morn- ing	Even- ing
1	Lowest Reading ...	95.2°F	98.0°F	5 per min.	5 per min.	24 per min.	27 per min.
2	Highest Reading ...	100.4°F	102.0°F	10 "	11 "	46 "	48 "
3	Mean Minimum ...	95.2°F	98.5°F	5 "	6 "	25 "	30 "
4	Mean Maximum ...	99.7°F	101.7°F	10 "	11 "	44 "	48 "
5	Average ...	97.9°F	100.0°F	7.5 "	9 "	33 "	36 "
6	Standard Deviation.	0.853	0.540	0.404	0.710	3.5	3.4

The temperature of majority of animals ranged from 97.2°F to 98.7°F in the morning (Histogram-I) and 99.0°F in the evening (Histogram-II).

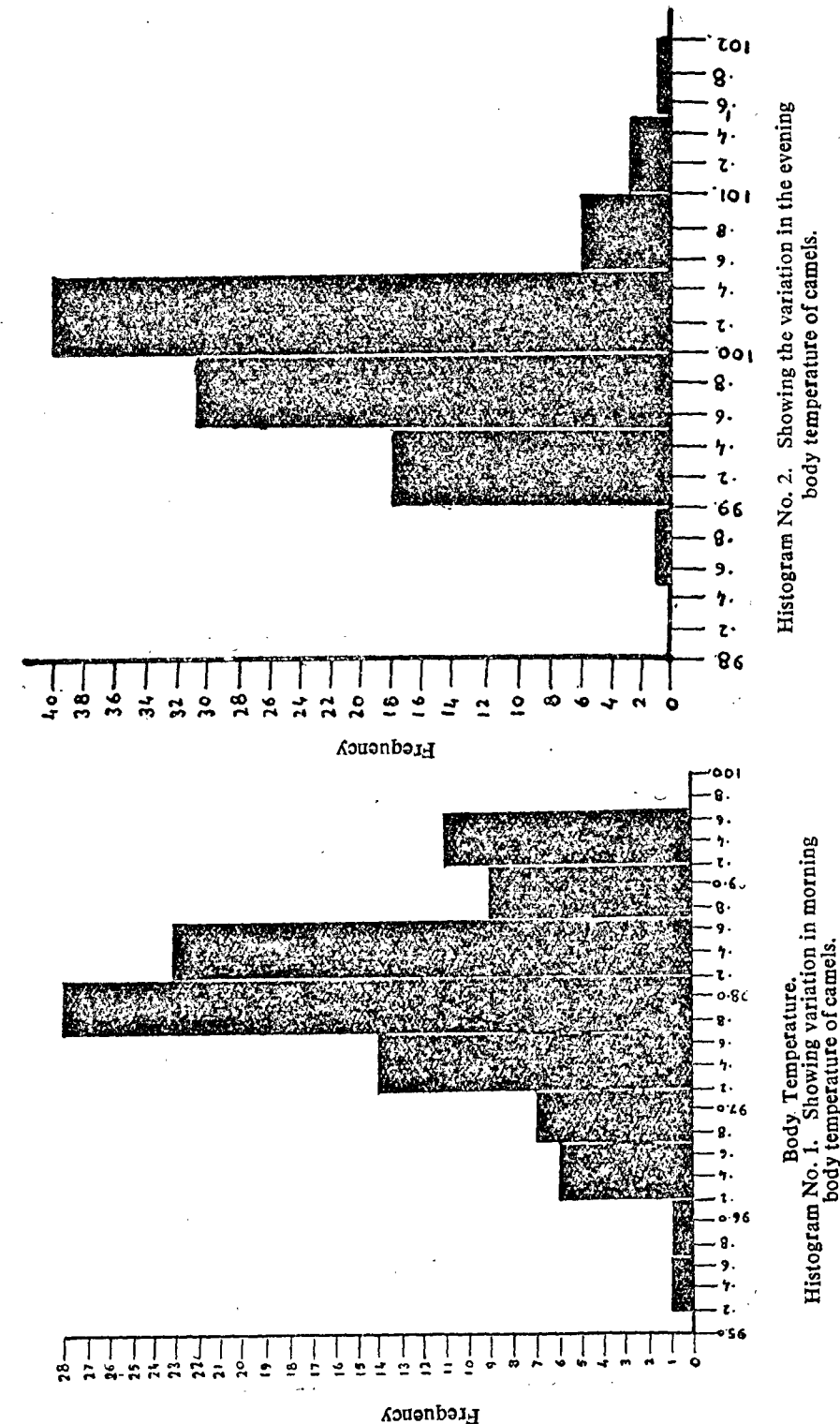
The rate of respiration of majority of animals ranged from 7 to 9 per minute, both in the morning and evening (Histogram-III & IV).

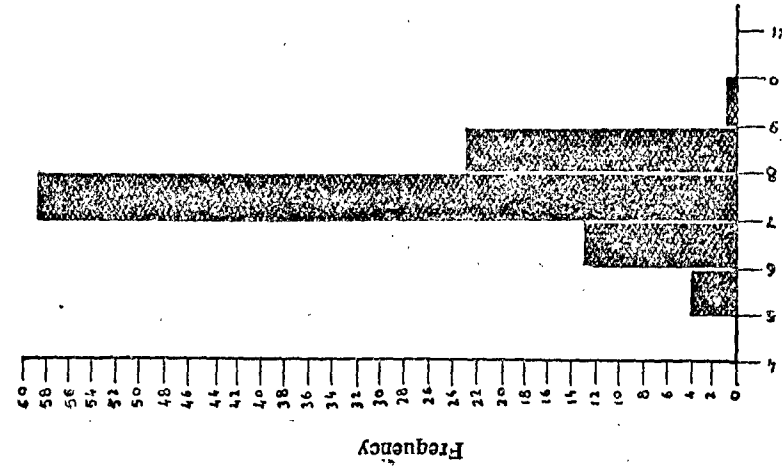
The Heart-Rate of majority of animals ranged from 28 to 37 per minute in the morning (Histogram-V) and 30 to 39 per minute in the evening (Histogram-VI)

Discussion and conclusions

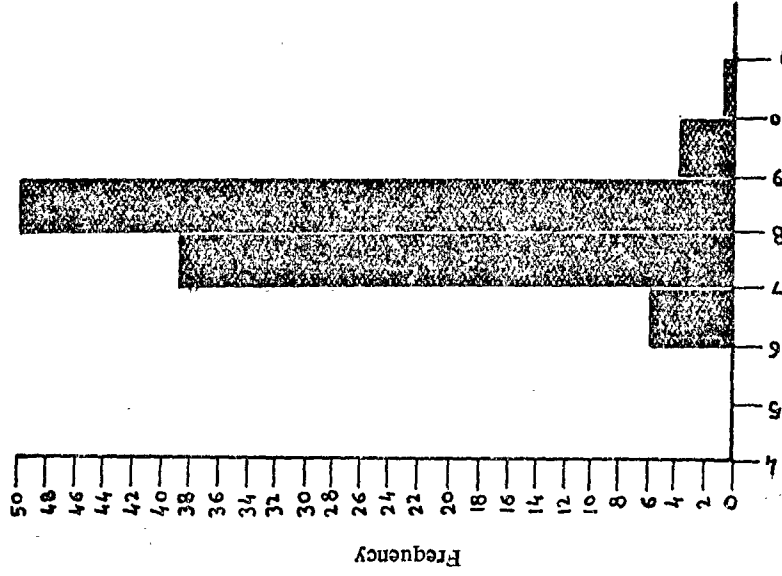
Taking the morning and evening observations as a whole, the minimum temperature recorded was 95.2°F and the maximum 102.0°F but the majority of animals ranged between 97.2°F to 100.5°F; the average of means being 98.95°F. In the same way the minimum respiratory frequency recorded was 5 per minute and maximum 11 per minute; in the majority of animals it ranged between 7 to 9 per minute and the average of means being 8 per minute. The minimum heart-rate recorded was 24 per minute and maximum 48 per minute in majority of animals lying between 28 to 39 per minute and the average of morning and evening means being 34.5 (34 to 35) per minute.

The average body temperature, respiratory frequency and heart rate was found to be 97.9°F, 7 to 8 per minute and 33 per minute in the morning and 100.0°F, 9 per minute and 36 per minute in the evening respectively.

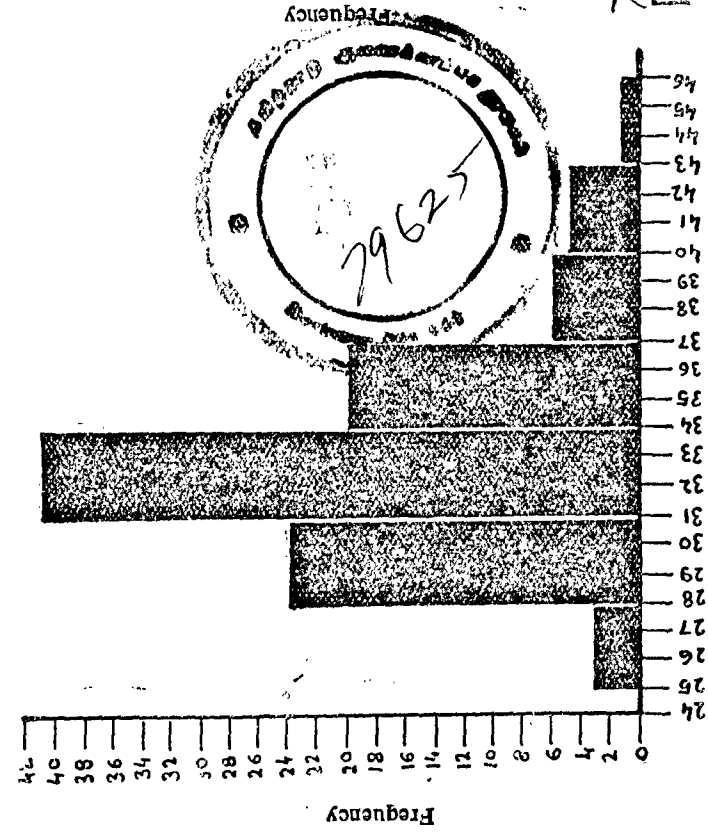




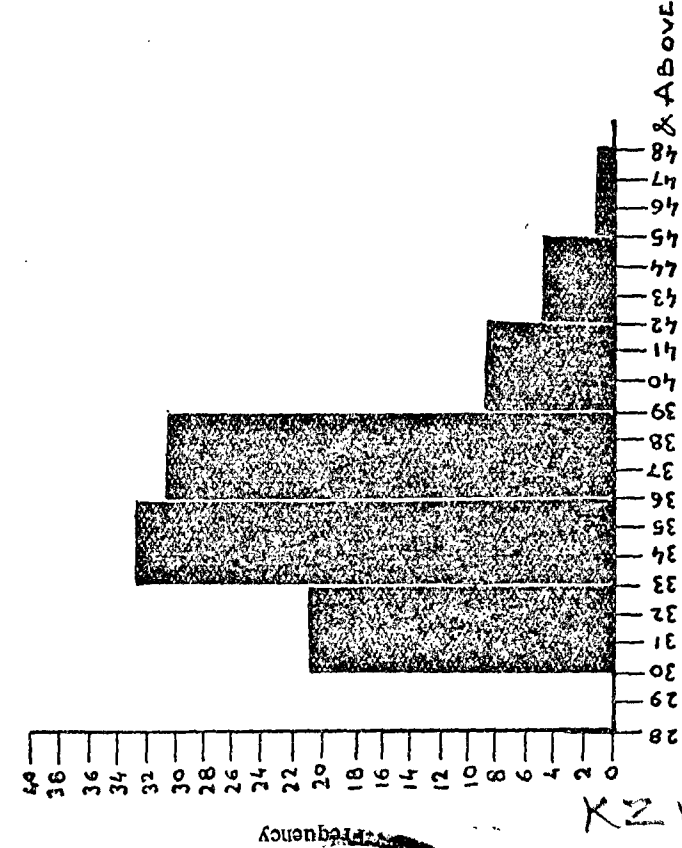
Respiration per minute.
Histogram No. 3. Showing variation in the morning
respiratory frequency of camels.



Respiration per minute
Histogram No. 4. Showing variations in the evening
respiratory frequency of camels.



Heart-rate per minute.
Histogram No. 5. Showing variation in the morning heart-rate of camels.



Heart-rate per minute.
Histogram No. 6. Showing variation in the evening heart-rate of camels.

Handwritten notes:
KZ m2, N24-
N60-32.9

The results obtained by present writers tend to show that there is considerable variation between the morning and evening observations, thus confirming the works of earlier authors.

The site for feeling the pulse reported by Leese, (the posterior tibial artery about 7" above the point of hock and about 1" to the inner side of the tendo-achilles, and the middle sacral artery in the medial line of the ventral surface of the tail near its root) could not be uniformly palpated by the present authors. They could of course, palpate the artery and feel the pulse in the lean animals, but the irregularity and intermittence in pulsation was a regularly encountered feature in many camels. Leese also describes to have come across irregular and irregular-intermittent pulse in healthy camels with no heart disease. Hence it was decided to record the rate of heart beat instead of pulse rate to avoid getting misleading results by recording the latter. By virtue of experience gained by this work, authors feel that the recording of heart-rate in camels as in poultry and pig, is more practicable and convenient than recording the pulse rate.

Summary

The morning and evening rectal temperature, respiratory frequency and heart-rate were recorded in one hundred healthy camels in the month of May 1959 and the results are reported.

Acknowledgment

Authors are highly indebted to Dr. Mohan Singh Purohit, Vice-Principal, for encouragement and to Major N. R. Rao, for the facilities provided. Thanks are also due to Shri Fakhrudin, Artist, for help in making the drawings.

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RECORD OF COMBINED INFECTION OF *SALMONELLA GALLINARUM* AND AVIAN LEUCOSIS COMPLEX (VISCERAL FORM) IN AN OUTBREAK IN BOMBAY STATE

By

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W. V. CHATUPALE

and

D. T. PARNAIK

Historical

Salmonella infection is world wide in its distribution and is likely to be found where poultry are being raised. Losses of serious proportion have been reported during the last decade of the 19th Century. In India first outbreak of Salmonellosis was recorded by Iyer in 1940 in a commercial flock of birds. Before 1940, Cooper and Naik had recorded isolation of *Salmonella gallinarum* in 1931. Investigation of Duck Salmonellosis was undertaken by Rao in Army development farm in 1946. Extensive research work was undertaken by I.V.R.I. in 1945 and evidence recorded about the existence and prevalence of this infection in India was considered as negligible. In Bombay State *Salmonella gallinarum* was recorded by Kulkarni *et al* in 1956.

Fowl leucosis was first described by Marek in 1907. Ellerman and Bang in 1908 reported that the disease was transmissible and that the etiological agent was a virus. The main object of writing this article is to record the incidence of concurrent infection of Lymphomatosis (Avian Leucosis Complex — Visceral form) and *Salmonella gallinarum* infection in an outbreak form in a flock of birds consisting of more than seven hundred birds, in Poona District.

The first incidence of fowl Paralysis was recorded by Mohydeen in Bombay State in 1933 which he considered the result of hypocalcemia and it was difficult for him to draw any conclusions on the strength of a single observation of Fowl Paralysis.

Mahajan from Hyderabad in 1934 reported the incidence of fowl polyneuritis amongst fowls. Krishna Iyengar in 1937 described from Mysore a condition of neurolymphomatosis gallinarum and in 1940 Buchansingh described a leg weakness in Poultry due to nutritional deficiency. Probably the efforts were unsuccessful to classify and differentiate the various types of Paralysis and possibility of occurrence of neurolymphomatosis gallinarum was overlooked.

Thus in this country the literature on this condition is meagre. Record of Paralysis in fowls are attributed to different causative factors such as nutritional deficiency, hypocalcemia etc.

A systematic survey was undertaken to investigate the incidence and distribution of this condition by S. G. Iyer *et al* in the year 1955, and these authors confirmed the existence of Avian Leucosis Complex in widely separated localities in different states and the condition was established on histopathological examination. All the common birds were noticed to have been affected and especially exotic breeds maintained at different organised poultry farms were investigated. The Desi Fowls in rural flocks were not undertaken in the survey work. The previous workers however considered that the local breeds of the fowl were less susceptible.

Rao, and others in the year 1950 have described some studies on Avian Leucosis Complex. These workers conducted some transmission experiments and stated that visceral form of the disease may give rise to the other forms of the disease. Blood study indicated an increase in monocytes. In the present investigations the farm consisted of 300 Rhode Island Red, and 400 White leghorns and diseased condition was recorded in breeds maintained on the farm. It is further interesting to record here that along with Avian Leucosis Complex simultaneous infection of *Salmonella gallinarum* was noticed in the flock and both the infections could be recorded on postmortem examination in one and the same bird.

Materials and Methods

On the 4th of September 1959 a dead R. I. R. adult bird belonging to the Poultry development scheme, (Vidyamandir Narayangaon) was brought to the Disease Investigation Officer's Laboratory at Poona for investigation of the cause of death. The first author Shri Kulkarni who was working as Assistant Disease Investigation Officer, Poultry Poona, visited the farm on 13th September 1959 and the following history was collected about the incidence of this condition.

As stated above the farm consisted of about 700 adult birds, The mortality amongst the birds started in the first week of August 1959 and by the end of August the owner had lost about 45 adult birds.

Symptoms

The birds became restless, inactive and preferred to separate from the flock. There was greenish yellow diarrhoea, loss of appetite, roapy discharge from the mouth and nostrils. Temperature rose to 108°F. and the bird was unable to stand, (Vide plate No. I.) The birds died in about 5 days time. 4 postmortems were conducted

and one bird *in extremis* was destroyed in order to study the pathology of the condition. The gross postmortem lesions were as under. Liver assumed bronze colour, and grey patches were seen on the surface. Spleen could be considered as appreciably enlarged and in three cases it appeared twice the normal size. The heart showed gross changes prominent myocardial infiltrations leading to deformities of the hearts could be observed in all the postmortems. (Vide Plate No. II). Lungs and kidneys did not exhibit any appreciable pathological changes. Heart blood cultures were taken. Heart blood smears stained by Gram's method revealed Gram negative short plumpy bipolar rods very few in number, mostly in singles were seen. The cultural examination of heart blood after 48 hours incubation demonstrated small discrete colonies on blood agar slant. At first Pasteurella infection was suspected. The mortality continued at the farm and by the time the farm was visited the owner had lost about 57 birds more, bringing the total mortality to 102 birds. Thus from 1st August to 18th September 1959 the owner had lost 102 birds out of a total of 700 birds. One ailing bird was destroyed *in extremis* and heart blood culture was once more obtained. On postmortem of this bird also identical lesions as described above were seen. Lesions in the myocardium appeared to be characteristic. Intestinal canal was slightly congested. The heart blood smears this time also revealed short plumpy rods. Cultures obtained from this were also identical in all its characteristics. The isolate was further studied as under.

Morphology and staining

The organism could be stained with common dyes and was observed to be Gram-negative short plumpy rods. The isolate had tendency to stain a little darker at the poles than in the centre. It grew aerobically, did not form spores, and no capsules could be seen. It was nonmotile.

Agar : Moist, greyish, circular and entire colonies.

Broth : Turbid with heavy flocculent sediment.

Indol : negative.

Litmus milk : unchanged and no coagulation.

Nitrates reduced to nitrites.

Acid but no gas from dextrose, Xylose, maltose, mannitol and dulcitol but lactose negative.

The organism was tentatively typed as "*Salmonella gallinarum*".
Pathogenicity tests : Two rabbits and two healthy birds were injected with one c.c. of broth culture 24 hours old isolated from the bird destroyed *in extremis* at Narayangaon on 19th September, 1959.

Record of Combined infection of *Salmonella gallinarum* and
Avian Leucosis Complex (Visceral form) in an outbreak
in Bombay State

By V. B. KULKARNI & OTHERS.

Both the rabbits died five days after inoculation, grey patches were seen on the liver. Subcutaneous vessels were congested. Spleen and liver were congested. Out of the two birds one bird died 24 hours after inoculation and nothing significant could be observed on post-mortem. The heart blood cultures were sterile. The other bird died on the 6th day after inoculation. The heart showed myocardial infiltration as observed at Narayangaon. Intestine at some places revealed congestion. The spleen appeared to be slightly enlarged and the liver showed small grey patches. On cultural examination of this bird, isolate identical in character as described above could be obtained. Tissues in ten percent formalin from postmortem conducted at Narayangaon as well as at Poona were forwarded to the Professor of Pathology, Bombay Veterinary College for histopathological examination. His report reads as under.

Heart: Macroscopically it showed slight enlargement and the myocardium appeared greyish with "tigerling". Microscopically it showed cardiac muscle fibres disappearing in places, presenting a breach of continuity of these fibres and replacement of such disappeared fibres by lymphocyte like round cells some of which were slightly larger resembling lymphoblasts. The remaining cardiac muscle had however retained the striations, (vide Plate 3).

Intestine: Macroscopically it showed thickening of mucous membranes which appeared slightly granular. Microscopically the mucous membrane showed the remnants of intestinal glands while the other portions of the mucosa showed heavy infiltration with lymphocyte like round cells and at places had replaced the columnar cells of the intestinal epithelium and glands. (Vide Plate 4).

A portion of Pancreas was also studied microscopically which showed the extension of the lymphomatosis process which had replaced the cells of the "Islets of Langerhans" and pancreatic cells. This condition was therefore recognised as "Visceral form of lymphomatosis" which is now included by Biester and others in the Avian leucosis complex. Microscopically liver also showed heavy infiltration of lymphocytes.

The rest of the organs did not show any appreciable change.

The culture isolated was tentatively typed at this laboratory as *Salmonella gallinarum* and was forwarded for confirmation to Armed forces Medical College Laboratory, Poona and the Director, Haffkine Institute Parel, Bombay.

The report from the Armed Forces Medical College Laboratory, Poona, reads as under. "The organism forwarded by you for typing has been confirmed as *Salmonella-gallinarum-pullorum*".

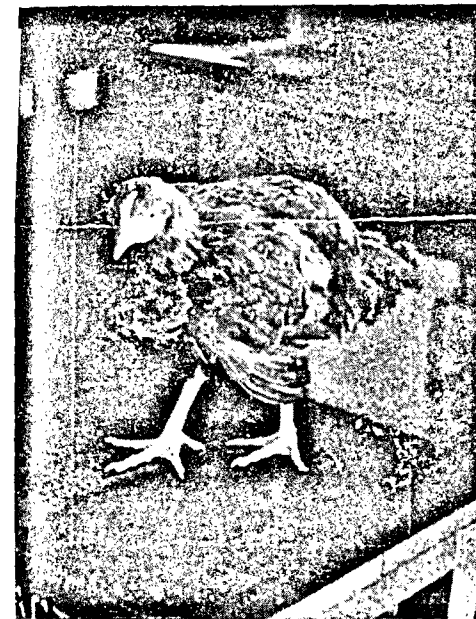


Fig. 1. A typically affected bird.

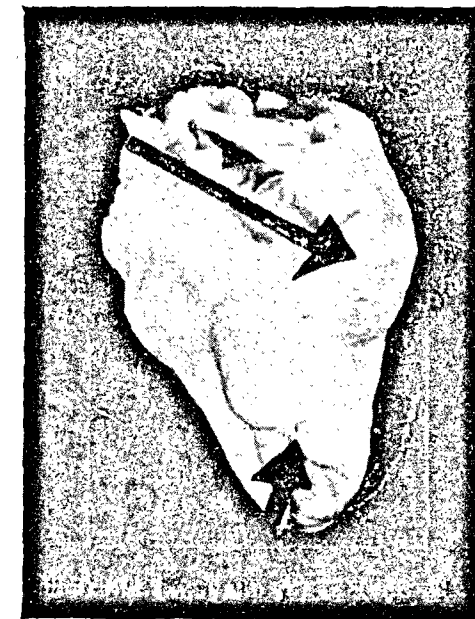


Fig. 2. Nodular lesions on the heart.



Fig. 3. Microscopic appearance of the myocardium showing atrophy and disappearance of the musculature and replacement of lymphocytic cells.



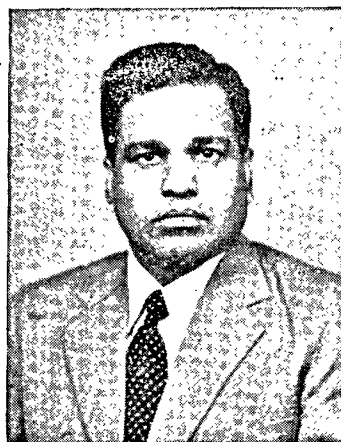
Fig. 4. Microscopic appearance of the intestinal mucosa showing heavy infiltration by lymphocytic cells.

[To face page 463]

They Go Abroad



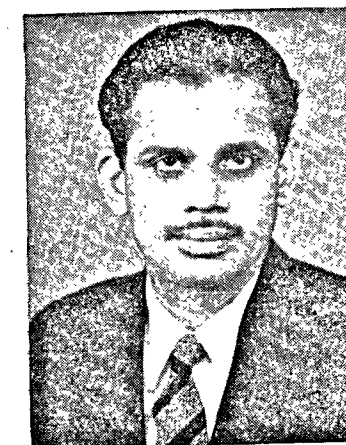
Dr. K. S. SHETTY, G.M.V.C., Ph.D. (Edin.),
Director of Animal Husbandry and Veterinary
Services in Mysore, proceeds to U.S.A.,
on an observation tour of the Rural
University system there. [T.C.M.]



Sri C. K. VELAYUDHAN NAIR, G.M.V.C.,
Professor of Pharmacology,
Madras Veterinary College, proceeds to
U.S.A., for higher studies. [T.C.M.]



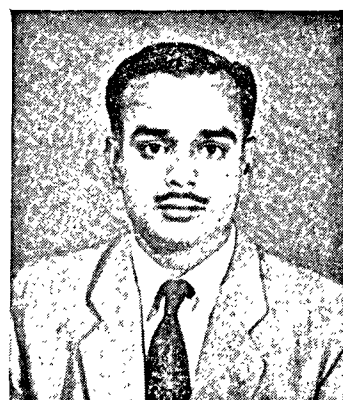
Sri V. SATCHIDANANDAM, B.Sc., B.V.Sc.,
Dept. of Physiology, Madras Veterinary
College, proceeds to U.S.A.,
for higher studies. [T.C.M.]



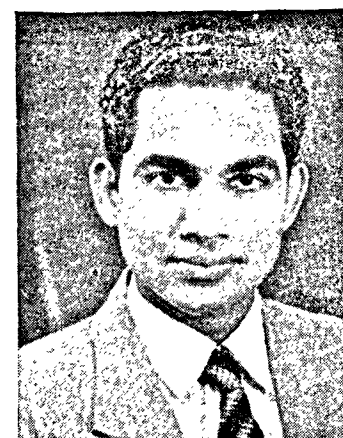
Lieut. K. P. D. NAIR, G.M.V.C., B.V.Sc.,
Senior Lecturer, Veterinary College,
Mannuthy, Kerala, proceeds to U.S.A., for
clinical studies in Kansas University.
[T.C.M.]



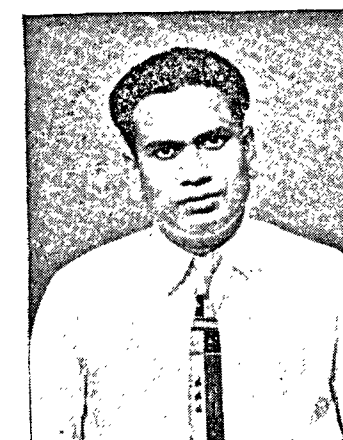
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Reader in Bacteriology, Madras Veterinary
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proceeds to Columbia University,
U.S.A., for higher studies in
Dairy Science.

A Case of Cutaneous Malignant Melanoma in a She-buffalo

BY J. V. NARAYANA & S. P. RAO

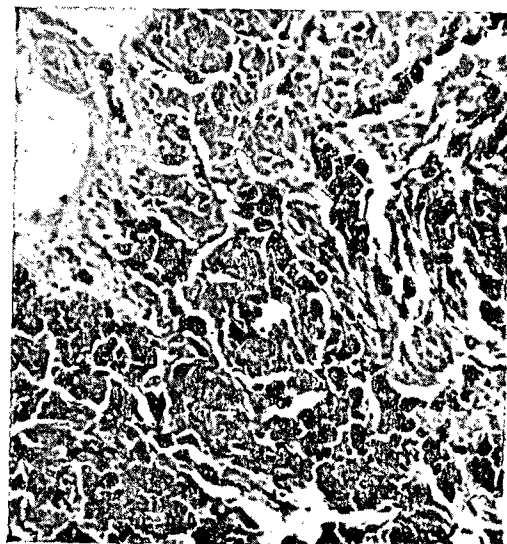


Fig. 1

Photo-micrograph of malignant melanoma: Note increased cellularity and acinar arrangement of neoplastic cells. Epithelial pearl formation in the overlying skin epithelium is also evident. H & E x 100.

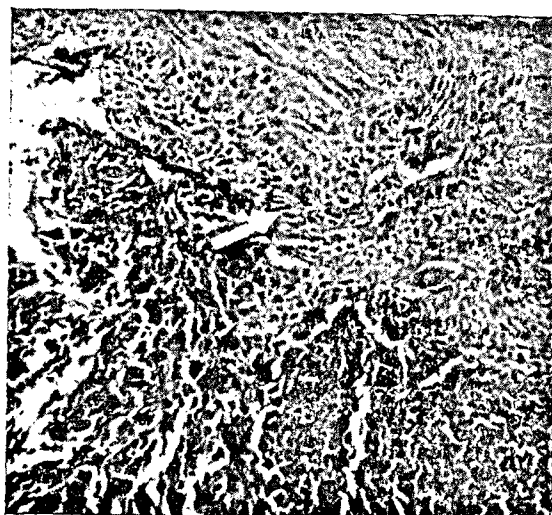


Fig. 2

Photo-micrograph showing breach in the continuity of basal cell layers (arrow) of epithelium due to columns of neoplastic cells splitting off from the deeper layers of skin epithelium. H & E x 100.

SALMONELLA GALLINARUM AND AVIAN LEUCOSIS COMPLEX 467

Letter from the Director, Haffkine Institute, Parel, Bombay reads as under. "The organism gives biochemical and serological reaction of *S. gallinarum*."

Discussion

Salmonella gallinarum was first recorded in Bombay state in the year 1956 and at that time as the material was received from Assistant Disease Investigation Officer, Poultry, Poona it could not be conclusively said that the infection existed in an outbreak form. In spite of the fact that the Assistant Disease Investigation Officer, Poultry, Poona made efforts to collect additional material from the same flock where from he had obtained the original material. In the year 1959, *Salmonella gallinarum* infection was recorded in a flock of birds consisting of about 700 R.I.R. and W.L.H. During the investigations it was further recorded that A.L.C. was also concurrently causing mortality in the flock and during the period of about two months, 102 adult birds were lost. In the circumstances discussed above it is very difficult to attribute the cause of mortality to any individual infection. As the whole flock comprised of only R.I.R. and W.L.H. it was not possible to investigate the incidence in Desi birds. But it must be recorded here that in a radius of about 10 to 15 miles no outbreaks of any infections were reported from the surrounding villages.

The Manager, Poultry Development Scheme, Vidya Mandir, Narayangaon was advised to cull the whole flock and replace the same with healthy stock.

Summary

1. Literature on fowl typhoid and A.L.C. has been reviewed.
2. Symptoms, post mortem lesions, histopathological findings and cultural examinations confirming the diagnosis of *Salmonella gallinarum* and A.L.C. infections have been detailed.
3. This is the first time in Bombay State when double infection in the same flock in an outbreak form is recorded.
4. Confirmation of *Salmonella gallinarum* from Armed Forces Medical College, Poona and Director, Haffkine Institute, Bombay has been given.
5. Plates showing visceral form of A.L.C. and the gross lesions of heart demonstrating tubercles of the myocardium leading to deformities of the heart is also given.

Acknowledgment

The authors are very much indebted to Shri Subnis, Manager Poultry Department Scheme, Vidyamandir, Narayangaon for rendering

all assistance for investigational work of this infection. The authors are also very much thankful to the Director, Haffkine Institute, Parel, Bombay for having kindly examined the cultures confirming the findings of the organisms.

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A CASE OF CUTANEOUS MALIGNANT MELANOMA IN A SHE-BUFFALO

BY

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Introduction

Melanomas have been reported in several species of domestic animals including fowls. Their incidence is more in horses (old gray and white horses) and dogs, less so in white cattle and much more rare in buffaloes.

Venkatesa Iyer (1925, *cit.* Damodaran, 1957) reported a case of melanosarcoma in the region of the neck in a she-buffalo. Bonga (1935, *cit.* Cotchin, 1956) has reported a case of malignant melanoma in a she-buffalo. Chandrasekharan Nair and Sastry (1954) reported two cases of melanoma in their survey of animal neoplasms in the Madras State. Damodaran (1957) gave a detailed account of a multiple melanomatosis in the same species. In view of the rarity of reports of melanotic tumours in buffaloes, a case of a malignant melanoma in a buffalo is reported.

Case History

A non-descript she-buffalo, aged about 10 years, was admitted into the Andhra Veterinary College Hospital on 25th August 1958. The history provided by the patient-owner was, that the animal had an injury on the left hip and he had applied certain drugs, which produced blisters followed by the formation of a growth locally after a period of six months. The biopsy material taken from the growth was examined and identified as malignant melanoma.

Materials and methods

Paraffin sections were obtained from the biopsy material of the tumour. Sections were stained by Haematoxylin and eosin method for routine examination.

A few sections were, however, bleached in 0.5% Potassium permanganate for 2 to 3 minutes followed by treatment with 1% Oxalic acid and examined after staining.

Gross appearances :—The growth over the region of the left hip was in the form of a large deep black coloured mass showing superficial ulceration. The average diameter of the growth was 4".

Microscopic appearances :—Histologically, the epithelium overlying the tumour showed proliferative changes together with well defined epithelial pearl formations here and there. The tumour was highly cellular in nature and the neoplastic cells were pleomorphic but large sized asteroid cells were predominating. The melanoblasts were packed so densely with melanin, that the details of the individual cells were not discernible. A few amelanotic cells were observed. Columns of melanoblasts were seen with the tendency to downward migration from the epidermis to the dermis and thence into the underlying skeletal muscles. In a few areas of the histological picture of the neoplasm, a definite acinar arrangement of melanoblasts with a little amount of a thin fibrous stroma was found. The pigment, melanin, was seen mostly intracellular, although a small quantity of it was dispersed in the interstitial tissue spaces. The colour of the pigment appeared dark brown, when present in smaller quantities, but in deposits of larger quantities it was deep black.

The nuclei of the tumour cells were vesicular, either oval or slightly polygonal in shape, hyperchromatic and possessed very prominent nucleoli, the number of which varied from 1 to 4. Mitotic figures were scanty in spite of tumour exhibiting highly invasive and infiltrative tendencies into the underlying skeletal muscles.

Numerous infiltrating columns of melanoblasts were observed in the underlying skeletal muscles. The muscle bundles were homoge-

nously deep pink, with loss of striations. The nuclei of the muscle cells were either pyknotic or in several places completely indiscernible.

The tumour was richly vascular and contained numerous thin walled vessels and extravasated blood. A few tumour cells were also found within the blood vessels as emboli.

Discussion

The histogenesis of cutaneous melanomas is still a controversial subject among oncologists. Masson (1948, cit. Willis 1953) has upheld the idea of "neural crest" theory. Rawles (1953) while discussing the origin of the mammalian pigment cells also emphasizes the "neural crest" hypothesis, which is at present gaining more supporters to it.

Dawson (1925), Allen (1949) and Willis (1953) are of the opinion that the naevus cells are derived from the epidermis only. Wills (1955), in a more recent reference, expresses that "the neural hypothesis is not necessarily in conflict with the epidermal one" and that both the hypotheses may be correct "if it is true that there are specifically neural cells as an ingredient of epidermis".

In the present specimen, the tumour cells appeared to have split themselves off from the basal cell layers as evidenced by the breach in the continuity and alignment of those cell layers. Such cells were seen to descend down the dermis in the form of columns, which invaded the underlying skeletal musculature.

The above features indicated the tumour to have been apparently derived from a cell located in the deeper layers of the epidermis.

With regard to the exact nature of the cells, which the neoplastic cells claimed their origin from, Willis (loc. cit.) reiterated that all of the epidermis was in a sense neural, as the nerve endings ramified among epidermal cells, which hypothesis, he held, was quite compatible with that of the pure epidermal origin.

Further study with regard to the exact cell of origin and its nature could not be undertaken by us due to lack of special technical facilities.

Summary

(1) A case of cutaneous malignant melanoma in an indigenous she-buffalo is reported.

(2) The gross and microscopic appearances are described in detail.

(3) The clinical history of the case is suggestive of injury caused by an irritant as the predisposing cause for the development of the neoplasm.

(4) Observations regarding metastasis of the neoplasm to internal organs could not be made as the owner of the animal did not allow post-mortem examination of the carcass.

Acknowledgments

Our grateful thanks are due to Dr. P. S. Rajulu, B.V.Sc., M.S., Principal, Andhra Veterinary College, Tirupati, for the encouragement given in the preparation of this article and for providing the facilities. We also record with appreciation the services of Sri A. Sreeramamurthy, Laboratory Technician, for the preparation of sections and photomicrographs. Our thanks are also due to Dr. Syed Mohiyuddeen, for his valuable suggestions.

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Clinical Articles

OBSERVATIONS ON SOME CLINICAL CASES OF HYPO-MAGNESEMIA IN INDIAN BUFFALOES

By

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Magnesium deficiency in cattle has been reported by several authors in European countries and also in the United States of America. Thus, Sjollem (1930) expressed that the condition was known in Holland for a long time and its occurrence has increased to a considerable extent since World War I. Udall (1947) mentioned about its prevalence

amongst dairy cows in New Zealand and Great Britain. Trum (1942) and Nolan and Hull (1942) reported the occurrence of this disease in Nebraska and Kentucky in Missouri and Iowa respectively. Survey carried out by FAO (Richard and Hamilton, 1948) on the occurrence of nutritional deficiencies in livestock revealed the presence of grass tetany amongst cattle in Holland, New Zealand, Great Britain and Ireland. Blaxter and McGill (1956) reviewed the literature on the incidence of hypomagneseemic diseases in cattle in Great Britain. Ray (1942) reported an experimentally induced outbreak of hypomagneseemic tetany in some heifers of Haryana breed where the condition was found to be associated with low serum magnesium content (1.3 mg./100 c.c.) in the affected animals.

Diseases due to metabolic disorders, especially those arising out of mineral deficiencies, mostly in buffaloes in India, have not been studied in great detail. Isolated reports of clinical cases might have been published, but their importance is of limited value since these have not been pursued closely or systematically. However, reports on clinical cases of phosphorus, calcium and vitamin A deficiencies are comparatively larger than those of magnesium (Sen, 1953; Ray, 1958).

The present paper may prove interesting in the context of the statement made by Ray (1958) who opined that the possibility of developing magnesium deficiency symptoms in farm animals under Indian conditions of feeding is remote, since, the mineral (magnesium) is usually present in ample quantities on a mixed ration commonly fed to our farm stock. This report is, however, chiefly aimed at the illustration of a number of hypomagneseemia cases in buffaloes with the expectation that.

- (i) It might help the veterinarians employed in organised cattle and buffalo farms to keep vigilant eye on the occurrence and prompt detection of the condition before it causes economic loss to any considerable extent resulting from the reduction in milk yield and/or from the death of the affected animals.
- (ii) It might provoke thoughts amongst the animal nutritionists of the country so that the causative factors responsible for the development of such conditions even in well fed milch buffaloes are determined and necessary recommendations for the prevention of such conditions advocated.

Materials and Methods

The material of this report consisted of fifteen adult she buffaloes which developed and exhibited hypomagneseemic symptoms. These were the case records of the Veterinary Section of the Government Milk Colony, Haringhata, West Bengal. This organisation colonises more

than two thousand buffalo cows in different smaller and larger herds of the approximate strength of 10 to 250 animals respectively. The owners of these herds usually procure animals from the breeding tracts of Punjab and Delhi and also from certain areas of Bihar and U.P.

The ration fed to these animals consists of concentrate mixture and dry and green roughages. The concentrate mixture is composed of either "Arhar or Mung chuni" (a bye product of pulses) together with mustard and/or linseed cakes. Greens are supplied in the form of chaffed jowar, para grass or berseem. Paddy straw is the main source of roughage. Certain owners incorporate some quantity of wheat bran. The usual practice is to soak all the ingredients of concentrate mixture in water for 4-5 hours and then to feed these soaked mixture mixed with chaffed straw prior to milking. Common salt is liberally supplied in the ration by almost all the owners. Green fodder is generally fed in sufficient quantities during day time.

Blood samples from seven affected animals were collected before any kind of medication and these were sent to the Eastern Regional Animal Nutrition Research Centre, Haringhata, for quantitative estimation of serum magnesium in mg./100 c.c.

Symptoms

The symptoms as observed in all of these animals are narrated briefly along the course of the disease. In less acute form the animal remains prostrate with a most characteristic twist of the neck which assumes to some extent a "s" shaped curve. In the most severe form of the disease the following symptoms were observed:

Acute excitement and restlessness, thrashing of the legs back and forth at a rapid rate which accelerates on disturbance; head is stretched backwards; ears remain sensible; eyes become congested and vicious; occasionally the head is raised to have a painful look over the body but within a few seconds it is again thrown back with a renewed attack of tetanic spasms of the whole body; respiration is deep accompanied by an occasional break at expiration; certain amount of dyspnoea is also observed; tonic and clonic spasms of the entire body are noted. On further deterioration of the condition the animal enters into the phase of paresis and muscular spasms continue; limbs are thrashed mildly; thrashing and muscular spasm can be induced by startling the animal with external stimuli; the tongue is protruded to gasp air to compensate for the difficulty in breathing; salivation is usually profuse; temperature remains generally around 100°F.

Post mortem findings

Some of the animals which succumbed to death showing the symptoms narrated above revealed on post mortem examination

no macroscopically detectable abnormalities of the internal organs except a stagnation of large quantities of ingesta mostly in the rumen and in the omasum.

Diagnosis

Diagnosis has been based chiefly on chemical estimation of magnesium in mg./100 c.c. of serum collected from the affected animals at the time of the seizure of fits. The distinct clinical picture also helped greatly to arrive at a tentative diagnosis. When the occurrence of the disease was established in the herd some animals were diagnosed on the basis of clinical symptoms and the diagnosis was confirmed subsequently by the response of affected animals to the treatment specific against hypomagnesemia. On the whole, for confirmative diagnosis emphasis was given to the correlation of different factors, namely, magnesium level in the blood, clinical symptoms and the response of such conditions to magnesium injection and the post mortem findings in certain cases as well.

Treatment

Table II shows the details of treatment of all animals which were attended upon at different intervals from the time of attack. In our hypomagnesemic therapy the source of this mineral was magnesium sulphate in 20% aqueous solution and M. F. C. solution (a proprietary preparation issued by M/s. May & Baker and containing magnesium sulphate, 5% w/v, calcium borogluconate 25%, w/v, dextrose, 20% w/v and distilled water to 100). Moreover, in a few cases the sulphate of magnesium was prescribed along with calcium borogluconate and in some M. F. C. solution. For every animal the subcutaneous route was resorted to in the administration of the prescribed drug.

On the basis of hypomagnesemic therapy practised in these cases the animals are assorted into four different groups. Thus, group I includes two animals No A/3262 and A/2073 which received 400 c. c. and 300 c. c. of 20% magnesium sulphate solution respectively. The former recorded signs of relief and an effective cure while the latter collapsed within half an hour of medication.

In group II animals No. O/30 and A/2430 were prescribed comparatively higher doses of magnesium salt (540 c.c. and 600 c.c. respectively) concurrently with 350 c.c. of calcium borogluconate solution in 20% strength. On further observation it was marked that treatment proved effective since the animals progressed quickly towards recovery.

Group III represents four animals which were treated with varying doses of M.F.C. solution followed by 500 c.c. to 600 c.c. of magnesium

sulphate at variable intervals from the initial injection of the proprietary drug. All of them got cured.

Group IV or the last group includes seven animals which have been treated with a single injection of M.F.C. solution in massive dosage of 700 c.c. to 800 c.c. All cases thus treated showed encouraging results with subsequent recovery except animal No A/3136 which expired within half an hour of medication.

Discussion

The normal blood magnesium level in Murrah she buffalo has been observed to be 2.96 ± 0.19 mg./100 c.c. (Anonymous, 1958-59) at the Eastern Regional Animal Nutrition Research Centre, Haringhata, West Bengal. Sen (1953) quoted the normal magnesium concentration in the blood of Indian cattle as varying between 2.84 mg. and 2.40 mg./100 c.c. Boddie (1953) stated the magnesium concentration in ruminants to be 2.5 ± 0.5 mg./100 c.c. and indicated that during acute phase of deficiency the concentration may drop to 0.5 mg./100 c.c. Ray (1942) detected low magnesium concentration in the blood (1.17 mg.—0.07 mg./100 c.c.) of a number of Haryana heifers during "fainting fits" in these animals.

In our study it was observed that magnesium content of blood in animals from which samples were collected soon after the development of tetanic symptoms, varied between 1.90 mg. to 1.28 mg./100 c.c. (Table I). Thus, it is apparent that in the affected animals magnesium concentration of the blood dropped down to lower values than the normal. This reduction of magnesium is obviously associated with the deficiency symptoms. This can be held responsible for causation of tetanic symptoms in the affected animals.

Greig and Boddie (1949) recommended magnesium sulphate in $\frac{1}{2}$ oz. doses in the treatment of hypomagnesemic tetany in dairy cattle. Ray (1958) and Udall (1947) expressed that prompt responses may frequently be obtained by simple administration of magnesium salts. Blaxten and McGill (1956) concluded that though the onset of the condition is very sudden and the course too rapid on many occasions the response to a single injection of magnesium is usually complete. Udall (1947) reported the success of Dutch Workers in the treatment of grass tetany with parenteral administration of calcium chloride (30 G) and magnesium chloride (8 G) in combination. Huffman and Duncan (1935 and 1936) demonstrated that magnesium improves calcium and phosphorus metabolism. Hence, it is presumed that there exists some relationship among these elements inside the animal body. Moreover, it is not improbable that hypomagnesemic syndrome may involve a simultaneous reduction of calcium level in the blood. Greig and Boddie (1949) in view of such possibility, considered

inclusion of calcium borogluconate advantageous in the treatment of hypomagnesemic diseases. Therefore, on the above principle the majority of cases reported in this paper were treated with drug (s) containing all these three elements, viz, calcium, magnesium and phosphorus.

The procedure of treatment may be outlined in some greater details so as to make it more informative on the context of the results reported in this paper. It has already been mentioned that we tried several drugs in different methods of treatment keeping magnesium as a constant factor in all of them. It seems rational that adequate amount of magnesium should be prescribed in all conditions of hypomagnesemia. Therefore, we prescribed magnesium sulphate only in the first group of patients. In view of the suggested relationship of magnesium, calcium and phosphorus in the body the latter two elements were combined with usual magnesium therapy in the treatment of a number of cases. The treated animals showed encouraging results.

In group III M.F.C. solution was included along with magnesium salt in the treatment of four animals. At first two animals were prescribed 700 c.c. of M.F.C. solution followed by 500 c.c. of magnesium sulphate, which would meet the adequate demand for this mineral. The treatment was successful. In the third animal (No A/2703) the dose of M.F.C. was reduced to 500 c.c. with a simultaneous increase of magnesium sulphate (600 c.c.). The result was favourable. The last animal (No O/320) received a still lower dose of M.F.C. along with 700 c.c. of magnesium sulphate solution. The case was discharged after complete recovery.

In group IV altogether seven animals were treated with massive doses of M.F.C. solution (700 c.c. - 800 c.c.), sulphate of magnesium being omitted totally. All cases got cured except No A/3136 which died shortly after the treatment.

From the different methods of treatment it appears that in the treatment of hypomagnesemic tetany, the dose of magnesium requires to be adequately higher. Heavy doses are likely to cause no harm while inadequate dosing may render no help to the animal during magnesium crisis.

So far as the selection of medicines is concerned aseptically prepared magnesium sulphate seems to be preferable along with calcium salts. Simple magnesium sulphate may prove effective. But the syndrome may also entail some complications with the simultaneous reduction of calcium level in the blood. Therefore, it is safer to incorporate calcium salt as well. M.F.C. solution is equally effective

like magnesium and calcium combination, but the dose being heavy (700 c.c.) as tried in these cases, the treatment appears to be a bit costly. (M & B recommends 200 c.c. to 350 c.c. in cattle according to body weight for the treatment of grass tetany). However, it has got an advantage in the sense that it can be stored in the clinic and made available at the moment of emergency.

Another interesting phenomenon has been observed in the treated cases. This is the time interval between the attack and the attendance. In the total number of 15 animals two failed to exhibit encouraging response against our magnesium therapy. Of these, animal No A/2073 was attended after 3½ hrs. of the attack and although received about 2 oz. of magnesium it died within ½ hr. The other (No A/3136) which was attended after 4 hrs. of attack yielded no response even to a massive dose of M.F.C. solution (700 c.c.). The rest of the animals were attended within ½ to 2 hrs. of their attack and recorded effective cure for different hypomagnesemic therapy. Hence the time factor appears to be equally important like the dose in the matter of effective treatment against hypomagnesemia in buffaloes.

It was observed that out of 15 cases, 9 attacks were recorded during rainy seasons (July-October) as against 5 cases marked in summer (March-June) and one in winter (November-February).

In order to hold forth the aetiological factor(s) responsible for the development of hypomagnesemic symptoms in dairy cattle several hypotheses have been propounded by several authors. They appear to be of interest in view of the results embodied in this paper. Therefore these are mentioned in brief.

The idea which incriminated excessive K intake with the resultant reduction in serum magnesium as the causative factor for hypomagnesemic tetany in bovines (Kunkel, *et al* 1953) was not substantiated by the experiments of Pearson (1948), Baton and Avampto (1952) and Odell, *et al* (1952).

Toxicity due to fermentation products of protein, such as amines and principally guanidine in the rumen exerted no effect on blood Ca and Mg content (Shohl, 1939). Also, nitrate poisoning depicted an entirely different syndrome other than that of grass tetany (Seekless and Sjollesma, 1933).

Workers at Reading (Blaxter and McGill, 1956) provisionally maintained excessive ammonia formation in the rumen from fermentation of protein and other nitrogen-containing compounds of grass as a causative factor for the development of hypomagnesemic tetany in cattle. Rathje (1958) attempted to correlate the incidence of grass

tetany to nitrogen-content of the pastures. Fields which recorded higher incidence of tetany were also found to have higher estimates of nitrate. Thus the author suspected nitrate poisoning as the causative factor for grass tetany.

Because of the suddenness of attack and surprisingly rapid course together with the amazing response commonly to a single injection of magnesium compound the disease has not been regarded as a dietary deficiency in the classical sense (Blaxter and McGill, 1956). No explanations have, hitherto, been provided as to why the affected animals fail to mobilise their body reserves, even though these remain intact, during the acute phase of the crisis. Ray (1958), however, indicated that the condition is difficult to be regarded as of nutritional origin and is, perhaps, caused by a failure to mobilise body magnesium due to some endocrine dysfunction.

Summary

15 clinical cases of hypomagnesemia in Indian buffaloes at the Govt. Milk Colony, Haringhata, West Bengal, are reported in this paper. The symptoms are described briefly. Magnesium content in the serum from 7 affected animals are estimated and embodied in a separate table.

Treatment of all the clinical cases carried out with different drugs are discussed in some detail. Factors observed to influence the efficacy of the treatment are also mentioned.

Certain hypotheses propounded by several authors to elucidate the aetiological factors of hypomagnesemic tetany in bovines are mentioned briefly.

TABLE I

Estimated concentration of magnesium in the serum collected from the clinical cases of hypomagnesemia in Indian buffaloes.

Brand No.	Date of attack	Interval between attack and collection of blood	Mg. in mg./100 c.c.
A/2073	...	3-3-59	3½ hrs.
A/3262	...	18-3-59	½ hr.
A/2331	...	27-4-59	½ hr.
A/320	...	30-5-59	1 hr.
Unbranded	...	14-7-59	½ hr.
A/3136	...	26-7-59	4 hrs.
A/1971	...	1-8-59	1½ hrs.

TABLE II

Detailed procedure of treatment of hypomagnesemic cases in Indian buffaloes.

Group Buff. No.	Interval between attack and attendance	Drugs/Preparations	Dose	Remarks
I				
A/3262 ...	30 min.	Mag. sulph. 20%	400 c.c.	Cured
A/2073 ...	3½ hrs.	Mag. sulph. 20%	300 c.c.	Died ½ hr. later
II				
A/2430 ...	1 hr.	Mag. sulph. 20% Cal. borogluconate 20%	600 c.c. 350 c.c.	Cured
0/30 ...	1 hr.	Mag. sulph. 20% Cal. borogluconate 20%	540 c.c. 350 c.c.	Cured
III				
0/459 ...	1 hr.	M.F.C. Solution Mag. sulph. 20%	700 c.c. 500 c.c.	Cured
A/1971 ...	1½ hrs.	M.F.C. Solution Mag. sulph. 20%	700 c.c. 540 c.c.	Cured
A/2703 ...	1 hr.	M.F.C. Solution Mag. sulph. 20%	500 c.c. 600 c.c.	Cured
0/320 ...	1 hr.	M.F.C. Solution Mag. sulph. 20%	350 c.c. 700 c.c.	Cured
IV				
A/2331 ...	½ hr.	M.F.C. sol.	800 c.c.	Cured
B/1851 ...	1½ hrs.	" "	700 c.c.	Cured
Unbranded ...	1½ hrs.	" "	700 c.c.	Cured
0/259 ...	2 hrs.	" "	700 c.c.	Cured
A/782 ...	½ hr.	" "	700 c.c.	Cured
A/3136 ...	4 hrs.	" "	700 c.c.	Died ½ hr. later
Unbranded ...	½ hr.	" "	700 c.c.	Cured

Acknowledgment

The authors express their gratitude to Dr. S.C. Ray, Director of Dairy Development and ex-officio Milk Commissioner, West Bengal, and to Dr. S. Bhattacharya, Deputy Milk Commissioner, (Livestock), West Bengal, for their encouragement shown during the course of preparation of this paper.

The authors are also greatly indebted to Mr. N.C. Deb, Assistant Research Officer, Animal Nutrition, Eastern Regional Animal Nutrition Research Centre, Haringhata, for his guidance and valuable suggestions made available while preparing this report. Sincere thanks are also due to Mr. A. K. Pal, Senior Research Assistant, in the same Organisation for the analytical work included in this paper.

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TREATMENT OF MASTITIS

By

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and

M. P. SHARMA,

Punjab College of Veterinary Science and A. H., Hissar.

Before the advent of antibiotics, there was no satisfactory treatment of mastitis. The veterinarians and the dairymen were helpless witnesses of the malady which claimed many victims and caused heavy economic losses. With the antibiotics, the treatment and control have become easy.

Oily suspensions of penicillin and terramycin, prepared by different commercial firms, available in collapsible tubes, were being used extensively for the treatment of mastitis. Due to import licence difficulties during the last two years, the supplies of the latter were almost negligible and the supplies of the former very much restricted. This gave the authors an opportunity to try over a large number of cases of mastitis in cows and buffaloes, an aqueous antibiotic mixture, which could be effectively used for treatment. The formula for this mixture is the courtesy of Indian Veterinary Research Institute, Mukteswar and is given below :

Procaine penicillin	... — one lac units.
Dihydro-streptomycin	... — 50 mgms.
Sulphamezathine sol.	... 33-1/3%—5c. c.
Cobalt Sulphate	... — 5 mgms.
Aqua distillata	... — 40 c.c.

To be injected intra-mammary into the affected quarter.

The infected quarter was thoroughly stripped off its contents and the teat orifice disinfected. The mixture was then injected into the quarter (40 c.c.) with a sterilized syringe and a hypodermic needle, rendered blunt and smooth at the tip. The owner was instructed not to milk the treated quarter in the evening thus allowing the mixture to be retained for 24 hours. Next morning the quarter was cleaned of its contents and the treatment repeated. After a continuous treatment of four to eight days, most of the cases responded to treatment and the milk returned to normal. Two cases of suppurative mastitis (due to *Pseudomonas pyocyanea* infection) could not be cured.

This treatment was tried over a large number of cases brought to the clinics of the Punjab College of Veterinary Science and Animal

Husbandry, Hissar, and it was noticed that the results were better than the oily preparations. This is in line with the recent investigations of Hueber *et al* (1960) who have reported, by tagging radio-isotopes with antibiotics in oily and aqueous mixtures, both *in vitro* and *vivo*, that the aqueous mixtures are more readily diffusible, thus carrying the antibiotic to the remote acini of the mammary glands and are thus superior in action to the oily suspensions.

The following table gives the number of cases treated and the results of the treatment :

No. of cows and buffaloes treated	No. of cases recovered	No. of cases not recovered	No. of cases with incomplete treatment	Percentage recovery
115	101	3	11	88%

It is hoped that the mixture will be tried widely by the field workers and the results reported.

Acknowledgment

Our thanks are due to Shri P. N. Nanda, M.R.C.V.S., ex-principal of this college for affording us all facilities for the trial.

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Abstracts

An Outbreak of Pasteurellosis in Grackle.—By G. K. GHOSH & D. P. NAYAK, *Bengal Veterinarian*, Vol. VII, Oct., 1959.

The authors investigated into the outbreak of an acute septicaemic disease among Grackles (*Gracula religiosa*) in a Calcutta aviary involving 400 birds, out of which 40 died in 3 days. Autopsy revealed cutaneous hyperaemia of pectoral and abdominal regions and acute haemorrhagic enteritis with marked deposit of viscous mucinous fluid. Organisms, which were subsequently typed as *Pasteurella avicida* and found to be pathogenic for laboratory animals, were isolated culturally from the heart blood of the autopsied birds. The authors claim that this is the first record of Pasteurellosis in Grackle in captivity.

A. MUKERJI.

A *Neisseria* species Associated with Infectious Keratoconjunctivitis of Sheep, *Neisseria Ovis* New Spes.—By KARE LINDQVIST, *Jour. Infectious Diseases*, Volume 106, No. 2, March-April, 1960.

Keratoconjunctivitis in sheep of an infectious character is prevalent in many sheep breeding districts in Norway. Although many suggestions have been made concerning the etiology of this disease, no definite proof of any specific infectious agent has been presented. Most research workers, however, agree that the Rickettsia-like organisms observed in smears from affected eyes seem to be the causative agent. In the course of some investigations into this problem, a Gram negative, haemolytic species of the genus *Neisseria* has been isolated. The strains appear to belong to a new species, for which the name *Neisseria ovis* is suggested. The species is further characterized by its haemolytic, non-chromogenic, and non-fermentative properties, as well as by a positive nitrate reduction test. Its role in infectious Keratoconjunctivitis of sheep is not yet known.

A. MUKERJI.

Infectious Meningo-Encephalitis in Cattle, Caused by A *Haemophilus*-Like Organism.—By P.C. KENNEDY, *et al.*, *Amer. Jour. Vet. Res.*, Vol. XXI, No. 82, May, 1960.

(Authors' summary reproduced)

An epizootic of bacterial encephalitis in feedlot cattle is reported. The disease was experimentally reproduced by means of a previously undescribed organism. Clinically, this disease was characterised by a brief prodromal stage of fever and stiffness followed by the rapid development of neurologic signs and death, if untreated. Diagnostic gross lesions were confined to the brain, where single or multiple haemorrhagic areas of softening were present. Microscopically, these lesions showed evidence of a bacterial vasculitis which led to thrombosis and infarction. The causative agent of this disease is a small, gram-negative coccobacillus which requires blood and an increased CO_2 tension for growth on primary isolation. The taxonomic aspects of this organism are discussed.

A. MUKERJI.

Bacteriological Studies of Experimental Air-Borne Salmonellosis in Chicks.—By D. I. CLEMMER, *et al.* *Jour. Infectious Diseases*, Vol. 106, No. 2, March-April, 1960.

(Author's summary reproduced)

1. New Hampshire Red chicks 1 to 2 days old were infected by exposure to quantitated aerosols of 10 strains (9 species) of *Salmonella*. The number of retained inhaled organisms necessary to initiate respiratory infection was low in some cases less than 20 viables.

2. With certain exceptions, the inhaled organisms multiplied to a significant extent in the lungs over a period of several days. The pulmonary infections were usually self-limited, although 2 to 3 weeks might be required for auto-sterilization. Some strains appeared to proliferate relatively poorly in the lungs. In a small proportion of infected birds, the failure of natural defence mechanisms to restrict microbial growth resulted in a disease process with millions of *Salmonella* in the lungs and subsequent fatal outcome.

3. Concurrent enteric and haematogenous infection often resulted from exposure to *Salmonella* aerosols. Conversely, in chicks inoculated per orally by capsule the enteric infection frequently resulted in haematogenous spread of organisms to the lungs as well as other tissues.

4. Bird mortality following exposure to aerosols was, for the majority of *Salmonella* strains, no higher than would be expected from per oral inoculation.

5. Even with minimal inoculums *via* aerosol, the two strains of *S. pullorum* tested multiplied to large numbers in the lungs and the bird mortality was at least twice that observed among chicks infested *per os*.

A. MUKERJI.

Inter-Relationship Between Hypovitaminosis A and *Ascaridia galli* Infestation in Poultry.—BY PANDE, P. G. and KRISHNAMURTHY, D. (1959). *Poultry Science*, 38: 13-25.

The authors investigated the factors responsible for heavy mortality among birds in the Government Poultry Farm attached to the Veterinary College, Mathura, Uttar Pradesh. The feeding practice indicated that there was deficiency of vitamin A activity in the feed given to the birds, though the ration provided protein and minerals adequately. The quantity of greens—the main source of vitamin A supplied was only a quarter to half of the actual requirement. So the birds were in a chronic state of hypovitaminosis A. The mortality figures revealed a heavy toll of chickens less than 6 months of age. Analysis of post-mortem reports showed that 62.5% of deaths were due to vitamin A deficiency and *Ascaridia galli* infection. Moreover majority of carcasses revealing lesions of hypovitaminosis A were found harbouring large numbers of *A. galli*. These studies indicated an inter-relationship between hypovitaminosis A and *A. galli* infection.

The effect of *A. galli* infection on the fate of ingested carotene was observed in a group of experimental fowls heavily infected with the helminth. Even though the optimum quantity of the greens (2 oz.) was given as a supplement to the routine feed, the birds revealed extensive lesions of avitaminosis A and very low vitamin reserve in the

liver, as the intestinal epithelium damaged by *A. galli* was not able to absorb and synthesise carotene into vitamin A. In another experiment healthy and parasitised chicks were fed on a diet deficient in vitamin A activity. It was found that hypovitaminosis A occurred as a chronic condition in 7-10 months in the free group while lesions of hypovitaminosis A appeared in the parasitised group in 1-2 months. The observations indicated that vitamin A deficiency would lead to helminthic infection and the damage caused to the intestinal epithelium by the helminth would interfere with the conversion of carotene into vitamin A. This represented a cyclic relationship of the clinopathological events tending to perpetuate both these conditions in the flock. In the third experiment, infection free chicks maintained on a heavily contaminated run and fed on a diet containing recommended level of vitamin A activity were found to thrive free from *A. galli* infection.

Based on the above observations and studies the birds in the farm were maintained on the routine feed supplemented by 2 oz. of greens per bird for each day and the chicks and adults were dosed with carbon tetrachloride fortnightly at the rate of 0.75 ml. and 1.5 ml. respectively. The mortality was considerably reduced and neither lesions of vitamin A deficiency nor *A. galli* worms were found in the dead birds. In the subsequent years the entire farm stock was maintained free from hypovitaminosis A and *A. galli* infection without resorting to anthelmintic treatment but providing in the ration 2-oz. of greens per day for each bird.

V. S. A.

On a New Species of *Stephanofilaria* Causing Dermatitis of Buffaloes' Ears in Hyderabad (Andhra Pradesh) India.—SATYA NARAIN SINGH (1958). *J. Helminth.*, 32: 239-250.

Specimens of *Stephanofilaria* were collected from the ears of buffaloes initially at Baswada (Nizamabad) and subsequently at an abattoir in Hyderabad. The infection with this worm was found to be common. In the affected ears the internal skin was abnormally thickened and covered with papules and encrustations. In advanced conditions the inner surface of the ear showed red patches and the protruding head ends of female worms. A detailed morphological study of the collection resulted in the discovery of a new species of *Stephanofilaria*—*S. zaheeri*. After a complete description of the male and the female, the author compared *S. zaheeri* with the known species of *Stephanofilaria*—*S. dedoesi*, *S. stilesi*, *S. kaeli* and *S. assamensis*. *S. zaheeri* was distinguished from *S. assamensis* the other species described from India, by the large size, distinct anal aperture, lack of lateral alae, longer left spicule, larger number of postanal, precloacal

and preanal papillae, thicker and shorter tail of the male and longer microfilariae. The author felt that the ear infection in buffaloes with *Stephanofilaria* in Dutch East Indies and Assam might not be due to the species *S. dedoesi* and *S. assamensis* respectively as hitherto believed.

V. S. A.

Effects of High Level Feeding of Stilboestrol to Dairy Heifers.—By BROCKERT, J. E. and JOHNSON, K. R. *Proc. W. Div. Amer. Dairy Sci. Asso.* (1957).

Results of a small scale trial with three pairs of Friesian heifers indicate that low level feeding of Stilboestrol (2 or 3 mg/100 lbs. live weight) has no adverse anatomical or physiological effects but a higher level (4 mg/100 lbs. live weight) may have adverse effects. In all cases udder development was so slight as to be considered *nil*.

B. PANDA.

Effects of Intramuscular Injections of Oxytocin in the Maintenance of Maximum Milk Production.—By ARMSTRONG, DR. and WARD, G. M. *Proc. W. Div. Amer. Dairy Sci. Asso.* (1957).

Alternate 5 day intramuscular injections of 30 or 40 i. u. of Oxytocin produced an increase in milk yield of 1.87 lb./day and reduced milking time on an average of 1.9 min/cow. Greatest response to the injection of Oxytocin was noticed, in nearly all cases, on the third day.

B. PANDA.

The Storage of Hatching Eggs and The Post-Hatching Body Weights of Chickens.—By BECKER, W. A. *Poul. Sci.*, Vol. 39, No. 3, p. 588-590 (1960).

The storage age of hatching eggs was found to affect the 8 and 9 week body weights of chickens. In four experiments using meat-type chickens the body weights of chickens hatched from eggs stored for at least two weeks before incubation were lower than the body weights of chickens from eggs stored for a shorter period (Author's).

B. PANDA.

Effects of Diencephalic Lesions on the Ovary of the Hen.—By RALPH, C. L. and FRAPS, R. M. *Amer. J. Physiol.*, Vol. 197, pp. 1279-83 (1959).

Small lesions produced electrolytically in the median diencephalon of actively ovulating hens caused most of them to cease ovulation

regardless of the site of the lesions. The duration of the non-ovulating period thus induced however, tended to vary with position of the lesions. When in the pre-optic hypothalamus, supra-optico hypophyseal tract, or dorsocaudal thalamus, the mean periods of interruption were about twice that found when lesions were in the central diencephalon. Considerable variability was encountered. A possible explanation is offered for the differing rates of functional recovery which occur following the placement of lesions. (Author's).

B. PANDA.

Block Development Corner

[Articles under this section, should be more in the nature of simple 'talks' to rural folks and village level workers, on Animal Husbandry matters and not loaded with scientific terms and theories.]

A FEW LABOUR SAVING DEVICES IN A POULTRY FARM

By

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Bhavanisagar

Poultry farming has come to be recognised as a subsidiary cottage industry to agriculture. An agriculturist who toils all the day long in the fields is really in need of some more enterprise which will augment his income. For this, he can have a ready recourse to poultry keeping. But he can't afford to spend much of his useful time in feeding and rearing poultry. He has got to find out some devices which will save his labour without affecting efficiency and at the same time give him increased returns. Here are a few tips which may be of some help to such a ryot.

1. *Housing*:—(a) A cheaper adult poultry house which will cost him only about Rs. 20/—to lodge 20-25 adult birds and which has provisions for feed and water may be constructed. For details of such a house please refer to November, 1959 issue of *I.V.J.*

(b) For a ryot, who has a well constructed costly house with asbestos roofing the undermentioned suggestion may be useful. Instead of wirenetting on the base of the house beneath the perches, bamboo

trellys may be placed. Cleaning of the poultry faecal matter is a much dreaded job for any individual. By adopting the Bamboo trellys frame work, daily cleaning of the house is not considered necessary. The natural instinct of the bird to scratch out any matter strewn on the floor is taken advantage of. The voidings of birds, when dried, are scratched by the birds and the powdered mass falls in the pit dug underneath the house, to conserve this good nitrogenous manure.

But, for adopting the above procedure, one should take care to see that he makes a fixed day in a month for deworming the birds with Phenovis or any deworm pills. For this purpose, the multipurpose Village Level Worker of a development block or any Animal Husbandry agency will readily render all necessary help to the ryot.

2. *Feeding*:—Giving birds grain and mash coupled with additional feeding practices involve much attention and consume more useful time of a ryot. The poultry being a biological machine requires efficient feeding so that maximum returns by way of eggs for hatch and table and fattened birds for food purposes are obtained. To achieve this object efficiently, dry mash system of feeding of poultry may be practised. On any shandy day, the ingredients necessary for mixing feed may be purchased and the mixture made and kept in a dry container, to last for a week or 10 days depending on the number of birds one possesses. By spending about $\frac{1}{2}$ hour for mixing feed to last for a week really saves labour and time. Even children can feed poultry with a balanced ration for poultry daily from the prepared mixture. The concern of the elders is only to mix the feed on a fixed day and leave the rest to children.

3. *Feed hoppers*:—For such of these ryots who rear birds in a semi-intensive system with wire-netting, etc. the suggestions under this head may be useful. The present day feed hoppers are of a linear type and they can hold only small quantities of mash. Further there is a possibility of their being toppled down by the birds in their desire to eat more food. Further the feed in such hoppers is exposed to sun and rain. As already said, very frequently in a day the feed hopper has got to be filled and this requires much time. To overcome this, a feed hopper of the box type (Figure No. 1-2) may be adopted. A box to contain 20 to 30 lbs of feed may be designed with a lid. As the birds go on eating from the sides the food at the centre slides on, and the birds get their full quota. Thus a box once filled need not be filled for another 2 or 3 days or even longer, depending on the number of birds.

Community feed hopper designed at the R.E.T.C. Bhavanisagar.

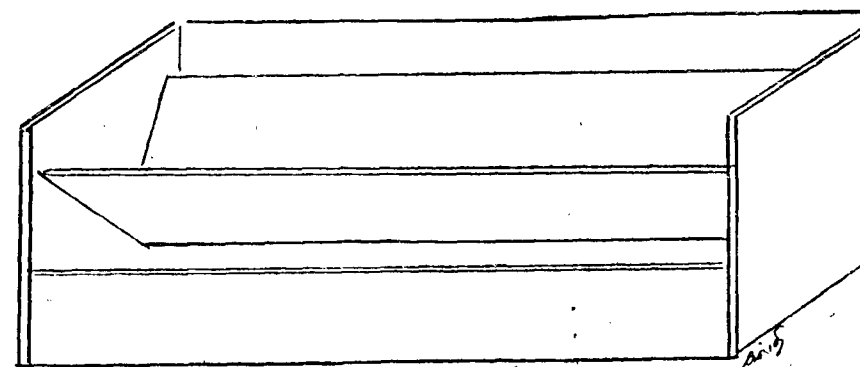


Fig. 1. Without lid.

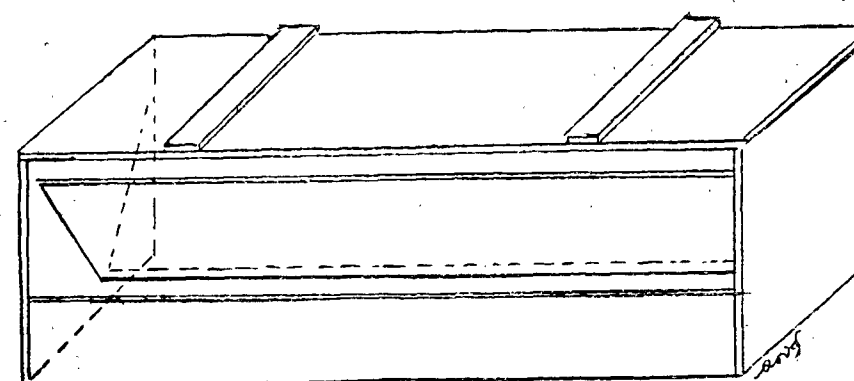


Fig. 2. With lid.

There may be some more labour-saving devices but the ones mentioned above have been tried in the poultry unit attached to the Rural Extension Training Centre, Bhavanisagar and found successful. By adopting such devices, it will be possible for a boy of 10 to 14 years to manage 200-300 birds at a time without much difficulty.

Association News

The Indian Veterinary Association

Proceedings of the meeting of the Managing Council
held on 14-8-60 at 10-30 a.m.,
at Hotel Dasaprakash, Madras.

Members present :—

Dr. T. Vinayaka Mudaliar, *President, I.V.A., and*
Editor, I. V. J.

„ V. S. Alwar, *General Secretary, I.V.A.*

„ C. I. John, *Jt. Secretary and Treasurer, I.V.A.*

„ D. Pattabhiraman, *Director of Animal Husbandry,*
Madras State (co-opted).

„ A. R. Vedanayakam, *Secretary, Madras Veterinary*
Association (co-opted).

1. (a) Read letters from Drs. Anupam Chatterjee and K.N. Nair regretting their inability to attend the meeting and offering suggestions on the subjects of the agenda.
- (b) The Members regretted to note that Dr. M. R. Ghosh, Vice-President, I.V.A. was still confined to bed and prayed for his early recovery.
2. Read letter dated 2-3-60 from Rao Sahib T. Vinayaka Mudaliar, President, I.V.A., *cum* Editor, *I.V.J.* (requesting to be relieved of both the offices from 1-1-1961); read also the note of the General Secretary on the subject and the remarks of the other Council Members fully agreeing with the above note.

The meeting unanimously requested Dr. T. Vinayaka Mudaliar to continue in office till the end of 1961 at least. The suggestion of the Editor for associating Dr. V. S. Alwar, G.M.V.C., B.V.Sc., M.Sc., and Dr. M. S. Jayaraman, G.M.V.C., B.V.Sc., M.V.Sc., with the work of the Journal as Associate Editor and Assistant Editor respectively to give him the desired relief as well as to get them trained in the work, was approved. Since Messrs. Alwar and Jayaraman are Government Servants, it was resolved to address the Madras Govt. through the Director of Animal Husbandry, Madras, for necessary permission to the above Officers to undertake the assignment.

3. Resolved to address the I.C.A.R. for an annual recurring grant of Rs. 5,000/- to meet the increased expenditure involved in the publication of the *I.V.J.*, the only scientific journal of its kind published monthly in this country and for further improvements of the journal.
4. Considered the suggestion of some members regarding the supply of *I.V.J.*, to the students of Veterinary Colleges in India at a concessional rate and the note of the General Secretary thereon. It was resolved to supply the *I.V.J.* to the students of Veterinary College in India at a concessional rate of Rs. 6/- per year, if they apply through the Principals of their respective Colleges.
5. Resolved to request the Government of Madras for alienating a suitable Government site, not less than two acres in extent for putting up a building for the *Indian Veterinary Journal*.
6. Read the correspondence from West Bengal about the transfer of Animal Husbandry Section from the Veterinary Department to the Directorate of Dairy Development and resolved to communicate to the West Bengal Government the following resolution on the subject :—

“This meeting of the Managing Council views with grave concern the transfer of the Animal Husbandry Section, which was after mature consideration, annexed to the Veterinary Department only in 1959, to the newly formed Directorate of Dairy Development and feels that this action is not a step in the right direction. Instead, the Council is strongly of the opinion that both Animal Husbandry and Dairying should form part and parcel of the Veterinary Directorate. The council wishes to bring to the notice of the Government the following resolution passed at the 14th All-India Veterinary Conference held at Calcutta in February 1960 under the Presidentship of the Animal Husbandry Commissioner with the Government of India. Hence the Managing Council requests the Government of West Bengal to continue to have the Animal Husbandry work under the Veterinary Directorate.

RESOLUTION No. 3

“This Conference resolves that in view of the great success so far achieved in the development of livestock in this country since its transfer to the Veterinary Department after careful consideration, the existing arrangement should be allowed to continue without disturbance; further resolves to request the Governments of the States in which the Livestock development work is still entrusted to Departments other than the Veterinary Department to transfer the livestock section to its rightful custodian - the Veterinary Department.”

7. The Managing Council regrets to note that persons other than Veterinary specialists are appointed as Livestock Development Advisers to the Ministry of Agriculture, Government of India and requests the Government to recruit only Veterinary Specialists for such posts as the work involved is of a highly specialised nature necessitating laying out of policy matters not only with regard to breeding and livestock development but of giving necessary guidance to the Directors of Veterinary and Animal Husbandry Services in the States.
8. Read the communication from the Under Secretary, I.C.A.R., to the Secretaries of State Associations about, the action taken for the nomination of a representative of Veterinary Science to the Rajya Sabha and about the need for the State Veterinary Associations to take steps for the nomination to the Legislative Councils. The meeting resolved to send copies of the I.C.A.R., communication to the State Associations and to request them to make representation to the Governors for nominating a Member of the Veterinary Profession to the Legislative Councils.

The President thanked Dr. D. Pattabhiraman, the Director of Animal Husbandry, Madras, for the readiness with which he accepted to attend the meeting in the midst of his highly responsible duties and help the Council in its deliberations.

With a vote of thanks to the Chair, the meeting came to a close.

V. S. ALWAR,
General Secretary.

THE RESERVE FUND

An event of great importance to the Veterinary profession in India, took place in August 1924. It was the birth of the *Indian Veterinary Journal*. Circumstances were positively hostile and yet the profession took that bold step and the lion-heartedness of the early pioneers cannot be too highly praised. Ever since then, the *I.V.J.* has toiled hard under very adverse circumstances. The *I.V.J.* lives to-day so that the profession could prosper and science advance,

And now the hat is sent round so as to place this journalistic venture on a sounder and firmer basis. The *I.V.J.* is a priceless possession of our profession. It has placed the Indian Veterinary Surgeon, on the map of the scientific world. Just pause and ponder over, how much we owe to the Journal both individually and collectively. Is it too much then to expect the profession to respond to the appeal issued for a Reserve Fund? We hope not.

Some enquiries have come to us asking us to indicate the extent of help expected. We do not want to put the members of the profession to any undue financial strain in these hard days. At the same time, a certain amount of sacrifice is needed to make this fund a great success, so as to make it worthy of our profession. So we feel that the following scale of contribution will be quite reasonable. It could even be paid in two or three instalments.

Class I Officers	...	Rs. 100/- and above.
Class II Officers	...	Rs. 50/- and above.
All others	...	Rs. 25/- and above.

It is our ambition that no Veterinary Surgeon in this land should remain without contributing to this fund. Brick by brick, this great edifice of our's should begin to rise higher and higher. On the success or otherwise of this venture, the solidarity of our profession depends. "Pay and Prosper" is the slogan we pass on to the members of our profession.

Jai Hind!

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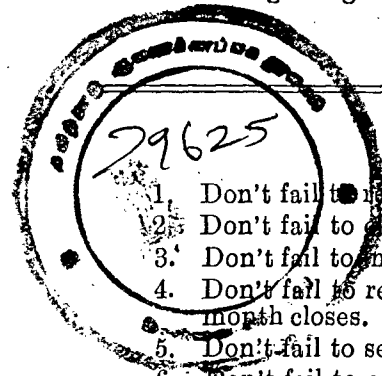
An Introduction to Veterinary Pharmacology.—BY FRANK ALEXANDER, Ph.D., D.Sc., M.R.C.V.S., B. & S., Livingstone, Ltd., Edinburgh and London, 1960. Price 20s. net.

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It is left to the author to examine this point when the book is revised.

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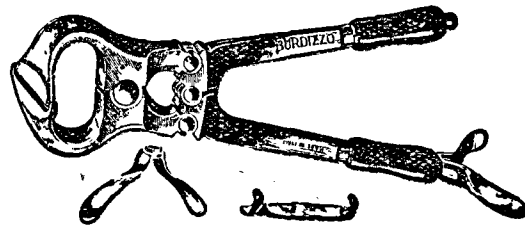
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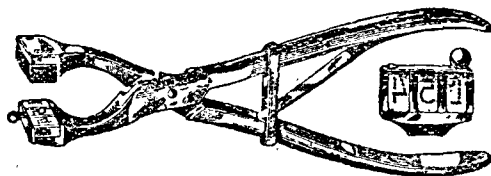
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