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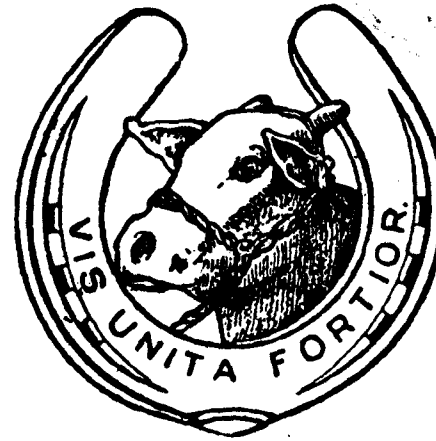
MAY, 1962

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THE INDIAN VETERINARY JOURNAL *H96*

(The Journal of the Indian Veterinary Association)

*A Monthly Record of
Veterinary Science*



(ESTD. 1924)

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THE
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A New Year Resolve

The *Journal* is suffering from lack of a permanent abode. The management has asked the Government of Madras and the Corporation of Madras for free grant of a piece of land to put up a building. It is likely they may consider our request favourably. But we must be prepared with the necessary finance to start work immediately. It is the sacred duty of every Veterinarian in India to send in his contribution to the Reserve Fund immediately. Let us put our shoulders to the wheel and raise this monument which is bound to attract, in years to come, members of our profession both from within and without India. Let every one of us be worthy of this noble profession. Let it not be said that we as a profession have failed her, in her hour of need. Come then, come quick, with your contribution and let us house this national *Journal* of ours in an abode of its own, before the end of 1962. Let this be our New Year resolve. Let us take a pledge to achieve this object before the new year is out.

We intend publishing a consolidated list of all contributors as a supplement to the *I.V.J.* in suitable time or as a special number with photos of all those who pay Rs. 100/- and above. May God help us in our attempt!

G. Vinayaka Rao

President, Indian Veterinary Association
and
Editor, Indian Veterinary Journal

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Vol. 39

May, 1962

No. 5

THE INDIAN VETERINARY JOURNAL

[THE JOURNAL OF THE INDIAN VETERINARY ASSOCIATION]

PUBLISHED MONTHLY



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Devoted to the cause of the
Veterinary Profession



EDITOR

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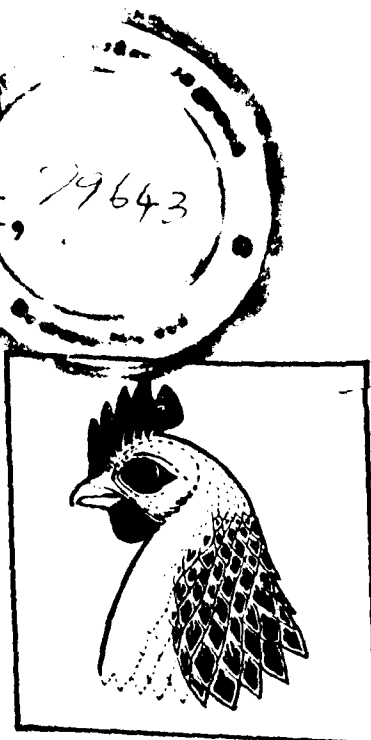
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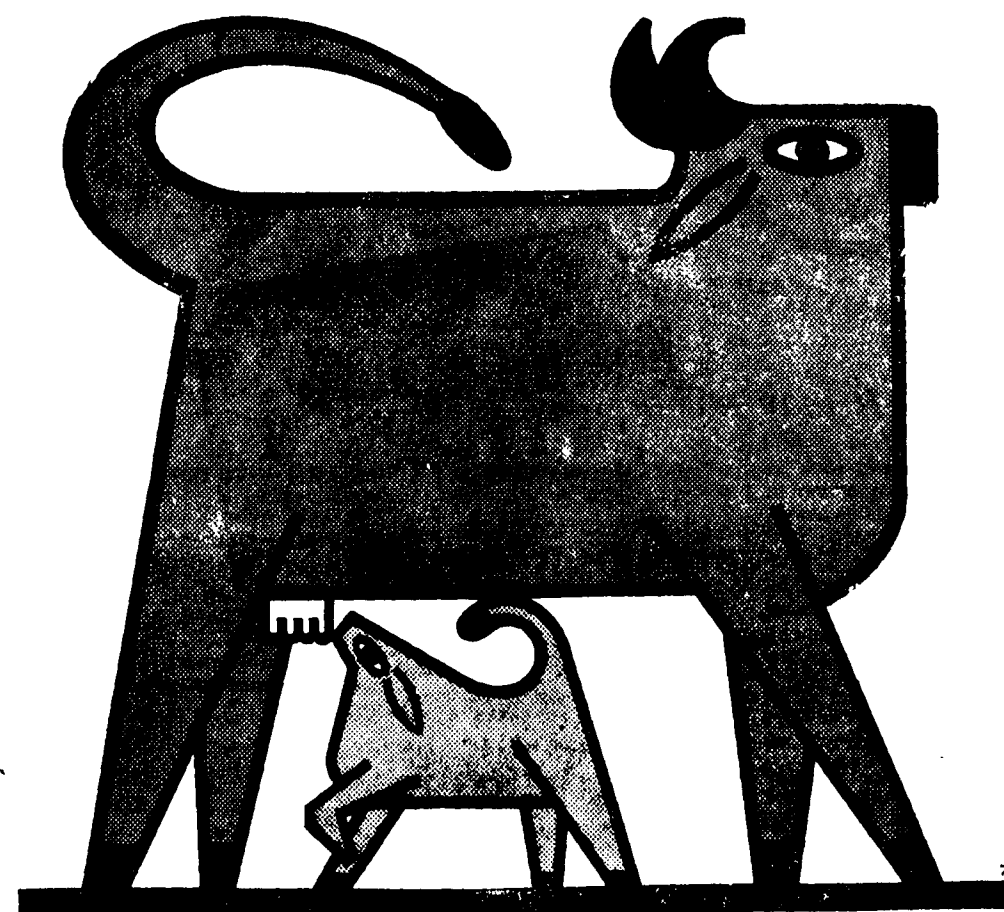
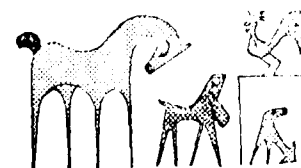
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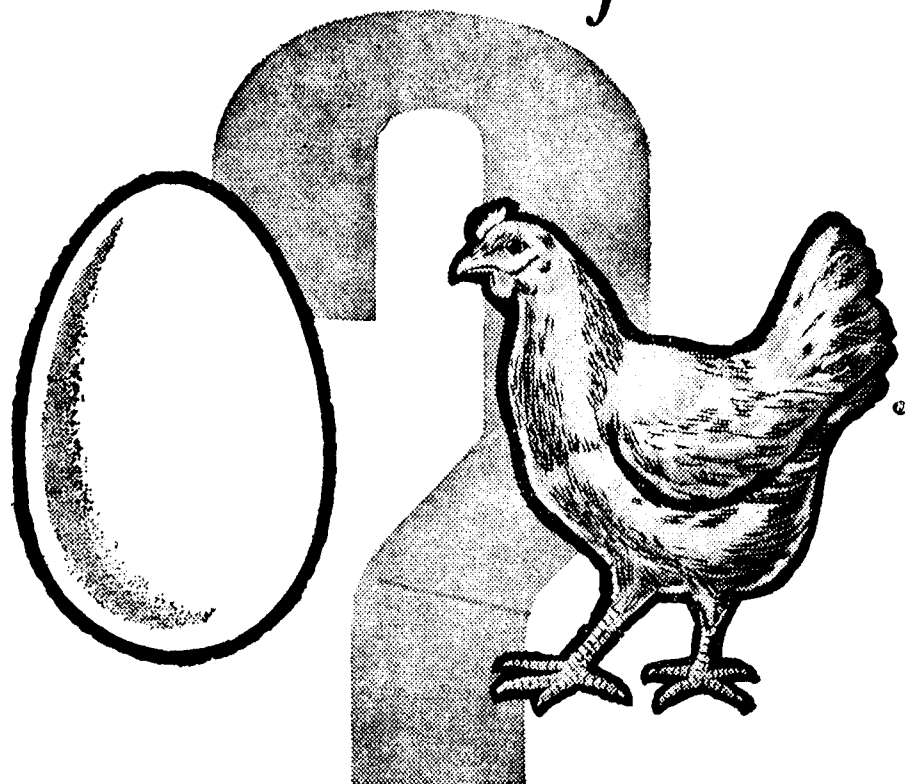
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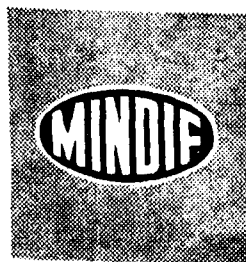
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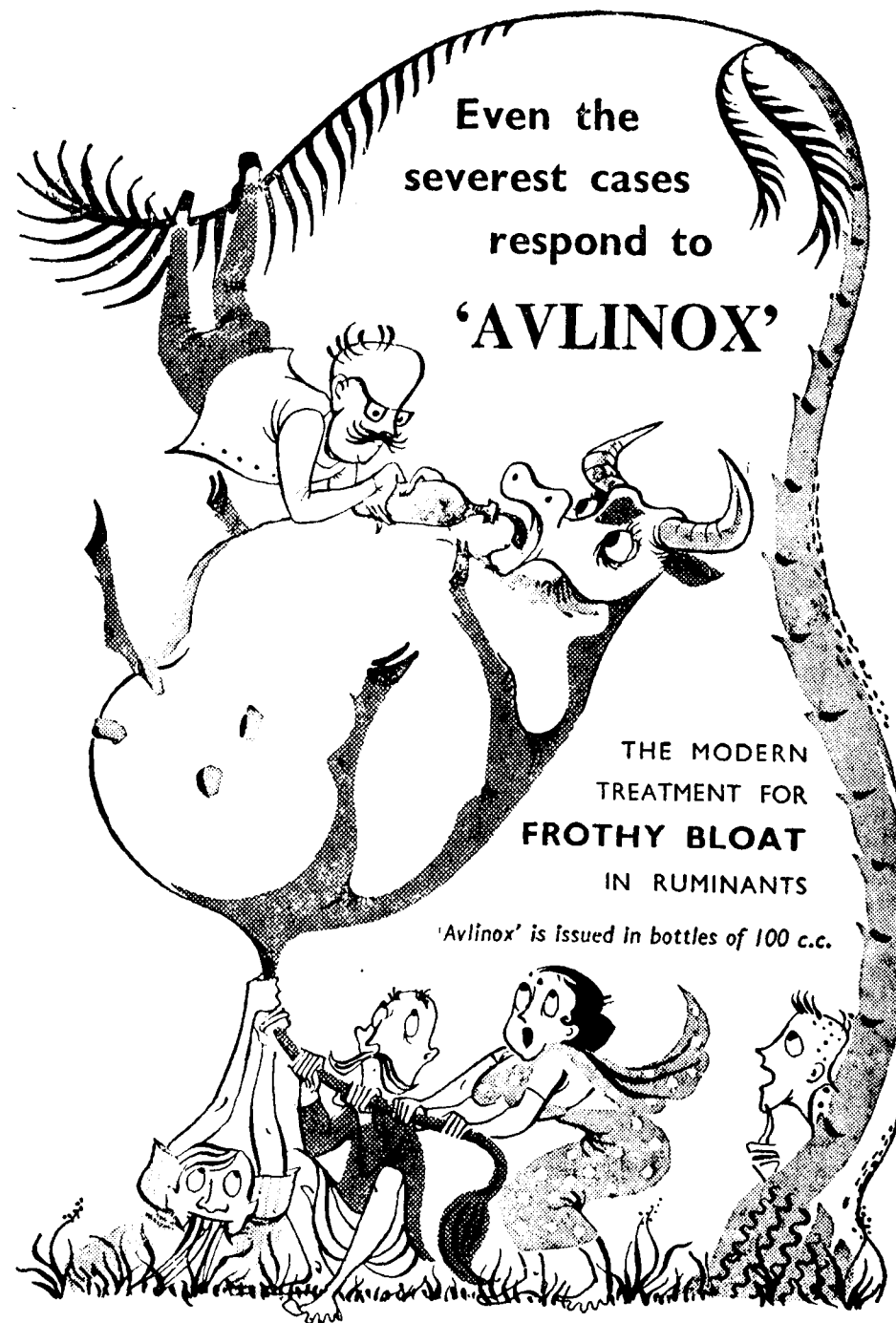
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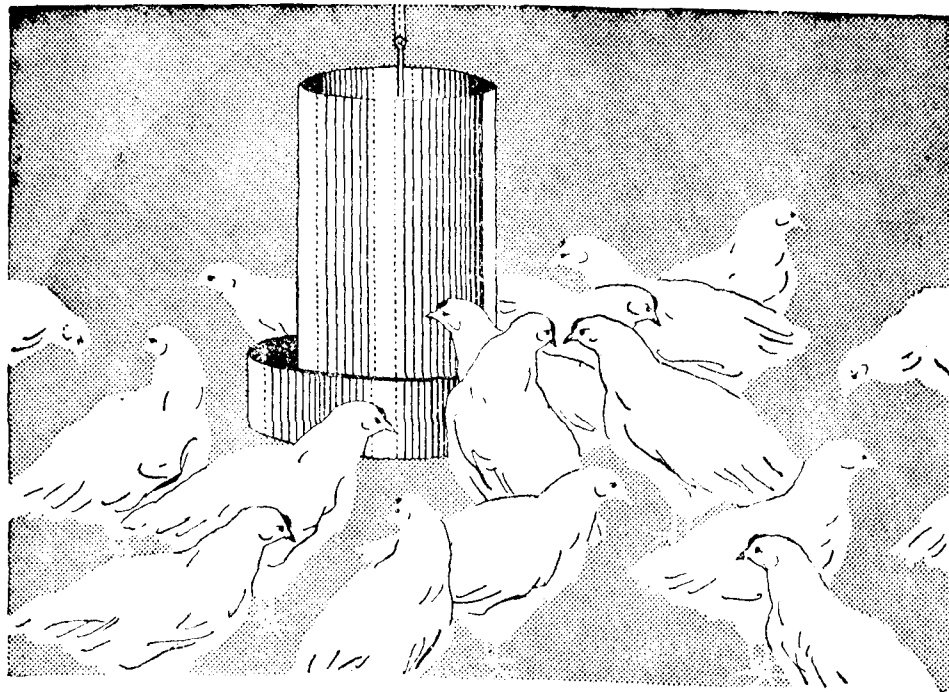
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*Head of Dept. of Pathology & Preventive Medicine,**College of Veterinary Medicine, Baghdad, (Iraq).*

who passed away recently at Baghdad.

[See In Memoriam]

THE Indian Veterinary Journal

(The Journal of the Indian Veterinary Association)

Vol. 39

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Editorial

BRUCELLOSIS IN ANIMALS AND MAN

In our April 1959 issue, we wrote about the above disease, based on an article by a Medical Officer, Dr. T. N. Mathur of Punjab who recorded the occurrence of this disease in human-beings in that state. Now three years have passed by and there does not appear to be any work worth the name done to tackle this problem on a planned basis. We admit it is undoubtedly a very difficult and elusive problem, more particularly with the meagre means and methods available at present. But that is no reason why we should sit with folded hands and allow things to drift. What is merely a spark to-day may develop into a big conflagration in the not distant future. Dr. Mathur has again come out with another article on the same subject in this issue. He evidently believes in the old dictum, to be forewarned is to be fore-armed. But it is within the common experience of many that such voices are never heard until it is too late. He has dealt with the subject in a more comprehensive manner this time, touching on all aspects of the question and finally cataloguing certain concrete proposals for adoption, in the fight against this disease.

The magnitude of the task is evident from the fact that this is an insidious disease, which keeps on lurking in stables and byres, in fields and pastures, in a variety of animals and man and not particularly free from a certain amount of uncertainty of results in diagnostic methods and disputed lines of treatment, both prophylactic and curative. And yet, the advances made in the control of this disease in countries like the U.S.A., Canada, Netherlands, U.S.S.R., United Kingdom, etc., should serve as an eye-opener to other countries. There is decrease in the incidence of this disease in human-beings in those countries and it is claimed that the estimated losses from Bovine Brucellosis have been reduced in the U.S.A. from 100 million dollars in 1947 to 40 million in 1957.

There is so much to be done in way of preliminary work, before definite steps could be taken to control this disease with the ultimate object of its eradication. First and foremost, the livestock owners should be taken into confidence, through an effective information campaign. "Factual data relating to the nature of the disease, the incidence of infection and the resultant economic loss" should be brought home to the livestock owners and their attendants. They must be made fully aware of the benefits to be derived from the control and ultimate eradication of this disease. It must be made clear to them that this is a positive danger to the livestock industry of any country. The hazard involved to human-welfare should also be clearly impressed on them. The necessity for a thorough survey on a regional basis and mapping out the endemic areas should be quite apparent to all workers in the field. "Partial coverage" in the testing of herds in a given area will take us nowhere. The entire work should be properly planned and systematically carried out. This brings out to the fore the necessity of establishing central field laboratories or mobile laboratories to facilitate the work of the hard worked staff. A Master Plan, co-ordinating the work in urban and rural areas may even be thought of. "Certain gaps in our knowledge" as is pointed out by Dr. Mathur, "with regard to type of infection, incidence among humans and animals and epidemiology should be bridged". It is a challenge to both the Veterinary and Medical professions. Will they accept it? They will. But how soon and how well, is the moot point.

The work of the FAO/WHO in this regard is indeed a monumental one. The I.V.R.I. at Mukteswar is an accredited "Brucellosis Centre" in this country. It is for them to whip up the tempo of work in this land, which occupies a place of honour in the world with regard to her cattle population. It is a great responsibility, which we are sure the I.V.R.I., is fully aware of.

General Articles

INCIDENCE OF BRUCELLOSIS AND ITS CONTROL IN CERTAIN ENDEMIC AREAS AND THE VALUE OF AVAILABLE SEROLOGICAL TECHNIQUES *

By

DR. T. N. MATHUR, M.B.B.S., D.T.M., P.C.M.S.,
Assistant Bacteriologist, Govt. of Punjab, Karnal.

Brucellosis is a disease which should be of great importance to an agricultural country like India where the population of cattle, is the greatest of any country in the world. It is likely that this disease will acquire more importance in the future due to milk schemes of the various State Governments and plans for development of Animal Husbandry and Dairy Industry with a view to improve the quality and increase the quantity of milk. It is a disease about which much more needs to be known in our country than is known at present. The control of brucellosis can be possible only when certain gaps in our knowledge, regarding the type of infection, incidence among humans and animals, are bridged. All the endemic areas are not yet known.

Incidence in Man

The incidence of brucellosis among humans in the different states in India is shown in Table I. It must be said that this information is very meagre. It may be that brucellosis may not be such a great problem, at any rate, in some parts of the country. Yet it is surprising that from certain areas of high endemicity, *e.g.* Orissa and Madras, brucellosis has not been reported among humans. The correct incidence in Punjab is not known, but I found 6% sera of cases of pyrexia of unknown origin (P.U.O.) positive for brucellosis and it seems certain that cases are missed and not diagnosed properly, (Brucellosis is missed by the general practitioner and also by the pathologist). Some idea of the prevalence of brucellosis in Bombay can be obtained from the paper of Soman and Kothari (1954) who found 4 to 5% Widal sera, 2.6% Kahn sera and 4% sera of dairy workers positive for brucellosis; such studies need to be carried out in all the states. Although brucellosis among animals is lesser in Punjab than in many other states, more cases of human brucellosis have been reported from Punjab. This is attributable partly to greater awareness among physicians and pathologists in this state and partly because the infecting micro-organism is *Br. melitensis*.

* Based on a paper read at the 10th All-India Animal Diseases Conference, Izatnagar.

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Reasons for Missing Brucellosis by the General Practitioners

The general physician is not aware that brucellosis occurs at all in India, he is not well informed about the disease process, he does not suspect it in his cases of fever, and he does not send the sera of his cases of P.U.O. to the Laboratory for examination. Clinically the disease is missed for malaria, influenza, typhoid and paratyphoid fevers, rheumatism and rheumatic fever, amoebic hepatitis, bacterial endocarditis, tuberculosis of lungs and hip joint, infectious mononucleosis, brachial neuritis, sciatica and gonococcal orchitis. He also does not realise that the disease can be acquired not only by drinking the raw milk of goats, but also of cows and buffaloes, and also by contact with these animals and pigs, and by living near infected premises, infection taking place by inhalation and contamination of the mucous membrane of the eye. This may be a possible source in patients who deny history of contact and ingestion of unheated milk.

Reasons for Missing Brucellosis in the Laboratory

Sera submitted for the Widal test are not as a routine tested for brucellosis. The only way to know about the incidence of brucellosis in febrile patients is to examine the sera sent for Widal test as a routine for agglutination test for brucellosis. Some sera are missed because of the prozone phenomenon and because of the widespread belief that only very high titres are diagnostic of brucellosis. Blood culture in cases of P.U.O. in most laboratories is done with the salmonella infections in view; the media employed do not support the growth of brucella and so brucellosis is wrongly excluded and is thought to be rare. For the same reason very few cultures are isolated and still fewer are typed.

Incidence in Cattle, Sheep and Goats

Table II gives some idea of the incidence of brucellosis among cattle, sheep and goats. One cannot feel satisfied with this information. It may be pointed out that in some states *e.g.* Himachal, Kerala and along the Western coast, areas of high endemicity may be found due to greater rain fall and in Kashmir and Rajasthan even though the rain fall is lesser, there may be a lurking infection of the goats with *Br. melitensis* which may be spreading from here to other states. So far most of the testing has been confined to organised dairy farms and even there adequate controlled testing with repeated observations has been lacking. In most dairy farms it is well known that the herds are bred by natural service and the probability of the large incidence of the disease by the spread of infection through bulls cannot be ignored. The conditions of hygiene, breed of livestock and other epidemiological conditions in the organised farms are very much different from those in the thousands of villages where very little work has been done, except in Madras where an I.C.A.R. scheme is working.

Incidence in Pigs

No work on brucellosis among pigs has been done in India. It will be of interest that recently a strain of *Br. suis* has been isolated at the All India Institute of Medical Sciences, New Delhi from a human source (Om Parkash 1961). It is a very significant finding, indicating that some work on the incidence of porcine brucellosis needs to be done.

Brucellosis in Goats and Sheep

The incidence of brucellosis in goats and sheep needs to be found out in Kashmir, Punjab, Rajasthan and other states where these animals are reared for wool or for milk. The result of agglutination test in goats has to be interpreted on herd basis, so that even if one goat in a herd has an agglutination titre of 50 units, those goats which show a titre of 10-20 units should also be considered to be infected. The agglutination test is not always positive even in infected animals. Eradication of brucellosis in goats will be a very important and difficult task, even though successful vaccination of goats has been reported. (FAO/WHO Expert Committee Brucellosis Third Report 1955).

Epidemiology

Cross infection with the three strains of brucella and the importance of cultural studies before eradication programmes are launched: - Epidemiological studies when undertaken not only result in the detection of more cases (Mathur & Sood 1955) but also in the collection of other useful information. The report of the second session of WHO/FAO (1952) on brucellosis draws attention to the increasing frequency of cross infection with the three species of brucella in the various domestic animals; this must be given serious consideration. The finding of infection of human beings with *Br. melitensis* is also significant. The isolation of only strains of *Br. melitensis* in Punjab (Mathur 1959), in Bombay (Joshi 1944, Soman and Kothari 1954), in Gujarat (Shukla, 1961) and in Kashmir (Rao, 1952) from human cases is of great epidemiological interest. In Punjab brucellosis is more prevalent in rural areas (Mathur, 1953). Some of the human cases in this state were in contact with cows and buffaloes and others with goats. It is reported that in some parts of France, cows are infected with *Br. melitensis*, and such a situation may also be obtaining in Punjab due to common pastures and grazing grounds, keeping goats and cattle together, and the situation may be quite different in the villages than in government farms in Northern India, from where only isolation of *Br. abortus* has been reported from cattle (Polding, 1948. Murty, 1960). It has also been found that in Punjab, shepherds, butchers and those farmers who keep goats and cattle together have

several members of their families suffering from brucellosis. Cows infected with *Br. melitensis* excrete the micro-organism for more than 3 years and so are potentially even more dangerous than goats. There must be human cases if cows have *Br. melitensis* infection (Renoux, 1952). 19 strains isolated by me so far from human cases have all proved to be *Br. melitensis*.

The Importance of Infection With *Brucella Melitensis* for Man

Infection with *Br. melitensis* is of greater importance for man than infection with *Br. abortus*. It (the former) causes a more serious and prolonged illness, with more relapses and complications in bones and the nervous system, the infection is also less amenable to treatment by antibiotics (Spink, 1953), and the incidence of the disease in man is much greater because of its infectiousness and invasive character. Milk infected with *Br. melitensis* is also more dangerous as chances of infection through it are greater and more people are affected. In Bhiwani, a town in the dry Hissar District of Punjab, where perhaps because of the goats, the infecting micro organism is *Brucella melitensis*, several cases of human brucellosis occurred in an outbreak (Mathur 1962). Three strains of *Br. melitensis* were isolated from these patients. On the other hand infection of cows with *Br. abortus* is a different affair. In one part of France where 25% of the cows are infected with *Brucella abortus*, human cases are so few, that they have only been discovered by systematic examination of the population (Renoux 1962). From the point of view of human health, therefore, brucellosis in animals of organised dairy farms in India is not so important as brucellosis in village animals. Greater attention will be needed to find out the incidence and type of infection in the villages before control measures could be launched. *Br. melitensis* has been isolated only once from a cow (Polding 1948), but in view of the findings in man it is necessary that more cultures from cows and buffaloes should be examined specially in the villages before it is concluded that *Brucella melitensis* only rarely affects, these animals.

Brucellosis in Villages and the milk Schemes of the State Governments.

Under the milk schemes, milk from the villages round some big cities will be collected, chilled and brought to the cities where it will be pasteurized. It is necessary to find the incidence of brucellosis and the type of infection in these villages, for failure of proper pasteurization could result in outbreaks of brucellosis among consumers in the cities particularly if *Br. melitensis* happened to be the infecting micro-organism.

Need For Detailed Bacteriological Studies

It would not suffice to be content with only the classification of the Indian Strains of *Brucella*, but their bacteriology such as catalase production and virulence must be studied. In Great Britain, *Br. melitensis* has been isolated from the milk of cows, but no *melitensis* human infection has been reported from there (Cruickshank 1952) so it is thought that it is not very infectious. It is possible that the virulence of the 3 strains may vary in different countries.

Phage typing of *Brucella*

It is being realized that recognized methods of classification of *Brucella* by serological tests, inhibition by dyes, H₂S production and CO₂ requirement are not entirely satisfactory. Although it is doubtful if phage typing of *Brucella* could be useful for epidemiological purposes (WHO/Bruc. 215, 1961), it will be interesting to see if the Indian *melitensis* and *abortus* strains are related to the South Indian A/M Strains. This could be done in a Central laboratory where all strains isolated in the different Laboratories in India could be sent.

Determination of Type of Infection by Absorption Tests

In the absence of positive culture the type of infection, *melitensis* or *abortus* in human beings, could also be found by absorption of sera with pure *melitensis* and *abortus* antigens.

The Importance of Other Strains

From Andhra, Orissa and some other states in South India, Polding (1948) has reported the isolation of unclassified aberrant strains (A/M), which differ from the classical *abortus* and *melitensis* strains. Some cases of human brucellosis were reported from Andhra, Pandalai & Raman (1941) Joga Rao, (1961). Three strains of *Brucella* were recovered by the former which could have been either *melitensis* or the aberrant strains. It remains to be seen if the A/M strain is as infectious for man as the *melitensis* strain of North India.

Control of Brucellosis

It will be premature to think of control programmes before more information on the incidence, type of infection and epidemiology of brucellosis in the different states in India could be gathered. It could not be said that vaccination with strain 19 will prevent infection of cattle with *Br. melitensis* or with the aberrant (A/M) strains such as are found in South India. The eradication of reservoirs of *Br. melitensis* infection is a very difficult matter. Preventive vaccination of goats will be difficult and expensive. All the same control of brucellosis by standard methods is well known. It resolves itself into :—

- (1) Control among human beings.
- (2) Control among animals.
 - (a) Control in farms.
 - (b) Control in villages.

(1) *Control among Human Beings*:—Control of human brucellosis depends upon its control in animals. So long as there is brucellosis among animals there will be brucellosis among man. Men get infection in 3 ways so that if we could control the modes of infection, the incidence of brucellosis among man could be considerably lowered.

(i) Heat treatment of milk and cream, and making of cheese from pasteurised milk or giving cheese enough time to ripen.

(ii) Improving conditions of Hygiene in cattle sheds and dairies so that infection through the respiratory tract and the eye does not take place.

(iii) The use of gloves to take out retained placenta and proper disposal of calves and placenta in cases of abortion. Disinfection of infected premises.

(iv) Cutaneous vaccination of human beings against brucellosis with a live *Br. abortus* strain 19·BA has been reported from USSR by Smirnov (1961), who was able to reduce the incidence of the disease in people engaged in live stock rearing there. This may be tried in people who due to their profession run greater risk of acquiring the infection.

Control of Brucellosis in Animals

Control in farms:—(1) Where the reactors rate among cattle is not high, periodical testing and segregation. (2) Where it is high, vaccination of calves with segregation of reactors after periodical testing. (3) Improvement of conditions of hygiene and sanitation. (4) Service by artificial insemination, from bulls which are negative for brucellosis. (5) Proper disposal of the aborted foetus and membranes, genital discharges, and grass or hay in contact with the discharge.

Control in villages:—(1) Health, education and publicity to improve conditions of animal husbandry and hygiene and sanitation. (2) Rapid disposal by burial of the dead calf and aborted placenta. (3) Keeping of goats and cattle on separate farms and separate pastures for grazing, so that cattle do not get infected with *Br. melitensis*. (4) Test and slaughter of goats on herd basis. In places where the problem of infection of cattle with *Brucella melitensis* is very grave and where it is proved that goats are the source of infection it may be worthwhile vaccinating the goats with a live attenuated strain as recently reported by Alton (1961) from Malta or with one

of the dead vaccines in oil. The Alton vaccine has been found useful in preventing abortion in even infected goats. If abortions can be checked, the spread of infection which occurs mostly at the time of abortion could be considerably minimised. (5) Encourage artificial insemination of cattle (6) Use of semen from *Brucella* negative bulls.

Experimental work on Vaccination:—Whereas we do not have data to justify the use of vaccination with strain 19 Vaccine, its use under Indian conditions requires to be studied in detail, as also its dose, mode of administration, duration of protection and its efficacy. It is infective for man (Spink, 1953 Revich *et al* 1961). The effect of freeze dried vaccine deserves to be studied. It will also be useful to make some experimental studies to see if vaccination with strain 19 will protect cattle against infection with *Br. melitensis* or the aberrant strains.

The Value of Available Serological Techniques

The most valuable serological test is the agglutination test. Two techniques the Weybridge, tube agglutination and plate-techniques are used. Standard agglutination suspensions which are titrated with the Standard International anti *Brucella abortus* Serum are used: the titre of each suspension using the International serum should be known and results should be reported in International units, so that the results in the different laboratories, and in different parts of the world, could be compared (WHO/FAO III report on Brucellosis 1955). It should be known that the prozone phenomenon sometimes can be found upto dilutions of 1/500 (Mathur 1955) and so a great series of dilutions up to 1/1280 should be put up otherwise some positive sera will be missed. This accounted for six negative tests in sera tested with the Kasauli antigen. Strict quality control over the production of the antigen is necessary. The blocking antibodies which appear in chronic cases should be kept in view. Where the suspicion of brucellosis is very great and the serological test is negative, the serum should be tested for blocking antibodies, which however, do not affect the slide agglutination test. Rising titre in humans is difficult to get because the cases are diagnosed very late. While very high titres are more diagnostic, the possibility of infection at lower titres, but above the diagnostic one, should be kept in view otherwise genuine cases will be missed.

It has been shown by recent work (Mathur 1960) that although *Brucella* agglutinins appear in the sera of certain percentage of people inoculated against cholera, these agglutinins do not appear in significant titres and they do not persist for long. They tend to disappear after 4-5 months or are left in very insignificant titres, which

do not interfere with the diagnosis of brucellosis. Tularaemia has not been reported in India so that confusion in this regard does not arise in our country. The minimum diagnostic titre for human beings and cattle is 100 units, and for goats it is 50. The slide test with the stained antigen is quite useful.

The ABR Test

This is a very useful screening test specially in a country like India where large numbers of cattle have to be tested by a limited number of technicians that can be employed for this work. The drawing of blood from the cattle in villages which is sometimes objected to by the owners is thus not necessary in all cases. The test is quick and easier to perform and to read. It has however certain disadvantages. (a) It is unreliable in cattle near the beginning and end of lactation. (b) It gives false positive in mastitis. (c) It cannot be performed when the milk fat is poor. (d) Its value has still to be assessed in testing buffalo milk.

Recommendations

To tackle the problem of brucellosis among animals and man the following recommendations are considered necessary.

1. The focus of attention must shift from organised farms to the villages, and more work on the incidence of brucellosis in village animals should be carried out and efforts should be made, and organizations set up to isolate *Brucella* from village cattle and see if they have *Br. abortus* or *Br. melitensis* infection.
2. In view of the milk schemes of the state Governments and the Government of India it will be desirable to know the incidence of brucellosis among the cattle of the villages from where milk will be collected. It will also be necessary to know if the infection in these villages is with *Br. abortus* or *Br. melitensis*. Accidental failure of proper pasteurization may result in several cases of brucellosis in the cities if *Br. melitensis* were the infecting micro-organism.
3. Regular bacteriological control over pasteurization will therefore also be necessary.
5. The high incidence of brucellosis among village cattle in Orissa and Madras should be brought to the notice of the Medical authorities of these States and they should be asked to look for cases of brucellosis among patients suffering from fever. The best way of doing so is to encourage serological examination of cases of fever which clinically look like typhoid and the routine testing of all Widal sera to the agglutination test for brucellosis.

5. It is important to employ standard antigens and techniques in the performance of serological tests and to report the titre in units. The lowest diagnostic titre is 100 units for non vaccinated cattle and human beings and 50 units for goats. The prozone phenomenon should be kept in view specially in human sera. Cross agglutinins in salmonella infections and in people inoculated against Cholera appear in low titres and are transitory.
6. All strains of brucella that are isolated must be centrally collected and typed.
7. The infectiousness of the Indian, abortus, melitensis and aberrant A/M strains should be determined.
8. The seriousness of infection with *Br. melitensis* should be realized both from the human and animals points of view. It is problematical if vaccination with strain 19 vaccine will protect animals infected with *Br. melitensis*. It will also be difficult to eradicate the disease from the goats.
9. In view of the recovery of only strains of *Br. melitensis* from human cases, the probability of cross infection of cattle in villages with *Br. melitensis* should be considered. More studies on isolation and classification of *Brucella* from village cattle are needed.
10. Sometimes it is not possible in human cases to isolate the causative micro-organism. The possibility of determination of the type of infection by absorption tests should be explored.
11. There is also need for more work on brucellosis among sheep, goats and pigs.
12. Proper control over the production of antigens for diagnostic purposes is necessary to ensure antigens of good quality.
13. Greater collaboration and cooperation among dairy men, Veterinarians and medical and public health men is necessary.
14. The abstracting of papers on human brucellosis in Veterinary and Dairy Journals, and those on animal brucellosis in medical journals, so that veterinarians and dairymen should look for infected animals in areas from where cases of human brucellosis are reported, and doctors may look for brucellosis in their cases of fever in such areas from where brucellosis has been reported among animals.
15. The setting up of public Health Laboratories in each division of a State where work on both animal and human brucellosis could be done. This would be more economical and all the information on animal and human brucellosis in a region will be available at one place.

16. The collection of all published and unpublished information on the disease in India and its publication by the Indian Council of Agricultural Research.

17. The use of strain 19 vaccine should be limited to areas of high endemicity. Controlled experiments on the use of the vaccine with regard to the following points should be made and data collected (a) Duration of protection offered by the vaccine against the Indian abortus, melitensis and aberrant A/M strains. (b) The efficacy of protection offered by vaccination to know if immunity conferred by vaccination was solid or fragile. (c) The effect of freeze drying of vaccine and its efficacy to protect animals. (d) The period for which agglutinins persist in calves vaccinated at various ages. (e) The value of the ABR test in vaccinated cattle.

Summary

1. Data on the incidence of brucellosis in the different states of India among human beings, cattle, sheep and goats have been presented.

2. The reasons why brucellosis is missed by the general practitioner and the pathologist have been stated.

3. The need for more work, on incidence, epidemiology, and bacteriology of brucellosis, in organised cattle farms and more so in the villages has been stressed.

4. The need to study the incidence among pigs and in goats and sheep in certain areas has been pointed out.

5. The epidemiology of brucellosis in India with particular reference to the possibility of cross infection and the relative importance of *Br. melitensis* infection for man has been stated.

6. For the control of brucellosis it is recommended that before any programme is launched more data on incidence, epidemiology and bacteriology need to be collected.

7. Certain recommendations have been made for practitioners and pathologists for greater detection of brucellosis. Suggestions regarding more publicity, need for Public Health Laboratories and on the need of undertaking experimental work before control programmes are launched have been made.

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TABLE I
Information about Human Brucellosis in India.

State	No. of cases	Author	Remarks
Punjab	13	H. S. Rajan, 1930 quoted by Bardhan Sivankaran, 1940	4 strains isolated not typed. Cases in one year.
Amritsar	1	Manchanda, 1953	18 strains (All <i>Br. melitensis</i> isolated).
Patiala	9	Balasubrahmanian, 1953	—
Karnal	11	Mathur 1951 to 1961	2 strains isolated one <i>Br. melitensis</i> and the other <i>Br. suis</i> .
Kashmir	152	Detected by Army Medical Officers, 1958 and Capt. K. N. A. Rao, 1952	8 strains isolated but not typed. All grew without CO_2 .
Delhi	Not known	Dr. Om Parkash 1961	4 Cultures isolated. Result of typing <i>Br. melitensis</i> .
Gujarat	2	Shah 1954	7 strains isolated. All grew without CO_2 . Serologically, 6 were abortus. Dytest not done. 3 strains did not produce H_2S .
Ahmedabad	20	Shukla 1959	2 strains isolated. Both <i>Br. melitensis</i> . He found 0.37% W. R. sera and 0.78% Widal sera positive.
Bombay	(i) 11 (ii) Not known (iii) 7	Monterio & Patel 1948 Joshi 1944 Soman & Kothari 1954	5 strains isolated. All <i>Br. melitensis</i> . They found 2.66% W. R. sera, 4.5% Widal sera and 4% sera of Dairymen positive.
Andhra	6	Pandalai & Raman 1941 Jogarao 1962	3 strains isolated. All <i>Br. melitensis</i> or A/M. 5 cases.
Kerala	1	Soman & Kothari 1954	One of their cases came from Kerala.
Bengal	1	Chaudhuri & Rai Chau- dhuri, 1943	—
Assam	1 case in a Punjab girl	Bhuyam & Barua, 1947	—
Rajasthan	4	Mathur 1958	Not published

There are no reports of cases of human brucellosis from U. P., Bihar, Orissa, Madras, Mysore, Madhya Pradesh and Himachal.

TABLE II
Showing the Incidence of Brucellosis among cows, buffaloes, goats and sheep in the different states in India
Legend A. Number of animals tested. B. Number found positive. C. Percentage of positive.

State	Cow			Buffaloes			Goats			Remarks
	A	B	C	A	B	C	A	B	C	
Punjab	667	14	2.1%	894	6	1.6%	1527	13	0.85%	Tested serologically in the different districts. 2283. Cows and buffaloes tested at the Govt. Livestock farm Hissar from 1955-1957, 263 animals i.e. 11.5% were positive. Abortion rate was considerably reduced. 282 samples of milk tested by ABR test in Goshalas. 2 found positive (Sharma). Sera of 96 slaughter house goats of Karnal tested 8.3% found positive. 42 sheep sera also tested from slaughter house 7% were positive. (Mathur 1953). Animals of organised farms and some districts Goshalas (Bapat 1961). Cows tested in Raipur, Durg and Bastar. Reactors also found in Gwalior (Narayan Rao 1961). Sera of cattle in Govt. farms Goshalas Govt. Dairies. Incidence reduced from 5.6% to 0.9% in cattle and in bulls from 8% to 0% from 1956-1960. 368 samples of milk tested by ABR test in 13 villages round Mathura. All found negative. Incidence of brucellosis at Mathuri Kund farm reduced from 11.4% to 1% (56-6037. Brucella strains isolated all proved to be Br. abortus (Murty, 1960).
Gujarat	631	43	6.8%	...	...	...	96	8	8.3%	Sera of cattle of Goshalas and Govt. farms (Rajagopalan, V. R. 1959)
Madhya Pradesh	213	8	1.4%	...	...	...	...	...	...	Serological tests of village cattle (Mohan R. N.)
Uttar Pradesh	3559	...	0.9%	...	...	...	...	...	...	Serological tests in cattle of Govt. farms, Mohiyudeen, S. (1959)
Bihar	81	18	23.5%	...	...	...	470	0	0%	Cattle tested in different states in India, Polding (1948). 49 strains isolated from cattle, goats & horses: 26 Abortus, 2-Melitensis and 20 Aberrant strains.
Bengal	789	194	26%	...	...	...	...	...	...	
Mysore	160	47	29.4%	...	...	...	...	...	...	
All India	5996	...	...	1800	...	...	...	...	...	

Bombay 14.3% cows and 12.6% buffaloes were found positive. *Anchra Fraush* Sporadic abortion among cattle. No epidemics anywhere, new foci at Dharmavaram, Muthyampet, Juktia and Banawala. In Rajendra Nagar Dairy farm 10 buffaloes aborted. Madras 5% reactors found in Salem, Coimbatore, Madurai, Ramanathapuram, and Tirunelveli. In villages along the hill slopes of Western Ghats the incidence is 20%. Eleven strains of Brucella isolated so far all aberrant A.M. strains. *Yak* one strain of Brucella melitensis isolated from a human case. No case of brucellosis among buffaloes. Goats and sheep not tested so far. Kashmir Rao (1952) tested 106 goats, 56 sheep and 52 cows, and found 32 goats, 30 sheep and 50 cows to be having agglutinins in a titre at 1/20 or above, and 18% goats and 11% sheep at 1/40 or above; and 23% cows at 1/80 or above. 15 Ewes and Goats aborted. Some sheep sera found positive, abortions reported in cows but sera not tested. *Kajasan* 14 animals positive at Bassi cattle breeding farm. 2 Animals at saiwakalan village. At Ajmer few animals gave positive agglutination test. Some cattle found positive in Kotah, Banda, Dharampur, Jaswan, Jaipur, Kishangarh and Sirohi. *Kerala* No survey but some doubtful reactor cattle found in some villages. *Crisis* INCIDENCE REPORTED TO BE THE HIGHEST IN INDIA even as high as 50% in some villages *Himachal and Assam* No information. Reference should also be made to Poldings Paper (1948).

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OBSERVATIONS ON SOUTH AFRICAN HORSE SICKNESS IN MAHARASHTRA

By

D. S. GORHE., B.Sc. Vet., Hons., D. T. PARNAIK., G.B.V.C.
M. B. NISAL., B.Sc. Vet. and J. B. KHOT., B.Sc. Vet. Hons.,

*Department of Bacteriology and Virology, Bombay
Veterinary College, Bombay.*

Introduction

African horse sickness is a disease of equines caused by a filterable virus. It has a seasonal appearance and is known for high mortality. The infection is transmitted by blood sucking midges. In Africa, the disease is widespread and is one of the major infectious diseases of great economic importance. Horse sickness was so far little known in India but it suddenly came to prominence when the disease swept the horse population in Maharashtra and in other states in 1960. The findings pertaining to the clinicopathological aspect of this condition as observed in the outbreak in Maharashtra state are presented in this paper.

Material and Methods

The clinicopathological picture described in this article was observed in cases from affected areas of Dhulia and Amraoti districts of Maharashtra state. About 50 cases were studied. Autopsy examinations were carried out at Ambapur and at Dhulia. One of these cases was destroyed in extremis. Blood for virus isolation was collected from affected cases in heparin., (0.01 to 0.02 mgm/ml) and was stored in ice till inoculation. Tissues for virus isolation were collected in ice and for histopathological examination in 10% formalin.

For virus isolation, locally bred, swiss albino mice of 4 to 6 weeks of age weighing 14 to 16 grams each, were used. All the mice after inoculation were sacrificed in extremis.

Laboratory technique adopted for virus isolation

Blood for virus isolation was injected intra-cerebrally in mice using 25 ml tuberculin syringe with B. D. 28 G, $\frac{1}{2}$ " luer mount needles. The mice prior to inoculation were anaesthetized with ether. A 10% suspension of the brain harvested was prepared in diluent of Bovine plasma albumin in saline solution obtained from Virus Research Centre, Poona; serum saline containing 1:10,000 merthiolate; and phosphate buffer saline pH 7.2 with antibiotics (penicillin 1000 units and 5 mgm

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of streptomycin/ml) were used as diluents. The tissues from which isolation was undertaken were made into suspension by grinding them in sterile alandum. The suspension was centrifuged at 3,000 r.p.m. for 15 minutes. The supernatant was taken as inoculum. Similar procedure was followed for obtaining inoculum from infective brains.

Symptoms observed

In majority of the affected cases the temperature ranged from 101° to 105.2 °F. It was noted that the temp. was 99.4 °F. in the last stage of the disease in two cases on which autopsy was conducted. In almost all cases there was swelling over the supraorbital fossa. Subcutaneous areas at these sites showed presence of pale, yellowish, oedematous fluid. A few animals showed stiffness in the fore quarters. Petechial haemorrhages were seen on conjunctiva. The oral mucosa, particularly that of tongue was cyanosed. The tongue appeared swollen, oedematous, and in many cases haemorrhagic necrotic patches were evident on the antero dorsal and ventral aspects. Colicky symptoms were also seen in advanced cases. Protrusion of the eyeball was observed in some cases. One of the authors examined some cases from another locality where the symptoms were more pronounced. In these cases the swelling on the supraorbital fossa extended to the temporal region, brim of nose, lips and even to the neck region. The swelling was severe and extensive. These symptoms were not noted in the cases from which blood samples for virus isolation were collected.

Autopsy findings

Yellowish gelatinous subcutaneous exudate at the supraorbital and the temporal fossas was observed. The tongue was cyanotic, oedematous and showed haemorrhagic patches. Thoracic cavity contained about 12 to 14 ounces of sero-sanguineous fluid. The trachea and lungs appeared congested. The pericardial sac contained about 10 ounces of clear, yellowish, brown fluid. The heart showed haemorrhagic spots. The whole organ appeared intensely congested. In the abdominal cavity, liver appeared slightly enlarged. Spleen was normal. Kidneys were congested. The urinary bladder was partly full and contained dirty red coloured urine.

The heart blood, pericardial and pleural fluid and tissue suspension proved negative on bacteriological examination.

Histopathological study

Histopathological study on the organs collected at autopsy is detailed as under.

Tongue: The muscular tissue showed degenerative changes accompanied by loss of striations and disappearance

of nuclei. Intermuscular connective tissue showed severe haemorrhages. Extensive degenerative changes of the stratified squamous epithelium was observed.

Trachea: The submucosa showed oedematous changes.

Lungs: The alveoli of the lungs showed oedematous changes.

Heart: Showed congestion and haemorrhages in myocardium. Cardiac musculature also showed loss of striations and granular degeneration.

Liver: Showed cloudy swelling and congestion. A section of the liver (from Ambapur case) showed a parasitic nodule.

Stomach: Pyloric portion showed congestion and haemorrhage.

Small Intestine: Congestion and haemorrhage were observed.

Adrenal: Showed congestion.

No other organ showed any characteristic change.

Haematological examination:

The differential leucocytic and total w. b. c. count and haemoglobin estimation did not reveal any significant change.

Virus Isolation

Subsequent to intracerebral inoculation, in the primary passage 13 to 15 days were required for the inoculated mice to show the neuroparalytic symptoms which were suggestive of virus multiplication in the nervous system. On an average only 7 to 8 days were required for these symptoms to appear in the second passage. By 10th passage the inoculated mice showed the characteristic symptoms as early as the 5th day. This was suggestive of the adaptation of the virus to nervous tissue.

The isolates were identified as horse sickness virus by complement fixation test.

Diagnosis

Seasonal appearance of the disease, the characteristic clinicopathological picture, with heavy mortality may present little difficulty in diagnosing horse sickness in recognised enzootic areas. Difficulty may be felt when the disease is reported for the first time. Under these circumstances, laboratory confirmation of the clinicopathological diagnosis must be obtained. Virus isolation, complement fixation test on suspected serum and serum virus neutralisation tests are recommended.

Methods of prevention and control

Prevention of horse sickness may be carried out as under.

- Vaccinating horses with poly-valent neurotropic, attenuated vaccine.
- Protecting the horse from the bite of the insect vector (biting midges)
- Restricting the movement of horses from the affected to the healthy area and *vice a versa*.
- Sanitary measures to check spread of infection.

The polyvalent attenuated vaccine now in use gives solid immunity for at least 6 years if not life immunity. To ensure complete protection annual vaccinations are recommended. The vaccine is supplied either in single dose container or in multi-dose container, and consists of a dry almost colourless powder. It must be stored in refrigerator at 4°C. The diluent for the vaccine is sterile normal saline which is to be used in the proportion of 5 ml for each dose. The vaccine is to be given sub-cutis. The dose is same for horses, and mules irrespective of age and size or breed. Foals from susceptible dams can be protected at any age but foals from immune dams should not be inoculated before seven months of age as they only develop immunity at that age. Mares may be inoculated 14 days before and after foaling.

Post vaccination reaction

From the reports, post vaccination reaction noted in other countries, it is found that the animals react between 7th to 14th day. However the onset and duration of reaction may vary under Indian conditions. In a recent survey on post vaccinal reaction, by one of the authors covering 284 animals, it was noted that the onset of thermal reaction in 10 cases was within 48 hours and in 35 cases within 4 days after vaccination. Thermal reaction was observed in 33.6 % cases. In 50.9 % cases the fever lasted for about a week, in 20.8 % cases for more than two weeks and in 22.1 % cases for more than three weeks. Post vaccinal mortality was observed in 1.08 % cases. Virus isolation from 6 febrile and 4 afebrile cases collected on 22nd post vaccinal day showed the presence of circulating virus. The viremia at such a late stage has not been observed in the past. It may be concluded that because some of the vaccinated cases showed reaction within 48 hours vaccinated animals have to be given complete rest immediately after vaccination.

Problem of vector and reservoir host

Du Toit (1944) showed that the South African biting midges of the genus *Culicoides* act as transmitters of two important African virus diseases, Horse sickness of equines and Blue-tongue of sheep. The

habits of *Culicoides* in India are yet to be studied in detail. However animals could be protected from these midges by using mosquito repellents, D.D.T. spray, etc.

Other control measures

(1) It is of utmost importance to dispose of the carcass in a similar way as is done in cases of anthrax.

(2) Whenever an outbreak is reported in a locality, restrictions on movement of animals should be imposed.

(3) The animals imported from a known infected locality should not be allowed in clean areas unless accompanied by a vaccination certificate. Vaccination date should be at least one month prior to the date of entry.

(4) All the horses in the border area adjoining infected locality should be protected with horse sickness vaccine so that the infection may be restricted.

Summary

Symptoms observed in recent outbreak of Horsesickness in Maharashtra are detailed. Pyrexia, partial anorexia, swelling over the supra-orbital fossa, at the muzzle and the lip region, protrusion of the eye ball, cyanosis of the tongue with necrotic ulceration were the common symptoms observed. At autopsy haemorrhage in myocardium was noted. Histopathological findings are described. Virus isolation in mice is detailed. The method of diagnosis in the field and in laboratory are described. The prevention and control measures to be adopted are described. Special mention is made of the post-vaccinal reaction observed.

Acknowledgment

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SIGNIFICANCE OF BLOOD UREA NITROGEN IN INTESTINAL OBSTRUCTIONS OF THE CANINES

BY

V. RAVIVARMA HEGDE

Professor of Physiology, Mysore Veterinary College, Bangalore.

In small animal practice obstructions of the gastro-intestinal tract is a common occurrence. Clinical syndromes associated with these maladies vary considerably according to the site of obstruction. It is generally accepted that if the severity of the discomfort is more, the more anteriorly the obstruction is located. Consequently, when the seat of obstruction happens to be the oesophagus, the cardia or the pylorus, the train of symptoms exhibited by the patient are so severe and characteristic that it is difficult to miss the diagnosis. It is only when the obstruction is located posteriorly towards the duodenum and the ileum that the veterinarian is at cross roads and has to consult various clinical and diagnostic procedures before arriving at his diagnosis. In matters of this nature the quickest procedure is radiography but unfortunately few veterinarians have a ready access to this costly apparatus and search for other aids becomes necessary. Estimation of blood urea nitrogen is one of the important aids to assist the clinician.

It has been stressed in veterinary literature that the elevated blood urea nitrogen in dogs is due primarily to renal damage and hence in practice the clinical determination of blood urea nitrogen is predominantly used for evaluating the kidney function. For the most part published material on blood urea nitrogen levels in the dog disregards its importance as a diagnostic aid in intestinal obstructions and an attempt has been made in this work to assess its significance.

Review of literature

Levinson and Mac Fate have listed several conditions which showed the increased BUN, such as nephritis, ureamia, peritonitis, renal obstruction, malignancy, pneumonia, intestinal obstructions, prostatic obstruction, metallic poisoning and cardiac failure. Peters and Van Slyke in discussing the azotemia of infectious diseases observe that severe infectious diseases show an increased non-protein nitrogenous substances in the blood. According to him the high nitrogen catabolism and the scanty urine seen in these conditions favour the accumulations of nitrogen in the blood and tissues. Prevention of dehydration and providing plenty of fluid to promote adequate urine flow usually eliminates such accumulation.

Kingma and Catcott studied the effects of foreign bodies in the canine alimentary tract. They considered that the two usual sites of most obstructions in the alimentary tract are the areas of the pylorus and the terminal part of the ileum. They studied the BUN variations in the dog in which foreign bodies were forcefully introduced into the stomach, in dogs whose pylorus and ileum were partially obstructed and also in dogs whose pylorus and ileum were completely ligated. Their results demonstrated no significant change of BUN in dogs in which gastric foreign bodies were placed. In dogs with intestinal foreign bodies, there was a significant increase in each trial. Only two dogs were utilized in the study of the effects of the complete intestinal obstruction.

Gamble and Ross studied the factors in the dehydration following pyloric obstruction. They found that there was a reduction of plasma chlorides due to a withdrawal of Cl^- from the body as a result of the continued vomiting of gastric secretion. Another important change noted was a rapid and extensive dehydration of the plasma indicated by a progressive increase in the concentration of the proteins. They were of the opinion that a moderate impairment of renal function shown by a rise in the urea content of the plasma may reasonably be attributed to the lack of water intake, there being practically no absorption of the water taken in the stomach.

Wangensteen and Leven experimented with intestinal obstructions at various levels. They concluded that hypochloremia, a rise in blood urea and increased carbon dioxide combining power result from the loss of essential fluids due to vomiting. When the obstruction was established in the lower part of the ileum the dogs survived for longer periods and the incidence of vomiting greatly decreased.

Materials and Methods :

For this study a total of 14 dogs, 6 males and 8 females, of mixed breeding were used. The dogs varied from 1 to 3 years in age and ranged from 10 to 23 lbs. in weight. The state of health was determined by physical examination and clinical observation for a period of 48 hours prior to the commencement of the experiment, and only sound dogs were used for the study.

The method and principle of BUN determination used in these series was the one recommended by Karr using the Klett-Summerson photo-electric colorimeter.

Group I consisted of seven dogs Nos. 1 to 7 from which food was withheld for 18 hours prior to surgery. Anaesthesia was induced by intravenous injection of nembutal at the rate of one ml. for every 5 pound body weight. Abdomen was opened with usual aseptic procedures and the pylorus was ligated using a double strand of twisted silk.

Care was taken to see that the ligation was tight enough to prevent the passage of food and at the same time not too tight to cut through the tissues. The stomach and the duodenum were carefully replaced and the incision closed by the usual method. Control dog No. 1 was subjected to the same procedure of surgery and manipulation of stomach and duodenum but the pylorus was not ligated. The weight, temperature, symptomatology and the BUN were recorded at 12 hour intervals in each dog until the time of death. Water and food were made available throughout the post-operative period.

Group II consisted of seven dogs Nos. 8 to 14 used for the study of ileac obstruction and its effect on BUN. Six dogs Nos. 9 to 14 were subjected to the same procedure of preparation, anaesthesia and surgery as in Group I. In this group a portion of the ileum just anterior to the ileocaecal junction was ligated with silk. The control dog No. 8 underwent the same surgery and manipulation of the intestines without the ligation. The findings were recorded at 24 hourly intervals for a period of five days.

Observation and Discussion

The results obtained in the pyloric and ileac ligation experiments are detailed in the tables. In Group I of pyloric obstructions all the six dogs showed an initial slight drop in the BUN level, in the first 24 hours. The rise in BUN thereafter is very marked and approximates on an average of 3 to 4 mg. % per hour. Symptoms consisted of malaise, depression, severe vomiting, staggering, shivering, ataxia and tetany. Though the animals continued to eat and drink, the ingesta was promptly vomited with more and more of gastric secretions. The ingested material was prevented from entering the duodenum and jejunum where most of the digestion and absorption takes place. Thus the medium of water is denied for the basic metabolic needs and in addition the severe vomiting produces further dehydration and loss of essential electrolytes thereby aggravating the situation. Following persistent vomiting in pyloric obstruction, an acute depletion of water, hydrogenion, sodium and potassium occurs. Harper suggests that the excessive removal of gastric secretion elevates the blood pH rendering it alkaline and this uncompensated alkalosis leads sometimes to tetany by inducing a decreased ionized serum calcium.

It is observed that complete obstruction of pylorus induces a very rapid and high BUN due to the combined effect of water and electrolyte loss. The BUN in this group of animals rose from 13.84 mg. % to 125.71 mg. % in the course of 48 hours, giving a percentage increase of 807.5%. This is of real significance of diagnostic importance when suspicious cases are encountered. The high content of urea in the blood produces the toxic effects of uremia. In addition the obstructed

segment elicits a larger quantity of toxins which are absorbed to produce a quicker lethal effect. As a result of these combined toxic syndromes 5 of the 6 dogs died between the 60th and 72nd hours while the 6th died between the 48th and 60th hours. These evidences suggest that surgical intervention in cases of pyloric obstruction is indicated at the earliest possible period since any delay favours the development of toxic factors and an early lethal termination. It is of interest to note that when the condition is diagnosed, prompt treatment with subcutaneous or intravenous injection of saline considerably prolongs the life of the animal by correcting the dehydration and alkalosis. (Wangesteen).

Obstruction of the ileum

In these experiments dogs survived much longer and the vomition was not great. In lower obstructions there is a considerable length of absorbing intestine between the stomach and the site of obstruction which helps in absorption.

The results obtained in the present series of dogs Nos.8 to 14 indicate that the fluctuation in the level of BUN is almost negligible and of little or no significance. Dog No. 9 showed a small rise upto 25 mg.% on the second day, presumably due to the temporary effect of vomition and the BUN dropped to normal on the third day. Dog No. 12 also showed a small rise which came down to normal in the next 24 hours. This rise too was a temporary effect of vomition on blood concentration. It is significant to note that obstructions at the site of ileo-caecal valve did not show any increase in the level of BUN. Since most of the food and water ingested is absorbed and since there is proper excretion of urine there is little chance for the increased retention of urea formed in the body.

The marked disparity between the findings in BUN levels at the pyloric and ileac sites may aid in the location of the site of the obstructions. When the BUN level exceeds 50 mg.% the need for immediate corrective therapy is well established. Clysis with saline solutions may prevent dehydration and further deterioration.

Summary

A review of the literature revealed that determinations of BUN in small animal practice is predominantly directed towards assessing the renal damage and leptospirosis. Though mention is made concerning the elevated findings in intestinal obstructions, the determination of BUN is rarely utilized for this purpose. This study was directed to assess the significance of BUN in intestinal obstructions of the canine.

GROUP I.

Effect of Pyloric ligation on BUN in dogs.

[illegible]

GROUP II.
Effect of Ileac Ligation on the BUN in dogs.

Serial No.	Bun mg%							Weight in lbs.							Temperature						
	Days							Days							Days						
	0	1	2	3	4	5		0	1	2	3	4	5		0	1	2	3	4	5	
8 (Control)	10.80	11.25	10.24	12.06	12.0	11.5		23	23	23	23	23	23		101.8	101.6	102	101.4	102	101.6	
9	13.50	13.0	25.0	20.50	12.48	11.60		18	18	18	17.5	17.5	17.5		101.8	102.2	102.6	102.2	101.8	102	
10	10.50	12.75	12.25	11.80	13.56	14.52		16	16	16	15.5	15.5	15.5		101.2	101.8	103	101.6	102	101.2	
11	14.50	12.98	13.56	17.82	10.58	16.32		22	22	22	21	21	21		101.6	101.8	102	101.2	102	101.6	
12	15.00	12.50	12.0	15.25	22.12	17.28		16	16	15.5	15.5	15	15		102.2	102	101.6	102	101.8	101.8	
13	13.56	11.0	11.0	13.28	12.58	12.30		12	12	12	11	11	11		101.2	101.6	101.8	101.4	102	101.2	
14	16.02	15.62	14.52	18.56	15.36	14.32		13	13	13	12	12	12		102.2	102	102.6	101.8	102.4	101.6	
Average Bun	13.84	12.79	14.72	16.21	15.44	14.89															
Percent Increase	—	-7.3	6.4	17	11.6	3.9															

Complete obstructions of the pylorus produced a slight decrease from the normal BUN in the course of the first 24 hours. Thereafter the loss of water and chloride depletion due to the persistent vomiting produced a steep rise in the BUN content which rises at the rate of 3 to 4 mg. percent per hour. The overall increase was 807.5 percent at the end of the 60th hour. All the six dogs in this series died between the 60th and 72nd hour after ligating the pylorus. These early fatalities emphasize the need for surgical intervention to correct the malady before the 60th hour.

The intestinal obstruction at the ileo-caecal site evinces practically no increase in the BUN level. The percentage increase recorded was 17% over the normal. These animals showed little discomfort compared to those evinced by dogs in pyloric obstruction series and survived much longer.

Acknowledgment

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TELEGRAM — INDIGENOUS

A PRELIMINARY REPORT ON STUDIES ON NEBULIZATION METHOD OF PROTECTING CHICKS AGAINST NEWCASTLE DISEASE USING INDIGENOUS VACCINE STRAINS OF VIRUS*

By

DR. U. K. MENON, G.M.V.C., B.V.Sc., D.Sc., (W. Germ.)
Professor of Bacteriology, Madras Veterinary College.

Introduction

The advantage of aerosols in protecting chicks against Newcastle Disease has been fully established. Many proprietary preparations covered by patents have been developed using this technique. Of late multiple vaccines incorporating Newcastle Disease, Fowl-Pox and Infectious bronchitis have been increasingly used. Commercial poultry breeding has benefitted to a considerable extent by the development of these techniques, since the aerosol form of the vaccine does not require professional veterinarians for administration. To this extent it saves the poultry breeder the cost of specialised service. The added advantage is that the device itself is time saving. Many dispersal media, liquid and solid, have been employed. In fact the dispersal medium gives each proprietary product its distinctive character. The virus strains used are FI in England and BI in Europe, and U. S. A. Studies have not so far been made on aerosols employing Mukteswar vaccine strains of virus. It therefore appeared worth while to pursue studies in order to develop a nebulization technique employing the vaccine strains of the Asian virus. This paper is a preliminary report on these investigations.

Literature

Considerable amount of studies have been made regarding the protective powers of vaccine strains, FI in U. K. and BI in Europe and U. S. A. A serological study of vaccinations and revaccinations has been made by Markham *et al.* (1954).

Detailed methods for identification of vaccine strains have been given by Hansen & Brandly (1955). Evaluation of the comparative prophylactic ability of the BI strain administered by different routes have formed the subject of a number of investigators. Extensive trials involving over 2 million chicks and adult birds have been reported by Bran *et al.* (1959). Their studies established in order of efficacy the aerosol, I/M and drinking water as the best methods of administration. An evaluation of the wing web vaccination has been reported by van Rockel (1955). Johnson (1955) has also evaluated various methods of administering the vaccine. Johnson & Gross (1951 & 1952) have reported

* Presented at the XV Indian Veterinary Conference held at Mathura (U.P.) in January 1962.

ted on a method of nebulization using BI virus. Studies on mass vaccination with live virus dust vaccines have been made by Markham *et al.* (1955). Since most of the work on prophylactic quality and evaluation of techniques have been made in Britain U. S. A. and the Continent these studies have naturally been limited either to the FI or BI strains. Even in this country, Rao & Agarwal (1960) have used FI strain by intranasal instillation for their studies on its efficacy in protecting chicks against virulent Asiatic strains of the virus. The prophylactic techniques employed in India so far have been limited to the wing web inoculation method. No study on the efficacy of the Indian vaccine strains as an aerosol has been reported so far. This may be due to the fact that commercial poultry raising as a full time occupation has yet to take root in this country. However with the fillip given by the five year plans to poultry husbandry, it is imperative that suitable methods to prevent chick mortality due to diseases like Newcastle disease, fowl-pox and infectious bronchitis are made available in forms that could be easily administered by the class of husbandry men who are interested in the poultry industry.

Materials and Methods

Lyophilised egg adapted Newcastle disease, Mukteswar strain of the vaccine obtained from the Institute of Veterinary Preventive Medicine, Ranipet was used as source of virus. Each ampoule had enough virus to protect 200 birds by the conventional wing web inoculation method. Propylene Glycol (commercial) was used as the medium for nebulization. The contents of six virus ampoules were taken into 5 c. c. normal saline and propylene glycol added to make up to 120 c. c. This mixture gave the best results in preliminary trials. The virus was suspended in the propylene glycol not earlier than an hour before actual nebulization. The dispersal was done using a 'flit gun' which was first washed with a small quantity of free glycol, sprayed and dried. No other sterile precautions were taken. Spraying was done into the brooder boxes direct at the rate of about 2 oz. of spray for 50 chicks. The method was tried out on five lots of day old chicks and one lot of month old chicks. The blood of chicks from each lot was drawn after one week and Haemagglutination (HA) and Haemagglutination inhibition (HI) titres determined. The tests were repeated at weekly intervals with another series of five chicks from each lot. Unsprayed chicks and chicks of the same age and lot protected by the conventional wing web method were used as controls. The HA and HI titres were made using standard techniques.

Results

The results of HA and HI tests are given in the tabular column appended. It will be seen that there is a rise in titre in the case of

sprayed chicks after a week. The response to the prophylactic procedure was found to be better in day old chicks rather than in one month old chicks. The variation in titres among individual chicks of the same lot was negligible.

Conclusion

Further studies are necessary to establish variations in titres in respect of chicks of all ages starting from day old to 3 months old chicks to establish the best age for nebulization. Studies have also to be made on the exact effect of the booster dose of the vaccine administered as aerosol and the exact age and time at which the booster dose produces maximum results. Before the final evaluation of the aerosol method is made the HI titres have to be correlated with the results of challenge with virulent virus on the protected birds. These experiments are under progress. From the results of the work so far it is apparent that aerosols employing propylene glycol and Mukteswar strains of virus are effective in raising the HI titres.

TABLE

Week after nebulization	Titres (HI)	Day Old					Month Old	Remarks
		1st Lot	2nd Lot	3rd Lot	4th Lot	5th Lot		
First week	HI	160	80	160*	160	160	80	*2 chicks died virus not isolated
Second week	HI	320	160*	320	320*	320*	320	*2 chicks died virus not isolated
Third week	HI	640	320	640	640*	640	640	*1 chick died virus not isolated
Fourth week	HI	640*	640	640	640	640	640*	*3 chicks died virus not isolated
Fifth week	HI	640	640	640	640	640	640	

Result of control

Wing Web method:	Positive Control	Titres.					(One month Old chicks)
		1st week	2nd week	3rd week	4th week	5th week	
		60	260	320	640	640	
	Negative Control (Unsprayed)	Day old Chicks			Month Old Chicks		
		HI titres not more than 10			HI titres not more than 10		

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CROSS - BREEDING WITH POLWORTH RAMS IN MALLA DANPUR (ALMORA) U.P.

By

KULANAND PUROHIT,

Veterinary Officer, Garur, Almora U.P. (formerly at State Sheep Farm, Karmi, Almora)

Introduction

Cross breeding as is well known is one of the important methods of improving the local livestock. This finally aims at evolving a new breed for the area. Danpur is situated in the north of Dist. Almora and has a sheep population of about 18000. These sheep have a large form but yield a very poor quantity and quality of wool suitable only for the coarse apparel, blankets etc. Cross breeding with Polworth rams in the farm and villages was taken up since 1956 so as to form a new breed for the area. This note is written with a view to appraise the co-workers elsewhere in the line to have an idea about their performance at this place with a heavy rainfall and situated at 8500' above sea-level. Rampur Bushair ewes were selected for cross breeding with Polworth rams in the farm and local Danpur ewes in rural area.

Breeding and Gestation Period

Two seasons, Sept.-October and March-April, have been fixed for taking the lamb crop at the farm. The rams are allotted to the flocks. The ewes covered are noted by the staff and the dates of their covering and lambing are recorded. Hand service has not been introduced so far at the farm. The average gestation period for R.B. ewes was 152 days and F₁ grade ewes 145 days. A total number of 7 R.B. ewes in 1959-60; 7 R.B. ewes in 1960-61 and 7 F₁ grade ewes in 1960-61, were observed for this study. A few observations are recorded in Table I below.

TABLE I

Sl. No.	Breed of Ewe	No. of Ewe	Date of covering	Date of lambing	No. of days of gestation	Average period of gestation	Remarks
Group I							
1.	R.B.	80	30- 9-59	1- 3-60	151	152 days	
2.	"	16	30- 9-59	22- 2-60	146		
3.	"	74	8-10-59	10- 3-60	155		
4.	"	21	8-10-59	5- 3-60	150		
5.	"	77	9-10-59	11- 3-60	155		
6.	"	71	9-10-59	12- 3-60	156		
7.	"	10	13-10-59	11- 3-60	151		
Group II							
1.	R.B. x Pol	2F ₁ /K46	10-10-60	6- 3-61	146	145 days	F ₁ grade Ewes
2.	"	3F ₁ /K46	24-10-60	6- 3-61	133		
3.	"	10F ₁ /K27	2-10-60	3- 3-61	151		
4.	"	11F ₁ /K17	6-10-60	2- 3-61	147		
5.	"	6F ₁ /K18	15-10-60	14- 3-61	149		
6.	"	39F ₁ /K48	11-10-60	11- 3-61	150		
7.	"	19F ₁ /K47	23-10-60	13- 3-61	140		

Age at first lambing in farm-bred F₁ grade ewes

A total number of ten ewes were observed for the study of maturity and first lambing. The range for first lambing age was noticed to be between one year and eleven months to three years and four months. The average for these 10 ewes was 2 years, 7 months. As already stated the farm has a height of 8500' above sea level. During this period there was moneziasis and lung worm infection in the flocks of the farm and may have played some part in the process of maturity.

Wool Production

The annual wool yield of Rampur Bushair and F₁ grade ewes was studied. The annual yield of R.B. ewes for 1959-60 was 2 lb. 8 oz. and F₁ grade ewes for the same period was 3 lb. 13 oz. These averages were based on 10 animals of each breed. A few of them are appended in Table II.

TABLE II

Sl. No.	Breed	Brand No.	Date of birth	Last lambing	Wool Yield		Annual yield	Average annual yield	Remarks
					10/59 lb oz	4/60 lb oz	lb oz		
Group I									
1.	R.B.	1	13-6-55	2-10-59	1 4	0 10	1 14	2 lb-8 oz	All purchased stock. All animals were selected at random for purposes of study.
2.	"	2	13-1-55	22- 9-59	1 4	0 9	1 13		
3.	"	3	13-6-54	9- 3-60	1 7	1 9	3 0		
4.	"	10	13-6-55	11- 3-60	1 6	1 2	2 8		
5.	"	5	13-6-55	—	1 3	1 6	2 9		
6.	"	8	13-6-55	11- 3-60	1 10	1 11	3 5		
7.	"	18	13-1-55	—	1 6	1 2	2 8		
Group II									
1.	FI Grade	1F ₁ /K17	1-2-57	9- 3-60	2 4	1 8	3 12	3 lb-13 oz	
2.	"	3F ₁ /K17	9-2-57	17- 3-60	2 1	2 6	4 7		
3.	"	7F ₁ /K17	21-3-57	—	1 13	1 6	3 3		
4.	"	10F ₁ /K27	18-5-57	7- 3-60	2 6	1 3	3 9		
5.	"	13F ₁ /K18	1-2-58	24- 2-60	3 0	2 12	5 12		
6.	"	16F ₁ /K18	3-2-58	16- 3-60	1 11	1 10	3 5		
7.	"	6F ₁ /K18	14-1-58	—	1 12	1 4	3 0		

The wool yield summary at the farm for 58-59 & 59-60 was as under. The F₁ grade yearlings yielded about 2 lb-8 oz of wool as indicated in Table III.

TABLE III

Sl. No.	Year	Breed	Wool yield in lbs average		Average annual yield in lbs	Individual maximum per shearing in lbs	Individual minimum per shearing	No. of sheep shorn	
			Sept	March	Oct	April		Sept	March
1.	58-59	R.B.	1-2	1-10	2-12	2-8	0-6	38	37
2.	59-60	"	1-8	1-1	2-9	2-9	0-9	36	36
3.	58-59	F ₁ grade	1-15	1-6	3-5	8-2	0-6	32	38
4.	59-60	"	2-24	1-6 ¹ / ₃	3-8 ⁷ / ₂	3-0	0-11	15	27
5.	59-60	F ₁ grade yearling	1-6 ¹ / ₇	1-12 ¹ / ₃	2-7 ¹ / ₂	2-1	0-8	28	18

The wool yield in the villages from local and cross bred progeny was studied but representatives from uniform age groups were not available. However table IV will give an idea about the increase in the wool production in the crosses in rural areas.

TABLE IV

Sl. No.	Date of sample survey	Breed	Age	Number observed	Max. wool yield in one shearing		Min. wool yield in one shearing		Average yield per shearing	Remarks
					lb	oz	lb	oz	lb oz	
1.	10-6-59	Local Danpur Ewe	3-4 yrs	22	0	12	0	4	0 7	Progeny Dam
2.	10-6-59	F ₁ grade (Local x Pol)	1-1 yr	3	2	6	1	4	1 13	
3.	11-8-59	"	2 yrs	3	1	11	1	0	1 5	
4.	3-8-60	"	1 yr	16	2	6	0	13	1 6 ¹ / ₂	
5.	3-8-60	Local Ewe	4-5 yrs	16	1	6	0	4	0 6 ¹ / ₂	

Notes.—All weights have been expressed in lbs and ozs. Three shearings are done in the villages in one year. The wool yield of the yearling F₁ grade animals is first shearing of their life.

Wool analysis

The wool analysis could not be done in detail in 1959-60 for want of facilities at the central sheep and wool research station Pashulok Rishikesh. However on medullation test most of the F₁ progeny wool was typed as A & B class and Rampur Bushair wool as B and C class. During 1958-59 the results of wool analysis are given in table V.

TABLE V

Sl. No.	Items of analysis	Wool samples analysed			Remarks.
		R.B.	Pol. rams	F ₁ grade	
1.	Mean diameter	38.69- 1.36 μ	27.62- 0.59 μ	34.39- 1.22 μ	
2.	Dispersion range	33.16-51.52 μ	22.28-34.24 μ	25.01-43.26 μ	
3.	Standard deviation	13.58	5.85	12.24	
4.	Dispersion range	7.28-20.12 μ	4.36- 7.76 μ	6.92-20.12 μ	
5.	Coefficient variation%	31.85	22.17	35.57	
6.	Dispersion range	21.49-46.40	17.95-38.49	21.40-46.40	
7.	Medullation %	16.03	—	12.58	
8.	Volume constant	0.32	—	0.37	
9.	Clean wool yield	84.25%	66.62%	Not recorded.	

Summary

Wool yield, gestation period and wool analysis in Rampur Bushair, F₁ grade and local Danpur ewes are given for study.

Acknowledgments

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BIOCHEMICAL ACTIVITIES IN THE RUMEN
OF SHEEP AND GOAT

By

H. C. PANT, J. S. RAWAT, M. D. PANDEY,

R. K. BHATNAGAR and A. ROY,

College of Veterinary Science, Mathura (U. P.).

Since the hosts are very largely dependent on the products formed in the rumen as a result of microbiological activity, the metabolism and requirement of the rumen microbes are receiving greater consideration in the evaluation of the ruminant nutrition. While the breakdown products obtained from carbohydrates are beneficial to the host, its dissimilation causes considerable wastage of energy and may amount to 25% of the ingested carbohydrate. The wastage of gross energy in the form of faecal crude fibre can be reduced and diverted for production if ruminal bacterial activity could be controlled and guided. In recent years attempts have been made to increase the available energy from crude fibre by stimulating the microbiological activity with the help of certain specific micro-nutrients apparently essential for the growth and activity of the rumen microbes (Burroughs *et al.*, 1950 a, b, c). It would be necessary, however, to ascertain many other facets of microbial activity before concrete measures could be suggested for guiding and controlling their activity. The determinants for the activity and the density of the rumen microbes are largely controlled by the food intake by the host (Pounden and Hibbs, 1948; Masson, 1950; Blaxter, 1945). Since the nature of the food differs from one season to another, the pattern of activity or the density of microbes changes (Moir, 1951); It would be maximum or optimum when the ingested food can make available the specific nutrients required for microbial growth and activity or when the composition of the food is such that it offers easily digestible substrates. Assuming that the activity as well as density of the microbes remain constant the digestibility of a fixed amount of fibre would differ depending on the degree of lignification (Forbes and Garrigus, 1950; Kamstra *et al.*, 1958). *In vitro* studies have been of great help in elucidating these differences (Quicke *et al.*, 1958; Quicke and Bentley, 1959). It is with the help of *in vitro* studies again, where the nature of the substrate was kept constant, it has been shown that the activity of rumen inoculum obtained from a particular animal during different seasons varies and that the degree of digestibility could be changed by the incorporation of micro-factors specifically affecting the microbial activity (Bently *et al.*, 1955; MacCleod and Murray, 1956). In *in vitro* studies two

criteria have been primarily used for measuring microbial activity; namely, the amount of the residual substrate or estimation of the products arising out of the substrate; e.g., with cellulose as a substrate the indices for the microbial activity could either be residual cellulose or the volatile fatty acids (VFA) arising out of it (Burroughs *et al.*, 1950 a, b; Gray *et al.*, 1951; Stranks, 1956; Warner, 1956; Barnett and Reid, 1957). With these as indices it has been demonstrated that the microbiological activity differs from one season to another (Pant *et al.*, 1961a). The nature of the remedial measures for improving digestibility can only be formulated when the variations during different seasons are evaluated correctly. In view of what has been stated above, the investigations reported in the present communication were designed to ascertain the changes in certain biochemical activities that take place in the rumen of the two species of ruminants, goat and sheep, in the two different seasons, (i) July - September and (ii) December - February.

Material and Method

The two seasons were based on the nature of the grazing material available to the animals; (i) 15th July to 15th September, when there was abundant lush green pasture and (ii) 1st December to 15th February, when the pasture was sparse, dry and more lignified.

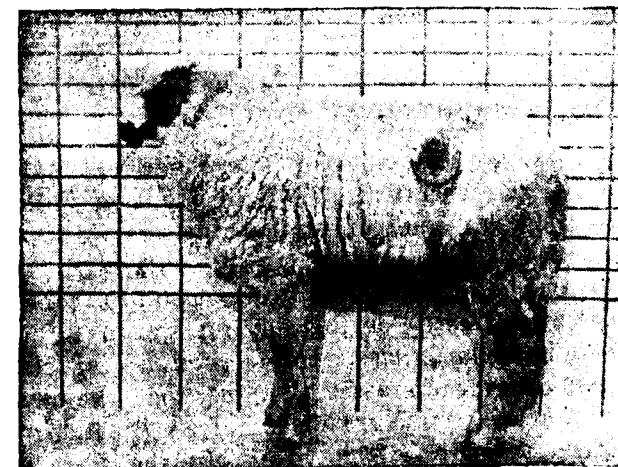
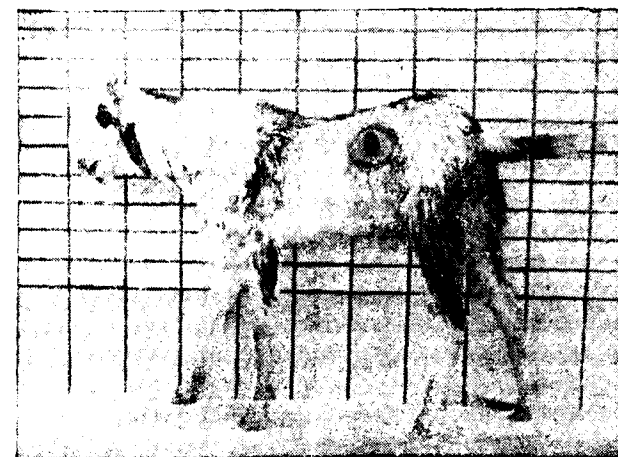
Fistulated sheep and goats were used as experimental animals. The rumen fistula was prepared and plugged according to the technique described by Bhatia (1960). Throughout the course of these investigations the composition and the amount of the concentrate mixture fed to the animals was kept constant. Each fistulated animal was given 0.5 lb. of the concentrate mixture both in the morning (7 a.m.) and in the evening (3 p.m.) to be followed by three hours of grazing. To ensure proper supply of minerals to the experimental animals, 2 lb. of mineral mixture (ISI, 1960) was evenly mixed with each 100 lb. of concentrate mixture. Half oz. of common salt/day/animal was also given. The composition of the concentrate mixture was as follows:—

Groundnut cake	...	20 parts
Wheat Bran	...	30 parts
Crushed Barley	...	25 parts
Crushed Gram	...	25 parts

In the morning the animals were denied access to water for two hours after feeding, otherwise water was given *ad lib.*

Samples of rumen liquor were taken from the fistulated animals before offering them concentrate mixture in the morning and again two

hours after they had consumed the concentrate mixture. Rumen liquor was collected by opening the cap of the plug and sucking out the ruminal fluid from different depths and directions in a 250 ml conical flask by inserting a hard polythene tube into the rumen. About 80 ml of rumen liquor was collected at each sampling time. It was immediately brought to the laboratory and strained through a double folded fine muslin cloth. The strained liquor was centrifuged at 3000 r.p.m. for 10 minutes; the supernatant (CRL) which was free from protozoa and larger-food-particles was transferred to test tube, corked and kept in thermosflask containing ice till further analysis.



Fistulated Goat and Sheep.

TVFA was estimated by the method adopted by Barnett and Reid (1957) with minor modifications; 2 ml of CRL was placed in a Kjeldahl steam distillation apparatus followed by 2 ml. of Scarisbrick buffer (Scarisbrick, 1952) and 130 ml. distillate was collected and titrated against N/50 NaOH in the presence of phenolphthalein. A "blank" was always run simultaneously. TVFA was calculated as acetic acid. For the estimation of NH_3 in the CRL the method described by Pearson and Smith (1943) was adopted.

Result and Discussion

In table I have been collected data on the concentration of NH_3 in the CRL of fistulated sheep and goat in the two different seasons.

TABLE I

Concentration and net increase of NH_3 in the CRL of fistulated sheep and goat obtained before morning feed (0-hour) and 2-hour after it. (mg/100 ml CRL)

SHEEP				GOAT			
Seasons.	Statistical attributes	0-hour	2-hour	Net increase	0-hour	2-hour	Net increase
I	Mean	20.78**	26.59	5.81	26.23**	35.38	9.15
	SE	± 0.82	± 0.70	± 1.13	± 0.59	± 1.77	± 1.27
II	Mean	24.13 NS	28.94	4.80	26.77 NS	33.68	6.91
	SE	± 1.90	± 2.45	± 1.20	± 2.33	± 2.93	± 1.50

NS - Not significant, * - Significant at 5% level,

** - Significant at 1% level

These abbreviations have been used in all tables.

Perusal of the table reveals that after 2-hours of feeding there is an increase in the concentration of NH_3 in CRL in both species - a finding in agreement to a number of investigators (McDonald, 1952; Annison *et. al.*, 1954; Chalmers *et. al.*, 1954; Butz *et. al.*, 1958). It is also apparent from the table that the difference in the concentration of NH_3 before and after feeding during the first season is highly significant ($P < 0.01$) in both the species. In the preflowering stage not only the crude protein content of grasses is higher but the nature of the nitrogen containing compounds are less complex (*e.g.* amide nitrogen) and more readily digestible (Sen, 1953). This was the stage of the fodder during the first season; the highly significant difference at the time was probably due to the higher intake of more readily available protein.

In table 2 have been collected data on the VFA concentration in the CRL of the fistulated sheep and goat before and after 2-hours of feeding in the two different seasons.

TABLE II

Concentration and net increase of TVFA in the CRL of fistulated sheep and goat obtained before morning feed (0-hour) and 2-hour after it. (expressed as acetic acid micro eq./litre CRL)

SHEEP				GOAT			
Seasons	Statistical attributes	0-hour	2-hour	Net increase	0-hour	2-hour	Net increase
I	Mean	66.86**	91.22	24.42	79.25**	92.80	13.55
	SE	± 3.92	± 2.59	± 2.77	± 2.16	± 2.29	± 1.51
II	Mean	64.81**	80.67	15.86	69.21**	88.46	19.25
	SE	± 2.60	± 3.77	± 2.27	± 2.86	± 4.12	± 2.49

Perusal of the table reveals that in both the species 2-hours after feeding the concentration of VFA increases and the difference in the concentration of VFA in CRL between before, and after 2-hours of feeding is highly significant ($P < 0.01$) and is in agreement with the observations of Balch and Rowland, 1957 and Stewart *et. al.*, 1958. It has also been found that in sheep the net increase in VFA during the first season is significantly more than found in the second (Table 3). During the former season plenty of succulent grass was available and the intake of the easily digestible substrate was obviously responsible for the higher net increase in VFA.

TABLE III

Significance of difference in the net increase of TVFA in sheep between seasons.

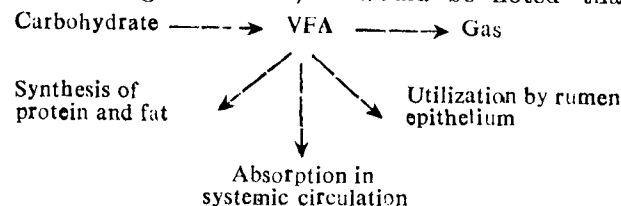
Characteristics	Species	Means Value	
		I Season	II Season
TVFA (net increase)	Sheep	24.42**	15.86

Significance of difference in the seasonal concentration of CRL obtained from sheep & goat before feeding (0-hour)

TVFA (0-hour)	Sheep	66.80 NS.	64.81
	Goat	79.25*	69.21

Compared to the sheep the net increase in VFA in the goat during the first season was less. This apparent contradiction appears to be due to the facilities offered to the gas producing microbes inhabiting the goat rumen; firstly because of the relatively higher rate of production of VFA in this species consequent to the possession of higher cellulolytic activity of goat rumen microbes (Pant *et al.* 1961a); secondly, higher rate of production of VFA in the first season because of the greater digestibility of the succulent grass; and thirdly, higher concentration and/or activity of gas microbes in goat. There is no direct proof to support the third contention but the assumption is based on the observation that in goats, soon after they are fed there is distension of the abdominal cavity simulating very much the pathological condition of tympanitis.

From the diagram below, it would be noted that all other



conditions remaining same, the nature of the substrate would influence pathway 1. When it is highly digestible resulting in higher rate of VFA formation gas production would be more and the VFA concentration in the rumen liquor inspite of the higher rate of formation may appear to be lower. In such a situation estimation of VFA alone cannot account for the rate of dissimilation of carbohydrate unless the amount of gas produced is determined simultaneously. The carbohydrate content of the ingested fodder is composed of components which are either soluble or insoluble in water. It has been shown that not only VFA's are produced more readily and rapidly from the former, but when both are present it is the former which is digested preferentially and causes a steep rise in VFA concentration (Head, 1953). The composition of the fodder in the first season was characterised by the presence of relatively more of soluble carbohydrate and must have facilitated an acute rise of VFA. Furthermore, it has been shown that the anabolic processes are less well developed in goat rumen than in sheep (Pant *et al.*, 1961b); in such a condition much of the VFA formed would go in the direction of pathway 1 indicated in the diagram above. The concentration of the VFA in the rumen ingesta arising from the insoluble components would be decided, amongst other factors, by the availability of metabolic products (e.g., NH_3). If these are made available at this stage, synthetic mechanism would reduce the concentration of VFA; in their absence the VFA concentra-

tion of the ingesta would be more. It is in this context that the VFA concentration present in the rumen ingesta of sheep and goat "before feeding" during the first season has to be considered (Table 3). The respective values are 66.8 and 79.25; the higher value in goat is explained by the discussion detailed above. "Before feeding" in effect means the concentration found 16-hours after ingestion of the evening feed (3 p.m.) by the animals. This is the residual VFA arising from the insoluble carbohydrates which due to less developed synthetic mechanisms and/or less availability of metabolic products like NH_3 went on accumulating and thereby increased the VFA concentration of the ingesta examined immediately before the morning feed was given. The assumptions and the circumstantial evidence on which the above conclusions are based receive indirect confirmation from the data obtained during the second season; "before feeding" the VFA concentration found in the rumen ingesta of sheep and goat is 64.81 and 69.21 respectively. The almost equal value in the two species during the second season was consequent to the change in the composition of the fodder characterised by the decrease in the amount of soluble carbohydrate present in the fodder. In the changed circumstances the VFA production right from the beginning would be relatively slower thereby helping the anabolic processes with the ultimate result that the residual VFA in the rumen ingesta would be less.

Summary

1. Certain biochemical activities in the rumen of sheep and goat were investigated in the two different seasons. The seasons were based on the nature of the grazing material available to the animals; i.e., either green and succulent or dry and coarse. The biochemical reactions are indicative of the differences in the microbial set up in the rumen of the two species.

2. In sheep the net increase in VFA during the first season was significantly more than in the second due to greater availability of more easily digestible fodder.

3. In the goat the net increase in the VFA during the first season was less than in the second. This observation does not, however, contradict the conclusion made in the preceeding paragraph. The decrease was apparent and not real. It was in all probability due to the breakdown of VFA to gases. The reasons for this conclusion have been discussed in detail.

4. The concentration of VFA in the CRL of both the species was found to increase significantly in both the seasons 2-hours after feeding. However, the concentration of NH_3 was found to increase significantly only in the first season.

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BIOMETRICS OF SPERMATOOZOA OF CATTLE AND BUFFALOES*

By

DR. V. VENKATASWAMI, B.A., B.V.SC., M.S., Ph.D. (Minn.)
and

A. R. VEDANAYAGAM, G.M.V.C., B.V.SC.,

Department of Dairy Science, Madras Veterinary College, Madras.

The ever increasing use of artificial insemination emphasises the need for morphological investigation for accurate spermatozoon evaluation. Though as early as 1852 Wagnes and Leuckart noticed differentiating characteristics of spermatozoa of animals, not until recently their structural details have been elucidated as a result of application of new techniques particularly those of electron microscopy and histochemistry.

All mammalian spermatozoa are of similar basic pattern (Bishop and Austin, 1957), but their morphology differs between species (Roberts, 1956). Spermatozoa of rat and mouse (Friend 1936), of human (Van Duijn, 1957) and of bovine (Bohm and Holman, 1957) strikingly differ. The biometrical values arrived at by different workers for the component parts of bovine spermatozoa vary. Bonadonna *et al* (1956) reported 9·15, 4·25, 14·84 and 45 to 50 while 9·20, 4·50, 14·00 to 18·00 and 45·00 microns were recorded by Roberts (1956) for the head length, width, mid-piece and tail lengths respectively. They were 8·00 to 10·00, 4·00, 8·30 to 10·00 and 50·00 microns as observed by Rikmenspoel (1957). The overall length varies from 50·00 to 80·00 according to Roberts (1956) and 68·00 ± 3·00 microns according to Rikmenspoel (1957). The corresponding values for the buffalo-spermatozoa are not available.

Variation in spermatozoon size was noticed and ascribed to different causes. Braden (1959) and Beatty and Sharma (1960)

* Read at the XV Indian Veterinary Conference held at Mathura (U.P.) in January, 1962.

attributed the variation to genetic causes. Mukherjee and Dott (1960) attributed the reduction in head size during preservation to alteration in acrosome. Rathore and Mukherjee (1961) noticed the head length and width of preserved spermatozoa to be significantly less than those without preservation.

Morphologically normal gametes alone will effect fertilisation. Herman and Swanson (1941), Swanson and Herman (1944) and Laing (1945) agree that in semen of normal fertile bulls the abnormality should not exceed 17 to 20%. Primary rather than secondary spermatozoon abnormality is of major concern. From 5 to 10% of any type of primary abnormality will result in reduced fertility and is associated with testicular degeneration (Roberts, 1956). Semen of normal fertile bulls should not have more than 3 to 4% abnormal heads, 4 to 10% abnormal mid-piece and 0.5 to 2.00% abnormal tails (Rollinson, 1951). Elongated midpiece (Sallisbury and Van Demark, 1956) and double mid-piece (Roberts, 1956) being primary abnormalities, will tend to reduce fertility by interfering with motility.

It is endeavoured in the present study (i) to determine the biometrics of each component part of normal spermatozoa of bovine and of buffaloes and to assess the species and breed differences if any, (ii) to investigate on the effect of age of the bull on the biometrics of its gametes and (iii) to evaluate the suitability of the differential stain for biometric studies of spermatozoa.

Materials and Methods

Semen from 8 Sindhi, 3 Hallikar, 2 Ongole and 2 Gir bulls and also from 7 Murrah buffalo bulls was used for this investigation. Fresh semen collected by artificial vagina was diluted in Sodium citrate solution (1.96%) at 1 : 20. Thin smears were prepared by gently tilting the slide so that the fluid-drop taken on the slide would spread over the marked area. After air-drying, the smear was fixed for 3 minutes with a mixture of equal volumes of ether and absolute alcohol. Then it was stained with the staining solution of the following composition (Edward Gurr-1956) for 15 to 20 minutes at 60° C :—

Aniline blue	... 2 gms.
Eosin B	... 1 gm.
Phenol 1% (aqueous)	... 20 ml.
Distilled water	... 60 ml.

After gently washing the slide with water, it was dried and examined. Although this staining technique was originally designed for rat and human spermatozoa, it is found during the course of the present study to be equally satisfactory with slight modification for spermatozoa of cattle, head taking pink, mid-piece dark pink and tail dark blue

stain. Well stained, straight spermatozoa with clear outline were, located at random using 8 X ocular screw micrometer and X 100 oil immersion (1.30 mm) objective. Of 1722 cells measured 512, 240, 200, 235 and 535 were from Sindhi, Hallikar, Ongole, Gir and Murrah buffalo bulls respectively. The results of the study are reported below.

Results and Discussion

The average length and width of head, mid-piece and tail are 9.45, 5.08, 14.19 and 47.54 for bovine and 7.40, 4.48, 12.41 and 43.61 microns for those of buffalo spermatozoa as indicated in Table I. The species significantly ($P < .01$) differ from each component part of the cell as revealed by analysis of variance.

TABLE I
Indicating in microns the average values on the Biometrics of normal bovine and buffalo spermatozoa.

Species	Number of		Head		Mid piece	Tail.
	Animals	Sperma-tozoa	Length.	Width.		
Bovines	15	1187	9.45 $\pm$ 2.76	5.08 $\pm$ 0.90	14.19 $\pm$ 1.57	47.54 $\pm$ 43.75
Buffaloes	7	535	7.40 $\pm$ 1.07	4.48 $\pm$ 1.29	12.41 $\pm$ 0.85	43.61 $\pm$ 5.56

The values for different breeds are presented in table II. For Sindhi they are 9.71, 5.12, 13.92 and 47.93; for Hallikar 9.51, 5.36, 14.98 and 49.07 microns; while 8.25, 4.63, 13.95 and 41.32 for Ongole and 9.40, 5.36, 14.63 and 48.90 microns are for Gir breeds for the head measurements, mid-piece and tail lengths. The cells of the breeds differ significantly with respect to mid-piece ($P < .05$) and tail ($P < .01$) except head measurements. The cells of the Hallikar bulls are longer than those of other breeds.

TABLE II
Indicating in microns the average values on the Biometrics of normal spermatozoa of different breeds.

Species.	Number of		Head		Mid piece	Tail
	Animals	Sperma-tozoa.	Length.	Width.		
Sindhi	8	512	9.17	5.12	13.92	47.98
Halikar	3	240	9.51	5.36	14.98	49.07
Ongole	2	200	8.25	4.63	13.95	41.32
Gir	2	235	9.40	5.36	14.63	48.90

To investigate the effect of age of the bull on spermatozoal dimensions ten bulls, regardless of their breed, were classified into those above and below ten years old and the values for their cells are shown in table III. It is seen from the table that the average head length and width, mid-piece and tail of cells from 7 bulls above 10 years are 9.38, 5.04, 14.47 and 46.95 and of those below ten years they are 9.03, 4.99, 13.88 and 45.81 microns. The cells of older bulls are found to be significantly ($P < .05$) longer in head, mid-piece, and tail lengths except head width than those of the younger bulls.

TABLE III
Showing the effect of age of the bulls on the Biometrics of their spermatozoa.

Age (Years)	No. of animals	Head		Mid piece.	Tail
		Length	Width		
Above 10	7	9.38	5.04	14.47	46.95
Below 10	3	9.03	4.99	13.88	45.81

It is interesting to record here that disproportionately long cells were encountered in the semen of one 15 year-old Murrah buffalo bull, and also in that of two Sindhi bulls aged 13 and 12 years, but none in any of the younger bulls. The photograph of one such cell along with a normal cell from one Sindhi bull is produced in Figure 1. It is approximately one and half times as long as the normal cell with head length and width measuring 10.71 and 5.36 microns, while its mid-piece, tail and total length measure 14.29, 76.79 and 106.79 microns, respectively. The increase in its length is partly due to mid-piece but mainly,



Fig. 1

due to the tail. The percentage of such abnormal cells in them vary from 1 to 5. The fertility rate of these bulls are 48, 49, and 45 percent respectively. The significance of these giant spermatozoa seems to be associated with questionable fertility. Whether the infrequent use of

bulls due to their declining fertility or their advancing age resulting in testicular degeneration be the cause can only be surmized. It needs further investigation to ascertain their importance in affecting fertility of the aged bulls.

Summary

1. The average values on the biometrics of the different component parts of spermatozoa of cattle and buffalo and of different breeds are presented. The species and the breeds significantly differ with reference to the biometrics of their gametes.

2. Age of the bull is noticed to affect the biometrics; aged bulls having longer cells than younger bulls.

3. Disproportionately long cells were encountered in the semen of some aged bulls, but none in younger bulls.

4. The differential staining technique recommended for rat and human spermatozoa is found to be equally satisfactory for those of cattle for the study of spermatozoal biometrics.

Acknowledgment

The authors wish to thank Dr. Bertie A. D'Souza, the Dean, for the interest shown in this work and Dr. Kerala Varma, Professor of Dairy Science for his valuable suggestions and encouragement during the course of the study.

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Clinical Article

CHOLECYSTOGRAPHY WITH BILIODYL IN DOGS—ORAL METHOD

By

Capt. AJIT SINGH & SH. K.B. SABHARWAL

(Punjab College of Veterinary Science and
Animal Husbandry, Hissar)

In order to visualise the gall-bladder a suitable contrast medium is required to be administered by mouth or intravenously. It is preferably administered orally being safe and easier. The contrast medium thus administered provides good diagnostic visualization of the gall-bladder in a high proportion of dogs with functioning gall-bladders enabling study of its shape, size and position.

The contrast media employed in cholecystography contain an X-Ray opaque element iodine, firmly and organically bound to a compound of specific affinity to the liver. It is eliminated in high concentration by the bile. In U.S.A. contrast media under different trade names e.g. Tetra-iodophenolphthalein, Cholepulvis, Tetradol-Emulsion, Iodeikon, Iso-Iodeikon, were mostly employed for cholecystography in animals. These were however not available in India. OPACOL (Iodophthalein compound), Biliodyl (PHENOBUTIODIL), etc. X-Ray contrast media for cholecystography are now available in India and are in use in human practice.

No attempts seem to have so far been made on cholecystography in Veterinary practice in India. Accordingly the authors were prompted to try BILIODYL (Phenobutiodil, 1-2:4:6-tri-iodophenoxy)-butyric acid; of M. & B. Ltd.) to visualize the gall-bladder in dogs. Biliodyl was selected because of the fact it is well tolerated and the cholecystograms obtained from its use are not spoiled by interfering bowel shadows. It does not delay emptying of the gall-bladder after a fatty meal. The trials were made on several normal country dogs of different sizes to prove its efficiency.

Gall-bladder is normally present in Ox, Sheep, Pig, and dog, whereas Horses, Elephants, Pigeons and some fishes lack it.

In dogs it lies in the fossa vesicae felleae, between the two parts of the right central lobe; usually it does not reach to the ventral border of the liver. (Sisson & Grossman).

Technique: Only light fat free diet should be given to the dog 24 hours before the examination. A control exposure should be made to ascertain the suitability of factors and other shadows. Then the

Cholecystography with Biliodyl in dogs - oral method

By CAPT. AJIT SINGH and SH. K. B. SABHARWAL



Fig. 1. 13 Hours after the administration of Biliodyl. Gall bladder fully visualised in dogs.

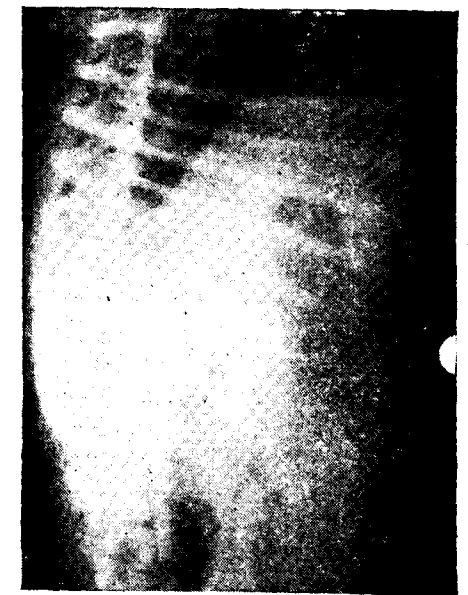


Fig. 2. 30 Minutes after feeding the fatty meal, showing contraction and emptying of gall-bladder, evacuating about half its contents and dye also seen in the bile duct.

He Goes Abroad



SRI J. B. R. CHOUDARY, B.V.Sc.,
Animal Husbandry Dept., Andhra Pradesh
has gone to U.S.A., for higher studies
in Dairy Science.



MR. MADRAS UNIVERSITY
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 (Mr. V. Subbiah of 1 Year B.V.Sc., Class,
 Madras Veterinary College has won
 the above coveted title).

requisite number of biliodyl tablets as per dosage table given below, should be administered as a single dose with water after a light fat reduced meal about 12-15 hours before the cholecystogram is to be taken. No further food should be given to the animal until after the first film has been taken. Usually the number of tablets as a single dose should be given at 8 P.M. during the evening and the first film exposed at 9-10 A.M. on the following day. The exposures should be made in the lateral position with the left side on the X-Ray table and legs pulled away after inspiration. After the first film has been exposed, bread and 1/2 to one Chatak of Dalda ghee and milk should be given and further films exposed after fifteen, thirty, forty five, sixty and ninety minutes, after feeding the fatty meal for judging the capacity for contraction and evacuation of the gall-bladder.

A portable X-Ray unit being available with us the following factors were used.

55-65 K.V.P. 10 M.A., 1/2 second, 20 inches focal film distance. Kodak X-Ray (Blue brand) films were used in Cassettes fitted with Kodak intensifying screens (ultra speed).

Dosage of Biliodyl for oral method of cholecystography in dogs.

<i>Weight of the dog.</i>	<i>Dosage.</i>
Below 10 lbs.	4 tablets of 0.5 grammes each.
Above 10 lbs.	6 tablets of 0.5 grammes each.

Observations: In the X-Ray film taken after 12-15 hours of administration of Biliodyl the gall-bladder was fully visualised in dogs with functioning gall-bladders (Fig. 1). The contrast medium concentrated here because of the concentration of bile.

The film taken fifteen minutes after feeding the fatty meal showed the start of contraction and emptying of gall-bladder. The film taken thirty minutes after feeding the fatty meal showed contraction and emptying of the gall-bladder evacuating about half its contents and dye was also seen in the bile-duct. (Fig. 2).

The film taken forty five minutes after feeding the fatty meal showed contraction and emptying of gall-bladder evacuating about three fourth of its contents. (Fig. 3).

Gall-bladder was not visualised in the X-Ray film taken 1-1½ hours after feeding the fatty meal, obviously suggesting that the gall-bladder had completely evacuated its contents. (Fig. 4).

Films were exposed in the Dorso-ventral, ventro-dorsal, Oblique and Lateral positions, to ascertain the proper shape, size and position of the gall-bladder. The authors are of the opinion that the film

exposed in the lateral position gave the best result. In cases where the gall-bladder is visualized feebly, it points to poorly functioning gall-bladders and feeding of fatty meal to such dogs may greatly delay the emptying of the gall-bladders.

In the series of films taken during these trials on normal dogs the gall-bladder was visualised in between the 8th-11th ribs, and appeared more or less pear shaped.

Conclusion

Oral method of cholecystography is safe and an easy method in dogs, with functioning gall-bladders.

Acknowledgment

The authors are thankful to the Principal, Punjab College of Veterinary Science & Animal Husbandry, Hissar for all facilities.

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Abstracts

Crossbreeds Offer Advantages in the Average Dairy Herds—

The average U.S. dairy cow completes just over two lactations. In the course of cross breeding experiments at the Illinois Agricultural Experiment Station, Urbans, 44 of 63 crossbreeds (Holstein Guernsey) survived 6 lactations against 31 of 65 purebreds, 20 of which died or were culled before completing 2 lactations. Losses from reproductive trouble were much higher among the purebreds.

(Agric. Res. USDA, 9:7, 1961)

B. PANDA.

Coccidiosis Immunity.—Immunity to coccidiosis is not as long lasting as previously thought, according to research conducted by Dr. W. M. Reid at the University of Georgia. Evidence reported by him shows that chickens lose some or all of their immunity to the coccidiosis species *E. mivati* and *E. acervulina* after 20 weeks, based on weight loss one week after challenge. As the immunity gradually wears off, birds again become susceptible unless there are enough infective coccidiosis organisms present in the litter to maintain a level of immunity. Immunity lasts much longer with other species such as *E. tenella*, which are less likely to show up in the laying house. Observations by Dr. Reid indicate that moving flocks to new quarters with new litter often precedes an outbreak of coccidiosis. Without coccidiosis organisms present in the new litter to maintain immunity, the birds become susceptible and at a later date, may be exposed to large number of oocysts to cause an outbreak of the disease.

(Georgia Poultry Tips, October 1, 1961)

B. PANDA.

Energy levels for the Layers.—Laying hens averaging 3.5 to 4.5 pounds of body weight requires at least 1,300 calories of metabolizable energy in their rations per day, according to C. E. Richardson, Iowa State University. A high energy ration is desirable because, when the energy and protein are balanced, hens can make better use of protein which is most expensive part of the ration. When energy levels go below 1,300 calories per pound of ration, hen has to break down so much of protein just to provide energy for egg production. In tests performed by him, hens receiving 900 calories per pound of ration were able to retain only 25% of the nitrogen provided by the protein in the diet. Those on 1,100 calories retained 27% of the protein nitrogen. Birds receiving 1,300 calories per pound of diet retained 35%, and those on 1,500 calories retained 44%. Rations providing 1,300 and 1,500 calories supported egg production for all the hens, but the 1,100-calorie diet supported egg production for only two of the hens on this test. All egg production stopped for hens that received a 900-calorie diet.

(Poultry Digest January, 1962)

B. PANDA.

Built-In Bacteria Protection.—The white of the egg has several built-in protective devices which will inhibit growth of certain bacteria, according to Dr. Milo Swanson, University of Minnesota. These safeguards are as follows:

1. A substance called lysozyme can dissolve the cell walls of bacteria and destroy the organisms. However, some bacteria are resistant to lysozyme.

2. Avidin, an albumen protein, makes biotin unavailable to spoilage organisms, but many germs can make their own biotin.

3. Another protein in egg white, conalbumen, makes iron unavailable to bacteria which need this material for growth. Conalbumen is an important protective agent, since most of the bacteria that spoil eggs need iron.

(*Egg Producer*, September, 1961)

B. PANDA.

Parasites Compete or Co-operate.—Some internal parasites of livestock apparently compete with each other for survival, in addition to feeding on their hosts, while other species live together peacefully. This has been shown in a recent study conducted by the USDA parasitologists J. H. Turner, G. I. Wilson and K. C. Kates. The larvae of three species were force-fed to lambs. Some lambs received larvae of only one species, some got larvae of two species, and some received larvae of all three species. About three months later, worms recovered from each lamb's stomach were counted and compared with the original number of larvae fed to each animal. The results showed that if all three species were in a lamb's stomach, the population of one species, the large stomach worm (*Haemonchus contortus*), was drastically reduced. The population of another, the medium stomach worm (*Ostertagia circumcincta*), was moderately reduced. But the third species, the stomach hair-worm (*Trychostrongylus axei*), persisted as well or better with the others than when alone.

In the two worm combinations, the large worm was again the weak competitor.—based on comparisons of larvae fed and worms recovered. If large and medium worms were together, populations of both were smaller than when either was alone, large worms were almost eliminated when tried with stomach hairworms, which did better in this combination than by themselves. Hairworms also thrived with medium stomach worms, which fared about as well alone or in combination.

Earlier experiment by Kates and Turner showed that other species may not compete with each other in sheep. Populations of the large, stomach worms and the thread-neck worm (*Nematodirus spathiger*) were greater than when either species alone infested the

animals. The scientists also demonstrated that the same effects occurred when intestinal hairworms (*Trichostrongylus colubriformis*) and thread-neck worms infested sheep.

(*USDA Agri. Research*, April, 1962)

B. PANDA.

Use of Dead Vaccines.—Dead Newcastle vaccine is being used extensively by poultrymen in the Maine State (U.S.A) and with success. Some 200,000 doses per week are being used—about 20% of the total weekly broiler placements. Vaccination is by injection at about 10 days of age.

Work on an effective dead bronchitis vaccine is under way at the Department of Animal Pathology, University of Maine. Some practical developments may be expected within a year.

(*Broiler Industry*, Vol. 25, No. 1, 1962)

B. PANDA.

Trend of Changes in Livestock Population in U.S.A., Last 10 years.—The latest report of USDA shows that from 1951 to 1960, numbers of animal units declined as follows: Milk cows, 15%; Hens and Pullets, 15%; Farm Chickens, 40%; and Horses and Mules, 53%. The animal unit numbers that increased during this period were as follows: Cattle on feed, about 60%; Other Beef Cattle, 30%; Sheep, 5%; Broilers, 22%; and Turkeys, 60%.

(*Feed Merchant*, Vol. 13, No. 2, Feb., 1962)

B. PANDA.

Influence of Light and Darkness Upon the Reproductive Performance of the Fowl.—According to the authors, R. K. Lanson and P. D. Sturkie, no significant differences in egg production, feed consumption, and body weight were noted between birds (pullets and hens) receiving eight light regimens providing an average of 14 total hours of light and 10 hours of darkness. However, the rate of egg production and feed consumption does not depend entirely upon the total hours of light. Chickens receiving as little as 4 hours of total light can lay at the 50% rate for a sustained period, provided the light is given throughout the 24 hours in short periods ranging from 28 seconds to 15 minutes.

(*Poultry Science*, Vol. 40, No. 6, 1961)

B. PANDA.

News and Views

Where ignorance is bliss it is folly to be wise.—Pregnant women will soon be able to tell within three weeks of conception the sex of the child they will bear according to the *Guardian* of London. An electronic device the "Argon Chromatograph" could determine the sex of a foetus within 20 minutes. The machine which costs £700 and operates

by analysing the steroids in the blood of the pregnant woman was displayed to Scientists and Doctors who attended the opening of a new Scientific Instruments Factory at Cambridge.

Sir M. Visveswaraya, the Centenarian, Engineer-Statesman died at Bangalore on the Tamil New Year day, 14th April 1962, in his 101st year. He was an embodiment of high character, discipline, efficiency and nobility. He was an Engineer of international repute, who has benefitted this country with several of his schemes of irrigation, power-projects and industrialisation. As Dewan of that enlightened state of Mysore, he made it so progressive that there is no exaggeration in his being claimed to-day as the Maker of Modern Mysore. Mysore has had a long line of illustrious Dewans but he was the brightest star in the firmament. We share the view of Sri S. R. Kanthi, the present Chief Minister of Mysore, when he says "Many centuries will pass before any such great individual walks on the soil of Mysore again".

His golden advice.—What we need in this country is more work, hard work and continuous work. The working power in the country is alarmingly low". How true! The motto with some people seems to be 'Work the least and earn the most'. In fact, it is being religiously practised as a fine art and in an increasing measure. The rest of the time is utilised to fawn on the Powers-that-be! **O Tempora O Mores!** India is doomed to failure as long as such men continue to plague the Society.

The World Federation for the protection of animals is convening on 20th to 23rd May 1962 an international Conference on the transport in Europe of livestock for slaughter. The Conference will be held at Hotel de Ville (Town Hall), Versailles, France.

Association News

The Indian Veterinary Association

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 ours 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!

T. VINAYAKA MUDALIAR,
Editor, *The Indian Veterinary Journal*.

THE I. V. J. RESERVE FUND

LIST OF CONTRIBUTORS

	Rs. nP.
Amount acknowledged (April 1962 issue) ...	7,922.55
U. P. Veterinary Association, Lucknow ...	201.00
Dr. H. P. Kapoor, Bakkas, Lucknow, U. P. ...	25.00
The British Book Depot, Lucknow, U. P. ...	101.00
Dr. V. Santiago, Retd. V. S., Malaya, Panjanpatty, Madras. ...	25.00
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Cheques, money orders and all correspondence should be addressed to the Editor, *The Indian Veterinary Journal*, Madras-17.

The Bombay Veterinary Medical Association

Extract of resolutions passed at a meeting of the Managing Committee held at Nagpur Veterinary Hospital, Nagpur, on the 4th March 1962 :—

1. The Managing Committee of the B.V.M.A. places on record its profound sorrow at the sad demise of Shri V. G. Khare and resolves to convey its heartfelt condolences to the members of bereaved family.
2. Resolved that the venue of the General Body meeting be fixed at Poona and the Director of Animal Husbandry may be approached to convene some seminar or meeting there on the lines of Agresco meeting of the Agriculture Department.
3. Resolved that the Minister for Agriculture may be approached to be the chief guest of the next Conference and in case he is pre-occupied, Deputy Minister for Agriculture may be approached.
4. It is unanimously resolved that Shree S. R. Nadgir be nominated Conference Secretary for the forthcoming annual conference at Poona.

Veterinary College, }
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M. G. KALE,
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Correspondence

[The views and opinions expressed in correspondence are those of the writers themselves and are not always endorsed by the Editor.]

Sir,

Sub:—Article—Stringhalt in Bovines—Published
in the *Ind. Vet. J.* March '62 issue.

I shall be very thankful if you could publish the following in your esteemed journal.

After carefully reading through the article I feel that the authors have confused Stringhalt with Chronic Luxation of Patella in Bovines. The treatment advocated is the treatment in vogue in these parts for the last two decades for cases of Chronic Luxation of Patella in bovines. Stringhalt as per text books is an involuntary spasmodic lifting of one or more of the limbs during progression which occurs only when the animal is made to move. This malady affects only equines. In the fixation of the patella above the trochlea, which is commonly known as Chronic Luxation of the Patella, symptoms may simulate those of Stringhalt but a dull sound may be heard when the patella slips back on the trochlea. The condition occurs in both equines and bovines.

The authors have carefully left out the symptoms but have reported a 'Click' sound after a sudden jerk in some cases. This obviously indicates that the sound was produced when the patella returned to its normal position. It is therefore necessary to correct and substitute 'Luxation of Patella' wherever the word 'Stringhalt' has been used.

Yours faithfully,
F. D. WILSON,
Professor of Surgery,
Madras Veterinary College.

Vepery }
2-4-62 }

REPLY

Sir,

Stringhalt as described in text books is an affection of equines only. But based on clinical observations by different workers the condition has been synonymised as chronic luxation of Patella and its other colloquial names (Ref. No. 5, 7 and 8 given in the article and Ref. Ramaiah, B. (1930) I.V.J. VII, No. 2 174). The symptoms have been described by the above referred to workers and others as mentioned in the article.

Keeping in view that several workers have described the symptoms of the disease the same were omitted.

Regarding the treatment the same treatment as advocated by other workers have been followed but by different technique.

16-4-62.

Yours faithfully,
Y. S. BHATIA,
P. C. YADAV.

In Memoriam

Dr. R. L. KAURA, L.V.P., D.V.M., M.R.C.V.S.,

Veterinarians in India have been shocked to hear of the sad and untimely demise of Dr. Ram Lal Kaura, at Baghdad, where he was working as Head of the Department of Pathology and Bacteriology in the University Veterinary College. Dr. Kaura had taken up the position in Iraq in 1959 some time after his retirement from the post of Director of Animal Husbandry, Uttar Pradesh.

Born on the 13th June, 1906, at Nakodar in Jullundur district, Dr. Kaura received his early education in his home district and in 1924 joined the Punjab Veterinary College, Lahore, from where he took the L. V. P. diploma after completing the four year course in 1928. During his college career, Dr. Kaura showed excellent results from year to year, as also distinct signs of capacity for organization and social work, and was elected as the Secretary of the College Students' Debating Association. Soon after qualifying he returned to the College as Demonstrator in Anatomy for about a year. Later, he was posted at the Government Livestock Farm, Hissar, where he acquired sound practical experience of the management of Livestock in health and disease.

In 1931 Dr. Kaura proceeded to Canada to study for the B.V.Sc. degree (subsequently changed to D.V.M.) at the Ontario Veterinary College, Guelph, and in the following year to the United Kingdom to join the Royal Veterinary College, London, in the final year of the M.R.C.V.S. course. It was by virtue of his good academic career supplemented by sound practical experience that Dr. Kaura was able to gain admission at these two places and his diligence enabled him secure the Canadian degree and the British diploma in less than 2 years, thereby doing great credit to his teachers and colleagues in India. He returned home in 1933, rejoined the Hissar farm, and in 1936 was selected as Research Officer (then designated as Assistant Serologist) at the Indian Veterinary Research Institute, Mukteswar-Kumaon. In 1939 he was appointed as Assistant Animal Husbandry Commissioner with the Government of India and from 1942 to 1946 he was in Orissa as Deputy Director in charge of the Civil Veterinary Department there. He organized this Department on sound lines and paved the way for further development.

Consequent upon the decision of the Government of Uttar Pradesh to establish a veterinary college and livestock research station at Mathura, Dr. Kaura was selected in 1946 to take charge as Superintendent of the Livestock Research Station and to plan the college. After about a year in this position, he was transferred to Lucknow as

joint Director and shortly afterwards, on the retirement of Mr. T. J. Egan, was put in Charge of the Animal Husbandry Department. In 1947 Dr. Kaura was appointed to the post of Director of Animal Husbandry created in place of the former I.V.S. cadre post. He held this position up to August 1955, when he joined the Government of India as Livestock Development Adviser (then designated as Cattle Utilization Adviser) in the Ministry of Food & Agriculture, where he continued to work up to the end of January 1958. Thereafter Dr. Kaura returned to Uttar Pradesh and was retired on 1st February 1958.

The Veterinary College, Mathura, and the Animal Husbandry Department in Uttar Pradesh bear ample testimony to Dr. Kaura's organizing ability and farsightedness. He was an indefatigable worker, in office as well as in the field, and tackled even the most unimportant detail with meticulous attention and thoroughness. Above all, he was a perfect gentleman and, although his life was full of struggle and hard work, he bore everything with fortitude. It was by virtue of such exemplary qualities that Dr. Kaura was able to rise from the lowest rung of the ladder to the top. His hospitality was proverbial and his noble behaviour and many other good qualities will always be remembered by those who had the good fortune to work with him. During the early part of his career he came in close contact with and acquired desirable traits from some eminent veterinarians, among whom the two most noteworthy are Lt. Col. A.C. Aggarwala and Sir Frank Ware. In spite of his heavy responsibilities Dr. Kaura found time to publish several papers and bulletins, including the book "Cattle Development in Uttar Pradesh". We can learn a great deal from his life, career and accomplishments.

It was in recognition of Dr Kaura's ability and organizing capacity that he was selected to take up the position of Dean of the College of Veterinary Medicine in the newly started Agricultural University in Uttar Pradesh. Unfortunately, Dr. Kaura had already placed his services at the disposal of the Veterinary College in Iraq and could not accept the position offered to him in India. Had he been able to do so, he would surely have been a good acquisition to this new university and perhaps might still have been available for service to his country. As it is, this has been denied by fate and he has been snatched away from his family and innumerable friends at a comparatively early age. We express our heartfelt condolence to Mrs. Kaura and the children in their irreparable bereavement. They have returned from Iraq to their house, Prem Bhavan, Clemen Town, Dehra Dun, U.P.

R.N.M.

Review

Elements of Animal Husbandry for Beginners.—By DR. G. BISWAL, M.S., D.V.M. (Hons.), Ph.D., Director of Animal Husbandry and Veterinary Services, Orissa and Dean of the Faculty of Veterinary Science and Animal Husbandry of the Utkal University, and L. D. PANDA, G.B.V.C., P.G., Assistant Professor, Orissa College of Veterinary Science and Animal Husbandry. Publisher:—Shrimati Indira Devi, New Capital, Bhubaneswar, Puri District, Orissa. Price Rs. 5-25.

The exhaustive curriculum in the several subjects recently introduced in most of the Veterinary Colleges in India, has brought out to the fore, the need for suitable text books. This has tempted some of our professional men to venture on the hazardous task of producing such books. One can well appreciate their anxiety and good intentions. But production of a book needs a lot of preparation, deep study of all available literature, thorough 'grinding' in the subject through actual work and experience and above all sufficient aptitude and general equipment to present the subject in proper form and grace, without offending public taste. This is said, not with the idea of discouraging our Indian authors—far from it, but with the idea of improving Indian publications, which are bound to be on the increase in coming years.

The book under review is a marathon attempt to cover all aspects of this multifaceted subject. The authors have taken a lot of pains to collect from several sources, all possible pieces of information, good, bad and indifferent and present them in the form of notes or lessons as they call them and that within the compass of a small book of 264 pages. In a subject of this nature there can be very little originality. Much of the matter has necessarily to be borrowed from several sources. But it could have been planned better and executed better. The merit of such publications is lowered by the gross spelling mistakes and grammatical errors. There seems to be no end to them. Even the correction slip begins with a mistake—*Correction* slip. It is a little taxing to get through a book so indifferently brought out. In spite of such defects, it is a useful book for beginners and lower order of livestock workers and the lay public interested in the subject.

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2. These prizes will be in the form of gold medals or cash or both and one prize in each subject will be awarded on the basis of outstanding results of researches achieved by research workers in the country either individually or jointly, during the Calendar years 1960 & 1961, i.e. 1st January, 1960 to 31st December, 1961. Results achieved prior to the calendar year 1960 or after the calendar year 1961 will not be recognized for the purpose of the present award.

3. The award of each of the prizes shall be based on significant advances in human knowledge in a particular subject as revealed by books, monographs or papers published in the name of the candidate or any other unpublished account of the outstanding research work done or discoveries and inventions made by him. The selection of a candidate for the award of a prize will be made on the recommendations of a Judging Committee consisting of eminent scientists appointed for the purpose by the Indian Council of Agricultural Research. The award of a prize may be made to more than one research worker and the prize money divided amongst them in such proportion and manner as may be decided by the Council.

4. All research workers, engaged in research work in India, in the fields of agriculture, animal husbandry and allied sciences are eligible for competing for these prizes. Applications should be submitted in quadruplicate in the prescribed form, which can be had, free of cost, from the Secretary, Indian Council of Agricultural Research, Dr. Rajendra Prasad Road, New Delhi. Candidates working in Research Institutes etc., should submit their applications through the Head of the Institute/Department etc. Others may submit their applications direct.

5. All applications should be addressed to the Secretary, Indian Council of Agricultural Research, Dr. Rajendra Prasad Road, New Delhi, so as to reach him not later than the 31st May, 1962. The cover of applications should be superscribed as under.

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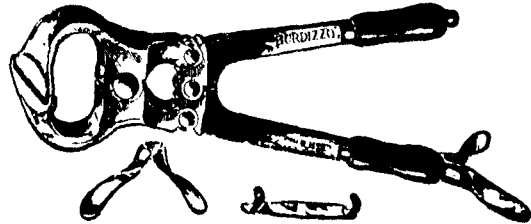
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5. Publications of clinical value, preferably of original nature, shall be eligible for consideration of the award.
6. In the case of joint authorship, the award shall be made by dividing the amount equally amongst the authors.
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8. The Managing Council of the Indian Veterinary Association shall appoint a Committee of three Judges - a Chairman and two Members - in December each year to determine the award. The General Secretary of the Association will act as Secretary to the Committee but he will have no voting power.
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