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(THE JOURNAL OF THE ALL-INDIA VETERINARY ASSOCIATION)

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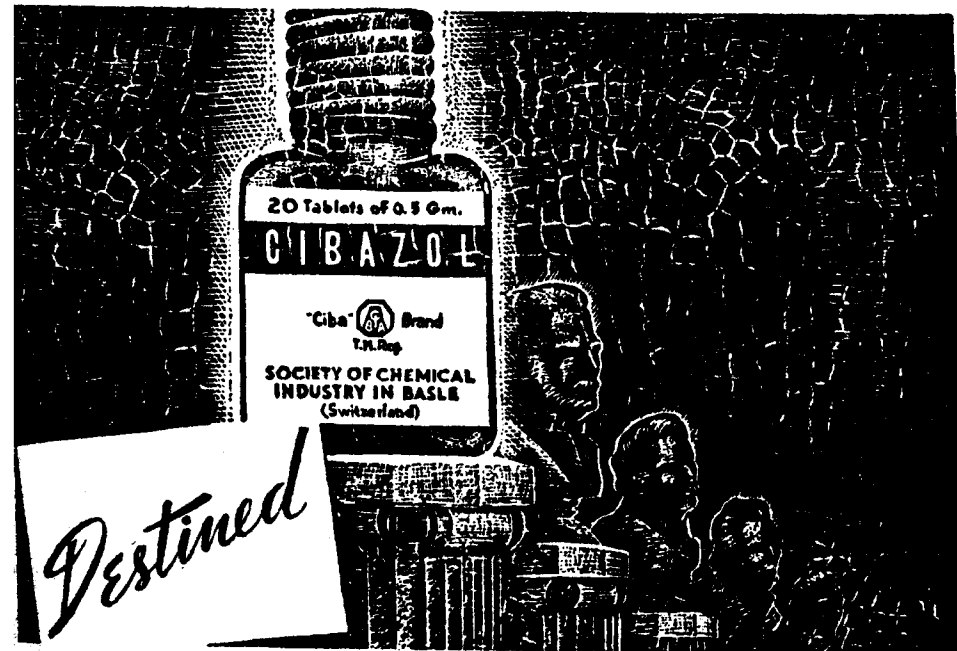
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(The Journal of the All-India Veterinary Association)



Editor :

P. SRINIVASA RAO, G.M.V.C.
Veterinary Surgeon, Madras.

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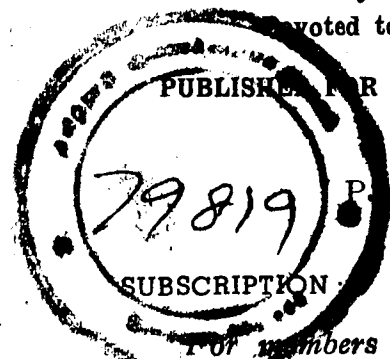
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devoted to the Cause of Veterinary Profession.

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EDITOR :

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General Articles 447

REMARKS ON THE DISTRIBUTION OF DISEASES OF THE
RESPIRATORY, CIRCULATORY, AND HAEMOPOIETIC
SYSTEMS AMONG DOMESTICATED ANIMALS

By

D. C. MATHESON, F.R.C.V.S., D.V.S.M.,

Department of Pathology, Bacteriology and Meat Inspection
Royal (Dick) Veterinary College, Edinburgh.

In any endeavour we may set an example;
even if we fail to achieve all we had
hoped, D. C. M.

The following article deals with the diseases of the respiratory, circulatory, and haemopoietic systems among the 3189 cases of disease in animals which form the basis of the present enquiry.

The distribution of the specific, general and parasitic diseases among these animals has already been dealt with (Matheson '1). Diseases of the tegumentary system have also been considered (Matheson '1). Observations on the neoplasms of the tegumentary system of these animals have also been made and it is hoped that the article dealing with them will have appeared in this *Journal* before the present article is published. The following tables then, deal with the non-specific diseases of the body systems under review, a fact which it is important to bear in mind when considering the distribution of the diseases among the animals concerned: these include 278 horses, 1325 oxen, 211 sheep, 100 pigs, 894 dogs, 185 cats, 20 goats, 83 foxes, 56 rabbits, and 37 other animals such as beaver-rats, fitches, etc.

Table I
Respiratory System

Diseases	Horse	Ox	Sheep	Pig	Dog	Cat	Goat	Fox	Rabbit	Other Animals	Total
abscess ...								1			1
polypus ...	1										1
tumours ...	1	1			8	6					16
pneumonia ...	6	19	29	20	26	6		10	1	2	119
broncho pneumonia ...	1	5	8	5	8	2		1			30
pleurisy ...	1	1	2		4			2			10
eryza ...	4	1									5
rhinitis ...	4										4
abs. Guttural pouch ...	1										1
abscess in Larynx ...		1									1
emphysema ...		1									1
alignant catarrh ...		1									1
congestion lungs ...		1	3	3	17						24
bronchitis ...			2							5	29
asphyxia ...			1	6	1			1		1	9
leucosis ...						1					1
hydrothorax ...					2	1					3
metastasis ...					1						1
Total ...	19	31	45	34	67	10		15	1	8	230

The above table shows the number and type of the diseases of the respiratory system encountered in the present enquiry; the number of animals affected and the distribution of the cases among the animals concerned.

Eighteen conditions of disease involving the respiratory system are recorded.

Certain details in the above table may be considered. Thus, ten cases of tumours involving the respiratory system have been encountered among 3189 cases of disease in animals; these tumour cases were distributed as follows; one among 278 horses; one among 1325 oxen; and eight among 894 dogs, approximately 0.89 per cent. among the dogs. The ten cases of tumour formation include an oedematous fibroma of the trachea of a horse, a primary carcinoma of the lungs of an ox, and five primary carcinomata of the lungs of dogs—one of which, accompanied by metastases, occurred in a smooth haired retriever; another in a Labrador retriever was of the squamous variety, while a third, which occurred in an Irish terrier, was of the alveolar type. In the other two cases, the breed of the dog was not recorded.

A primary osteo-sarcoma of the nasal cavity of a dog was encountered; and in two cases the lungs of dogs were the seats of secondary deposits from primary growths elsewhere in the body; one an adeno-carcinoma and the other a sarcoma which involved the intestines.

One hundred and nineteen cases of non-specific pneumonia are recorded, among which cases in sheep occupy a prominent place with twenty-nine cases out of the forty-five examples of non-specific respiratory diseases noted among the two hundred and eleven cases of disease in sheep under review.

Among the eight hundred and ninety four cases of disease in dogs, sixty seven non-specific diseases involved the respiratory system, twenty-six of these being examples of non-specific pneumonia. Among one hundred cases of disease in pigs., thirty-four non-specific diseases involved the respiratory tract, twenty of these being cases of non-specific pneumonia. Among thirteen hundred and twenty-five cases of disease in the ox, thirty non-specific diseases involved the respiratory system, nineteen of these being cases of non-specific pneumonia.

Six cases of non-specific pneumonia were encountered among 278 horses; six among 185 cats and ten among 83 foxes; approximately 12 per cent. among the foxes.

Cases of broncho-pneumonia are furnished mainly by sheep and dogs, and this is true also of pleurisy, though foxes are not exempt; but dogs furnish by far the larger number of cases of congestion of the lungs, the reason probably being that cases of pulmonary trouble are recognised and dealt with at a much earlier stage in dogs than is the case with sheep which are seen, only perhaps, once in the day and unless obviously ill receive no special attention hence cases in the stage of pulmonary congestion seldom reach the post-mortem room.

Dogs are sometimes sent on long journeys in unsatisfactory containers; as a consequence, cases of asphyxia are encountered from time to time.

One nasal polypus was met with in the horse.

The case of pus in a guttural pouch is of interest; the pus was inspissated and presented itself in the form of numerous rounded or bean-shaped masses, each about the size of a haricot bean; sections showed only masses of degenerated leucocytes. In this connection attention may be drawn to the case published in 1841 by J. Carlisle³; this article includes an account of his method of opening the guttural pouches. W. Ernes⁴ in 1846 published an account of pus in the guttural pouches.

A small pebble was found lodged in the larynx of a calf; there was no evidence to suggest how it had got into that position.

Cases of emphysema or broken wind, although still met with in horses are seldom sent in for post-mortem examination, hence their absence from our lists. Samuel Drinkwater⁵ in 1796 drew attention to the occurrence in cases of broken wind in horses of a peculiar discharge from the nose which recalled the white portion of an egg. He was, as Smith⁶ tells us, the first to point out this clinical sign in cases of broken wind.

Table II
Circulatory System

Disease	Horse	Ox	Sheep	Pig	Dog	Cat	Goat	Fox	Rabbit	Other Animals	Total
Lymphangitis ...	2										2
Hypertrophy Heart	1				2						3
Tumours ...	2	1			7					1	11
Fatty heart ...	1										1
Calcification heart	1	1					1				3
Thrombosis heart	1										1
Heart disease ...	3	2			1						6
Chronic venous congestion ...	4		2		1	2					9
Stenosis pulmonary artery.....		1			2						3
Pericarditis ...			1	1	1	2	1				6
Endocarditis ...	1			1	6						8
Ascites ...					6	3					9
Heart failure ...					1				1		2
Myocarditis ...					1						1
Arteritis ...										1	1
Totals ...	16	5	3	2	28	7	2		1	2	66

Table II shows the number and type of the diseases of the circulatory system met with in the present enquiry; the number of animals affected and the distribution of the cases among the animals concerned.

Among the 278 cases of disease in horses, 16 non-specific conditions affected the circulatory system, while among the 1325 oxen - 5 cases were encountered; and among 211 sheep, 3 cases were found and two among 100 pigs; while among 894 dogs, twenty-eight showed lesions involving the circulatory system: while among 185 cats only seven were so affected; no cases are recorded among the 83 foxes examined.

The cases of tumour formation, involving the circulatory system, were met with among the 278 horses under consideration; one among the 1325 oxen; and seven among the 894 dogs; and one in a mink. These eleven tumours consisted of a lymphangio-endothelioma of a lymph gland in a cryptorchid horse; a sarcoma involving the heart, also in the horse; and a fibroma of the heart of a cow; six haemangiomas involving the skin of dogs; in the first case the breed of dog was not recorded; the second occurred in a Labrador retriever, while the other four cases, definitely of the plexiform type, occurred in, respectively, a Scots terrier—neck region; an Airedale terrier; an Irish setter—groin region; and a Spaniel—flank region. A carcinoma involving the right submaxillary gland was met with in a West Highland terrier—this growth was probably secondary to a primary growth elsewhere in the body. It is essential that, when what appears to be a tumour growth is found in a lymph gland, a careful search

be made for the primary growth—which is not necessarily large. An endothelioma was encountered in the head region of a mink.

Though the heart, during life, may show clinical signs of inefficiency, it is not always possible to demonstrate a lesion after death; the trouble may have been functional; the lesion not demonstrable. Eight cases which came into this category are recorded; three from the horse; two from the ox; and two from the dog; and one from a rabbit.

Nine cases of general chronic venous congestion are recorded; four from the horse, two from the sheep; one from the dog and two from the cat; of these cases, two from the horse, one from the dog and one from the cat exhibited the condition known as "nutmeg-liver"; i.e., a combination of chronic venous congestion and fatty changes in the liver; the relatively pale areas of fatty change, together with the darker areas of venous congestion, giving the so-called "nutmeg" appearance to the affected liver.

The present survey includes three cases of stenosis of the pulmonary artery; one in the ox and two in the dog.

Six cases of pericarditis are recorded; two of them in cats. Pericarditis is not uncommon in the ox; it is generally of either tuberculous or of traumatic origin; for the reasons already given tuberculosis is excluded from the present consideration, while cases of traumatic pericarditis are readily recognised by the practitioner and are not, therefore, sent in for post-mortem examination.

Such cases as come under our cognizance are found at the abattoir and are not included in the present survey.

Table III
Haemopoietic System

Diseases	Horse	Ox	Sheep	Pig	Dog	Cat	Goat	Fox	Rabbit	Other Animals	Total
Leukaemia ...	1				7						8
Lymphadenitis ...	2	3			4						9
Necrosis Spleen ...	1	1	2		1						5
Hypertrophy Spleen ...	1					1					2
Perisplenitis ...	1										1
Anaemia ...				3		1					4
Lymphomatosis ...					6						6
Calcification Spleen ...						1					1
Calcification mesenteric gland							1				1
Leucocytosis ...							1				1
Tumours ...	1			1	3						5
Abscesses ...										1	1
Totals ...	7	4	2	4	21	3	2			1	44

Table III shows the number and variety of the diseases of the haemopoietic system encountered in the present survey; the number of animals affected and the distribution of cases among the animals concerned.

Although there is a tendency, at the present time, to include some forms of leukaemia in the neoplastic conditions, for the purposes of the present enquiry leukaemia will be dealt with separately and so we find that out of twenty-one cases of disease of the haemopoietic system occurring among eight hundred and ninety-four dogs, seven were due to leukaemia; while among two hundred and seventy-eight cases of disease among horses, one was due to leukaemia.

Six cases of enlargement of the lymph nodes with deposits in the internal organs, especially the spleen and liver in the dog, were encountered and interpreted as cases of lymphomatosis.*

Grouping the cases of leukaemia, which is usually of the lymphogenous type in the dog, with those of lymphadenitis and of lymphomatosis in the same animal, we find that out of twenty-one diseases affecting the haemopoietic system of the dog, no less than seventeen involved the lymphatic organs.

Four tumours involving the haemopoietic system were encountered; one a lymphosarcoma of the spleen of a horse; two lymphomata of the same organ in dogs, while the fourth case was one showing secondary carcinomatous deposits in the spleen of a dog; the cranial cervical lymph glands of the same animal being purulent and containing organisms. A growth having the characters of a teratoblastoma was found in the spleen of a pig—a rare but not unknown situation.

The case of calcification of the cat is of interest; innumerable areas of calcification, each about the size of a small pin's head, were spread throughout the substance of the spleen, imparting to the organ a speckled appearance. The lesion was confined to the spleen.

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* See Ewing "Neoplastic Diseases" and Holm "Leukaemia in Animals".

A CASE OF CANINE *S. TYPHIMURIUM* INFECTION WITH NOTES ON OTHER SALMONELLA INFECTIONS IN ANIMALS *

BY

J. F. SHIRLAW, M.R.C.V.S.,

Lieut-Colonel STUART McDONALD, M.D., M.R.C.S., R.A.M.C.,

AND

MAJOR W. HAYES, M.B., F.R.C.P.I., R.A.M.C.

(From the Imperial Veterinary Research Institute, Mukteswar, and the Central Military Pathological Laboratory, India Command.)

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Since Savage (1925) commented on the meagre knowledge regarding animal carriers of salmonella infection transmissible to man it is nowadays difficult for any one but the specialist in this field of research to realize the great extent of new knowledge and to keep pace with it. Thus, 'the number of recognized salmonella types had doubled from the time of the first publication of the Kauffmann-White Scheme in 1934 to the second edition in 1939 and has about trebled by now' (Bornstein, 1943). It is now firmly established that domestic animals are the main source of human salmonella infections: salmonella have frequently been isolated from animal sewage and well and surface water contaminated by it. The problem is further complicated by the fact that certain farm animals, notably swine, occasionally harbour a considerable variety of salmonella without any evidence of active disease. The risk of human infection is further aggravated by the fact that about 2 per cent of rats and mice (America), which are liable to contaminate foodstuffs, carry *S. enteritidis* and *S. typhimurium*, while *S. anatum* and *S. newington* have also been isolated from rats. Of the essentially human types of salmonella, *E. typhosa* has been isolated once from a hen along with *S. pullorum*: mixed salmonella infections are not uncommon in animals. It is worth noting, moreover, that not a few salmonella types isolated from man, and originally considered host specific, have been recently isolated from animals: 'it is highly probable that, sooner or later, these types will appear in septicæmic disease of animals and gastro-enteritis of man' (Edwards and Bruner, 1943). Summarizing this knowledge, these workers catalogue the following types (excluding *S. pullorum* and *S. gallinarum* from domestic fowls) isolated from animal sources according to the frequency of isolation: *S. typhimurium*, *S. cholerae suis* var. *kunzendorf*, *S. typhimurium* var. *copenhagen*, *S. abortus equi*,

* Indian Journal Medical Research 33, 1, May 1945.

S. cholerae suis, *S. bareilly*, *S. anatum*, *S. derby*, *S. newport*, *S. newington*, *S. senftenberg*, *S. breideney*, *S. orianenburg*, *S. enteritidis*, *S. dublin*, *S. montevidoe*, *S. californica*, *S. new brunswick*, *S. worthington*, *S. kentucky*, *S. minnesota*, *S. munchen*, *S. london* and *S. give*. All these types were isolated from a wide variety of animals, including domestic fowls from which, however, *S. abortus equi*, *S. cholerae suis*, *S. cholerae suis* var. *kunzendorf* and *S. dublin* were not isolated. The following types were recognized: in swine, *S. cholerae suis*, *S. cholerae suis* var. *kunzendorf*, *S. newport*, *S. new brunswick*; in ruminants, *S. typhimurium*, *S. breideney*, *S. newport*; in horses, *S. typhimurium*, *S. abortus equi*; in foxes and dogs, *S. typhimurium*, *S. cholerae suis*, *S. cholerae suis* var. *kunzendorf*, *S. dublin*.

In India, in spite of the frequency of paratyphoid-like fever in man and the general importance of the salmonella problem in public health work, including milk and meat inspection, the animal salmonella problem has scarcely been touched: the chief reason is the dearth of trained workers and the mass of general animal disease problems that confronts the animal pathologist. Infection of horses due to *S. abortus equi* has been studied in considerable detail (Edwards, Haddow—unpublished work), as horse-breeding is a matter of moment in India. Disease of the domestic fowl due to *S. pullorum* is suspected to exist but the organism has not been isolated. *S. gallinarum* has been isolated in a solitary instance (Cooper and Naik, 1931). From an outbreak of septicæmia in pigeons *S. enteritidis* was isolated (Shirlaw and Iyer, 1937). Septicæmia of calves due to *S. dublin* has been described (Shirlaw, 1935; Rajagopalan, 1938). Manifold (1928) isolated an organism described as *B. certrycke* (mutton) from one hound during an investigation into 'autumnal pyrexia' of hounds of the Poona Hunt: he found that, in two cases, the sera of pariah dogs agglutinated this organism at significant titre. The entry of the dog into the list of animals that are potential carriers of salmonella disease to man is noteworthy; to date, there are few clinical records. Caspersen (1937) describes an outbreak of paratyphoid fever in six persons living in adjacent houses in a small town in Norway: a sick dog was incriminated as the source of infection. The organism was not isolated but both the human and dog sera agglutinated *S. paratyphi B* at diagnostic titre. Magnusson (1938) records a small outbreak of human paratyphoid fever spreading from a house in which a female dog had been ill with fever and had aborted. Gard (1938) studied the bacteriology of this outbreak and isolated from the dog and from three out of four human patients an organism related to *S. paratyphi B* for which he proposed the name *S. abortus canis*. Kauffmann and Henningsen (1939) describe an outbreak of gastro-enteritis in six members of a family of seven. A sick dog was held responsible on bacteriological and serological grounds. The organism, named *S. glostrup*, was placed in group C of the Kauffmann-White Scheme, with an antigenic structure vi, viii: z₁₀; en. z₁₅.

The subject of this note is, therefore, in correlation with the foregoing facts concerning salmonella disease in the dog, worth recording and represents the second record of the isolation in India of an authentic salmonella species from the dog. The source was a cross bred female terrier aged about four years and living in a hospital compound. This animal aborted after about a week's febrile illness and when first seen had an acute septic metritis with signs of septicæmia and threatening collapse. The metritis cleared up rapidly under treatment but the constitutional symptoms persisted for about three weeks and were accompanied by a short but severe attack of enteritis, with blood in the fæces, lasting for about four days. Convalescence was protracted. Examination of the uterine pus revealed numerous *coliform* organisms, markedly phagocytosed. This organism was easily isolated by swabbing the uterine fundus and also from the fæces.

Morphology.—Gram-negative rods, 0.6 μ to 0.7 μ $\times$ 2.0 μ to 3.0 μ ; motile.

Biochemistry.—Forms acid and gas in glucose, mannite, arabinose, maltose, sorbitol, inositol and xylose; mannose fails to ferment lactose, saccharose, salicin, inulin, raffinose, glycerol and adonite. H₂S: positive, V. P., M, R. and indol: negative.

Serology.—The organism was agglutinated to titre by *S. paratyphosum* B (O) 250 and *S. aberdeen* (H) 5,000 sera. It completely removed agglutinins from *S. typhimurium* (H) sp. 250 serum. The serum of the dog agglutinated the homologous organism to a titre of 5,000 and standard *S. typhimurium* (H) sp. to a titre of 1,000.

Strain *S. typhimurium* (dog) was plated out and cultures in the (H) specific and group phases obtained by colony selection. Suspensions were prepared in formol saline from each of these cultures and injected into rabbits. The sera so obtained were diluted to give a titre of 1/250 against the homologous suspension and these diluted sera were used in the investigations outlined below, except where otherwise stated. (O) suspensions of the 'dog' strain were obtained by boiling an agar grown suspension for a few minutes to destroy the (H) antigens.

Simple agglutination.

(1) 'Dog' (H) specific serum v. 'dog' (H) specific suspension	= 250
" " " v. <i>S. typhimurium</i> (H) sp. suspension	= 250
<i>S. typhimurium</i> (H) specific serum v. <i>S. typhimurium</i> (H) sp. suspension	= 250
" " " v. "dog' (H) sp. suspension	= 250

From these experiments it is concluded that the 'dog' strain possesses the flagellar factor 'i' when in the specific phase. Absorption experiments were not considered necessary and were not performed.

(2) * 'Dog' (O) serum v. 'dog' (O) suspension	= 250
" " " v. <i>S. typhimurium</i> Glasgow (O)	= 250
" " " v. <i>S. enteritidis</i> (O) suspension	= 50

The serum of the rabbit used for immunization prior to injection contained no antibodies against *S. enteritidis* (O) when tested in a dilution of 1/5.

This experiment demonstrates the antigenic overlap existing between the strain under investigation and *S. enteritidis*. This overlap is to be expected in view of the antigen formulæ of the 'O' fraction of these organisms, according to Bornstein (*loc. cit.*)

S. typhimurium (I), IV, (V), (XII).

S. enteritidis (I), IX, XII.

() denotes possible absence.

Absorption tests.

(1) 'Dog' (H) group serum, unabsorbed v. 'dog' (H) group suspension	= 250
" " " " v. * <i>S. typhimurium</i> (H) var.	= 250
" " " " binns (H) suspension	= 0
'Dog' (H) group serum, absorbed binns (H) v. binns (H) suspension	= 0
" " " " " v. 'dog' (H) group suspension	= 0
binns (H) serum 250 absorbed 'dog' (H) group v. 'dog' (H) group suspension	= 0
binns (H) serum 250 absorbed 'dog' (H) group v. binns (H) suspension	= 0

These experiments prove that the 'dog' strain contains the group flagellar factors 1, 2, 3 and is in this respect, therefore, identical with *S. typhimurium*.

(2) 'Dog' (O) serum absorbed <i>S. typhimurium</i> Glasgow (O) v. <i>S. typhimurium</i> Glasgow (O) suspension	= 0
(3) 'Dog' (O) serum absorbed <i>S. typhimurium</i> Glasgow (O) v. 'dog' (O) suspension	= 0
<i>S. typhimurium</i> Glasgow (O) serum (250) absorbed 'dog' (O) v. 'dog' (O) suspension	= 0
<i>S. typhimurium</i> Glasgow (O) serum (250) absorbed 'dog' (O) v. <i>S. typhimurium</i> Glasgow (O) suspension	= 0

These experiments prove that the 'dog' strain contains (O) antigens which are identical with those of *S. typhimurium* Glasgow.

From the above data it will be seen that the organism isolated from the dog is identical, biochemically and serologically, with *S. typhimurium*.

* Obtained by diluting the 'dog' group (H) serum so as to give a titre of 1/250 against the boiled, homologous suspension.

* *S. typhimurium* var. binns is monophasic in the (H) group phase and is identical with *S. typhimurium* (H) group.

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THE WORK OF THE ARMY VETERINARY SERVICES IN RELATION TO MILITARY DAIRY FARMS IN INDIA*

SUBMITTED BY THE D. V. S. IN INDIA

Military dairy farms were established in India many years ago when the need for fresh milk for Europeans became apparent. At first dairy breeds of cattle were imported and crossed with indigenous animals in order to up-grade, and at the same time to produce progeny with increased resistance to the climate and disease conditions obtaining in this country.

Originally Ayrshires were utilized, but at present Friesians are being imported, as they have been found more suitable. Bulls have been brought from the United Kingdom, and bulls and heifers from South Africa. Many crosses have been produced, varying from half to fifteen-sixteenths breeds, and observations made on their constitution, resistance to disease, and milk yield. As a result, it is now considered that the five-eighths cross is the most satisfactory. In general, cross-breeding from imported cattle, while improving the constitution, has been found to lower the milk yield. Herds now, however, consist mainly of buffaloes.

SOME CHARACTERISTICS OF INDIGENOUS CATTLE

Among other physical characteristics, the native breeds have pendulous folds of skin in the dewlap, which provide a greater area of evaporation of heat, assisting these breeds to withstand high external temperatures without ill-effects. Buffaloes, while appearing to be placid and docile animals, are really very sensitive, and resent handling, particularly about the head, and especially by Europeans. They therefore have to be treated very gently. Rough handling only makes them worse, and on the slightest provocation they will go off their milk. Even under ordinary conditions they need much persuasion before they will let it down, and often a "gowala" or cowman will have to waste half an hour or more before they

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will begin to do so. The reason, no doubt, is that they are essentially village animals, and are accustomed to be kept in very small herds where they become used to the same personal attendant. They therefore do not respond well to being kept under large herd conditions, and it is some time before they become habituated to these. This factor is very important from the veterinary point of view when carrying out treatment. Investigation of methods of treatment devised for cows has to be carried out before they can be applied to buffaloes. Often differences in anatomy and physiology of the two species call for modification of treatment.

MILK AND MILK PRODUCTS

It is interesting to note that buffalo milk contains 7 to 8 per cent. of butter fat, which is far in excess of the fat content of any cow's milk. This renders such milk difficult of digestion by Europeans, and therefore separated milk is used to reduce it to a specified standard of 3.7 per cent. butter fat content prior to issue. All milk is pasteurized in dairies, most of which are equipped with the latest pattern machinery, the importation of this having been made possible even during the war. The "holding" process is mainly used, but in some dairies the "H. P. S. T." method (high-pressure short-time) of raising to 160° for fifteen seconds is in vogue. A great proportion of the milk is distributed as such, but butter and cream are also provided. One factory is functioning in which, in addition to the tinning of butter, tins of evaporated milk and of cheese are produced. Other factories are under construction. A number of herds of pure Indian milch cattle have, in fact, been built up whose average is better than the average in India of pure-bred or cross-bred European cattle, or Indian buffaloes, as regards the cost of production of butter fat.

EXPANSION

During this war the Military Farms Department has been called upon to implement a very extensive programme of expansion in order to meet the vastly increased demands for milk and other dairy products, and the Department now owns some 45,000 buffaloes and 5,000 cows. In addition, a buffalo-breeding programme, which has already achieved remarkable results, was established. As a result of selective breeding of these animals buffaloes are now being bred which produce more than 50 lb. of milk daily, as compared with a yield of 25 lb. given by average country stock. The herd expansion has entailed an enormous building programme in the various military stations where herds are maintained. Owing to war-time difficulties, the provision of animals can be completed before that of buildings, and milk production commenced before the farm buildings have been completed.

VETERINARY HOSPITALS

It will be appreciated that on the larger farms which hold 2,000 and 3,000 animals, the provision of accommodation for the sick is something of a problem. Provision has to be made for the everyday sick, as well as for

infectious cases, and this has meant the establishment of what are, in fact, small veterinary hospitals on these farms. Often new farms have been occupied before this accommodation has been ready.

In order to cope with the enormous expansion, a corresponding increase on the part of the R. A. V. C. / I. A. V. C. has been necessary. The Director of Veterinary Services in India now provides the following veterinary organization for the exclusive use of the Military Farms Department: an Assistant Director of Veterinary Services at Headquarters, Executive Veterinary Officers at Circle Headquarters in charge of groups of farms, together with Indian commissioned officers or veterinary assistant surgeons, I. A. V. C., allotted on the basis of one per farm of approximately 1,000 head of dairy cattle. Apart from the need for extra personnel, instruments, drugs, vaccines and hormone preparations, some of which were not previously held by Army Veterinary Stores, are now required on a large scale.

MINOR INJURIES

Not the least problem is the large number of minor injuries which occur, and which require veterinary attention. One of the chief of these is injury to the tail, which in buffaloes is very long, in some cases reaching to the ground. It seems that every buffalo must be subject to a tail injury at some time during its life. Other common injuries result from the large, heavy horns which buffaloes possess. The diameter at the base in some animals is as much as ten inches, and a broken horn may require weeks of treatment. Fights are not infrequent, and the usual horn gores are given and received by combatants. The dehorning of buffalo calves by the application of caustic potash is now being done, but it has been found advisable to apply the caustic at birth, and several applications may be necessary owing to the large area of the horn base.

DIGESTIVE DISTURBANCES

Generally speaking, the usual digestive disturbances of dairy cattle, such as impaction and tympany of the rumen, whilst occurring commonly, are not the cause of serious losses to the Department. Buffalo calves are very difficult to rear, and the losses occurring from gastro-intestinal disorders, varying from acute indigestion to infectious white scour, constitute a big problem. Much work has been done in investigating the bacterial flora associated with these cases.

CALF PYOSEPTICÆMIA

A variety of white scour due to infection with *bacterium enteritidis dublin* may cause in calves. It has been found that the practice of allowing calves to suckle for four days after birth has resulted in a marked decrease in calf mortality in general.

TRAUMATIC PERICARDITIS

This is a frequent cause of death in buffaloes. However, the condition does not show itself so well in the early (reticulitis) stage, nor do the typical signs of œdema in the later stages occur with the same frequency as in cattle. Buffaloes do not emit the typical "grunt" which is heard in cattle. Although rumenotomy, with extraction of the foreign body, has occasionally been performed successfully, sudden death appears to be a commoner result of this condition.

MASTITIS

Acute mastitis seems to be chiefly with inflammatory conditions and injuries to the teats. The udder of buffaloes is usually somewhat pendulous, with very long teats, which are thus liable to injury. Contagious black spot, which is so troublesome in England, has also been diagnosed in these animals. Chronic mastitis caused by *streptococcus agalactiæ* exists, but has only been investigated so far on a limited scale, laboratory facilities not being available for all farms. As far as possible, animals are examined for chronic mastitis before purchase. When a positive case occurs on a farm the policy of isolation is adopted.

PANTING

This condition, which is also known to occur in America and South Africa, has much in common with that known as "dry coat" or "non-sweating" in horses, and has been the subject of investigations by officers of the R.A.V.C. It is found to occur in some of the higher crosses, mainly during the hot weather, and to affect young stock as well as dry and milking cattle. The main symptom consists of distressed respiration or panting; in advanced cases laboured respiration takes place through the mouth. It is often accompanied by high temperature, and animals may be in poor condition, with a hide-bound coat, and giving an inferior milk yield. All efforts are made to avoid breeding from such animals and the affected are sent to cool climates as far as possible.

PROLAPSE OF THE UTERUS

Buffaloes are extremely sensitive to manual exploration of the genitalia, especially so at the time of parturition, and very little stimulation is required to bring about prolonged and violent straining. This often results, in a prolapsed uterus, sometimes of the vagina and rectum. It has been found that the most satisfactory way of controlling the straining is by the use of epidural anaesthesia. After replacement, no truss is necessary if completely replaced after primary thorough cleansing.

EPIDURAL ANAESTHESIA

For buffaloes, after some experimentation as regards site of injection and dosage, the following has been found to be the most satisfactory procedure: the site of injection chosen is the apex of the triangle formed by the

ischial bone with the sacral vertebrae, injecting as close to the apex as possible. The needle is inserted at an angle of about 60 degrees, and need not penetrate for more than one inch. 2 per cent. Novocain Cobefrin is in general use, and a dose of about 10 to 30 c.c. has been found satisfactory, depending on the area of anaesthetization required.

RETENTION OF THE PLACENTA

This is of frequent occurrence in buffaloes, and the above-mentioned sensitivity to manipulation has to be taken into consideration, as well as the danger of the development of metritis, which is particularly liable to occur in the hot weather. It is therefore not easy to decide on the optimum time for manual removal of the placenta. It has been the usual practice to remove calves from their dams at birth, as this makes weaning so much easier. Altering this to the method of allowing calves to suckle up to four days has been followed by impressive results, the incidence of retained placenta showing a marked reduction.

ACUTE METRITIS

This is treated in buffaloes in the same way as in cows. Serious cases result in considerable loss in condition and milk yield. Chronic endometritis is a common sequel with consequent sterility. Here again the anatomical differences between the cow and buffalo cause some difficulties in the administration of intra-uterine injections. The vagina is somewhat shorter, and after an upward curve is then directed slightly downwards. The cervix is very small and is situated on the floor of the vagina, rather than at its anterior extremity. It protrudes very little into the vagina and thus it is almost impossible to secure a grip with the vulsellum forceps. When the *os uteri* is closed it is extremely difficult to introduce the uterine catheter except after considerable practice.

STERILITY AND PREGNANCY DIAGNOSIS

Apart from acute metritis, other causes of sterility such as cervicitis have been diagnosed as well as various abnormalities of the ovary. Cold, light specula and artificial insemination outfits have recently been received from the United Kingdom and will be invaluable in dealing with the sterility problem. This latter problem, however, at present resolves itself into the diagnosis of pregnancy. It will be appreciated that dealing with dry stock herds of 1,000 to 1,500 buffaloes, the early diagnosis of pregnancy is of the greatest importance, and until this is carried out systematically the sterility position will be somewhat uncertain. The buffalo comes in season about three months after calving, but signs of œstrum are not marked and are very easily missed. For this reason the bulls are run with the herds, usually at the ratio of one to 100 females. Even though devices such as painting the bull's abdomen are resorted to, the recording of service is not easy and the percentage recorded is not high. Therefore, for calculation of

the number of in-calf animals, supervisors have to rely largely upon outward physical signs of pregnancy, which become apparent at about six months, the period of gestation being ten months. The result is that there is some accumulation on the dry stock farms of animals whose pregnancy is in doubt. Although the history sheets, which, as well as other information, record breeding history of the animals, are reviewed periodically, it may be that these animals have been repeating to service for some time before being discovered. This is one of the inevitable results of large and rapid expansion by the purchase of newly calved animals. In future all animals are to be examined rectally for pregnancy by a veterinary assistant surgeon six months after calving, and at regular intervals afterwards. This alone involves a considerable amount of work, but it will ensure the early detection of animals which repeat to service and will reduce the numbers of animals whose pregnancy is in doubt.

ARTIFICIAL INSEMINATION

The difficulty encountered in passing the uterine catheter in buffaloes also causes some difficulty in carrying out artificial insemination, and with the present technique it has only been possible to deposit the semen on the cervix. It still remains to be ascertained whether this constitutes a successful insemination. In this connection also it has not been possible to make use of the artificial vagina owing to the excitement and intractability of both male and female at the time of service. Semen has been obtained, however, by scooping it manually from an animal recently served.

CONTAGIOUS DISEASES AND THEIR CONTROL

It is a remarkable veterinary achievement that, in spite of the previously mentioned lack of accommodation, and of the movement of large numbers of animals by rail up and down the country over vast distances, outbreaks of disease have been very few. Much work is involved in the control of epizootic diseases. All animals must be protected against rinderpest, and in some cases against anthrax and hæmorrhagic septicæmia. It is also necessary to deal with protozoal diseases.

RINDERPEST

(a) *Preventive Inoculation*.—All newly purchased animals, and all those bred on farms and intended for retention, are inoculated. In addition, any animals under 2 years at the time of inoculation are reinoculated on reaching the age of 2. Animals under 6 months old, within one month of calving, or considered physically unfit, are the only ones exempt. Goat blood virus is utilized in all cases, each animal receiving one dose only of virus at a flat rate of 2 c.c. On certain large farms goats are maintained as virus producers, the virus being kept available by constant passaging, and when required for other farms elsewhere it is sent under cold-storage conditions. Serum is utilized simultaneously with the virus for all adult buffaloes, as these are

particularly liable to give severe reactions. Pure-bred stock and stock with over 50 per cent. imported blood also receive serum. Apart from the above-mentioned animals, none receive serum, except for the control of severe reactions.

(b) *Control of Outbreaks*.—In places where the virus is readily procurable as at the above-mentioned centres, an outbreak among unprotected stock is dealt with by giving goat virus, together with serum if animals are of the particular class of stock requiring it, as mentioned above. If virus is not at once available it is given as soon as possible, and in an outbreak in buffaloes, when large doses of serum alone have been given owing to non-availability of virus, it is advisable to render the immunity active by administering virus between the seventh and tenth day after the injection of serum.

ANTHRAX

Large outbreaks are not common, but sporadic cases occur now and again. The blood of any farm animals dying suddenly is examined microscopically, and if a case is found positive all animals on the farm are inoculated with spore vaccine subcutaneously. This vaccine is a saponin glycerinated spore suspension, which gives an immunity commencing within ten days and of six months' duration. The routine dose is 1 c.c., and there is no reaction other than a mild local or thermal reaction lasting two or three days. When no vaccine is available, serum may be used to tide over an outbreak. As a routine procedure, imported cattle, and Indian-bred cattle with 100 per cent. foreign blood on reaching the age of 6 months, are inoculated at half-yearly intervals. In addition, all adult cattle of any type intended for field service areas are protected before dispatch. A period of ten days is allowed to elapse before animals intended for transfer are moved, but in an emergency this period may be reduced to three days.

FOOT-AND-MOUTH DISEASE

This is an annual occurrence in most parts of India among cattle owned by the civilian population, and in consequence it is almost impossible for animals on one or the other military farms to escape infection. Buffaloes and indigenous cattle have a considerable degree of immunity and are usually not seriously affected. Immunity following an attack is of short duration, probably about six months only, and owing to the several strains of virus existing, animals recovering are liable to reinfection with a fresh virus. In indigenous cattle the disease is usually of a mild nature, at times the feet alone being affected, at other times the mouth only. In imported cattle, however, such as Friesians, lesions are often severe and the mortality rate may be considerable. Lesions in the feet may extend to abscess formation and sloughing of the hoof, and death from pneumonia supervening as a complication is not uncommon. In all cases of foot-and-mouth

disease it is absolutely essential for animals with foot lesions to be kept on dry, hard standings and not left standing in wet mud. Another complication which may occur is a flare-up of an existing protozoal infection such as theileriasis, babesiasis and coccidiosis. Animals showing a secondary rise in temperature or in which complications are suspected are therefore subjected to a blood film examination, and if necessary a faecal examination for oocysts is carried out.

Treatment.—Routine treatment includes disinfection of udders, for which a 4 per cent. boric lotion is very suitable, and chlorination of the drinking water utilizing 90 grammes to the gallon. Foot-baths of 2 per cent. copper sulphate and dressings of Eupad are useful. For mouth lesions a saturated solution of magnesium sulphate has been found very effective.

VARIOLA VACCINIA

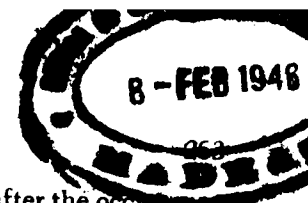
Outbreaks of this disease are relatively common, and when they occur cause considerable losses in milk yield. Lesions are mostly on the teats and udder, but may be found on the vulva and in the vagina, and, though they are usually mild in nature, mastitis and mammary abscess formation are not uncommon sequelæ. As preventive measures, the udder and teats of all cattle presented for purchase are carefully examined, paying special attention to the folds of the gland when emptied,

A policy of vaccination of all newly purchased stock has now been adopted, but to date it is still too early for assessment of results. The site of inoculation generally selected is the internal surface of the conchal surface of the ear, where the skin is comparatively thin and hairless. It is sufficient to wash the part with soap and water, and no antiseptic should be applied. Either undiluted "seed" lymph or ordinary calf lymph as used for human vaccination is utilized, a reaction occurring about three days later.

In an outbreak, affected cases are dealt with by segregation and disinfection, and in carrying out the latter care should be taken to include the handles of milk pails, which are a common source of infection. Lesions are dressed with mild antiseptic such as boric lotion, ointment or powder, and a solution of 0.6 per cent. sodium hyposulphite in water has been found very useful. In spite of the presence of lesions on the udder and teats it is essential that cattle should be milked out, neglect of this precaution often bringing about mastitis. A dressing of Elastoplast placed on the teats is very effective in permitting teat lesions to heal during the continuance of milking, but it may be necessary to use a teat siphon.

HÆMORRHAGIC SEPTICÆMIA

Outbreaks are not uncommon, especially during the rainy season, but are not a cause of serious economic loss. They are dealt with by the



inoculation of all cattle with vaccine as soon as possible after the occurrence of a case, but care in use is necessary, as severe reactions may occur with the large doses. When vaccine is not immediately available, serum is utilized. On farms where infection is liable to occur, a half-yearly inoculation is advisable.

CONTAGIOUS ABORTION

This is present on most farms, both in cows and buffaloes, but so far has not caused great economic losses. Although on some farms conditions favourable to the maintenance of abortion-free herds exist, a system of control based on the practice of hygiene, together with a policy of vaccination, is considered to be more suitable for the Department as a whole. The Indian Military Veterinary Laboratory is now preparing vaccines for both E 19 and 45/20 Brucella strains. Major F. W. Priestley, the officer in charge of this laboratory, was engaged on this work in civilian life, and his experience is now proving invaluable. However, no knowledge is available regarding the value of either of these vaccines in buffaloes, and before vaccination can be carried out on a large scale further experimental work is necessary. Hygienic measures adopted comprise the following: for healthy animals the provision of a maternity paddock, and a series of calving boxes well away from the main byres. Animals enter these paddocks three to four weeks prior to calving, and are placed in a calving box one week before calving is due. They remain in the boxes for ten days or so until completion of the parturient period. For Brucella-infected cattle special pens or calving boxes are utilized. Any animal aborting or delivering premature, still-born or moribund calves is placed in one of these and the agglutination test applied after an interval of three weeks. If negative, the animal is returned to the herd after disinfection; if positive it is retained for three months and treated by vaginal douching until all discharge has ceased.

TRICHOMONIASIS

Cases of abortion have been seen in cattle which clinically resemble those due to infection with trichomona, but the presence of this organism has not so far been demonstrated. It is not known whether this condition occurs in buffaloes.

JOHNES DISEASES AND TUBERCULOSIS

These are relatively rare and it is a great relief not to have these two scourges of English dairy herds to contend with. However, they are more than made up for by the various diseases peculiar to this country. There is, therefore, considerable work of the greatest interest to be done in connection with the military dairy farms in India.

**A COMPARATIVE STUDY OF THE QUALITY OF GHEE FROM
COW AND BUFFALO UNDER UNIFORM DIETARY CONDITIONS,
INCLUDING HEAVY FEEDING OF COTTON SEED***

BY
M. D. PATEL, B. M. PATEL
AND
C. N. DAVE,

Animal Nutrition and Dairy Chemistry Section, Institute of Agriculture, Anand
(Received for publication on 23 August 1943)

The results of a series of experiments hitherto carried out to study the effects of various food fats on the quantity and quality of milk fat suggest that the quantitative secretion of milk fat can be altered by a dietary fat, but not over any extended period, whereas the physical and chemical constants of milk fat can be permanently modified by the quality of the fat ingested. These observations have, however, been made on the milk fat from cows only. There is an apparent lack of information as to the extent the milk fat of buffaloes is susceptible to both quantitative and qualitative changes due to the character of the food-fat consumed. Only a few recorded data are available which would indicate the comparative influence of the dietary fat on the milk fats of cows and buffaloes when both these species are fed the same production ration [Doctor *et al*, 1940] or when their production ration is similarly altered by a dietary modification.

In the present paper are reported the results of an investigation carried out to study:

(a) The comparative difference in the physical and chemical constants of ghee, produced from the milk fats of both cows and buffaloes, when they were receiving the same production ration, and

(b) The relative changes in the physical and chemical constants of ghee, when the concentrate mixture in the production ration was entirely replaced by cotton seed.

Cotton seed is one of the most commonly used concentrates for milch cattle in Bombay Province and the Western Indian States. There is a popular belief in these parts that cows and buffaloes, when fed on cotton seed, give milk richer in fat, and the ghee made from the butter fat of such animals is of superior quality.

EXPERIMENTAL

For the purpose of the investigation 12 healthy animals, six Kankrej cows and six Surti buffaloes, were selected. The selected animals were approximately similar in age, number and the stage of lactation. They were divided into two groups, 'experimental' and 'control'. In the experimental group were taken four cows and four buffaloes, and in the

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control group, two cows and two buffaloes. The rations for the two groups of animals are set out in Table I.

Table I
Statement of rations for the experimental and the control groups of animals

Particulars	Experimental group	Control group
For maintenance	(1) Chopped <i>jowar</i> hay — <i>ad lib</i>	(1) Green Guinea grass 10 lb. (2) Chopped <i>jowar</i> hay— <i>ad lib</i>
For production	(2) 1 lb. of cotton seed per 2 lb. of milk yield	(3) 1 lb. of the following concentrate mixture per 2 lb. of milk yield. Parts Wheat bran ... 3 Groundnut cake ... 2 <i>Tur chuni</i> ... 1 Cotton seed ... 3 Crushed <i>guar</i> ... 1

The animals in both the groups received 2 oz. of common salt per animal per day.

It may be seen from the statement of the two rations that, while cotton seed constituted the sole production ration for the 'experimental' animals, its quota was barely 33 per cent for the production purpose in the case of 'control' animals. As a result of this quantitative difference in the cotton seed content, it has been calculated that the animals in the experimental group were consuming almost double the amount of fat (ether extract) in their production ration when compared with the animals in the control group.

After the animals in the two groups got adjusted to their respective rations, for three consecutive days in a month, the mixed morning and evening milk from each individual animals was curdled and separately kept. Three days collections of curdled milk from each animal were then mixed on the fourth day and churned for butter. The butter was immediately converted into ghee by melting in a suitable (tinned) brass vessel over a slow wood fire. The experiment was started in the month of May 1942 and was concluded at the end of November 1942. During the course of these months, seven approximately monthly lots of ghee were prepared from each animal. Within a month of their preparation, a sample from each was subjected to physical and chemical examination. Altogether 84 samples of ghee were examined. The following constants were determined strictly according to the methods described in the British Standard Methods for Chemical Analysis of Butter [1938] and in the Report of the Analytical Methods Committee of the Society of Public Analyst [1936]: (1) Butyrol

refractometric value at 40°C, (2) Saponification value, (3) Reichert Meissl value, (4) Krischner value, (5) Polenske value and (6) Acid value calculated as oleic acid.

The total number of 84 samples of ghee analysed can be divided into the following categories according to the number of groupings, species and dietary treatments:

28 samples from cows on cotton seed feed	} Experimental group
28 samples from buffaloes on cotton seed feed	
14 samples from cows on concentrate mixture	} Control group
14 samples from buffaloes on concentrate mixture	

RESULTS AND DISCUSSION

In order to save paper the detailed analytical data are not given. In Table II is presented only the mean value of the total number of the determinations of the different constants in ghee from groups of cows and buffaloes under the experimental and the control feedings. In the same table, the coefficient of variation and the standard error of each mean are also shown.

Table II

Constants of ghee from cows and buffaloes under identical dietary treatments

Species			Experimental			Control		
			Mean	Coeff. of variation	Standard error	Mean	Coeff. of variation	Standard error
Cow	...	...	43.3	0.91	<i>B. R. value</i> 0.074	42.6	1.47	0.167
Buffalo	...	...	42.6	1.54	0.123	40.9	0.96	0.104
Cow	...	...	221.0	1.13	<i>Sap. value</i> 0.478	225.2	0.87	0.523
Buffalo	...	...	224.1	1.15	0.487	232.6	0.75	0.465
Cow	...	...	23.7	10.40	<i>R. M. value</i> 0.466	25.0	6.09	0.407
Buffalo	...	...	28.1	8.37	0.455	34.7	6.80	0.630
Cow	...	...	20.2	11.10	<i>K. value</i> 0.440	21.4	6.23	0.369
Buffalo	...	...	25.2	7.92	0.399	30.3	6.88	0.579
Cow	...	...	1.20	12.58	<i>P. value</i> 0.028	1.5	17.00	0.069
Buffalo	...	...	0.94	8.62	0.015	1.3	15.62	0.054
Cow	...	...	0.47	17.02	<i>Acid value</i> 0.015	0.56	25.18	0.027
Buffalo	...	...	0.31	17.42	0.010	0.41	64.39	0.050

Cow ghee vs. buffalo ghee. The data in Table II offer a clear picture of the impression made by an identical diet on the milk fat of cows and buffaloes. It may be seen that, under both experimental and control feeding

the B.R., P. and Acid values are significantly higher, and such constants as Sap. value, R. M. value and K. value are significantly lower in the ghee from the milk fat of cows than that of buffaloes. These results are in agreement with the findings of Doctor *et al.* [1940] who have determined the physical and chemical constants of ghee from different breeds of cows as well as from Murrah buffaloes, kept under similar conditions of feeding and management. These results thus lead to the conclusion that even under identical dietary and management there is a distinct species difference in the character of the milk fat secreted by the cow and the buffalo. The B. R. and Sap. values suggest that in the milk fat of the buffalo the proportion of the fatty acids of higher molecular weight is less than that in the milk fat of the cow. This is also supported by the higher R. M. value. The higher K value of buffalo ghee shows that the milk fat of this species is richer in butyric acid, but its proportion of water insoluble volatile acids is comparatively lower than that of the milk fat of the cow as is evident from the P. value determined. The free fatty acid content is higher in the milk fat of the cow than that of the buffalo.

The effect of heavy feeding of cotton seed. The effect of the replacement of the concentrate mixture in the production ration entirely by cotton seed on the constants of ghee from cows and buffaloes is shown in Table III.

Table III

The effect of heavy feeding of cotton seed on the physical and chemical constants of ghee

Species			Mean Values		Diff. In means values	Per cent higher (+) or lower (—) value
			Experimental	Control		
Cow	...	...	43.3	<i>B. R. value</i> 42.6	0.7	+1.6
Buffalo	...	...	42.6	40.9	1.7	+4.0
Cow	...	...	221.9	<i>Sap. value</i> 225.2	3.3	—1.5
Buffalo	...	...	224.1	232.0	8.5	—3.8
Cow	...	...	23.7	<i>R. M. value</i> 25.0	1.3	—5.5
Buffalo	...	...	28.1	34.7	6.6	—23.5
Cow	...	...	20.2	<i>K. value</i> 21.4	1.2	—5.9
Buffalo	...	...	25.2	30.3	5.1	—20.2
Cow	...	...	1.20	<i>P. value</i> 1.50	0.30	—25.0
Buffalo	...	...	0.94	1.30	0.36	—38.3
Cow	...	...	0.47	<i>Acid value</i> 0.56	0.09	—19.2
Buffalo	...	...	0.31	0.41	0.10	—32.3

It is apparent from the data in Table III that the qualitative secretion of milk fat in buffaloes is comparatively more susceptible to dietary modification than that in cows.

The limits of the variation in the physical and chemical constants of ghee. The investigation has afforded an opportunity to record the limits of variations in the constants of ghee under the present experimental conditions. In Tables IV and V the minimum and maximum values of different constants of ghee from cows and buffaloes are respectively set out. In these tables, similar figures collected by Doctor, *et al.* [1940] are included for a comparative study.

Table IV

Limits of variations in the constants of ghee from cow

Constants	Experimental		Control		Doctor, <i>et al</i>	
	Min.	Max.	Min.	Max.	Min.	Max.
B. R. value ...	41.9	44.3	41.9	43.1	40.0	45.2
Sap. value ...	214.6	227.9	221.6	227.9	219.0	230.0
R. M. value ...	18.7	28.4	22.9	27.3	23.0	30.0
K. value ...	16.0	24.3	19.2	23.8	17.0	24.2
P. value ...	1.0	1.0	1.0	1.9	1.9	3.0

Table V

Limits of variation in the constants of ghee from buffalo

Constants	Experimental		Control		Doctor, <i>et al</i>	
	Min.	Max.	Min.	Max.	Min.	Max.
B. R. value ...	41.2	43.6	40.2	41.4	42.5	43.6
Sap. value ...	218.8	228.6	230.0	235.6	229.0	239.0
R. M. value ...	23.7	33.4	33.5	37.9	30.2	31.7
K. value ...	22.3	29.2	27.4	34.0	26.6	26.8
P. value ...	0.8	1.0	1.0	1.6	1.5	2.0

The wide variability in the constants as evident from the data in Tables IV and V emphasizes the limitation of the chemical and physical methods used at present for testing the purity and for the grading of ghee. It would, however, be of interest for future research to find out the possible correlation between the variation in the constants and such factors as the keeping quality and the biological value of ghee which is being investigated in this laboratory.

SUMMARY

Experiments have been conducted to study the effect of identical diet on the physical and chemical constants of ghee prepared from the milk fat of Kankrej cows and Surati buffaloes. The results show that the Butyro Refractometric, Polenske and Acid values are significantly higher and the Saponification, Reichert Meissl and Kirschner values are significantly lower in the ghee from the milk fat of the cow than that of the buffalo.

The replacement of the concentrate mixture in the production ration entirely by cotton seed shows that in the ghee from both the cow and the buffalo the B. R. value increases, but all other constants show a decrease. The qualitative change brought about in ghee by cotton seed feeding is more pronounced in buffalo ghee than in cow ghee.

This limits of variations in the constants of ghee from cows and buffaloes under the present conditions of study have been discussed, along with the data of other workers.

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SOME OBSERVATIONS ON 'WAH' OF GOATS AND SHEEP IN SIND *

BY

H. S. BAWA, M.R.C.V.S.,
Veterinary Investigation Officer, Sind, Karachi.

(Received for publication on 21 September 1943)

The disease known as *Wah* occurs in certain districts of Sind, viz. Nawabshah, Tharparkar, Sukkur, Hyderabad and Dadu.

The local name *Wah* means in Sindhi rheumatism *i.e.* a painful swelling of the joints. The disease occurs throughout the year, but its incidence seems to be more common during the month of February. Some herdsmen believe that the new shoots of grass arriving with the onset of the summer and winter rains are the aetiological factor, especially when they are grazed on with the morning dew on them. Mortality varies in different outbreaks from 10 to 30 per cent.

The condition was first noticed in Nawabshah in 1937 both in adults as well as kids, and a three-day old affected kid was purchased for pathological study, which constituted the start of its investigation.

The clinical picture, course and morbid anatomy will be described briefly.

SYMPTOMS

They are both systemic and local and are well marked so that the shepherd is quick in recognizing them. It is usually a chronic disease, but when acute, there is a sharp rise of temperature and a total or partial arrest of milk secretion, followed by great debility and death before any local lesions develop.

The acute form of the disease is rarely seen, while the sub-acute form with local lesions is what generally met with. In sub-acute cases the primary local lesion is generally in the udder, which becomes hot, swollen and painful, while the milk becomes either thick or thin and watery, occasionally blood-tinged with fibrin clots and is greatly reduced in quantity. A painful swelling of the knee and hock joints appears three or four days after the udder complications, giving rise to acute lameness. The swelling of the udder subsides within seven to ten days and is followed by an atrophy of the gland. The milk secretion does not return to normal. The few drops which can be squeezed out with great difficulty are greatly altered in consistency and appearance, having become either thick or watery and flocculent. In about three months the swelling of the joints decreases and

the lameness disappears; the mammary gland becomes soft and on palpation may be found to contain indurated areas. Usually only one quarter of the udder is involved. When the whole udder is involved, there is no secretion of milk in the affected quarters on the next kidding, with the result that the young ones die of starvation. Lambs and kids may be infected *in utero* and show swelling of the hock, knee or fetlock joints at birth and are unable to stand (Plate XIX). The majority of them die after a few days.

Sometimes the disease affects the mammary glands only. In one outbreak 5 per cent of the affected goats and sheep had inflammatory eye lesions, viz., conjunctivitis, corneal opacity and the presence of highly-injected minute blood vessels in the sclera, immediately around the cornea. In this particular outbreak 20 per cent of the animals showed obvious lachrymation. The lactating animals are the most susceptible, but males and the non-lactating animals may also be affected. Young animals are less susceptible than adults.

It has been observed that abortion is quite common among goats suffering from *Wah*, the percentage of abortion varying from 5 to 20 per cent.

It may be mentioned here that generally the disease is seen in goats only, while sheep in the same area, though grazing and living with affected goats, seem to remain free. Only one outbreak has been recorded in which both goats and sheep were seen to be affected. In the experimental animals the symptoms observed were the same as those noticed in natural cases. Under natural and experimental conditions only a certain percentage of animals contract the disease.

MORBID ANATOMY

Autopsy on ten natural cases of the disease and three experimental goats revealed that the main changes were confined to the knee and mammary glands. The postmortem findings are summarized below in detail:

Knee joints The swollen joints were painful and soft on pressure, and contained an excess of fluid. The bursae were thickened and there was fibrositis.

Mammary gland. The gland was atrophied and soft and had indurated areas. In acute cases the gland was inflamed and showed areas of necrosis. The mammary lymphatic glands were also enlarged in acute cases.

In some cases the liver appeared to be enlarged; sometimes there was infestation with liver-flukes, while at other times no parasite could be found. Other organs were normal, except that the stomach and intestines showed a varying degree of helminthic infestation, among which amphistomes, *Haemonchus contortus*, and *Trichuris ovis* were predominant.

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SHOWING SWELLING OF HOCK, KNEE OR FETLOCK JOINTS.

SOME OBSERVATIONS ON 'WAH' OF GOATS AND SHEEP IN SIND 273

HISTOPATHOLOGY

Knee joints. There was peri-arthritis, with proliferation of fibrous tissue. In some cases only bursitis and superficial fibrositis were seen.

Udder. Inflammatory changes with multiple abscesses were noticed in experimental animals, which had been given infective material through the teat canal. These changes were also noticed in some natural cases. In some cases, advanced hyperplasia of the fibrous tissue with monocytic infiltration round the acini was seen, and in others slight monocytic infiltration round the acini and very slight fibrosis were noticed.

Liver. Biliary and portal cirrhosis, extensive hæmorrhagic areas (hæmorrhagic infarcts) and verminous nodules, eosinophile infiltration, associated with necrotic changes were observed. No helminth parasites could be detected in sections.

BACTERIOLOGY

Examinations of smears of blood, milk and films from the cut surface of the mammary gland and from knee joint fluid repeatedly proved negative for pathogenic micro-organisms and protozoa. In most cases the cultural examination of different organs, viz., liver, spleen, kidney, mammary gland, knee joint, milk and urine failed to reveal any pathogenic organisms.

In one case coliform organisms were isolated from the liver, spleen, kidneys, heart-blood and knee-joints, but they were of no pathogenic significance, as both the young and old were seen to be affected alike and there was nothing to suggest navel-ill or joint-ill. In one instance staphylococci were isolated from the joint fluid. These presumably were contaminants, as no sign of pus or abscess formation has ever been seen in the knee joints.

Milk, blood and urine from affected animals were culturally examined for *Brucella abortus* and *Brucella melitensis* with negative results. Numerous samples of blood sera were examined and found to be negative on agglutination test for Brucella infection.

TRANSMISSION EXPERIMENTS

These experiments were conducted with a view to finding out the infectious nature of the diseases. For these experiments, naturally affected goats were brought to Karachi in order to have a fresh supply of material at hand.

Experiment No. 1

Four healthy goats were used, and the material was obtained from the donor goat, No. D1., brought from Jamesabad.

Table I
Material obtained from donor goat No. D1

Expt. goat No.	Date	Route	Material	Dose	Remarks
1	27-4-39	Intrav	Blood	5 c.c.	Shown rise of temp. to 103.8°F. on 7th day and again to 104°F. on 14th day. Kept under observation for two months but showed no signs of disease.
2	Do.	Subcut. & orally for 7 days	Milk	10 c.c.	Kept under observation for two months, but showed no signs of the disease.
3	Do.	Drenched for 8 days	Faeces and urine	15 c.c.	Ditto
4	Do.	Subcut	Knee-Joint fluid	2 c.c.	Ditto

The results of these experiments (Table I) suggest that the disease is not transmissible by the above routes with the material used.

Experiment No. 2

Since in experiment No. 1 intravenous inoculation of blood in goat No. 1 showed reaction, it was decided to repeat blood inoculation. Three healthy goats were used for this experiment.

No definite conclusions could be drawn from the experiments (Table II), as the animals did not develop the disease while under observation for two months and a half.

Table II
Material obtained from donor goat No. D2

Expt. goat No.	Date	Route	Material	Dose	Remarks
5	6-5-41	Intrav.	Blood	10 c.c.	Shown thermal reaction to 104°F. on 23rd day after injection, which returned to normal after two days. Goat aborted on 21st June.
6	Do.	Intrav.	Do.	10 c.c.	Same as above, except that goat did not abort.
7	Do.	Subcut.	Do.	10 c.c.	On 2nd day of inoculation temp. rose to 105.8°F. due to abscess formation. Abscess burst on 4th day, and temp. then returned to normal.

Experiment No. 3

This experiment was designed to explore the possibility of milk being the carrier of an infective agent; also to see if teat canal would serve as the route of infection, since milk given subcutaneously and orally to goat No. 5 in Experiment No. 1 failed to produce the disease. The goats used for this experiment, and experiments to follow were in lactation.

Preparation of inocula. Milk in all the experiments when given via the teat canal was diluted with boiled distilled water, in ratio of 3: 1, after the milk had been filtered through sterilized gauze to free it from blood and fibrin clots.

Table III
Material obtained from donor goat No. D3

Expt. goat No.	Date	Route	Material	Dose	Remarks
8	April 4, 42	Left teat canal	Milk	15 c.c.	Acute changes seen in left teat. Rt. teat remained normal. Changes in milk in both the udders resembled those seen in natural cases. Died on 23rd April 1943

Thus a disease confined to the udder was produced in goat No. 8 (Table III).

Experiment No. 4

This experiment was designed to see if milk from exptl. goat No. 8 was infective. One healthy goat No. 9 was injected via the teat canal, the left and right teat canals receiving respectively 20 c.c. and 10 c.c. of milk from the left and right side of the udder of goat No. 8. Acute changes were seen in the left side of the udder, and the milk was greatly reduced in quantity. Eight days after the inoculation, acute lameness and swelling of the right knee joint were observed such as are seen in natural cases.

Thus the disease was successfully passaged from one experimental animal to another, and typical symptoms of the disease were produced.

Experiment No. 5

One healthy goat No. 10 was housed and fed with donor goat No. D3 received from Jamesabad (from the 4th April to 23rd May 1942 when donor goat died) in order to see if the disease could be conveyed by contact. The receptor, however, showed no inflammatory lesions of the udder or joints, and the temperature remained normal. The animal, however, showed

changes in the milk and udder, became emaciated, and died on the 11th June 1942. Thus the disease appears to be transmissible by contact, when the diseased and healthy goats are housed and fed together.

Experiment No. 6

Experiments No. 3 and 4 proved that the infective agent is present in the milk and that the disease could be conveyed via the teat canal. This experiment was designed to see if the disease could be produced in healthy lactating animals by injecting milk subcutaneously or intramuscularly. Inocula consisted of three collective samples of mammary exudate taken from three batches of four, three and three goats suffering from *Wah* received from Laso Mahomed village, Khipro and Mirpurkhas on 23rd October 1942, 22nd October 1942 and 1st February 1943, respectively.

Table IV

Expt. goat No.	Date	Route	Material	Dose	Remarks
11	29-10-42	Subcut	Mammary exudate	10 c.c.	Only local reaction was produced at the site of injection. Goat was kept under observation for 1½ months, but showed change in milk only
12	Do.	Intramuscular	Do.	8 c.c.	Changes in milk were noticed on 9th day and inflammation of knee joint and lameness on 13th day after inoculation. Died on 26 November 1942. Typical disease was produced
13	9-2-43	Do.	Do.	10 c.c.	Acute inflammation at site of injection, goat went dead-lame and off-feed. In course of three days inflammation completely subsided. On 10th and 11th day after injection, changes in milk and the inflammation of knee were noticed. Typical disease was produced.

The results of experiment No. 6 (Table IV) showed that the disease could be produced in susceptible animals by subcutaneous and intramuscular inoculation of milk from affected cases

Experiment No. 7

This experiment was designed to see if the infective agent, which is believed to be a filterable virus, present in the milk, can be destroyed by heat at 60° C. for half-an-hour, as most known viruses are destroyed at temperatures ranging between 58°C. and 60°C. This experiment also served to show whether infection could be conveyed from the experimentally-produced disease to a second healthy goat.

Table V

Expt. goat No.	Date	Route	Material	Dose	Remarks
14	27-2-43	Intramuscular	Mammary exudate from goat No. 13.	15 c.c.	Slight lameness in fore-legs and changes in milk. Subacute type of disease produced.
15	1-3-43	Do.	"Do" heated 60°C. for ½ an hour.	15 c.c.	No reaction.

This experiment (Table V) shows that the disease can be passaged, and that the causative agent is destroyed when heated to 60°C. for half an hour.

DISCUSSION

According to the 1939-40 Annual Report of the Imperial Veterinary Research Institute, *Wah* was believed by early workers to be rinderpest, anthrax or haemorrhagic septicaemia. The present experimental and field investigation shows that *Wah* is none of the above-named diseases.

As already indicated, no growth has been obtained by sowing samples of morbid material on laboratory media, and no pathogenic organisms could be seen on microscopical examination of milk, blood or knee joint fluid. It seems that the causative agent will probably prove to be a filterable virus. (Attempts at isolating a virus could not be made in the author's laboratory owing to lack of facilities).

The chief symptoms of the disease, viz, abortion, swelling of the joints, lameness, disturbances of milk secretion and keratitis are also seen in goats and sheep suffering from *Brucella* infections [Dobois, 1926]. An examination of urine, milk, blood and blood sera from the affected cases, however, indicated that *Wah* is not due to *Brucella* infection, while the absence of undulant fever in human beings consuming the milk from affected goats further supports this conclusion. The symptoms of the disease, as seen in natural cases and as shown by experimental animals, resemble contagious agalactia of sheep and goats [Wooldridge, 1923; Galloway, 1930]. The writer has been able to reproduce the disease in healthy animals by inoculation

of altered milk, which is in conformity with the findings of Celli and De Blasi [1896]. After the introduction of virulent material, viz. mammary exudate, into the mammary gland, the milk was altered after three or four days; in some cases the infection remained localized, in others after 10 to 12 days there was generalization to the knee joints. This finding is in agreement with that of Galloway [1930], the only difference being that no eye lesions were shown in the writer's experimental animals. The infective agent, after heating to 60°C. for half-an-hour, failed to produce the disease in healthy susceptible animals. These results are also comparable with those of Galloway [1930].

The above evidence tends to show that *Wah* of goats and sheep, as found in Sind, bears a strong resemblance to contagious agalactia of sheep and goats as found in Italy [Metaxa, 1816] and Algeria [Sergeant & Roig, 1917]. In the Encyclopedia of Wooldridge [1923] it is stated that the disease is limited to Europe, particularly the mountainous districts of Switzerland, Northern Italy and Southern France. This is the first record of the disease in India.

As to treatment, no specific curative agent has been found for this condition. Bridre, Donatien and Hilbert, [1928] in a small number of experiments obtained good results with stovarsol. This drug has not been tried by the writer owing to its present high price. Palliative treatment by oral administration of magnesium sulphate and salicylic acid has given apparently beneficial results. The intravenous injection of Lugol's solution and formalin has also been tried on a few animals with varying success.

SUMMARY AND CONCLUSIONS

1. The disease of goats and sheep known as '*wah*' occurs as a specific epizootic in Sind and is transmissible experimentally.
2. The disease bears a strong resemblance to the condition known as 'contagious agalactia' and this is the first record of its occurrence in India.
3. The symptoms, course and pathology of the disease are described.
4. The pathogenic agent appears to be a filterable virus, since the disease is infectious and no specific pathogenic organism could be isolated from the lesions.
5. The causative agent is destroyed by heat at 60°C. for half-an-hour.
6. The incubation period in experimental goats is 5 to 11 days.
7. Inoculation of mammary exudate intramuscularly or by the teat-canal set up a disease similar to that seen in natural outbreaks.
8. A healthy goat subjected to close contact with a natural case developed the chronic form of the disease confined to the udder.
9. Lactating animals appear to be more susceptible.

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SALMONELLOSIS IN DUCKS IN ARMY DEVELOPMENT FARM

By

CAPT. S. B. V. RAO,

E. V. O., Dev. Farms, HQ. S. Command

Poor hatchings associated with high mortality from eight to ten thousand duck eggs during May 45 at Bikashipur farms near Bangalore with an average of 50 per cent dead embryos and 25 per cent hatch, and 80 to 90 per cent subsequent mortality in 1 to 4 weeks, called for enquiry from this HQ.

The incubators (local), method of brooding (battery), feeding and management (not ideal) despite being contributory causes could not by themselves account for this high mortality.

Investigation showed characteristic clinical appearance of salmonellosis in the ducklings of which several outbreaks had already been experienced in Poona Area in 1944.

Ducklings affected were from one to five weeks of age. Constant symptoms were, watery discharge from the eyes and nose, denudation of feathers, and poor feathering, incoordination of movements, diarrhoea, rapid emaciation and death. Ducklings when allowed to water died while quenching their intense thirst.

Post mortems were negative except for pallor and emaciation. Microscopic findings were salmonellosis (unidentified) in heart blood cultures which were confirmed subsequently by sugar tests at the Mysore Government Research Laboratories, Hebbal. The grave possibility of food poisoning in man (Scott 1930) arising from consumption of infected eggs and carcasses rendered imperative the detection and elimination of reactors.

Diagnosis. Blood samples were collected for a preliminary test from the wing veins of 25 wing banded ducks from a breeding flock of 1500 birds. These were subjected to agglutination by the slow tube method, the antigen for which had been prepared from cultures obtained from dead ducklings. The results showed 4 had a titre of 1 in 320 and 1 was doubtful at 1 in 200. All the positive cases were destroyed.

After confirming the presence of infection in the breeding flock the rest of the flock was tested by the rapid whole blood plate test on the farm. There were 32 reactors among 1434 ducks in the breeding pen, while only 4 were found positive in a growing flock of 1200 birds. All the positive cases were destroyed. A check test with 25 blood samples among ducklings between 1 to 12 weeks of age in a flock over 4000 in number, showed an incidence of 90 per cent infection. It is proposed to raise them in isolation up to 4 months of age before testing, thus give them a chance to shed their infection (Wilson 1945).

Discussion. The infection was under 3 per cent, still caused heavy losses in hatchery, both in incubation and the nursery. Scott (1930) has shown experimentally that penetration of the shell by the organisms is possible if kept exposed and moist; both conditions present in the incubators, while feeding of infertile duck eggs and close confinement of ducklings in batteries infected them. (Warrack and Dalling 1932-33).

Before this outbreak, the hatchings were normal on the farm, but the disease broke out though no new stock had been purchased. It is presumed the source in the adult breeding stock is the droppings of rats and mice as the feed particularly, the stock of wheat flour (condemned as unfit for human consumption is exposed to these vermin (Wilson 1944).

The routine blood testing may be open to question for selecting stock for breeding, owing to persistent reinfection on infected premises, (Gorder R. F. and Garside J. F. 1944), yet have unquestionable value for eliminating reactors, dangerous for human consumption (Dr. T. S. Zwanenburg 1937) thus making available large stock of birds as food, which otherwise would be lost.

The assistance of Drs. Naidu and Rao of the Mysore Veterinary Research Laboratory is hereby acknowledged with thanks.

DUCK - REARING AT THE LIVESTOCK RESEARCH STATION, HOSUR CATTLE FARM

BY

I.D. MANTRAMURTI, G.M.V.C., B.V.SC.,

Superintendent, Livestock Research Station, Hosur Cattle Farm.

It is needless to say that duck-rearing is more common in this Presidency than in other parts and that it is in the hands of professional duck-keepers, who raise these birds in select areas under natural conditions. Though the whole of West Coast with its extensive backwaters is noted for this trade, Travancore undoubtedly stands foremost.

Ducks are seldom reared for 'Game' or for Manure; both these objects count more in fowls. Duck's flesh and eggs are not relished by many; still the eggs are consumed by a bigger percentage of population and the maximum demand is from the restaurants, bakeries and confectioneries. Of course, at present, there is an equally good demand from the Army, which is more due to the large size of the eggs and their comparative cheap cost. Only a few take up Duck-rearing as a hobby, the reasons for which are well-known to everybody. Difficulty in affording swimming facilities in the backyards and keeping the place clean are discouraging factors. More than these, the continuous and unpleasant "quack quacks" of these birds, constitute a great disturbance to the locality. Therefore ducks are reared in interior tracts where facilities for rearing abound, chiefly for trading in eggs.

However, at the Hosur Cattle Farm, duck-rearing has been introduced with a different purpose. It is as an aid to Animal Husbandry.

Ducks thrive best on animal-feed of which snails are a delicacy. These snails which are commonly found on banks and beds of lakes, tanks and canals act as intermediate hosts in the life history of the trematode worm, *Schistosoma nasalis*, which causes among bovines the disease commonly known as 'Nasal Granuloma' or 'Snoring Disease'. A few cases of this disease have been met with at this Livestock Research Station. Though the treatment is effective enough to cure the animals, is not 'prevention better than cure'? And therefore duck-rearing has recently been introduced into the Hosur Cattle Farm with a view to biologically control this Bovine Nasal schistosomiasis.

Though control of this disease can be done either by eradication of snails by hand-picking or by killing them with some poisonous drug like copper sulphate yet, it is found, more advantageous in a vast area like the Hosur Cattle Farm where there are 5 tanks of varying dimensions covering about 300 acres to introduce duck-rearing for the biological control of snails.

The actual work started early in January 1945 with 100 ducks and 12 drakes purchased from North Arcot at a cost of about Rs. 25/-.

Housing. No elaborate housing is needed as weather conditions at Hosur Cattle Farm suit them well, except perhaps, during the monsoon seasons when young ones need special housing arrangements.

A spacious room with no fixtures or equipments but well protected from wild animals, rats and reptiles, with a thin layer of dry leaves collected from under the avenue trees, is all that is provided. During the day, the adult ducks and drakes are invariably permitted to have a free and enjoyable life in our big natural tanks where snails and other animalcules are available in plenty.

Labour. No specialised labour or a big staff is found necessary. The whole flock is managed by an adult who can swim well, on a daily wage of 8 annas and a boy on a daily wage of 4 annas to assist him in cleaning the rooms and for giving him a shift during meals time.

Feeding. Our tanks have plenty of snails, fish and other animalcules. Our aim being to eradicate the snails, these ducks are not fed with grains or mash to their fullest needs. If artificially fed well, our object will be frustrated when they are let into the tanks. Anyway, as it is too early to work out the actual capacity of the individuals to feed on snails and fish, in both of which our tanks abound they are fed only with about 2 ozs. of paddy per head every day for their maintenance. Occasionally they are sent out to our paddy fields especially after harvest and here they pick up much of animal matter and grains which have fallen during the harvest. This is the cheapest way of feeding ducks on a commercial basis.

Number of eggs laid is in proportion to the feed they get in the tank. In feeding livestock, it is truly said, that when a new feed is given, its result will be known in 5 to 6 day's time. More eggs are laid by these ducks in about a week's time after leaving them in the tanks. Similarly the egg-yield goes down rapidly in about 4 days time, if they are removed from the tanks.

Disposal of eggs. As duck's eggs are less relished by our countrymen, their sale is not so easy as in the case of hens' eggs, especially at a place like Hosur, which is cut off from big cities and towns with no proper transport.

Secondly, the ban on transport out of the district has necessitated us to sell these eggs at a reduced price of annas six per dozen to the public, most of whom are Farm labourers. Though better profit can be obtained if the 'export' ban is not in existence, it is pleasing to note that these restrictions had helped our poor labourers to consume a couple of dozens of eggs each, who I am sure, would not have had the chance to enjoy such egg-dishes—dishes which are considered a "luxury" for the labouring class of people, not in other countries but only in India—a country that has to support many a nation directly or indirectly.

Incubation. With a view to increase the flock to 'treat' all our tanks, duck's eggs are quite frequently being hatched out here by means of 50-egg capacity, hot-air Silver Hen Incubators.

The highest percentages of hatching obtained on this Farm are 92, 90 and 94, the first one during the month of April and the others during the month of June.

Failure to keep up humidity, during incubation results in late hatches and a high proportion of 'dead in shell'.

The available literatures advise, that the Incubator loaded with duck's eggs is to be run at 101° F during the first two weeks and at 102.5° F. during the second two weeks. We would like to be enlightened by other breeders, whether a higher temperature of incubation as in the case of hens' eggs would result in low percentage of hatchability. We maintained incubators loaded with ducks, eggs at a temperature of 104° F, for the first ten days, 103° F. for the second ten days and 102° for the remaining days and our average percentage of hatchability was 84.

A few hints that might be of interest to prospective duck-rearers.—

1. A sandy soil is more suitable for duck rearing. Though permitted on the banks of back-waters, lakes, tanks and canals, the birds are often on the land and therefore if the soil is sandy, the moisture of the dropping would be fully absorbed.

2. It is beneficial to house ducks in cheap thatched sheds on dry ground and forage. Shifting them over new grounds frequently, prevents disease.

3. The climate and natural conditions for breeding may also help in checking the disease.

4. Healthy ducks that are expected to lay well should be given good exercise in water and provided with abundance of natural food. These natural facilities will certainly keep down the cost of feeding and maintenance, especially on a commercial line.

5. It is advisable to keep ducks in smaller units of 200 each as overcrowding and concentration are not conducive to sanitary and hygienic conditions.

6. If results are to be satisfactory, it is essential to start with a healthy and vigorous flock.

7. Ducks mostly lay at nights and anywhere they like, even in water while swimming and on road-sides while walking. A duck may not lay more than one egg per day, though rarely, three eggs per day have also been recorded.

8. Though ducks prefer to live in water and cold, ducklings are very susceptible to chill and pneumonia.

9. Ducks and drakes can easily be spotted out more by a trained ear than by a keen eye, as they make different and distinct quacking noise. A keen eye can detect it by the turned up feather at the tail end and by shapes of other feathers.

10. Each drake will take in only 4 to 5 ducks for breeding.

CONCLUSION

As the duck rearing has been introduced only recently in this station, it is too early to give more detailed and authentic particulars of practical importance with regards to bringing up of ducklings, common diseases, production and 'profit and loss' account. It is however hoped that an article giving these particulars would be published in the near future.

At present, it is very difficult to say how far the snail population has been reduced as most of our tanks are dry and the snails are supposed to be in a state of hybernation.

Anyway, the incidence of disease among cattle is on the decrease which may be attributable to other preventive measures as well, as storing of drinking water for more than 36 hours. About 90 per cent of cases suffering from this disease have been successfully cured by intravenous injections of A Tartaratum.

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THE Indian Veterinary Journal

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Editorial

THE MINETT REPORT

THROUGH the courtesy of the Imperial Council of Agricultural Research, we published in our last issue a full report on Veterinary Education in India drawn by a Committee presided over by Dr. Minett, the Director of the Imperial Veterinary Research Institute. The other members of the Committee were Mr. Egan, Mr. Malkani and Mr. Garewal. The Committee visited the Veterinary Colleges and co-opted the Principals as Members of the Committee. It had also the views of officers like the Director of Veterinary Services in Madras, the Director of Dairy Research and Poultry Research Officer. The Report is thus an authoritative *official* view of Veterinary Education as it is obtaining in India. No attempt has been made (at least as far as we could gather, and we would very much like to be corrected if we are wrong) to elicit the opinions of what we would like to designate the *non-officials* of the profession in this matter of very great importance. True, the Veterinary profession in India is represented only by the officials of the Civil Veterinary Departments. Equally true also is the fact that there are not many Private Independent Practitioners in this country. Still, all the same, there are Veterinary Associations like the All-India Veterinary Association which could have been consulted in this matter of great importance to this country. There are also a number of Officers of the Government who have retired from Government service and whose opinions would have been of very great value to the Committee. They have had experience of the administration and the requirements of the country. It is a great pity that these were not

done and, to that extent, this report is defective. In the general interest of the profession and in the still greater interest of the country, the Committee would have done well to have ascertained the views of the Officials and Non-officials alike on this very important matter.

Some of the statements made in the report are not based on facts and consequently the recommendations are defective. Even as it is, there is not unanimity in the report. Mr. Garewal, the Principal of the Punjab Veterinary College, has given a strong minute of Dissent from the report of the other three members of the Committee and the importance of the Minett report has been greatly enhanced by this minute of Dissent of Mr. Garewal.

At the outset, the Minett Report has, without any justification, condemned the existing Veterinary Education in India in very strong terms. It says that the whole lay-out of the curricula at the different Colleges is somewhat disjointed and unsystematic, there is lack of uniformity, and so on. These are strong expressions to use and we most emphatically protest against such wholesale condemnation of Veterinary Education in this country. We are, therefore, very pleased to note that Mr. Garewal has given a fitting reply in the following terms.—

"I regret I do not agree with the remarks that the whole layout of Veterinary Education in India tends to be disjointed and unsystematic. It is certainly not so in the case of Punjab. I feel it is quite the other way so far as the Punjab Veterinary College is concerned and this has been the opinion of all those who have been visiting this Institution for many many years. In fact this place has got its reputation well established all over India and abroad. I feel that the subjects are very well arranged. The Syllabus approved by the Punjab University for the **B.V.Sc.** course could be very favourably compared with any other College in India or Great Britain. The opportunities available for Clinic at this Institution surpass all other places that I know of at present. We have often over 300 cases in the College Hospital in a day and this fact alone has surprised many visitors to this institution.

"The curriculum at this college for the **B.V.Sc.**, degree was prepared fully keeping in view the role which the Graduates from this college shall have to play in the near future so far as the control of contagious diseases in Livestock is concerned apart from their activities in work relating to improvement in Livestock (Breeding), and their working as Physicians of the Farm animals

and guarantor of the nation food supply. I have no doubt that all these points were fully kept in view in Madras College and are being kept in view in Bombay. The Syllabuses for the degree course at this college were prepared after great consideration and they have been approved by the University of the Punjab. I have no doubt the same was done in Madras for the **B. V. Sc.**, course."

We have given prominence to the above extract because it is necessary to expose the grossly unfair criticism levelled against Indian Veterinary Education that it is disjointed and unsystematic. We would also draw attention to the fact that the clinical materials available in the Indian Veterinary Colleges far surpasses any that are available in any Veterinary Educational Institution in the United Kingdom and that consequently the students of the Indian Veterinary Colleges have vast scope for practical work all through their years of study in their Colleges. It is therefore a matter of surprise to us that the majority of the Minett Committee should state that too little attention is being given to clinical training and, on this assumption, postulate periods of short vacation pupilage. This recommendation is on the lines of Loveday Committee in England, where conditions are totally different and where clinical material is very scanty. The present practice in Indian Veterinary Colleges where the students attend a clinic for two hours every day during their 2nd, 3rd and 4th year of study all the year round and for half the period during vacation, is far more salutary than the one month's stay in the Hospital after the 2nd and 4th year as recommended by the Committee. Mr. Garewal pointedly says:—

"There are often more than 300 cases a day in the college Hospital as mentioned above. I do not know of any other place outside the College where any one could learn as much as here."

Again, as regards the Farm pupilage, we have already the practice obtaining in the Punjab and Madras where the students have to spend full three months in a recognised Farm before they could appear for the final degree examination. Provision therefore already exists for enabling the students "to acquire wide experience of animals under normal conditions".

We mention all these existing facilities for the teaching of Veterinary or rather Animal Husbandry subjects in this land not with the view that we have reached perfection in this subject. Far from it. We only want it to be recorded that it is not true

TRAINING ABROAD

to say that Veterinary Education in this country is "disjointed and unsystematic" as expounded by the Minett report. It is only to controvert that statement that we have elaborated as to what is actually obtaining here. There is scope, ample scope, for improvement. The profession has been alive to it and we are sure that, but for the War, steps would have been taken towards that end. The chief difficulty has been, not with the aims and objects of Veterinary Education which has always been progressive to suit the needs of the country and the profession, but with the necessary staff and their salaries. Even here, a College like the Punjab leads the others. To quote Mr. Garewal again,

"I am glad to say that the remarks that Veterinary Schools are overcrowded, teaching staff inadequate do not apply so far as the Punjab Veterinary College is concerned where we have got eight Class I Gazetted Officers (Professors) and 10 P. V. S. Class II Gazetted Officers apart from Clinical Assistants, Demonstrators and Assistant Hospital Surgeon".

We wonder wherefrom the Committee got the impression that the Veterinary Schools in India are overcrowded! It is quite the other way about. The complaint, or rather the cry, has been that the Colleges do not attract enough students. This is because the Veterinary Graduates are poorly paid. If therefore Veterinary Education in this country is to be made popular, the one thing that should be done is to make the profession attractive. On this point, the recommendation of the Committee is as follows:— "We suggest that the Central Government may be asked to recommend to Provincial Governments the raising of the salary level for Degree course Graduates to that current in the Punjab, so that such a course may be adopted in all these three Colleges without delay."

We are very glad that the Committee has condemned the dual standard of Veterinary Education and recommended the affiliation of the Veterinary Colleges to the University. As is well known, the Madras and Punjab Colleges have already been affiliated to the University and we do hope that the other Colleges in India would follow suit shortly.

We reserve to a future issue the consideration of the recommendations of the Committee with regard to the course of study, syllabus, etc.



I. MUHAMMAD AZIZUDDIN, B.A., B.V.Sc.,
Madras Veterinary College.



V. MAHADEVAN, M.A.,
Madras Veterinary College.



M. DHARMARAJAN, M.A., M.S.,
Madras Veterinary College.



S. VANCHESWARA IYER, M.A., M.S.,
Madras Veterinary College.



S. A. JABBAR,
G.B.V.C., I.D.D., M.Sc., (Cornell)
Hyderabad-Dn

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K. S. SHETTY, G.B.V.C.,
C.V.D., Hyderabad-Dn



G. F. MATANEY, G.B.V.C.,
C.V.D., Sind.



YOGENDRA PRASAD, M.Sc.,
C.V.D., Bihar.



SHAH AFTAB AHMAD,
B.Sc., (Agri.)
C.V.D., Bihar.

CORPS NOTES

We are glad to note that the following officers and men of the I.A.V.C., have been mentioned in despatches in recognition of gallant and distinguished services in Burma or the Eastern Frontier of India:—

Lieutenant J. G. Morrison, R.A.V.C.
Major (T./Lieutenant-Colonel) H. L. Bhandari, I.A.V.C.
Major (Temporary) Mian Mahmud Ahmad, I.A.V.C.
Lieutenant Minnagaddala Muthugopal, I.A.V.C.
Risaldar Harnam Singh, I.A.V.C.
Risaldar B. H. Jackson, I.A.V.C.
Risaldar Kalandy Sukumaran, I.A.V.C.
Risaldar B. H. Naidu, I.A.V.C.
U.D. C. Ram Lal Patiar, I.A.V.C.,—V572
Daffadar Jagdish Chand, I.A.V.C.—V673
Sweeper Sia Ram, I.A.V.C.—V2770

—Jl. of R.A.V.C., November, 1945.

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We are glad to announce that the following persons have been selected for training in U. K., and U. S. A., for higher studies as Government Scholars from the different Provinces and States in India:—

Madras Veterinary College

1. I. Md. Azizuddin, B.A., B.V.Sc.,
Lecturer in Medicine ... Bacteriology, U.K.
2. V. Mahadevan, M.A.,
Lecturer in Chemistry ... Animal Nutrition, U.K.
3. M. Dharmarajan, M.A., M.Sc.,
Lecturer in Biology ... Animal Genetics, U.K.
4. S. Vancheswara Iyer, G.M.V.C.
Veterinary Asst. Surgeon, Serum Section.....Manufacture of
Biological Products, U.K.

Imperial Veterinary Research Institute, Izatnagar

1. Abdussalam,
Assistant Research Officer,
Foot & Mouth Disease Scheme ... Virus Diseases
2. M. R. Dhanda, L.V.P.,
Assistant Research Officer,
Anaerobes Scheme, Mukteswar ... Bacteriology & Physio-
logy of Trace Elements.
3. Dr. S. N. Ray, M.Sc., (Cal.) Ph.D., (Cantab),
Research Officer, Animal Nutrition
Section, Izatnagar ... do.

4. Mohammad Amin,
Asst. Research Officer Helminthology,
Veterinary Zoology Section, Izatnagar ... Ichthyology.
5. Dr. S. Bose, M.Sc., Ph.D., (Lond.), ... Advanced Training in
Asst. Research Officer, Poultry ... Poultry Technology,
Research Section, Izatnagar. ... Iowa State College,
U.S.A.

Civil Veterinary Department, Hyderabad Dn.

1. S. A. Jabbar, G.B.V.C., I.D.D., M.Sc., (Cornel),
Deputy Director ... Dairy Organisation in
U.K. and U.S.A.
2. K. S. Shetty, G.M.V.C., ... Bacteriology, Royal
Asst. Veterinary Surgeon (Dick) Veterinary College, Edinburgh

Civil Veterinary Department, Bihar

- Yogendra Prasad, M.Sc., ... M.R.C.V.S., U.K.
Shah Aftab Ahmad, B.Sc., (Agri) ... -do-

Civil Veterinary Department, Sind

- C. F. Mataney, C.B.V.C., ... Bacteriology—Poultry
Veterinary Asst. Surgeon Husbandry

Veterinary Department, Cochin State

- S. R. Chandran,
Veterinary Asst. Surgeon ... Animal Husbandry

Veterinary Department, Travancore State

- V. Padmanabhan, L.V.P.,
Veterinary Surgeon ... Dairy Technology

Civil Veterinary Department, Assam

- Maulavi Moslehuddin Ahmed Choudhury,
Veterinary Asst. Surgeon ... Royal Veterinary College,
London

Civil Veterinary Department, N.W.F.P.

1. M. Abdul Wahid,
Veterinary Investigation Officer ... Animal Genetic
(Larger Animals)
2. M. Syed Kamal,
Veterinary Asst. Surgeon ... Dairy Husbandry



ABDUSSALAM,
L.V.R.L., Izatnagar.



MOHAMMAD AMIN,
L.V.R.L., Izatnagar.



Dr. S. N. RAY, M.Sc. (Cal.) Ph.D. (Cantab)
L.V.R.L., Izatnagar.



M. R. DHANDA, L.V.P.,
L.V.R.L., Mukteswar.



Dr. S. BOSE, M.Sc., Ph.D. (Lond)
L.V.R.L., Izatnagar.

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Group Photo Taken on the Eve of Departure of J. R. HADDOW, M.B.C.V.S., from Mukteswar
as Veterinary Adviser to the Government of Bengal.

Clinical Articles

CARBON TETRACHLORIDE IN A NEMATODE INFESTATION IN A HORSE

By

BISHEMBER DASS BAHL,
I/C. Veterinary Hospital, Gojra

The owner brought his young horse to the hospital on 9-8-45 as an outdoor case No. 4187 with the history that the animal did not put on flesh, inspite of good care and feed. Moreover its appetite was normal. I enquired from the owner whether he had seen any worms in the faeces of the said animal, but he showed complete ignorance about it. While I was asking certain questions to the owner about the animal and examining the animal for certain wasting ailments, the horse passed faeces, I searched the faeces for the worms but found none. So I took a small particle of faeces, placed it on a slide and mixed it with a drop of water, examined under a cover-glass. On examination under the Microscope I found eggs which were round and ovoid, so I concluded that the animal had got Nematode Infestation. I gave the said horse about six drachms of Carbon Tetrachloride thoroughly mixed in six ounces of saturated solution of mag. sulphas. I mixed it in the mag. Sulphas solution by the help of a syringe *i.e.*, syringing and desyringing the mixture about ten or twelve times, then gave this mixture as a draught to the horse by means of an ordinary draught-bottle. I adopted this method of giving Carbon Tetrachloride, as there was no capsule available, nor I had a stomach tube in the hospital to send the Carbon Tetrachloride direct into the stomach. So to avoid the toxic effect of this drug I mixed it with Mag. Sulphas solution. On the 10th of August, the owner came to the hospital and told me that he had seen certain parasites in the faeces that day and these were from one inch to two inches in length and just like earth-worms, but the owner never brought any worm along with him for my examination. I told the owner to bring the said animal again tomorrow morning to give him another dose of the drug. On the morning of 11th, he again brought the horse to the hospital and this time I gave the animal about two ounces of Carbon Tetrachloride in six ounces of saturated solution of Mag. Sulphas thoroughly mixed, so to decrease the toxicity of the drug and rapid excretion, and kept the animal under observation for any unwanted action of the drug as the horse is a very costly one. No toxic symptoms of the drug were observed till the hospital hours. So I asked the servant to take it away to village but advised him not to feed him on any concentrates *i.e.*, gram etc., nor

give any fat, as the owner told me on the first day that he gave butter occasionally. As protein causes the production of guanidin with this drug, which causes hypoglycaemia and fat increases the solubility of the drug and causes its absorption through lymphatics, for this I dissuaded him from feeding gram and fat and told him to keep the animal simply on green grass and non-leguminous green fodder. The second morning the owner came to the hospital very glad and told me that thousands of worms were being passed by his horse in the faeces.

A COMBINED INFECTION OF TRYPANOSOMES AND *THEILERIA MUTANS* IN A STUD BULL

BY

S. V. SOUNDARA RAJAN, G.M.V.C.,
Veterinary Assistant Surgeon, Bhadrachalam.

Subject:—Kanagayam breeding bull, age 3½ years.

History:—A stud bull (Kangayam Breed) was stationed at Gollagatta village of Bhadrachalam agency during the latter part of 1943 for the improvement of local cattle in and around the village. The bull was inspected by the Veterinary Assistant Surgeon, in charge Veterinary Dispensary, Bhadrachalam, periodically. When the bull was inspected in February 1944, his condition was not satisfactory and he was brought to the Dispensary on 10.2.44 for treatment. Blood smears were examined and found to contain *Theileria Mutans*. The animal was treated with intravenous injections of Lugol's Iodine and Trypan blue and discharged cured.

On 20.9.44, the bull was inspected again and the condition was found to have deteriorated again. He was again admitted for necessary treatment on 21.9.44.

Symptoms:—Very weak in condition, rough coat, pallid mucous membranes, accelerated respiration quick pulse, depraved appetite, loose dung, urine pale and clear like water. Temperature 102.2° F. The bull was more inclined to be in the recumbent position.

A diagnosis of Theileriasis was provisionally made pending the examination of blood smears by the Principal, Madras Veterinary College.

Treatment:—60 c.c. of a 1 per cent solution, of Trypan Blue was given intravenously on 22-9-44 and again on 28-9-44. 20 c.c. of Lugol's Iodine was given intravenously on 24-9-44. On 2-10-44 a communication was received from the Principal, stating that *Trypanosoma evansi* and very few *Theileria mutans* were present in blood. So, 5 grains of

SOLUSEPTASINE OINTMENT IN "BURSATI"

Antimonium Tartaratum in 20 c.c. of aqua distillata was given intravenously on the same day. This was repeated again with 6 grains on 6-10-44 and 13-10-44. During the interval alteratives, stimulants and tonics were administered.

Smears were again submitted on 18-10-44 and 24-10-44 to the Principal. In the last communication from the Principal, it was stated that neither Trypanosomes nor any other organism could be detected in the blood. Since the treatment, it was found that the bull was gradually picking up and hence he was retained for use.

At the suggestion of the Principal, blood smears were submitted after nearly a year i.e., on 28-10-45 to the Principal, Madras Veterinary College and no Trypanosomes could be detected in the blood.

[It is not uncommon to find stray *Theileria mutans* in a large majority of indigenous cattle and this by itself does not inconvenience the animals in any way. Ed]

SOLUSEPTASINE OINTMENT IN "BURSATI"

BY

BISHEMBER DASS BAHL,

I/C, Veterinary Hospital, Gojra.

On 12-5-45, when I attended the permanent outlying dispensary at Chak No. 353. J. B. Syed Mahbub Hussain Shah showed me his horse, which he purchased recently for Rs. 700/- from the Lyallpur Cattle-fair in March, 1945. The horse had got a Bursati wound on the sheath. I curetted the wound, removed two kunkurs out of it and dressed it with powdered potassium permanganate. I instructed the Veterinary Compounder in charge of this dispensary to dress the said wound daily either with powdered potassium permanganate or with red oxide of mercury, and remove the kunkurs if formed any daily. But when I again attended this dispensary on 19-5-45, the owner was too much disgusted with the treatment, he told me "there is no relief to the wound at all" So I instructed the veterinary compounder to apply Soluseptasine ointment on it. But the same evening the owner sent the horse through his servant to the Gojra Veterinary hospital to get it treated here as an indoor patient. On 20-5-45 morning, I entered it as an indoor case No. 57. Washed the wound with Potassium permanganate lotion, removed two kunkurs out of it and applied Soluseptasine ointment on it. To my utter surprise I found remarkable healing in Bursati wound when I examined it on 21-5-45, morning. I washed it again with potassium permanganate solution and removed one kunkur out of it, applied Soluseptasine ointment on it. Within six days the wound healed completely with Soluseptasine ointment dressing. (So I suggest my professional brethren "to try this ointment on Bursati-wounds. It is May & Baker's preparation and it is available in tubes as well as in small jars of one ounce capacity.

A CASE OF HÆMORRHAGIC SEPTICÆMIA IN AN ELEPHANT

BY

C. V. NARASIMHAM G.M.V.C.

Veterinary Assistant Surgeon, Parvatipur.

Subject.—A male elephant about 45 years of age.

Symptoms.—The animal was first seen by me at 5 p.m. on 6-5-45. He was off feed, shivering, restless and was having profuse salivation and lachrymation. He was arching his back very frequently as if having colicky pains. Oedematous swellings were present on the neck, lower jaw, shoulder, throat and one side of the groin. The most prominent of these swellings was the one on the shoulder—its size being that of a half inflated foot-ball, hot and painful. The animal was not able to put any weight on the affected limb. Urine was scanty and turbid. Bowels were normal. Temperature 100° F.

Diagnosis.—The case was provisionally diagnosed as one of Haemorrhagic Septicaemia. Subsequent examination of blood smears on the same day revealed the presence of Bipolar organisms.

Treatment.—Camphor 2 tolas was advised to be given with jaggery in the form of an electuary every one hour. At 11-30 p.m. the same day the temperature came down to 99° F. and the animal was very much relieved of the alarming symptoms. He took cooked rice and drank a little water. Then camphor was repeated at two hourly intervals.

Next day, the temperature came down to 97° F and the animal looked by far better. Only 3 doses of the above prescription were given that day.

On 8-5-45 when the animal was examined at 2 p.m. the temperature remained normal and all the swellings on the body save the one on the limb had disappeared. Even this was reduced in size and the animal looked bright and ate his food well. Tonic powders containing nuxvomica, chirrata and ginger were prescribed twice a day for about a week. In the course of 20 days he was doing his work normally.

Nearly a month later one afternoon he suddenly fell down and died within 20 hours. There were no swellings on any part of the body. Temperature just before death was normal. The mucous membrane was pale white. Blood smears taken just after death were negative for pathogenic organisms. No postmortem was conducted as the owner was not in the station.

Conclusions.—It is very rare for a Veterinary Surgeon to come across a case of Hæmorrhagic Septicæmia in an elephant and much less to observe all the clinical symptoms when the animal is alive. This is the main consideration for recording this case. I would like to point out that the treatment adopted in this case is similar to the treatment given in cattle.

The cause of the subsequent death is not definitely known but it is not due to Hæmorrhagic Septicaemia as the animal recovered well and went to work afterwards.

Acknowledgements.—My thanks are due to Mohammad Rahimuddin Sahib Bahadur, G.M.V.C., P.G. (Edin), District Veterinary Officer, Vizagapatam for his help and guidance and to Sri K. S. Prakasa Rao G.M.V.C., Bobbili, for kindly examining blood smears.

Association News

PROCEEDINGS OF THE FIRST ANNUAL GENERAL MEETING OF THE ORISSA VETERINARY ASSOCIATION

The First Annual General Meeting of the Orissa Veterinary Association was held in the evening of 24th February, 1945 at the Narisangh Sadan, Cuttack. The following were present :—

1. H. Lal, Esqr., I.C.S., Director of Development, Orissa, ... *Patron.*
2. R. L. Kaura, B.V.Sc., M.R.C.V.S., Deputy Director of Veterinary Services, Orissa ... *President.*
3. P. S. Kuppuswami, G.M.V.C., P.G. (Edin.), Veterinary Investigation Officer, Orissa ... *Vice-President.*
4. U. Patnaik, B.Sc., Ag., B. Ed., Livestock Officer, Orissa.
5. Sri M. S. Mohan Raj, G.B.V.C., (Cal.), P.G., Veterinary Inspector, Berhampur.
6. " B. B. Chowdhury, G.B.V.C., (Cal) Veterinary Inspector, Angul Circle.
7. " G. Giri G.B.V.C. (Cal.)
8. " P. Gartia, G.B.V.C. (Cal.) P. G. (Mad). ... *Hon. Secretary-cum-Treasurer.*
9. " G. Biswal, G.B.V.C. (Pat.)
10. " B. B. Patra, G.B.V.C. (Cal.)
11. " L. N. Das, G.M.V.C.
12. " J. Prusti, G.B.V.C. (Pat.)
13. " L. D. Panda, G.B.V.C. (Pat.)
14. " R. N. Mitter, G.B.V.C. (Cal.)
15. " R. Kanango, I.D.D., (Bangalore)
16. " P. C. Patnaik, I.P.D., (Luck.)
17. " J. N. Panda, G.B.V.C. (Pat.)
18. " K. Sahu, G.B.V.C. (Pat.)
19. " N. Patnaik, G.M.V.C.
20. " A. K. Raul, G.B.V.C. (Pat.)
21. " G. B. Patnaik, G.B.V.C. (Cal.)
22. " D. S. Rao, G.B.V.C. (Pat.)
23. " B. Samal, G.B.V.C. (Pat.)
24. " Y. K. Viswanatham, G.M.V.C.

25. Sri A. Veerayya, G.M.V.C.
26. „ K. Kohoro, G.B.V.C. (Pat.)
27. „ R. N. Mohanti, G.B.V.C. (Pat.)
28. „ A. Rath, G.B.V.C. (Pat.)
29. Mr. S. A. Razzaque, G.B.V.C. (Cal.)

Mr. H. Lal, I.C.S., Director of Development, Orissa, the Patron of the Association presided.

Mr. R. L. Kaura, Deputy Director of Veterinary Services, Orissa, explained the aims and objects of the Association and said that, since the separation of Orissa from Bihar, the Veterinary staff lost its contact with the old Bihar & Orissa Veterinary Association. It was therefore felt necessary to start an Orissa Veterinary Association which should be affiliated with the All-India Veterinary Association. He further observed that this Association will be instrumental in improving the professional knowledge of the members through frequent discussions, discourses and demonstration at its meetings and thus enable them to discharge their duties more efficiently and to the greater advantage of the livestock wealth of country. The Association would also look after the general interest of the members. He added that the subordinate staff had given him their best in spite of their vast jurisdictions and increased activities of the Department and stressed that for the more efficient working of the Department it was necessary that the staff should be paid adequately and the pay should be commensurate with their qualification and status. The need for an increase in their pay was urgent in view of the abnormal rise in the prices of all the necessities of daily life. He also pointed out that unless the staff were paid T. A. in accordance with the Orissa T. A. Rules instead of inadequate fixed T. A. it was very hard on the part of the subordinate staff to visit distant places within their jurisdictions as frequently as it should be done.

Mr. Lal, I.C.S. the Patron of the Orissa Veterinary Association, while appreciating the work of the staff and the multifarious activities of the department, regretted that he had not so far been able to do anything for improving the prospects of the subordinate staff of the Veterinary Department since he took up the charge of his office as Director of Development. However, he expressed his sincere desire to take up this question as early as possible as he had already done for the staff of some of the other departments under him.

The following were unanimously elected office bearers of the Association for the year 1945-46.

H. Lal, I.C.S., Director of Development, Orissa	... Patron.
R. L. Kaura, B.V.Sc., M.R.C.V.S., Dy. Director of Veterinary Services, Orissa	... President.
P. S. Kuppaswami, G.M.V.C., P.G. (Edin). Veterinary investigation Officer, Orissa	... Vice-President.
P. Gartia, G.B.V.C., P.G.	... Secretary & Treasurer.

It was proposed by Mr. Kaura and approved by all present that after seeing the working of this Association for some time, the Secretary of the All-India Veterinary Association may be requested to work up for the affiliation of this Association.

The time at the disposal of the members being short, Mr. Kaura proposed that it would be convenient to frame the Association Rules and by-laws later and submit them for approval at a subsequent meeting of the Association.

It was announced by Mr. Kaura that the Government of Orissa have been pleased to recognise the Orissa Veterinary Association and suggested that for the benefit of the members "Orissa Veterinary Journal" may be published quarterly and that it may be commenced at the earliest opportunity. This suggestion was appreciated by the Patron who promised to help the Association by arranging supply of paper even during these days of paper shortage as it would have a beneficial effect on the activities of the Department which has a bearing on our war effort.

Sri G. Biswal next spoke and expressed that it was no exaggeration to say that the staff of the Department were being overpressed with work due to vast jurisdiction entrusted to each Veterinary Assistant Surgeon and the added activities on the Animal Husbandry side which had recently been taken over from the Agricultural Department. In voicing the feelings of his colleagues he pointed out that in spite of their adequate qualification, high quality and amount of work turned out by them and the important role played by them in improving the livestock wealth of the Province their pay and prospectus were very low as compared with those of the subordinate officers in the other departments in Orissa and the Veterinary Departments in most of the other provinces and states in India. He suggested that the Association should bring their legitimate grievances to the notice of the Government for a favourable consideration. He pleaded for higher scales of pay, better T. A. and larger number of higher posts to which the subordinate staff can look forward for promotion.

Sri A. Rath, in a short speech supported Mr. Biswal and hoped that both the Patron and the President will kindly move the Government to take a sympathetic view for redressing the grievances of the staff.

The meeting terminated with a vote of thanks to the Chair proposed by Mr. P. S. Kuppaswami and passed unanimously.

After the close of the meeting all the members were entertained at a tea party arranged especially for the occasion.

Cuttack, }
28th November, 1945. } P. GARTIA, G.B.V.C., P.G. (Madras),
Honorary Secretary.

THE INDIAN VETERINARY JOURNAL

Orissa Veterinary Association
RESOLUTIONS

-) The members of the Orissa Veterinary Association express their deep feeling of sorrow at the sad and premature demise of the wife of their Deputy Director of Veterinary Services Mr. R. L. Kaura, B.V.Sc., M.R.C.V.S., which took place at Calcutta on 19-12-45 and wish that her soul may rest in peace.
-) The members of the Orissa Veterinary Association regret to have to record the demise of Sri B. K. Dasappa G.M.V.C., Touring Veterinary Assistant Surgeon, Sambalpur (Orissa) on the 8th November, 1945. He was only 39 years old at the time of his death and leaves behind a young daughter, son, a widow and a host of friends to bemoan his loss.

They tender their heart-felt condolences to the members of the bereaved family.

Cuttack, }
1-12-1945. }

P. GARTIA,
Secretary,
Orissa, Veterinary Association.

New Year Honours

Our hearty congratulations to the recipients of the following New Year Honours:—

- KNIGHTHOOD on Mr. FRANK WARE, C.I.E., F.R.C.V.S., I.V.S.,
Director of Animal Husbandry, United Provinces,
Lucknow.
- RAO BAHADUR on Sri R. SWAMINATHAN, B.A., G.M.V.C.,
Principal, Madras Veterinary College.
- RAO SAHIB on Sri T. VINAYAKA MUDALIAR, G.M.V.C.,
Livestock Development Officer, Madras.
- " V. R. GOPALAKRISHNAN, G.M.V.C.,
Veterinary Investigation Officer, Gauhati, Assam.
- SARDAR SAHIB on SARDAR DALIP SINGH,
Superintendent, Civil Veterinary Department,
Lahore Division, Punjab.
- M.B.E.
(Military Division) on LIEUT. ANNATH SHANKARAN NAYAR
I.A.V.C.,

Extracts

THE OFFICERS' TRAINING SCHOOL

Indian Army Veterinary Corps Centre and Records

The Officers' Training School was opened in March, 1914, and is a branch of the Indian Army Veterinary Corps Centre and Records. Up to date approximately 200 veterinary officers have attended courses each of two months' duration. The officers selected for the course are:

- Recently commissioned Royal Army Veterinary Corps officers from the United Kingdom.
- Officers directly commissioned into the R.A.V.C. or I.A.V.C. in India.
- Officers of the I.A.V.C. who have been commissioned from selected veterinary assistant surgeons of the I.A.V.C.

The School was fortunate in securing buildings, formerly a British battalion mess, standing in spacious grounds and with suitable out-offices to form a nucleus for the other activities of the School.

The course includes basic military training and technical training. It has recently been extended to ten weeks, to include meat inspection.

Basic military training covers physical training; drill; weapon training (rifle, Sten gun, pistol and grenade); fieldcraft; equitation; gas; military law; map reading; M.T. driving and maintenance; administration and Urdu (for British officers).

Technical training deals with the varied problems with which veterinary officers will be confronted in the field and for this reason the instructional staff was specially withdrawn from field service. It also includes meat inspection, for which the Army Veterinary Service in India has recently assumed responsibility. Particular emphasis is laid on certain aspects of animal management which have been proved by experience to be of vital importance in reducing animal wastage in the field. Saddle fitting is dealt with in practical detail. Diseases prevalent in India are given special attention. The close proximity of the Army Veterinary School, with its Farriery Wing, admits of first-class instruction in the shoeing of Army animals, and officer-students are themselves required to remove shoes and reduce feet, etc. The more common surgical conditions encountered in India are covered by lectures and demonstrations whenever possible. Students are also shown routine work of other branches of the I.A.V.C. Centre and Records; in addition, they are shown representative units of other branches of the Services that they will have to deal with during their service. These include an animal Transport Company, a Military Dairy Farm, Mountain Artillery Units, a Remount Depot and a Local Production Farm.

The O.T.S., however, assists the "new" officer in other ways. During his course his accounts are checked and any difficulties taken in hand, uniform of the correct pattern is made available, all protective inoculations and vaccinations are brought up to date, dental treatment is arranged. Finally there is the inestimable advantage that he is introduced to a new country and a new career in the best possible way, among men of his own kind and Corps with experienced officers always available for advice and assistance. Friendships are made which cannot fail to help him in his future career, and the feeling that he has been looked after

properly during a difficult period of his life goes far towards engendering that *esprit de corps* which is so essential to the efficiency of any arm of the Service.

Each course ends with examinations, announcement of results, and interview of each officer by the Director of Veterinary Services in India, who takes the salute at the march past.

Before posting, officers are normally given ten days' leave. Many British officers go to Simla to the Viceregal Lodge, a portion of which H. E. The Viceroy has reserved for leave purposes.

—R. A. V. C. Vol. 17, No. 1.

RETENTION OF PLACENTA IN THE BUFFALO, WITH ASSOCIATED SEQUELAE *

By

Lieut. E. VINATTIERI,

Indian Military Veterinary Hospital, Lahore,

Captain. A. H. S. HAYWARD,

R.A.V.C., E.V.O. (Farms), Punjab Circle, Lahore,

AND

Lieut. D. ARTIOLI,

Indian Military Veterinary Laboratory, Lahore.

Retention of placenta and its sequelae have been found to be the chief source of trouble from a veterinary standpoint in the Military Farms at Lahore, and have caused considerable financial loss. Under optimum conditions a buffalo should expel the placenta within 24 hours of calving; retention after this period is abnormal and manual interference is required.

The incidence of retained placenta during the summer of 1944 was extremely high, as may be seen from figures given in Table I. It will be seen that out of a total of 944 calving cases 161, or 17.1 per cent, showed retention of placenta over 24 hours; the great majority of these had to be removed by hand. It may be noted also that, with one exception (Farm Mc), there was relatively little difference between farms; in every case 13 per cent. or more of calvings were followed by retention. Farm Mc had recently been stocked with newly purchased buffaloes from the villages, where the calves are reared under natural conditions; the change over to artificial rearing may well have been the explanation for the higher incidence of retention on this farm. The general indication was that the condition was widespread and probably occurred in at least 10 per cent, of all calving cases.

Table I

Showing the Incidence of Retention of Placenta in four Farms in Lahore Area

Farm	Number of Calvings	Number of Retention Cases
B.	463	74 (16.0%)
D.	254	39 (15.4%)
Mc.	189	43 (22.7%)
Be.	38	5 (13.2%)
Total	944	161 (17.1%)

* Veterinary Record Vol. 57, No. 46.

It has been the experience of local veterinary officers that metritis of varying degrees almost invariably follows retention of placenta. The possible sequelae are numerous; for instance: prolapse of vagina, prolapse of uterus, infection and necrosis of wounds in the genital tract, loss of milk, and in acute cases death from toxæmia or septicæmia. Sterility is a common sequel to metritis, necessitating the sale of many buffaloes. Following acute metritis destruction of maternal cotyledons and fibrosis and organisation of the uterine wall have been met. These imply permanent sterility. We have very few accurate statistics of these sequelae, but the following figures are instructive. On one farm, out of 202 calving cases, 26 animals showed retention of placenta with consequent metritis, and it is likely that a number of these will be permanently sterile. On another farm, out of 132 calving cases, 33 showed retention; and eleven animals died from metritis; thus on this farm 8.3 per cent. of the calvings during that period resulted in death and total loss. This particular farm was under observation for one month. Putting the cost of a buffalo at Rs. 350, this farm, therefore, lost Rs. 3,850 in one month from this cause alone. The actual monetary loss cannot be computed since no knowledge is available about the cases of resultant sterility, the loss in milk yield, etc.

It will be seen from these few figures that retention of placenta is indeed a cause of considerable financial loss and is likely to interfere seriously with planned stock farming, unless prompt remedial measures are instituted.

When the condition was first brought to our notice we considered the possibility of it being due to *Br. abortus*. Cotyledon smears were examined and agglutination tests carried out on a number of normal calving animals showing subsequent retention of placenta. Of 60 such cases examined by one or both tests only 15, or 25 per cent, showed evidence of *Br. abortus* infection. It was evident, therefore, that this organism was not the primary cause of the condition.

An abortive attempt to deal with the condition by the injection of stilboestrol was tried. Two normal calvers showing retention and negative to tests for *Br. abortus* infection received 25 mgm stilboestrol intramuscularly three days and one day respectively after calving. The first animal commenced straining 24 hours later and almost everted her uterus; a truss was immediately applied; the placenta was removed by hand six days after calving and the animal recovered after treatment for metritis. The second animal everted her uterus seven hours after the injection and died within 30 minutes. These two cases may have been unfortunate coincidences since other workers have apparently found 25 mgm. a safe dose of stilboestrol for buffaloes; nevertheless our experiments with this hormone thereupon ceased abruptly.

THE EFFECT OF ALLOWING CALVES TO SUCKLE THEIR DAMS

Experiment No. 1

It has been the practice on the Military Farms in this area to remove calves from their dams at birth and rear them on the artificial teat system. It was claimed that this was necessary since buffaloes, once having been suckled by calves, refused to "let down" their milk to the *gawala* (herdsman); it was also claimed that if calves were allowed to suckle their dams they would not thereafter take easily to rearing by artificial means, with consequent high death rate. It seemed likely that both these beliefs were fallacious.

In September, 1944, on one farm (Mc) one of us (E.V.) instituted the procedure of allowing to suckle their dams. The calves remained in the calving boxes with their dams for the first two days after calving; for the next two days they had access to the dams at milking times only; and on the fifth day they were removed

to calf pens and fed on the artificial teat. Observations were made for one month, the results being compared with those of the previous month. As is shown in Table II the results were striking. Out of 189 calving cases in August, 1944, when suckling was not allowed, 43 (22.7 per cent.) were followed by retention of placenta; out of 122 calving cases in September there were only six (4.9 per cent.) cases of retention. The difference of 17.8 per cent. is statistically significant, being over four times its standard deviation.

Table II

Showing the effect of allowing Calves to Suckle their Dams on the Incidence of Retention of Placenta and on the Death-rate from Metritis

	Total Number of Calvings	Number of Retentions	Observed Calving Cases	Deaths from Metritis
August, 1944 (calves not suckling dams) ...	189	43	132	11
September, 1944 (calves suckling dams) ...	122	6	92	2
Percentage difference :		17.8±4.2	6.1±3.1	

For various reasons not all these animals were kept under observation thereafter; however certain additional information was forthcoming from the available records. Thus out of 132 calving cases in August, eleven buffaloes (8.3 per cent.) died as a result of metritis; in September out of 92 cases only two animals (2.2 per cent.) died from metritis; again these figures are suggestive, although in this case not meeting the demands of statistical significance.

Of the calves born records were available for 121 born in August and 84 born in September. The death-rates up to five days after birth are shown in Table III. It is noticeable that there is a difference in death-rate between males and females under similar conditions; the two sexes must therefore be examined separately. Among the males it may be seen that there was a difference in death-rate of 34.4 per cent. and among the females 30.5 per cent; both these differences are statistically significant, being over three times their standard deviations.

Table III

Showing the effect of Allowing Calves to Suckle their Dams on the Viability of Calves

		Males		Females	
		Born	Died	Born	Died
August	...	76	38 (50.0%)	45	16 (35.6%)
September	...	45	7 (15.6%)	39	2 (5.1%)
Difference	...	34.4%±9.04		30.5%±8.99	

The figures suggested that suckling markedly reduced the incidence of retention and increased the likelihood of survival among the calves—at least up to five days after birth. The experiment was, however, exposed to severe criticism in that the two groups of animals were not under exactly similar environmental conditions; there was in fact a climatic change during this period, the weather becoming cooler in September. Further experiments were therefore devised to check the conclusions under controlled conditions.

Experiment No. 2

This experiment was commenced on September 18th and continued for 24 days. It was carried out on a different farm (D). On the first, third, fifth, seventh, etc., day of the experiment all calves born were allowed access to their dams for three days; on the second, fourth, sixth, eighth, etc., days all calves born were removed at birth and reared on the artificial teat. The results are shown in Table IV.

Of 52 cases where the calves were removed at birth, 13, or 25 per cent., were followed by retention, whereas of 52 cases where the calves were suckling only five, or 9.6 per cent., were followed by retention. The difference of 15.5 per cent. is statistically significant.

Table IV

Showing the effect of Calf Suckling on Retention of Placenta on Farm D

Buffalo Group	Number of Calving Cases	Number of cases of Retention
Calves suckling ...	52	5 (9.6%)
Calves weaned ...	52	13 (25%)
Difference :		15.4%±7.3

This result, therefore, confirmed the original finding that the incidence of retention of the placenta was reduced by allowing calves to suckle their dams.

Experiment No. 3

Experiment No. 3 was carried out on a third farm (Be). It was commenced on November 1st, 1944, and was continued until January 14th, 1945. The arrangement was exactly similar to that of experiment No. 2, i.e., calves born on one day were allowed to suckle and those born on the next day were removed at birth. Records were kept of the following points:—

1. The number of cases of retention of placenta.
2. The time after which the placenta was expelled.
3. The milk yield on the first, tenth and twentieth days after calving.
4. The death-rate among the calves.

During this experiment cotyledon smears were examined from many, but not all cases; in no instance was *Br. abortus* detected.

There were included in the experiment 97 buffaloes; 38 had their calves removed at birth and 59 were allowed to suckle their dams.

Table V shows the incidence of retention of the placenta over 12 and 24 hours and also the mean time of expulsion in the two groups. In the calf suckling group there was no case of retention of the placenta over 24 hours and only two cases (3.4 per cent.) over 12 hours; the mean time for expulsion in this group was under five hours. In the group where calves were weaned at birth there were five typical retentions (13.2 per cent.) and 15 cases (39.5 per cent.) over 12 hours; the mean time for expulsion in this group was more than 14 hours. It is noteworthy that in each case the difference between the two groups is statistically significant; in other words, it is improbable that these results arose by chance. The conclusion is that this experiment confirmed the findings of the two previous experiments.

Table V

Showing the effect of Calf Suckling on Retention of Placenta on Farm Be.

Buffalo Group	Total Number of Calvings	Number of Retentions		Mean Time to Expulsion (hours)
		Over 12 hours	Over 24 hours	
Calves suckling ...	59	2 (3.4%)	0	4.6±0.4
Calves weaned ...	38	15 (39.5%)	5 (13.2%)	14.4±2.1
Difference		36.1±7.9	13.2%±4.6	9.8±2.1

The manager of the particular farm was convinced beforehand that allowing calves to suckle their dams would result in an increased rather than a decreased milk yield. The figures shown in Table VI seem to justify this conviction. In this table are recorded the average milk yield in lb. for the two groups, one, ten and 20 days after calving. For the calf suckling group these values were 11.1 lb., 11.16 lb. 14.9 lb. respectively; for the calf weaned group they were 7.6 lb. 7.3 lb. and 10.9 lb. The differences of 3.5, 4.3 and 4.4 are statistically significant, all being over four times their standard errors. It is as well to mention here that it has previously been shown (Priestley and Artioli private communication), that at comparable lactation periods the milk yield is not obviously affected by variations in age, at least between the ages of six and 12 years. Thus since the majority of animals in this experiment were between six and 12 years old and the period of lactation was constant, the results would appear to be dependent on the other variable factor, viz., that of suckling or not.

Table VI

Showing the effect of Calf Suckling on Milk Yield in Buffaloes

Buffalo Group		Milk Yield in Lb.		Days After Calving
		1	10	20
Calves suckling ...		11.1±0.3	11.6±0.3	14.9±0.4
Calves weaned ...		7.6±0.6	7.8±0.5	10.9±0.6
Difference ...		3.5±0.7	4.3±0.6	4.4±0.9

At the time this experiment was carried out the weather had improved considerably, becoming relatively cool. Throughout the whole area the calf mortality had decreased markedly and, incidentally, changed in clinical type from scour to pneumonia. The mortality was, however, still sufficiently high to have revealed any markedly beneficial effect provided by one or other treatment. In Table VII are recorded the deaths and survivals up to seven days of the 97 calves. Most calves over seven days old were slaughtered for veal and therefore automatically dropped out of the experiment. As was noted previously, there was a marked difference in mortality between males and females. Among male calves, in the calf suckling group five died out of a total of 24 as compared with seven deaths out of 19 in the calf weaned group; for females, the respective numbers were six out of 35 and three out of 19. Neither of these differences is statistically significant. It may, therefore, reasonably be concluded that the difference in treatment had not affected the survival rate up to

seven days old. This conclusion is supported by the fact, shown in Table VII, that no difference in mean survival times is demonstrable between the various groups; these figures were calculated on the assumption that all animals surviving for seven days died on the seventh day—as in the usual practice.

Table VII

Showing the effect of Suckling on Viability

Buffalo Group	Males			Females		
	No. Born	No. Died	Mean Survival Time (Days)	No. Born	No. Died	Mean Survival Time (Days)
Calves suckling ...	24	5	6.2±0.4	35	6	6.2±0.3
Calves weaned ...	19	7	6.1±0.4	19	3	6.2±0.5

DISCUSSION AND SUMMARY

The idea for these experiments on suckling is not an original one of ours. Pugh (1944) at a general discussion on reproduction stated his belief that a calf when it suckled its dam brought about a rhythmical contraction of the uterus, which when frequently repeated accelerated the involution of the uterus, and that bi-daily milking of the cow's udder by hand or machine was a poor substitute for the day and night physiological massage of the uterus promoted by the suckling of the calf. It must be remembered that if involution could be accelerated the risk of metritis was greatly lessened. The high incidence of retention met in Lahore Farms seemed predominantly due to a physiological atony of the uterus due to a change in management from previous parturitions. In this area the practice of allowing calves to suckle their dams instead of weaning them at birth has resulted in a considerable drop in the incidence of retention of placenta in buffaloes. The incidence of metritis, which is a usual sequel to retention, has, therefore, dropped correspondingly. Under controlled conditions the incidence of retention on one farm among 52 animals which had their calves suckling was 9.6 per cent. as compared with 25 per cent. among 52 animals which had their calves removed at birth; on another farm, also under controlled conditions, there was no case of retention among buffaloes which had their calves suckling as compared with 13.2 per cent. among 38 animals with calves weaned. Calves at least up to seven days old appear to survive equally well whether reared artificially or naturally. It is not known what would be the effect of suckling or mortality during the period of the year when calf scour is rife, but there is suggestion in our work that suckling is beneficial (see Experiment No. 1).

Buffaloes whose calves are weaned at birth give definitely less milk, for at least three weeks after calving, than do animals whose calves are suckling; the average difference in milk yield may amount to as much as 4 lb per animal per day.

The underlying cause of expulsion of placenta as a result of suckling has not been determined. It may be either a reflex action or due to stimulation by hormones.

The results reported in this paper show conclusively, we think, that allowing calves to suckle their dams is beneficial in every way. It reduces the incidence of retention very considerably; it therefore reduces metritis from this cause; it leads to an increased milk yield, and it is probable that it increases the likelihood of calf survival.

Before suckling was introduced into this area the financial loss must have been enormous. Assuming that (a) 5 per cent. of calving cases were followed by total loss through death or sterility—probably (b) the cost of a buffalo was about Rs. 350 and (c) the price of milk was 3 to 4 annas per lb., the following approximations can be made. Among the 3,000 odd milking animals in this area there would be each year a loss of about 150, representing some Rs. 4,000 a month. In addition there would be a daily loss in milk yield of about 6,000 lb. (allowing for a difference of only 2 lb.) representing some Rs. 11,000 per month. In other words, there has been a monthly loss of approximately Rs. 15,000 directly attributable to retention of placenta. The loss must indeed have been far greater than this, since no account has been taken of expenses for loss of calves, labour involved in removing placentae, drugs for treatment and doubtless many other factors.

A certain amount of retention still occurs, of course, even though calves are allowed to suckle their dams, but it is probable that the incidence is reduced by 75 per cent., which represents a monthly saving of at least Rs. 10,000

Acknowledgment.—We would like to express our thanks to the various farm managers who co-operated in these experiments, and also to Major F. W. Priestly, R.A.V.C., Officer i/c Military Veterinary Laboratory, Lahore Cantt., for his valuable advice and especially his assistance in compiling and interpreting statistics.

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THE DUTIES OF VETERINARY SURGEONS IN RELATION TO RACING*

By

G. G. HESLOP, D.S.O., D.V.Sc., D.V.H.,

Stipendiary Steward to the Victoria Racing Club, Australia.

At Race Meetings in Victoria it is usual for the race club concerned to engage a Veterinary Surgeon to attend all meetings and to give any veterinary advice and assistance required. Some Race Clubs pay a fee for these services, but mostly such appointments are honorary. The conditions of such appointments, are usually the result of an arrangement between the Veterinary Surgeon and the Club, but during the actual racing, the Veterinary Surgeon comes under the control of the Stewards in charge of the meeting.

There is nothing in the rules of racing to compel a Club to engage a Veterinary Surgeon to be in attendance at the meeting, but it is a service which clubs usually attempt to provide.

The duties of the Veterinary surgeons appointed by the Club are not defined in the rules of Racing, but, briefly his main duties are as follows:—

(1) He may be required at any time during the meeting to give expert advice to the Stewards on all matters affecting the condition and physical fitness of the animals competing in the various events. His opinion may be required, for instance, in a case where a horse shows lameness—either slight or pronounced—as to whether the horse is fit to race or not, or whether the animal, if allowed to start, might be a danger to others in the field. (The decision as to whether the animal should start or not rests with the Stewards mainly, but their decision would be influenced, if not entirely guided, by the advice received by them from the Veterinary Surgeon).

*Australian Veterinary Journal Vol. XI, No. 1.

(2) He may be asked to express an opinion on any apparently abnormal condition in a horse such as hyper-excitability, nervousness, excessive sweating, *et cetera*, and state if, in his opinion, such abnormality is due to natural causes or not. His opinion may be required on questions of shoeing, whether shoes should or should not be worn by a particular horse, or whether a particular type of shoe is necessary. He may be required to advise the Stewards regarding the wearing of bandages or boots by a particular horse, and express an opinion as to whether any special gear is necessary or is likely to interfere with the animal's gait or inflict unnecessary cruelty.

(3) He may be required to give first aid to any animal on the course, whether the injury has been occasioned in a race or not.

(4) To destroy any horse whose injuries are such that he considers such action necessary in order to avoid unnecessary suffering.

(5) To examine and give an expert opinion to the Stewards concerning the age of any horse at the meeting when requested to do so. His opinion may also be asked as to the existence or otherwise of brands (whether burnt, clipped, plucked or produced by the application of chemicals). Also, whether there is any suspicion of dye or other foreign colouring matter on the coat, *et cetera*.

(6) If required by the Stewards to do so, to take swabs and samples from any horse. (This will be referred to in more detail later).

(7) Any other matters upon which the Stewards may require his expert opinion, such as whether a horse having bolted prior to the race is fit to start or not. Whether a horse injured prior to the race is fit to start or not.

For the efficient carrying out of his duties it is advisable for the Veterinary Surgeon to:

(1) Be in attendance at the Races before the time fixed for starting the first race.

(2) Report his arrival on the Course to the Secretary of the Club and the Stewards. He should see that he is provided with a ticket which will pass him through any gate into all enclosures on the course. He should not leave the course before the last race, but if he has to do so, he should report to the Stewards before leaving.

(3) He should arrange with the Stewards where he can be found easily throughout the meeting. If there is a method of signalling used to indicate that he is wanted, he should familiarize himself with it and be on the look out. In response to such signal he should report immediately to the Stewards.

(4) He should arrange with the Stewards for speedy transport to any part of the course to give first aid to any animal which has met with an accident on the course.

Thus it will be seen that a Veterinary Surgeon may be called to give opinions on Veterinary matters or do veterinary duty covering a very wide field. He may be regarded as the Expert Adviser to the Stewards on all veterinary matters arising at the meeting.

Regarding the destruction of horses injured to such an extent on a race course that their recovery is in his opinion hopeless or treatment inadvisable, it is not necessary now under the rules of racing for the owner or trainer of such an animal to give his consent to the destruction, although whenever possible it is better for this to be obtained if it occasions no unnecessary delay. The rule regarding the destruction of race horses is Australian Rule No. 50, which is as

follows :—" In the event of any horse being so injured on a race course that the destruction of such horse, in the opinion of the Stewards, is advisable, in order to save unnecessary suffering, the Stewards may order such horse to be destroyed at the hands of a Veterinary Surgeon, or in his absence a Police Officer, or in his absence such other person as the Stewards consider suitable."

As a general rule nothing more than the usual first aid kit is required by the Veterinary Surgeon, excepting that in addition he should possess a Greener Killer or revolver for destroying horses, and should also have the necessary materials to enable him to take swabs or samples for chemical analysis.

The Taking of Swabs.

The Veterinary Surgeon may be called upon by the Stewards to examine a horse which they have reason to believe may have been "doped", and he may be required to take swabs of the animal's saliva. He should therefore have in his possession some clean cotton wool (clean in the chemical sense) some labels, sealing wax and some 1 lb. screw top jars to act as containers to hold the swabs pending chemical analysis. It is also advisable to give a pair of long handled forceps for use when taking the swabs. Any expense to the Veterinary Surgeon for the provision of these items is a matter for arrangement beforehand between himself and the Club, but most Race Clubs are only too willing to assist their Veterinarians in these matters.

In cases of suspected doping the Veterinary Surgeon should make a detailed examination of the horse, noting all abnormal appearances before taking his swabs. The result of this examination should be noted down in writing at the time. He should not trust to his memory in such matters. He may have to give evidence later regarding his examination, and his notes are valuable evidence and very often may save him an unpleasant cross-examination at the enquiry. He should also take a complete description of the animal so that he can, if necessary, identify it with certainty on any subsequent occasion. Having completed all these preliminaries, he can proceed to take his swabs, as follows: Take a large piece of cotton wool (preferably from about the centre of the roll, and preferably from a previously unopened roll), tear it up into at least three pieces each about six inches in diameter. Put one of these pieces away into a clean container. This piece has to be analysed to show that the cotton wool was chemically clean to start with, *id est*, it contains no alkaloids. This sample of the swab is used for the purpose of what is technically termed "blanking". One of the other pieces of cotton wool is then rubbed along the mucosa of the buccal cavity and is impregnated with saliva to the fullest extent. When taking a swab of saliva it is advisable to hold the swab tightly in a pair of long-handled locking forceps. A restive horse (and doped horses are usually very restive) may attempt to close his teeth upon the operator's hand, and in the struggle the swab might be swallowed by the animal. Accidents such as this have actually happened. If long-handled forceps are used such an accident is impossible. Usually one large swab is sufficient, but the other remaining piece of cotton wool may be used to take another swab after a reasonable interval. After taking, each swab should be divided into two, as near as possible, equal portions. One half of each swab should be sealed up in separate containers, labelled and signed by the Veterinary Surgeon and sealed by him. These can be handed to the accused if he expresses a desire to be supplied with samples. If he does not wish them it is unnecessary for them to be given to him, but in every case he should be given the opportunity either to accept or refuse them. The other half of each swab is

similarly placed, in a separate container sealed and labelled and signed by the Veterinary Surgeon. These together with container containing the "blank" cotton wool, are handed to the Stewards. The name of the horse, date, time of taking, and signature of the Veterinary Surgeon should be written on the labels. If more than one saliva swab is taken these should be identified by the numbers 1 and 2, or letters A and B, as well as the time of taking.

Whenever a swab of saliva is taken, and the accused requests that he be given a sample, always divide the swab, after taking, into two portions and give him one half. It is never advisable to adopt the procedure of taking two separate swabs one for the accused and one for the stewards. Such action on the part of the Veterinary Surgeon would not necessarily nullify the subsequent analytical proceedings and inquiry, but it is advisable for the correct technique to be observed.

Analysis of Swabs.

The analysis of the samples is a highly technical chemical investigation which must be conducted by a competent analyst, preferably a specialist, as few veterinarians possess the technical knowledge and laboratory equipment to conduct such an analysis. The Stewards or the Race Club will arrange for the analysis to be made. Swabs should be analysed without undue delay, as some alkaloids decompose fairly rapidly, and also because decomposition of the saliva may present difficulties with the analysis. Sometimes owing to the dryness of the mucous membrane of the mouth caused by the particular drug which has been used, it is difficult to get a copious sample of saliva. In such cases if the horse is kept under observation for a short time, say up to half an hour, and the sample taken then, it will be found that better samples can be obtained. It may be suggested that in order to induce a copious flow of saliva an injection of arecoline, or pilocarpine, or physostigmine could be given and after a short interval the swabs could be taken. Such a procedure is open to very grave objection, and is quite unnecessary. There is no objection, however, to the use of swabs moistened with distilled water, but if distilled water is used the "blank" swab should be saturated with it also, so that the analyst can satisfy himself that the distilled water contained no chemicals. A certain amount of the distilled water should also be retained and forwarded to the analyst in its original bottle for analysis. It will be found that as a general rule there is no necessity to moisten the swabs before using them, and the use of the dry swabs is recommended. Excessive dryness of the buccal mucosa should always be noted by the Veterinarian, as it is strong presumptive evidence that certain alkaloids may have been administered to the animal. It is not to be interpreted, however, as actual proof of the presence of "dope". The only reliable proof is for the presence of an alkaloid to be demonstrated in the saliva on chemical analysis.

Symptoms Seen in "Doped" Animals.

The principal drugs used for doping are Cocaine and Morphine derivatives, such as Heroin. These are used either in the pure state or in combination with other medicaments, or in combination with each other.

The action of heroin and of Cocaine on the horse is described in most text books on Veterinary Pharmacology, the symptoms shown by a horse under the influence of either of these drugs being as follows:

Heroin:—There is hyperexcitability, nervousness and muscular twitchings and contractions as though the horse was attempting to jump. The head is elevated and the eyes lively, while the nostrils are dilated. The respirations

are accelerated and deeper than normal. The heart sounds are violent and the beats may be 95 per minute. There are stamping movements with the feet, movements being almost ceaseless and disordered. The least noise, such as horses moving in adjoining stalls, may be sufficient to bring on suddenly spasms of prolonged and uncontrollable reflexes. The animal fights against restraint, pushes against walls and other objects, and seems to have lost the instinct of preservation, as it may crash into objects apparently without seeing them. The pupils are dilated to the extreme, and vision to be more or less abolished. The generalised contracture of the muscles and the automatic movements of the limbs gives the horse a strange appearance, somewhat resembling vertigo. Looked at from behind the tail is elevated, the gaskins swaying and the support uncertain. The animal may collapse as though exhausted. If the drug has been injected there appears at the site of injection a circumscribed area of sweating which gradually enlarges and persists sometimes for several hours. As the symptoms develop sweating becomes profuse, appearing first at the site of injection, then at the usual sweating points, and finally extending all over the body. Later the coat becomes excessively dry. The mucous membrane of the mouth becomes abnormally dry, in spite of which the animal usually refuses to drink.

Cocaine:—Symptoms of marked excitability as with Heroin, with irrepressible desire for movement with incoordination of gait. Dilated pupils and disordered vision. Profuse sweating and usually abundance of saliva with foam on the lips. The sweating is at first localised to the site of the injection, but it gradually extends over the body. The animal in its excitement may frequently neigh and stamp the feet. It fights against restraint, and owing to disordered vision it may crash into objects apparently not seeing them. In the general physiological action of Cocaine you can distinguish a double influence nervous and muscular. The cerebral reaction is predominant and the reflex excitability of the cord is only moderately exaggerated. In making an examination of a horse suspected of being doped it will be necessary for the Veterinary Surgeon to differentiate between the hyperexcitability and excessive sweating due to nervousness, and that produced by dopes. Also the clinical picture of a horse suffering from acute pulmonary congestion after a race may, unless the examination is carefully made, be confused with that of a horse which has been "doped".

The time taken for the first symptoms to appear after the administration of either alkaloid depends on the dosage and the method of administration. It is also influenced in all probability by the idiosyncrasies of the animal. As a general rule, after hypodermic injection, the first symptoms appear in from twenty five minutes to half to three quarters of an hour. Given orally, the onset of symptoms is much slower and very variable.

The drugs can usually be detected in the saliva as soon as excitement is shown by the animal. During the maximum period of excitement and for an hour or so afterwards, elimination by the saliva is well marked, but it gradually diminishes and terminates usually in from 36 to 48 hours administration. After 48 hours they cannot be detected with certainty in the saliva.

Care in Administration of Alkaloids.

Veterinary Surgeons in practice who prescribe for race horses should be very particular about prescribing or administering alkaloids to such horses if they are in full training and about to take part in a race. Australian rule of racing No. 162 (Clause J) deals with the administration of drugs to race horses

and is as follows: The Committee of any Club or the Stewards may fine, suspend, warn off, or disqualify, for any period they may think fit, or during their pleasure.....(J). Any person who shall at any time administer or cause to be administered for the purpose of affecting the speed, stamina, courage or conduct of a horse, any drug or stimulant whatever, except by permission of the stewards, and subject to such conditions as they may impose....."

It is therefore important for the Veterinary Surgeon to take measures in order that the good faith of owners, and others, shall not be falsely accused. To arrive at this end Hendrickx⁽¹⁾ has formulated this principle: "Every horse in whom chemical analysis reveals the presence of an alkaloid in the saliva at the moment of or shortly after the race shall be considered as having been "doped." In order to avoid exposing themselves to suspicion of "doping", owners, trainers and others would have to cease the administration of all alkaloids at least three days before the horse has to race. If an animal requires to be treated with alkaloids within that period, it should be scratched and not raced until elimination of the alkaloids has been completed.

REFERENCE

Hendrickx (1921) "Apropos du Doping". *Annals du Med. Vet.*, October, 1921, p. 401.

Obituary

Mrs. R. L. KAURA

We deeply regret to record the sad demise of Mrs. R. L. Kaura the beloved wife of Mr. R. L. Kaura, B.V.Sc., M.R.C.V.S., Deputy Director of Veterinary Services, Orissa, at Calcutta on the 19th December 1945. We convey our heartfelt condolences to Mr. R. L. Kaura.

B. K. DASAPPA, G.M.V.C.

We regret to record the untimely demise of Mr. B. K. Dasappa, G.M.V.C., Touring Veterinary Assistant Surgeon, Sambalpur, Orissa, on the 8th November 1945 at the prime age of 39.

Our sincere and heartfelt condolences to the members of the bereaved family.



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