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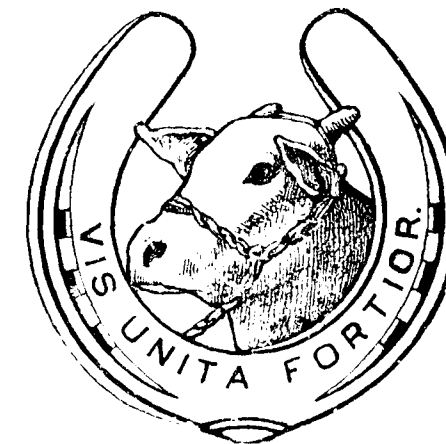
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PUBLISHED FOR THE ALL-INDIA VETERINARY ASSOCIATION

EDITOR:

SRINIVASA RAO, G.M.V.C.

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THE
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Vol. XXI

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No. 3

General Articles

**THE PERCENTAGE OF CONCEPTION IN THE ARTIFICIAL
AND NATURAL BREEDING**

By

J. D. SAMPATH KUMARAN, B.S.A., L.V.P. (Hons.) of I.A.R.I.
Express Dairy Ltd., Calcutta

Different views have been expressed regarding the breeding efficiency by artificial insemination. This is mostly due to want of a comparative statement. This article will deal with some of the authentic records from diverse sources. The success of artificial insemination depends to a certain extent upon the number of insemination required per conception. A clear picture therefore is an essential thing to appreciate this zootechnique.

Morgan and Davis (1938) considering the bulls of all ages mated to 2090 cows of all ages, found that 2.2 services were required per conception. Bulls under two years of age showed the smallest number of services per conception from two years to eight years of age the number of services varied but little, little information was available on bulls over eight years. Heifers under two years of age required more services per conception than any other age. Cows from two to thirteen years of age showed little variation in this respect. Two years old bulls mated to two years old heifers showed the smallest number of services per conception of any age combinations. The record of the Sahiwal herd of the Imperial Agricultural Research Institute, shows that young bulls under three years mated to two years and under two years old heifers required from 1.4 to 2.4 services per conception. Bulls above two years of age mated with cows above three years of age required from 2.0 to 4.1 services per conception. The above record covers a period over 36 years. The Missouri Experimental Station herd covering some 25 years and involving the

use of 21 sires show an average of 1.53 services per conception. Since February 1938, when this herd was divided into two equal groups, one bred naturally and the other by artificial insemination, with a total of nearly 100 cows settled in calf, the average number of services required per conception has been 1.56 for natural mating and 1.40 for artificial insemination. In Denmark the "Elite Breeding Society of Sams" in 1936-37 successfully bred over 1200 cows artificially. Two bulls were used and it is reported that the number of insemination per conception was 1.68, a lower rate than was required in natural services on surrounding farms. The total number of artificial insemination with successful pregnancies in Russia in 1938 was 1,500,000, approximately 5 per cent of all cattle in that country. It is further stated that the number of artificial insemination per conception was 1.9. In 1935, the average percentage for cows was 93.7. In the ewes in 1932, the percentage of conception was 82.4, which compares very favourably with the percentage of conception of 79.6 in 1,560,000 ewes served normally. Also in 1933 the percentage of conception in service in 31,911 Karakul ewes was 79.4. In 1935 the average conception percentage in the artificially inseminated ewes was 96.6. In some districts in Russia it is reported that the percentage was cent per cent. In the United States of America consolidated report for 17 States published in 1936 shows that the percentage of cows conceiving for the first insemination range between 40 and 80 and the average is 63.8. The number of services range between 1.20 to 2.5 and the average is 1.79.

The following are the individual reports:—

Davis (1939) obtained 66.7 conception in the first insemination; 21.5 in the second insemination; 7.6 in the third; 8.9 in the fourth and 1.9 in the fifth insemination. Sorenson (1938) 59.2 in the first insemination, Bonadonna (1939) obtained 60 to 80 in single and upto 90 with 2 or 3 inseminations. Anderson (1941) obtained 76.8 conception. Bell (1938) obtained 51.3 in the first insemination, Edwards et al (1938) reports that the semen collected from a bull in England were inseminated in Holland when the semen was 28 to 57 hours old to 26 cows out of which 8 conceived. From the semen which was sent from Holland 3 cows were inseminated in England and only one conceived. Cole et al (1939) artificially inseminated 121 cows in the vicinity of the North Central Sub-station at Grand Rapids Minn, and the results indicated that 1.77 inseminations were required per conception. Brady et al (1940) at Idaho Experimental Station obtained ram's sperm by electrical stimulation and inseminated 22 ewes, resulting in 16 conceptions. In the dairy cattle they had an average of 2.3 inseminations per conception.

CONCEPTION PERCENTAGE IN THE ARTIFICIAL & NATURAL BREEDING 139

The following is the work in India by the author:—

On 20th August 1939, through the Russian Model 'Artificial Vagina' semen was collected from a young bull named "Mudduram" whose dam was the Mysore Palace 'State Cow'. The amount of semen collected was only 2 c.c. On that particular day three cows T21., S110 and Q 45 were in heat. They were artificially inseminated. Pregnancy diagnosis based upon rectal examination was established in every case after the cows missed two successive heats after the insemination. All the three cows were, found conceived, and all the three gave birth to very healthy and strong calves during the month of June 1940. Further ten experiments with a total of 30 cows were inseminated artificially and 18 of them conceived for the first insemination. This gave a conception percentage of 66.7 in the first insemination. In the Imperial Agricultural Research Institute the first insemination was done to cow Lakhbila. The breeding history of this cow was rather bad. She was served ten times by different bulls before she conceived for the first time. In the second calving she took five services. For the third time, she was examined and *Trichomonas Bovis* was found, in the vaginal smears. Semen was collected from Bull Harihar and the cow was artificially inseminated on 13-12-40. The cow gave birth to a healthy calf on 2-10-41. Three more difficult breeders were inseminated with cent per cent success. (Plate No. 5).

In dealing with percentage of conception various factors have to be considered. Broadly speaking we may have three main divisions: the condition of the bulls, the conditions of the cows and heifers and thirdly the environmental factors. These different aspects when studied closely will indicate why there are fluctuations in the percentage of conception.

The seasonal variation in the percentage of conception from normal mating from 1925 to 1939 of the Pusa Sahiwal herd is as follows:—

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
No. of Services...	105	124	146	114	120	163	147	127	110	131	163	123
Conception...	46	39	70	55	51	71	58	48	38	56	54	43
Percentage of Conception	43.8	31.5	47.9	48.2	42.5	43.5	39.4	37.8	34.5	42.7	33.1	35.0

In dealing with the heifers estrus and service alone do not indicate the maturity or otherwise of the animal. It is interesting to mention here that there exists a delicate difference between puberty and maturity. Puberty is defined by Mirskaia and Crew (1929-30) as "that stage of individual development characterized by the ability to elaborate functional gametes, and by the physical ability to, and the desire to, play the appropriate role in mating. Maturity is that stage of individual development which is characterized by the exhibition of the maximum fertility ratio with reference to the conditions of husbandry that are present, and in the case of the female by the ability to produce viable offspring and to rear them. Puberty marks the completion of those processes of development which equip the individual for fruitful mating; maturity marks the completion of those processes of development which equip the individual for efficient reproduction." On the basis of the above definition it is quite possible that a number of heifers would have been served when they attained only puberty and maturity. In an extensive study made of the records of the Pusa Sahiwal Herd, it is also noted that there is a close relationship between the weight of the heifer and its age at the first successful service. Age of the heifer alone cannot be considered without due consideration to the weight of the heifer. The highest percentage of conception was obtained when the heifers were of 16 months age and the weight about 600 lbs.

The time of ovulation is also an important factor in fertilization. The following indicates the ovulation in the Indian breeds. The method adopted was to examine the ovaries per rectum every hour, six hours after the cessation of estrus. Out of 17 Amritmahal cows examined 12 showed ovulation and in 5 animals nothing was observed. Out of the 12 cows examined 7 showed ovulation in the right ovary, and strangely enough one cow showed ovulation in both the ovaries. All the cows which showed ovulation did not conceive but only ten conceived and delivered normal and healthy calves. The average time taken for ovulation was 11 hours after the cessation of estrus, the maximum was 19 hours and the minimum 7 hours after the cessation of estrus. At the Imperial Agricultural Research Institute, 8 Sahiwal cows were examined for ovulation in different seasons. Six of them ovulated. The cows which ovulated in the months of December and January took 16 hours. This apparent increase in time was perhaps due to the short estrus period in cold season, since the rest of the cows ovulated after an average of 12.4 hours. It was also observed that the heifers ovulated earlier than the cows.

BRUCELLOSIS IN INDIA*

By

J. B. POLDING

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Investigation of contagious abortion in India has been the subject of an Imperial Council of Agricultural Research scheme for a period of over three years and it has been observed that Brucellosis is by far the most common cause of this condition in Indian bovines. This article, therefore, has been written with the object of indicating what has so far been achieved in the study of this disease, as it occurs in the Indian subcontinent.

The investigation of Brucellosis in India, however, is not yet complete and in any case there is no limit to the amount of information that it seems desirable to acquire concerning so wide-spread a disease. In order, therefore, that Indian Veterinarians may have readily to hand, as much instruction as possible on the diagnosis and control of this disease, a series of appendices describing some useful technical methods have been prepared and are obtainable from the Director, Imperial Veterinary Research Institute, Mukteswar-Kumaon, U. P.

The bacterial subspecies responsible for Brucellosis in India

The genus *Brucella* is usually considered to contain 3 variants, or subspecies, viz, *Brucella abortus*, *Brucella melitensis*, and *Brucella suis*; nevertheless variants occur which are intermediate between any of these types. The host of predilection of *Br. abortus* is the bovine, of *Br. melitensis* the goat and *Br. suis* the pig. Occasionally these hosts may be interchanged and all variants may at times occur in almost any other animal, including man.

Up to the present time, 46 Indian *Brucella* strains have been secured by the writer. Of these, 22 have been typed as pure *abortus*; 18 as intermediate between *abortus* and *melitensis*; and 3 as *melitensis*. The remainder were either lost before typing or have not yet been typed. Table 1 shows the hosts of origin and the character of these strains. It is noticeable that only 3 *melitensis* strains and no *suis* strains have been encountered; and that of the 3 *melitensis* strains, one came from man, one from a goat and only one from a cow. It is also to be observed that all

* The Indian Journal of Veterinary Science and Animal Husbandry, Vol. XIII Part 1.

4 village strains are typed* as *abortus-melitensis**, from which it is tentatively suggested that the indigenous Indian *Brucella* strain is of this kind. It may also be seen from the table that organised dairy farms are about equally infected with this type and the imported English type *Br. abortus*.

Table I.
Indian Brucella strains.

Host	No. of strains isolated	Typed as		
		A	A/M	M
Dairy Cow ...	20	11	8	1
Village Cow ...	4	0	4	0
Buffalo (Dairy) ...	16	10	6	0
Goat ...	1	0	0	1
Horse ...	1	1	0	0
Man ...	1	0	0	1
Total ...	43	22	18	3

A = *abortus*, A/M = *abortus/melitensis*, M = *melitensis*.

It is not usually feasible to distinguish the variant responsible for an outbreak of Brucellosis without first isolating the strain involved. The more strains that can be procured, therefore, the greater will be the amount of information available on the character of Indian infections.

The susceptibility of Indian stock to Brucellosis

As has been previously stated, almost all the higher mammals can on occasion become infected with Brucellosis; but, as in India the commercially important animals are cattle, sheep and goats, the following remarks are confined only to these species. Nevertheless, because observations are almost always influenced and obscured by other factors, such as climate and animal husbandry, it is difficult at present to give reliable figures illustrating the relative susceptibility of even these animals. On the whole, however, the conditions in Military Dairies and such like farms do not differ widely throughout Northern India; hence a statement drawn from an aggregate of these is not unworthy of consideration. Again, although it is possible that their climate is on the whole less

* The term *abortus-melitensis* refers to an intermediate strain, exhibiting some characteristics of *Br. abortus* and some of *Br. melitensis*.

likely to favour the spread of Brucellosis the Punjab Grantee farms also merit consideration, as they are run on a system similar to that of the Military Dairies and they are probably the best available source of information on pure indigenous cattle. The following figures relating to such farms are abstracted from the records of this Institute.

Table II.

The relation between the incidence of Brucella reactors and the occurrence of European blood in Military Dairy Farms.

Military Dairy.	Percentage of crossbreds in herd	Percentage of Brucella reactors.
Allahabad ...	90	56
Ambala ...	82	45
Quetta ...	80	39
Lahore ...	17	24
Ferozepore ...	1	13
Average ...	54	34

Table III.

The relation between the incidence of abortion and the occurrence of European blood in Military Dairy Farms.

Military Dairy.	Percentage of crossbred in herd	Percentage of aborters.		
		All breeds	Cross breeds	Indigenous breeds
Allahabad ...	90	42	45	20
Ambala ...	82	25	27	16
Quetta ...	80	30	33	17
Lahore ...	17	10	4	11
Ferozepore ...	1	10	0	10
Average ...	54	23	21.5	15

The term 'aborters' refers to animals with a history of abortion present in the herd at the time of a single random observation.

The figures in Tables II and III tend to show that the higher the proportion of European blood in a herd, the higher is the incidence of infection in all classes of animals.

Table IV.

The percentage of aborters present at a single random observation in the classes of stock indicated.

Class of animal.	No. of animals observed.	Percentage of aborters.
Crossbred stock of 15 Military Dairy Farms	1,333	16.0
Country-bred stock of 13 Military Dairy Farms	164	7.5
Buffaloes of 15 Military Dairy Farms	1,880	5.0
Indigenous cows not in contact with crossbred cattle (Northern India.)	4,495	3.5
Buffaloes not in contact with crossbred cattle (Northern India.)	895	3.5
Buffaloes in special environments (1 farm).	281	15.5
Indigenous cows in special environments (3 farms).	502	3.5

Northern India is taken to be the territory north of a line drawn from Bombay to Calcutta, Bengal and Assam excluded.

From Table IV it will be seen that:—(i) the largest number of abortions occur in the crossbred stock of Military Dairies, (ii) the rate of abortion in the country-bred stock of Military Dairies is about half of that in crossbred stock, (iii) the abortion rate in the buffaloes of Military Dairies is rather less than that in the country-bred stock in the same establishments, (iv) the abortion rate is about equal in country-bred stock and buffaloes when neither is in contact with cross-bred stock, but, at the same time, is less than that in the same sort of stock when it is co-habiting with crossbred animals. The last two categories listed in Table IV require some discussion. The special environments mentioned are the conditions of animal husbandry in and around Bombay. These conditions will be discussed more fully in a later section, and it is sufficient to say here that buffaloes in this environment show a startling increase in the rate of abortion as compared with the rate in the Punjab, whilst cows in the same environment show the same rate as for Northern India. The numbers recorded in these classes are small, especially in the case of buffaloes, as figures are difficult to obtain from many Bombay farms. Nevertheless, many additional farms have been examined and in the absence of records the general impression received supports the figures shown in the table. It is concluded, therefore, that when buffaloes are removed from their natural environment, they become much more susceptible to Brucellosis than similarly moved indigenous cattle. Indeed, in these circumstances, their susceptibility perhaps reaches or even surpasses that of the crossbred cows of Northern India.

There is some evidence to show that either the susceptibility of Indian cattle is decreasing, or that better methods of animal husbandry are limiting the spread of Brucellosis. Table III was constructed from records made during the period 1924 to 1929 and Table IV from figures collected from 1939 onwards. It is noteworthy that the average number of abortions in the former table is greater than that in the latter. Again, the annual reports of Military Dairy Farm show a progressive decrease in abortions from all causes during the years 1932 to 1939. Lastly in 1923, mean number of abortions present at a single random observation on 5 Punjab Grantee Farms was 3 per cent of the 1264 animals observed, while at the time of the writer's visits in 1939, this figure had fallen to 1 per cent of 835 animals. If this decrease is indeed due to a reduction in susceptibility, it may only represent a phasic decrease, but if it is due to better animal husbandry then the decrease is likely to be permanent.

The susceptibility of various classes of stock to repetitions of abortion is shown in Table V.

Table V.

The likelihood of repeated abortions in various classes of Indian stock.

Class of stock.	Percentage of animals aborting.				Average expectation of loss of calves per aborter.	Population observed
	Once	Twice	Thrice	Four times		
Crossbred cows	79.5	17.5	2.5	0.5	1.24	198
Country-bred cows	90.0	9.0	1.0	0.0	1.11	75
Buffaloes	90.0	10.0	0.0	0.0	1.10	91

Assuming that the percentage abortions shown in Table IV are correct then amongst 100 crossbred cattle 16 may be expected to be aborters and their total loss of calves would be $16 \times 1.24 = 19.84$ calves. The same figures for countrybred cows and buffaloes work out at 8.33 and 5.5 respectively, and by making the last figure unity, the preceding figures would be 1.5 for country-bred cows, and 3.5 for crossbred cows. Thus, susceptibility to abortion amongst buffaloes, country-bred cows and crossbred cows is 1 : 1.5 : 3.5. Applying the same calculation to buffaloes in special environments, their susceptibility figure works out at a little over 3.

The susceptibility of sheep and goats to the Brucella types extant in India appears at the present time to be small but the final word has yet to be said on this subject.

Incidence of Brucellosis in India

(i) *On organized farms.* It is not proposed to give a list of places in India where Brucellosis is present, it being sufficient to state that this disease can usually be detected on almost any organised farm in the country. It may also be added that where European blood is present and conditions of animal Husbandry are favourable the annual average loss of calves will be in the neighbourhood of 3 per cent. In well-run indigenous herds in good climates on the other hand the average loss may be less than 1 percent while in thoroughly bad conditions the annual loss of calves amongst any type of animal may be as high as 25 per cent.

(ii) *In village or desi cattle.* It is impossible to give accurate figures for actual abortion rates amongst village cattle as no records have been kept. It is probable, however, that Brucellosis in this class of stock is common in Bengal and Assam; it is certainly common in Orissa, eastern and central Madras, in the eastern and central parts of Central Provinces, and in the south-eastern parts of Hyderabad State. It appears to be rare on the Deccan plateau. The survey of villages north of the line from Bihar to Bombay is not yet complete.

Conditions governing the spread of Brucellosis in India

It is, of course, quite impossible to assess accurately all the factors affecting the spread of Brucellosis, but the following are probably the most important in India: (1) the magnitude of existing reservoirs of infection, (2) the magnitude and direction of cattle movements, (3) the prevailing conditions of animal husbandry, (4) the climate and (5) the phasic susceptibility of animals. It is the writer's opinion that, when factors (3) and (4) are favourable, the magnitude of existing reservoirs, even when cattle movements are considerable, is insufficient to cause a large increase in abortion in India. The gravest possible cause of increase in sources of infection would be, undoubtedly, an increase in the proportion of foreign cattle or an increase in cattle movement from villages on the Eastern Seaboard of the Indian peninsula. There is also danger of a further spread of infection from an increase of cattle movements from a few special areas such as Calcutta or Bombay. Actually, at the present time, where animal husbandry has been improved or is improving and the climate is good, the existing reservoirs seem hardly sufficient to maintain themselves. When conditions of animal husbandry and climate are bad, however, the smallest reservoir is probably sufficient to spread infection. As regards animal husbandry, at present there seems to be no evidence that ill-balanced cattle feeding *per se* plays an important role in the spread of Brucellosis. Indeed, it is well known that some of the best-fed herds are the worst infected. Nevertheless, it is believed that the contamination of food, especially cut green fodder, by animal secretions may play some part in the spread of this disease. The branch of husbandry that is most likely to affect the spread of Brucellosis in cattle is, undoubtedly, the hygienic conditions of the

animal's environment. Animals kept in semi-ranch conditions or in sanitary quarters with proper drains and maternity wards are obviously less exposed to infection than those that are not. With regard to climate, it is obviously much easier to keep quarters hygienic in sunny, dry climates than in places with less sunlight and a high rainfall. Indeed, it is believed that one of the most important factors affecting the spread of Brucellosis is humidity and lack of sunlight, a belief based on the following considerations:—

(1) The exposure of the Brucella organism to direct sunlight results in automatic sterilization within an hour or two. (2) In general, sun-baked surfaces are more easy to keep clean than those that are wet or muddy. (3) In dry climates animals can usually spend more of their time out-of-doors and this avoids the danger of overcrowding. (4) In good weather there is less likelihood of animals becoming chilled.

Weight is lent to the validity of this belief and to the importance of hygienic surroundings by the following observations:—(1) The diminution of infection in the Punjab Grantee herds during the period that they have been self-contained, well-managed units, run on semi-ranch conditions. (2) The diminution of infection on the Military Dairy Farms, which runs parallel with the improvement of buildings and the erection of maternity wards in these institutions. (3) The distribution of village infection in South India, which is in general greatest on the humid east coast and least on the arid Deccan Plateau. (4) The fact that during the four rainless years at Hissar, abortion in the Government Farm was 50 per cent less than in the previous six years of normal rainfall. (5) The extraordinarily high incidence of infection in buffaloes in farms around Bombay.

Item (5) requires a little elaboration. In a certain buffalo farm near Bombay, the annual abortion rate for the last 5 years has been 25 per cent of the total breeding stock. This is by far the highest abortion rate yet encountered in India; much higher indeed than the highest rate observed amongst delicate European stock and some explanation of this unusual state of affairs is needed. Apparently, the reason is that in this part of the country buffaloes breed seasonally, i.e., the majority calves in the *post-monsoon* month of September. Animals, therefore, are liable to abort from May onwards. Actually, however, most of the abortions occur in August and the wave of abortions coincides with the occurrence of the monsoon, during which all animals are closely confined, sometimes for weeks on end in warm, humid stables, some of which have mud floors. It is hardly surprising, therefore, that in these conditions a disease should assume exceptional proportions.

The last factor thought to affect the spread of Brucellosis is phasic susceptibility but, owing to the short duration of the present researches, it is not possible as yet to estimate the importance of this influence.

The diagnosis of Brucellosis

Two methods of diagnosing Brucellosis are described in detail in the appendices but this opportunity may be taken to clear up some misconceptions concerning the Brucella agglutination test.

The fundamental facts governing the use of this test are probably as follows. Shortly after its invasion by Brucella, the host develops a response which is detectable by the agglutination test. Unfortunately this response is often inconstant in degree, time of appearance and duration. This inconstancy is probably governed by the time of ingress of infection in relation to pregnancy, and by the amount of hold the infection is able to gain over the host. Experimental records have enabled reactors to be divided into two classes, viz. 'constant reactors' and 'inconstant reactors'. The 'constant reactor' responds within a short period after infection by producing in its serum a high agglutinin titre and this persists for several years subject to a slow over-all decline. The 'inconstant-reactor' responds with a low fluctuating serum titre, which may appear, disappear and reappear at irregular intervals for several months after infection. Experimental observations engender the belief that in an average outbreak of Brucellosis 50-60 per cent of infected animals will be 'constant' and 40-50 per cent will be 'inconstant reactors'. It follows that if all infected animals are tested once at random, all the 'constant', but only a few of the 'inconstant reactors', will be discovered; or in other words a single random test will have an accuracy of not more than 60 per cent. In the same way, a single random test of an infected individual animal will only reveal infection in 60 out of 100 cases. On the other hand if it is possible to test all infected animals once weekly during the year succeeding infection, then during one or other of these tests almost all 'inconstant reactors' will be in a reacting phase and consequently almost 100 per cent of infected animals will be detected.

However, it is seldom possible to test herds more often than once in six months, if as often, and it follows that some 40 per cent of infectious animals are escaping diagnosis. For this reason, any system of eradication based on infrequent tests is doomed to failure. There is experience with well regulated European herds which in spite of being tested every six months, with vigorous disposal of reactors, still show fresh reactors at succeeding tests. Such systems of testing will minimize but rarely eradicate infection and when, as is often the case, they cause great inconvenience, they seem of little practical value, especially if equally good results can be obtained in other ways.

The value of the agglutination test is, therefore, limited and its chief use is to diagnose Brucellosis as the cause of an outbreak of abortion and to give some idea of its extent. Consequently, when an abortion enzootic occurs, all or at least a representative number of the herd should be tested

and if the result confirms the diagnosis of Brucella infection, the appropriate steps for its control can be inaugurated. This apart from experimental and other special work such as vaccination, appears to be the beginning and end of the usefulness of the test.

Control of Brucellosis in India

From what has been said above, one method of control of Brucellosis in India becomes at once apparent, viz. a system based on the practice of hygiene. Such a method is fully explained in Appendix VI and in the same appendix reasons are given for the discontinuance of systems based on test and slaughter, test and disposal, and test and segregation.

Another system is becoming increasingly popular overseas, namely vaccination, but as its practice has only lately been taken up seriously in India, it is not yet possible to give details of the method. For general guidance, however, it may be said that the method of vaccination at present in vogue consists of a single subcutaneous injection of 5.0 c.c. of a saline suspension of low virulent strain of Brucella organisms. The most suitable subject for vaccination is the calf or the heifer and vaccination is mainly recommended in badly infected herds maintained under adverse conditions. In certain circumstances adult animals can be vaccinated. At present, nothing can be said as to the duration or degree of protection offered by this form of immunisation in India but from reports of overseas experiments it appears that, given the right circumstances, an annual abortion rate of say 20 per cent. can be reduced to about 3 per cent. Up to the time of writing, between two and three hundred animals have been vaccinated in India, and so far no unfortunate sequelae have been observed. The immediate reaction to the injection is a slight rise of temperature on the second and third days, together with a local swelling at the site of injection which is rarely larger than a man's hand and which disappears completely in a week or 10 days.

ACTIVITIES OF CIVIL VETERINARY DEPARTMENTS IN BRITISH INDIA

By

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The main duty of a Civil Veterinary Department is to prevent and control the outbreaks of contagious diseases among domesticated animals, to provide veterinary aid to the wounded and diseased animals, to castrate such animals as are considered unsuitable for breeding purposes and to conduct research in veterinary science. The Punjab, Bengal, Bihar,

Bombay and Madras provinces have their own institutions to impart veterinary education. Animal husbandry work is also entrusted to these departments in some of the provinces and Indian States. Wherever possible inspection of meat and ponies plying for hire are also done by the veterinary assistant surgeons. From Appendix I it will appear that the Punjab is leading other provinces in veterinary activities.

Prevention and control of contagious diseases:—Epizootic forecasts are generally issued by these departments to warn cattlemen against the danger of seasonal occurrence of diseases. As soon as an outbreak of a contagious disease is reported prompt attention is paid by the staff of the Civil Veterinary Department and necessary steps are taken by them to control such diseases. Animals are inoculated with antisera and vaccines to check the spread of contagion to adjacent areas. Serum inoculations against anthrax, rinderpest, haemorrhagic septicaemia and black-quarter have achieved marvellous results. Systematic vaccination of cattle with 'goat-tissue' virus against rinderpest has become a daily routine and the inoculation work saves millions of cattle every year. Mortality records are also kept by these departments as far as possible.

Hospitals and dispensaries:—The number of Veterinary hospitals and dispensaries in British India during the year 1938-39 was 1,079, of which 29 per cent were in the Punjab. These institutions are placed in the charge of qualified veterinary assistant surgeons and serve as centres for providing veterinary aid. They are usually financed from local funds and do not, generally speaking, charge any treatment fees.

Veterinary research:—Professors and Lecturers of Veterinary Colleges, Veterinary Investigation Officers and Assistant Disease Investigation Officers (poultry) in the provinces and Indian States and all the members of the Imperial Veterinary Research Institute (Mukteswar-Izatnagar) are engaged in research work. Problems relating to animal diseases, nutrition and genetics are paid special attention by the experts.

The Imperial Veterinary Research Institute (Mukteswar-Izatnagar) is the first central research laboratory, which was established towards the end of 1890 at Poona (Bombay Province). Dr. Alfred Lingard, a distinguished medical man, was the first officer in charge (then called Imperial Bacteriologist). After his retirement in 1907 the post has been held by veterinarians. In 1893 the laboratory was shifted to Mukteswar in the Kumaon Hills (United Provinces). Twenty years later, a sub-station was opened at Izatnagar (United Provinces) and this branch is now, if anything, larger than the parent branch at Mukteswar.

The Institute is one of the foremost veterinary institutions in the world. It is spread over more than 3,000 acres of land (including some forest land at Mukteswar) and about 1,200 persons are employed on various types of work.

The annual expenditure comes to about Rs. 7 lakhs against the receipt of about Rs. 5 lakhs. The Institute consists of various sections *viz.* Pathology and Bacteriology, General Disease Investigation, Veterinary Zoology, Animal Nutrition, Poultry Research and Biological Products. The addition of an Animal Genetics Section is expected in the near future. There are in addition certain service sections *viz.*, Estate, Veterinary, Engineering, Medical and Administrative.

The Institute carries out investigations on the diagnosis of diseases, gives advice to field workers and assists in the control of special epizootics throughout the country. Indian insect pests and parasites, animal nutrition, poultry management and breeding and the minute details of every affection that animal flesh is heir to, are studied by qualified and experienced research workers. In many cases causes of serious diseases have been elucidated and specific antisera and vaccines successfully manufactured and issued in larger quantities for the prevention and control of certain infectious diseases of domesticated animals. Apart from work under direct financial aid from Government, a number of special schemes financed by the Imperial Council of Agricultural Research are run under the supervision of the Director of the Institute.

Enormous quantities of sera and vaccine for the prevention and control of rinderpest, anthrax, black-quarter and haemorrhagic septicaemia are manufactured every year. Other products of the Institute are bovine and equine abortion vaccines, anthrax spore vaccine, fowl cholera serum and vaccines, mixed streptococcic vaccine, fowl-pox vaccine, tuberculin, mallein, rinderpest bull virus and rinderpest 'goat-tissue' virus. It may be mentioned that these sera and vaccines save millions of cattle every year from premature deaths. Obviously the Institute is rendering a great service to the Indian livestock industry.

The Institute also conducts post-graduate courses. Many years ago a 3-months Veterinary Graduate Course was started for disseminating more advanced and up-to-date knowledge of problems connected with animal disease and modern methods of treatment. Recently two other courses have been introduced, *viz.*, Poultry Husbandry Course of 4 months and Advanced Animal Husbandry Course of 8 months.

Veterinary Education:—There are five recognised Veterinary Colleges in India which are financed by the provincial Governments. These are:—

1. Bengal Veterinary College, Calcutta.
2. Bihar Veterinary College, Patna.
3. Bombay Veterinary College, Bombay.
4. Madras Veterinary College, Madras.
5. Punjab Veterinary College, Lahore.

Of these the last two institutions are affiliated to the local Universities for awarding the degree of B.V.Sc. (Bachelor of Veterinary Science), while other three Colleges have only diploma course in addition to the degree classes. Post-graduate courses are conducted by the Punjab, Madras and Bihar Veterinary Colleges and the Imperial Veterinary Research Institute. All these Institutions have qualified and experienced staff, well equipped laboratories and up-to-date veterinary hospitals. On the 31st March 1943 there were 624 students on roll in different classes of the five Veterinary Colleges. The annual expenditure on these Colleges amounted to Rs. 7,14,498 against the income of Rs. 1,95,557, during the year 1942-43 (See Appendix II)

Animal Husbandry:—Animal husbandry work is entrusted to the Civil Veterinary Departments in some of the provinces and states, such as in the North-West Frontier Province, Baluchistan, Punjab, Delhi, Ajmer-Merwara, Central Provinces and Madras Province. In these areas the livestock research stations and farms as well as the village breeding operations are supervised by the members of the civil veterinary departments. Poultry keeping and dairying are also looked after by these departments in some of the tracts. In the United Provinces, a separate Animal Husbandry Department has recently been started.

Quarantine Stations:—In India, except a few enactments, there are no legal sanctions for the control of bovine contagious diseases. The infection, therefore, spreads easily from one locality to another by the free movements of cattle. In the Central Provinces, however, quarantine stations are established under the Central Provinces, Cattle Disease Act XVI, 1934 in the Saugor and Hoshangabad districts, which are placed under the control of the Director of Veterinary Services. All cattle entering the Central Provinces from the north must pass through these posts where every animal is thoroughly examined by a qualified Veterinary Assistant Surgeon. The sick and incontact animals are detained and others are vaccinated against rinderpest. They are then branded and granted a permit to pass the provincial boundaries. The officers of the Veterinary, Revenue, Police and Forest departments check the animals after they have entered the province. Persons contravening the provisions of the Act and the Rules are liable to prosecution. A vaccination fee of annas four per head is charged which is more than enough to cover the cost of running these stations.

The results are encouraging and there is a considerable decrease in the number of outbreaks of rinderpest in all the northern districts and Chattigarh division which receive their supplies of cattle through these stations. If similar steps are taken in other provinces and States the cattle mortality in the country will be considerably reduced.

Appendix I.

Working of the Civil Veterinary Departments in British India (1938-39).

Province	Expenditure (Rupees)	Receipt (Rupees)	Staff (Sanctioned cadre)			Institution				Veterinary aid given		
			Superior	Subordinate	Total	Research Institute	College	Dairy & Live Stock Farms	Hospitals and Dispensaries	Cases treated	Castration performed	Inoculations done
Ajmer-Merwara	9,594	1,139	1	—	1	—	—	—	3	8,439	975	2,319
Assam	3,37,748	27,068	2	73	75	—	—	—	3	1,83,074	31,300	2,87,142
Baluchistan	51,950	51,950	1	24	25	—	—	—	10	85,899	579	1,196
Bengal	4,15,814	1,57,358	14	198	212	—	—	—	50	3,58,601	8,925	2,54,666
Bihar	4,34,593	1,90,393	13	104	117	—	1	1	30	5,49,664	1,15,826	6,16,720
Bombay	5,63,517	41,271	11	153	164	—	1	—	120	3,21,520	52,470	1,30,466
Central Provinces and Berar	1,70,706	56,625	8	170	178	—	—	6	106	6,83,601	80,774	5,94,049
Coorg	23,572	83	—	6	6	—	—	—	8	76,473	1,608	2,749
Madras	12,85,294	1,02,406	26	231	257	—	1	—	118	4,88,971	93,400	7,49,319
North-West Frontier Province	2,56,890	12,366	4	63	67	—	—	—	71	4,21,112	1,02,892	97,667
Orissa	1,01,264	21,533	2	39	41	—	—	—	30	1,89,021	29,378	2,06,185
Punjab	17,57,278	2,42,673	43	436	479	—	1	7	314	25,26,570	6,36,255	12,64,917
Sind	1,71,874	23,764	3	36	39	—	—	—	24	1,47,417	4,752	11,873
United Provinces	5,08,115	1,40,414	5	250	255	—	—	1	192	6,62,439	1,25,571	5,40,950
Imperial Veterinary Research Institute, Mukteswar and Izatnagar	6,52,423	5,41,024	27	36	63	1	—	2	—	—	—	—
Total for British India	67,40,632	16,10,067	160	1,819	1,979	1	5	17	1,079	67,02,801	12,84,705	47,60,219

Appendix II.

Veterinary Education in India (1942—43).

Institution	* Students	Teaching staff †			Patients treated ‡	Receipts Rs.	Expenditure Rs.
		Gazetted	Non-gazetted	Total			
1. Bengal Veterinary College	153	8	6	14	101.5	62,326	1,92,557
2. Bihar Veterinary College	119	7	9	16	11.5	28,286	71,648
3. Bombay Veterinary College	77	6	2	8	112.0	15,636	86,923
4. Madras Veterinary College	118	8	10	18	88.5	30,236	1,33,155
5. Punjab Veterinary College	157	13	11	24	96.0	59,073	2,30,215
Total	624	42	38	80	409.5	1,95,557	7,14,498

* On roll on 31—3—1943.

† Sanctioned strength on 31—3—1943.

‡ Average number of patients treated daily in the college hospital.

AGRICULTURE AND ANIMAL HUSBANDRY IN BENGAL

By

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The importance of Bengal as an agricultural province is not unknown. About eighty per cent of its total population earn their livelihood from cultivation and the rest of which are entirely dependent upon the income of the former. The cultivators of Bengal, to tell the truth, help much to supply food for crores of people of the country and it is through their hard labour that the improvement of agriculture and industries effects. The modern civilisation takes its new form day by day with the help of cultivators. So, there is no exaggeration to say that they are the nucleus of the country. But the condition of the so called agriculturists of Bengal are so precarious that if quick efforts to ameliorate it are not taken, they will surely die in future. The Zamindars and Capitalists of the country have up till now earned lots of money from the poor rayats with the help of legislature and have spent the money for merry makings. This is the basic cause of downfall of agriculture in Bengal. It is more than a century since the moneyed men of villages began to live in towns keeping the modern civilisation in front and the poor cultivators behind. Consequently, the latter were made to supply resources for the farmer's ease and comfort and were entirely left to the tender mercies of their oppression and to various malignant maladies. The Zamindars of Bengal in return for crores of money having collected from the poor cultivators, did nothing practically for their benefit. However the illiterate cultivators cultivated the lands to the best of their age-old system which could never supply the net requirements for the rising population of India. On the other hand, various industries were once a pride of India. The foreign cotton mills were ashamed to know the fame of fine cloths and Muslins of Bengal. But it is a matter of regret that these industries have almost disappeared not only due to the fact that several Acts came in force at that time such as British Free Trade, Factory Act and Customs Duty etc, but due to irresponsibility of the worshippers of modern civilisation as well.

In order to take up reconstructive measures for the welfare of the cultivation and animal husbandry, the rayats should be relieved from various superstitions, unfrugality and from other such vices by wide propaganda and education. The domesticated animals belonging to them require special care and attention for improvement. Because mechanised system of cultivation in our country is of no use. His Excellency the Governor General of India stated in the sitting of All-India cattle Show Society at Delhi on the 1st September 1943, 'In this immense agricultural country which feeds the largest population of the whole

world, almost every seed that germinates owes its debt to the work of cattle in ploughing up the soil every grain that is carried to the market to feed the urban population is carried by bullock transport'. But it is an astonishing fact that the so called important cattle of Bengal have got little or no capacity practically. One proverb says, 'The man who has got cattle but unworthy for work has to suffer long.' According to Dr. MacLagan Gorrie's statement, India can claim for her rising population 170 million acres of fresh land for cultivation. This is surely a great help to the success of 'Grow more food campaign'. But before the onset of cultivation of such huge tracts of land the poor creatures before the plough should be improved for easy achievement of success. Each cultivator of Bengal brings up numbers of cattle with a view to make a show and to have benefit from it. But they never care to supply their proper feed and to make hygienic byre. As a result of that the indigenous type of animals always loiter in the streets and fields in search of a morsel of fodder and gradually being reduced to skeleton fall under the prey of various pestilences. This is another cause of economic distress of Bengal Peasants.

The Western Provinces of India are more forward than Bengal to build up a better type of animals. But still the per capita consumption of milk of those places is lower than the actual need. The improvement of Animal Husbandry in Palestine is a matter of thrill to us. The problem of abode of the oppressed Jews have not been solved as yet, but in the meantime they have astonished the world to breed a better type of animals. The system of animal industry in Russia gives sufficient impetus to the Bolshevist statesman to fight the enemy. They are getting lakhs of animals of higher capacity with the help of artificial insemination only. It is really a fact that the actual power of the state remains on an improved form of agriculture and animal industry. On the face of earth every nation tries to preserve always its own speciality and independence in tact and thereby the stronger one predominating over weaker ones proves the Darwin's conception 'Survival of the Fittest'. But the peasants of Bengal are so weak that they are quite unfit to keep pace with the present war for existence. Their only help is a pair of bullocks which cannot work more than a few hours and the cows cannot yield more than half to two pounds of milk a day. So to strengthen the foundation of the nation, every one of the country should come to the field to improve the present status of agriculture and animal industry. They should well understand that the philosophical thoughts are not possible with an empty belly.

During this day of food crisis, the domesticated animals can help much to solve the problem. It has been a tendency of the rural people to live in towns leaving their villages. So in consequence of that they are totally deprived of ample supply of fresh and nutritious vegetables.

Thereby the urban people have to insist upon concentrate diets to keep their health. Ultimately the question of regeneration of cows comes to supply the need. A cow can be designated as a living machine to convert raw materials to a most delicious finished product called milk. This is the only food which can nourish the nation. The life process of a man whether an eminent statesman of the country or a kooli of the street wants milk to meet the waste. But the production of such an important diet of Bengal is according to Dr. Norman C. Wright's report 3.1 per head and the per capita consumption is 1.9. This figure is so poor that cannot supply even the fraction of net requirements of the body which needs 15 to 30 ounces a day to fill up the waste. So to maintain the general health of the public more supply of milk is necessary.

Co-operative process is the best way to effect improvement of cultivation and animal industry. But the cultivators of Bengal are not acquainted with this system. So they should be given all instructions by propaganda and proper education. In this connection it is most essential to include a little chapter about the above subject in the syllabus of Primary and Secondary Schools.

The land of Bengal has become defertilised by degrees in the hands of illiterate rayats. So to solve the problem and to keep the potency of the seeds, they require proper instructions immediately. It has been noticed that the cultivators prepare manure according to their age-old system from cow dung, weeds, grasses and from other rubbishes which they heap in a haphazard way in the sun. Consequently they lose the principal matter of manure. So, to prepare good manure in a simplest way, the above articles with the urine of animals should be heaped under a thin shade, where water cannot stagnate. This prevents evaporation of nitrogenous matter in the manure. The process of preparing 'Indore compost' possibly the best kind of manure, is a little complex for the untrained rayats of Bengal. But with the help of wide and actual demonstration among the cultivators the process may become easy. Water-hyacinth is also a great source to have nitrogenous substance for the growth of plant life and for the nutriment of milch cows. And it is a fact that in Bengal the dissemination of this plant in the stagnant pools and brooks, is increasing with amazing rapidity. But the "Man behind the plough" who is solely responsible for the work should be educated properly so that he can well-utilise the most important substance both for the soil and for the poor creature. To anticipate improvement of cattle industry, cultivation of fodder crops is of urgent necessity. Because in Bengal, the most populous province it is impossible to procure land for preparing pasture field for animals. Hence the cultivation of Napier Grass; Guinea Jowar, Bazra and Berseem (Egyptian clover) etc. are recommended for the animals. The cultivators may prepare silage (scientific storage) from green grasses during

monsoon. If a silage be prepared in a pit measuring about 14 ft. circumference and 32 ft. depth, then about 25 animals can be fed from the silage (stored grass) for six months in summer. But this process is quite unknown to the cultivators of our country.

To sum up the whole problem for reconstruction and regeneration of animal husbandry, several points are given below:—

(A) The cultivators as a general require sufficient instruction and influence by wide propaganda and actual guidance.

(1) They should learn the process and methods of co-operation and should begin cultivation with the help of it. Co-operative milk business can be easily organised among themselves if they are properly educated. This enterprise would help better marketing and improvement of animal industry.

(2) It is a well known fact that the cultivators bring up numbers of animal of an indigenous type, which is a sort of burden on them. So they should discard the bad ones. Then the good dams should be bred with the high yielding sires.

(3) The newly born progenies require supply of good and nutritious fodder. To succeed in this, they should cultivate fodder crops and prepare silage from it during monsoon.

(4) The filthy and unhealthy byres should immediately be improved. The rayat never cares to build up a clean and hygienic cow-shed. So it is necessary for them to change this bad principle without delay.

(5) The owners of animals are always in the habit of believing various superstitions regarding prevention of cattle outbreaks. In order to way off this vice, they should depend upon the activities of the Government instead of taking shelter under quacks.

(B) The next importance regarding solution of the problem is to build up Mixed Farms all over the Province. The Zamindars and Capitalists can help much in this enterprise. Having collected sufficient land for it they should begin cultivation at a bigger scale. The animals in it having improved by the aforesaid method, should be distributed or sold at a legitimate price among the neighbouring cultivators. This would help much to regenerate the animals of cultivators. They can apply the same principle to improve other animals such as goats, sheep, and poultry etc. and at a time they can facilitate the improvement of animals and can earn lots of money from business. On the otherhand, cultivation of fodder crops may become easy among cultivators if the wise farmer would sell or distribute the cuttings and seeds of Napier, Guinea, Jowar etc., to the local cultivators. In this way if the farmer, if he is a well wisher of the country can do much for the campaign of rural uplift.

Every cultivator of Bengal is a more or less Mixed Farmer. So if proper education is imparted to them with the light of science, they can prepare various valuable bi-products from agricultural produce and thereby the ways of sending crores of money from India can be totally stopped. It is therefore, a call to the capitalists of the province who invest money for getting interest only and while away their valuable time for enjoyment to come to the field for the welfare of the country.

BARLEY SILAGE

BY

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The Birla Dairy Farm at Pilani, Jaipur State is engaged in investigating silage as prepared from barley and closely related crops. A part of this experiment involves work done with barley crop and owing to the apparent excellent quality of the silage, it has been deemed advisable to publish some of the results of this experiment. Many of the farmers in the foreign countries who ensile corn, sorghum, sunflower, soyabean, cowpeas and other legumes and grasses, seem to discard barley as a silage crop since the stem is hollow and that considerable difficulty will arise in getting rid of the imprisoned air in the hollow stem. The experiment done here gives quite a different picture.

Barley (*Hordeum vulgare*) was introduced into the Jaipur State recently. Only under irrigation it is produced in these parts. The sandy and friable loam of these parts is favourable for its cultivation. Since the State of Jaipur suffers considerably from inadequacy and uncertainty of rainfall, which is never above 20 inches and in the major part of the state below 15 inches, it is not possible to cultivate barley as a dry crop.

The livestock of the State depend very largely on the Bajra (*Pennisetum typhoides*) and Jowar (*Sorgum vulgare*) straw. Next in importance though not in quality is the dried leaves of Ber (*Zizybus zizuba*) which is found as a weed in the cultivated and jungle areas. The dried leaves are usually mixed up with the dried fruits, thorns and sand. The feeding value of these is very very doubtful. So far no attempt has been made to analyse the chemical composition to judge its nutritive value. The cost of either bajra or jowar straw ranges from 12 annas to one rupee a maund and the dried leaves of 'hee' which is known as 'Pala,' ranges from one rupee to rupee one and annas eight per maund.

The following table shows the cost of producing Barley. It will be observed that the charges of irrigation are the highest. This is due to the fact that water is got from deep bore-wells and the electric current charges are fairly high. In a semi-desert condition even this much of facility is a mighty boon.

Cost of Producing 400 Maunds of Silage (Barley) From 10 Bighas of Land at the Birla Farm, Pilani, Jaipur

	Rs.	A.	P.
3 Ploughmen at 2/8 per ploughman ...	7	8	0
10 Men @ 12 annas per head for making beds. ...	7	8	0
10 Men @ 12 annas per head for sowing. ...	7	8	0
15 Men @ 12 annas per head-irrigation labour ...	11	4	0
30 Men @ 12 annas per head-harvesting labour. ...	22	8	0
20 Men @ 12 annas per head-ensiling labour. ...	15	0	0
3½ maunds of barley seed for sowing. ...	35	0	0
500 maunds. of manure ...	25	0	0
5 Irrigation water charges ...	175	0	0
4 maunds of Gur (jaggery) ...	32	0	0
1 maund of common salt. ...	8	0	0
Total Cost ...	346	4	0

The barley was harvested when the grains were in a milky stage. Moisture content of a sample examined was only 50%.

The moisture content of the fodder is a very important factor. The silage must contain 70 per cent moisture. The extra moisture in the shape of water was added to the fodder. Since molasses was not available due to the transportation difficulties in these days, gur (jaggery) of an inferior quality was added to the water. The sugar provides the necessary nutrient for the bacterial action which produces the desirable acidity for preservation.

The crop was ensiled without cutting in from 2-2-44 to 6-2-44. Particular care was taken to ensure a very close packing of the entire material in the pit. Water mixed with jaggery was added with every load of the fodder and salt was sprinkled over them. The whole material was first covered with a thick layer of straw and then old gunny bags and over that a two feet layer of mud which sealed the stuff airtight.

The pit was unsealed on 1-5-44 and the spoilage was very little. The following gives the feeding value. The experiment was conducted with the milch animals only. The cows were in different stages of lactation and very few were in the flush period. It is the general experience here that when the fodder is changed from green to dry, the drop in the yield is nearly 20%; this decrease is further affected during the mid summer.

* 3 Bighas = 1 Acre.

Effect of Feeding Barley Silage on Milk Yield

Date	No. of cows	Total milk yield (Lbs)	Average Per Day	Fodder, Per Day		
				Carrots (Mds)	Berseem (Mds)	Barley Silage (Mds)
1-5-44	99	1415	14.27	25	15	Nil
2-5-44	99	1419	14.32	20	18	"
3-5-44	100	1380	13.8	15	20	"
4-5-44	100	1414	14.14	9	25	"
5-5-44	100	1411	14.11	Nil	18	"
6-5-44	101	1420	14.05	"	24	"
7-5-44	101	1376	13.63	"	22	"
8-5-44	101	1413	13.18	"	18	"
9-5-44	101	1391	13.76	"	10	"
10-5-44	99	1368	13.7	"	5	10
11-5-44	99	1376	13.89	"	5	10
12-5-44	99	1368	13.81	"	5	10
13-5-44	98	1381	14.09	"	"	20
14-5-44	98	1379	14.07	"	"	20
15-5-44	97	1468	15.14	"	"	20
16-5-44	97	1455	15.0	"	"	20
17-5-44	97	1450	14.94	"	"	20
18-5-44	97	1417	14.6	"	"	20
19-5-44	96	1420	14.8	"	"	20
20-5-44	96	1437	14.97	"	"	20
21-5-44	96	1423	14.82	"	"	20
22-5-44	96	1451	15.11	"	"	20
23-5-44	96	1422	14.82	"	"	20
24-5-44	96	1439	14.96	"	"	20
25-5-44	96	1406	14.64	"	"	20
26-5-44	96	1439	14.96	"	"	20
27-5-44	96	1400	14.58	"	"	20
28-5-44	95	1425	15.0	"	"	20
29-5-44	65	1405	14.78	"	"	20
30-5-44	95	1421	14.95	"	"	20

The above table indicated that barley silage has no adverse effect in the point of the milk yield. Whenever there is a change from the green-fodder to the dry fodder the drop in the milk yield is great. As succulent feeds are very costly to be raised during the summer months, the value of silage in summer is at once realised. Barley supplies good ensilage materials in these parts, hence a further study of their value as silage is well worth while. Further in the above study comparison has not been made between the different values of carrot, berseem and barley. The main point was how far barley silage could answer the need of a succulent fodder during the hot summer months. So far the experiment has proved a success. It may be pointed out here that the

best milk produced in the United States, New Zealand and Denmark as well as the milk produced at the greatest net profit, is the milk produced from silage. The cows producing this milk are of course not fed exclusively on silage, but it is because of the cheapness of the silage, and of the intrinsic value of silage as a feed that such milk can be produced so cheaply.

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Editorial

TOO OLD AT FIFTY

We are very much surprised over a recent order passed by the Government of Madras, in the Development Department, that their Veterinary subordinates will not be promoted to the grade of a District Veterinary Officer if they are above fifty years of age. We are not in the know of the genesis of this curious order but whatever it may be, we cannot gainsay the fact that the order is not conducive to the efficiency of the administration nor for the advancement of the profession. The duties of a District Veterinary Officer, as far as we can gather, are not such as to be beyond the capacity of a man of Fifty and when we remember that there are many members of the service, fifty years of age and above, efficient and capable, we fail to perceive the soundness of this order. A District Veterinary Officer is primarily responsible for the Veterinary, or rather Animal Husbandry, work in a district or two. He is to inspect the hospitals and dispensaries and touring billets: arrange for the efficient and prompt attention to outbreaks of contagious diseases: study the livestock problems in his jurisdiction and plan out suitable measures for the livestock improvement in the area under his charge. This is a work which, every one should readily admit, is most appropriate and fit for persons with mature experience and service. A member of the Civil Veterinary Department when he reaches the age of fifty, gathers a fairly wide knowledge of the whole presidency and also its Veterinary and Livestock requirements. His service both as an itinerating officer and in charge of veterinary hospitals and dispensaries must have necessarily brought him into intimate contact with the real

conditions of the country. This intimate and close contact will naturally enable him to plan out correctly the remedial measures for the Animal Husbandry work. His mellowed age and experience would give him the correct orientation to the shape of things to come. If, at that age, he is told he is unfit for promotion solely on account of his age of fifty, the loss to the individual officer by way of denied opportunities of service and enhanced emoluments may be only secondary—really it should not be viewed so—but the loss to the country by way of loss of valuable experience and service is of far greater import. It is a loss that cannot be easily assessed. Nor can the Government be unaware of that value, judging by the way in which it readily re-employs super-annuated officers. And, therefore, it passes our comprehension how officers of fifty of age are found unfit for the work of a District Veterinary Officer.

There is another aspect to this order. It is in regard to the *morale* of the rank and file. Opportunities and openings for promotion are far and few. (Out of a total number of 383 subordinates, there are only 34 gazetted posts.) And when such opportunities do come, they come only in the latter part of one's service. Naturally such an opportunity is eagerly looked forward to by the officers because it gives them greater opportunities for service, increased emoluments and added dignity and position towards the end of their career. A fitting climax, to the service, as one would say. If then, age is put forward as an excuse and their *earned* promotion denied, then surely it is *Hope* blasted with its natural consequences on contentment and efficiency of service. Age should not, and cannot, be the sole criterion for denying promotion. Merit and efficiency alone should count. Under this order, an efficient officer with an excellent record and physique, would be declared unfit and his promotion stopped when he reaches age of fifty—which is indeed ridiculous. As such, looked at from any point of view, the Government order is not in the general interest of the country and the profession. We wonder how, Mr. Hurley, the Director of Veterinary Services acquiesced in this highly unfair and unjust order.

The sooner the order is withdrawn, the better.

Clinical Articles

A CASE OF HYDROPHOBIA

By

KHUWAJA AZIZULREHMAN GHOURI, L. V. P.,
Veterinary Assistant Surgeon & Inspector, Civil Veterinary Dispensaries,
Kotah State, Rajputana.

Description:—The case in question was a Kayestha about 30 years of age and of fairly good physique. He was stout and short and being a wrestler took great care of his body.

History:—One day he came to the medical officer of his village, stating "Janab kal se mere peshab man dhat ja rahee hai" meaning that on the previous day he had been suffering from spermatorrhoea. The medical officer enquired as to gonorrhoea or other venereal diseases, but no such history was presumably forthcoming. The patient gave a detailed account of the onset of the trouble. It appeared that in the course of a journey on foot to attend a court ten miles away he had felt a desire to pass urine. He then noticed the presence in the urine of whitish sticky discharge. At the same time, he was seized with an attack of giddiness which he attributed to travelling on foot under the hot sun. The medical officer made a diagnosis of spermatorrhoea, gave a prescription and asked for a sample of the next morning's urine.

COURSE OF THE DISEASE AND SYMPTOMS.

The urine sample was diagnostic of spermatorrhoea. Abnormal discharges were passed with increasing frequency and amount and the patient became weaker. Medical treatment was proving of no avail. On the third day somewhat peculiar symptoms developed, viz., frequent and prolonged erections of the penis and desire to micturate, which however resulted in the expulsion of seminal discharge. This occurred as often as four to five times an hour. There was pain along the sciatic nerve, accompanied by tremors of the legs. There was also increased thirst which could be quenched by water containing sodium citrate and glucose. The symptoms were put down to exhaustion due to the loss of seminal fluid. Since the patient's condition was daily getting worse, resort was had to treatment by quacks. One quack recommended the patient to have coitus with his wife and this was attempted but without success owing to weakness, tremor of the legs and severe pain over the sciatic nerve.

PERSONAL OBSERVATIONS.

The curiosity was aroused as to the nature of this illness. While reflecting on the matter, the suggestion that it might be rabies was brought home to me by a passing dog which micturated twice within a minute or so. I then remembered that increased sexual excitement is sometimes a symptom of rabies. I then visited the patient and was told that by this time he could not drink water in spite of a strong thirst. An enquiry as to whether there had been contact with a rabid animal was answered in the negative.

On a close examination nothing abnormal was found, such as a wound, swelling or other injury. The pulse and respiration were normal and the temperature slightly elevated (99.5°F). There was no excessive salivation. The patient urinated in my presence and the urine was gelatinous and sticky-white and had the peculiar odour of semen. He could walk with assistance but the chief complaint was thirst. I sent for a cupful of water and asked him to drink, encouraging him by saying that the Devil spirit would not remain in my presence. When attempting to hold the cup, his hand quivered. The cup was then brought close to his mouth. The patient supported his body by placing both hands on the cot and stretched his neck in attempting to take the cup to his lips. His whole body then quivered, the eye balls rotated in their sockets and the spectacle reminded me of a dog being dragged through water by collar and chain. It now seemed clear to me that this was a case of hydrophobia. I again asked if the patient had ever been bitten by a dog, jackal or other canine. The patient then said that five months previously, when sleeping out in summer, a dog had licked his left foot. He got up, washed his foot with soap and water but found no abrasion or redness of the skin. He considered that, had there been any contusion of the skin, there would have been irritation due to soap.

The immediate problem in this case occurred to me how to administer liquids to the sick man. It was hoped that this might be done by avoiding the sight and sound of water, and the stomach tube suggested itself. The patient was not informed as to what was to be attempted. The bed room lamp was put out and an irrigator containing water was secretly hung on the wall over his head. The man was then asked to open his mouth and the rubber inserted to the base of the tongue. The tube was clipped so that only a thin stream of water could run through. As the first drops of water passed spasms began. The tube was then thrust with some difficulty to the middle of oesophagus, and water was again allowed to trickle through. This time the spasms were so severe that the tube was withdrawn though with considerable force. After that, it was noticed

that the mere word 'Water' would set up spasms. The patient then asked his relatives to lock him up in a room and this was done. At 3 a. m. he gave a dog-like howl two or three times and died.

DISCUSSION.

Points worthy of note are as follows.

(1) The patient attached little importance to the early symptom of giddiness and wrongly attributed this to walking under a hot sun. Being a wrestler, however, he was anxious regarding the loss of seminal fluid. (2) Pathognomonic symptoms of hydrophobia were not predominant and did not appear until the later stages. (3) The frequent erection of the penis, the strong desire to copulate, the expulsion of seminal fluid, at first mixed with urine and afterwards in the pure state, were predominant symptoms, which are scarcely referred to in medical or veterinary literature. (4) The fear of water and the difficulty in deglutition have been referred to as reflex effects from the sound and sight of water. In this case, the mere utterance of the word "Water" produced spasms of the muscles of deglutition. (5) It is suggested from this case as a matter of wise precaution to recommend anti-rabic treatment even when the saliva of a rabid animal has come in contact with unbraded skin. (6) Virus is known to occur in saliva, lymph and lymph glands of the bitten region and within the nerves passing through the seat of infection. Nothing however has been said as to the presence of virus in urine or seminal discharge. If the presence of virus may be assumed in urine and seminal fluid there is a likelihood of infection being acquired through the vaginal mucous membrane and a warning against coition should be added.

SUMMARY

An account is given of a fatal illness in man in which the history and symptoms were strongly suggestive of hydrophobia. The peculiarities of the case, apart from thirst and the onset of spasms when attempts were made to administer fluids, were frequent erections of the penis, seminal ejaculations and desire to copulate.

ACKNOWLEDGMENT.

My thanks are due to Dr. F. C. Minett, Director, Imperial Veterinary Research Institute, Mukteswar, for examining and correcting this paper.

SNAKE BITE (?) IN A DOG

By

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Touring Veterinary Assistant Surgeon, Kovvur, Madras.

*Subject:—*Cross-bred Terrier.

*History:—*The dog was said to have been bitten by something at about 4 a.m. on 28-5-44. Immediately he was sent to me.

*Symptoms:—*The dog was in a semi-comatose state. The right front foot pad was slightly bleeding. There was profuse salivation and froth allround the mouth. He was sneezing almost continuously more than a dozen times in a minute. Pupils dilated and pulse very feeble. He was unable to stand or place any weight on the bleeding foot.

*Diagnosis:—*Provisionally diagnosed as snake bite.

*Treatment:—*The foot pad was cleaned with antiseptic lotion and a search was made to see if there was any foot lesion. Nothing could be detected and the bleeding also stopped completely. By this time the dog was found to be sinking and the sneezing intervals were long. Immediately 5 c. c. of a $\frac{1}{4}\%$ solution of Pot. Permanganate was given subcutaneously on either side of the neck at about 5 p.m. (The injection could not be given intravenously as the veins were small and shrunken). The foot was dressed and bandaged.

7 A.M.—The salivation was very much reduced and the animal was able to stand and move about though limping. Sneezing had stopped. No food was taken.

4 P.M.—Salivation completely disappeared and the dog took a little milk. The gait was steady.

29-5-44.—The dog was active and bright looking.

Enquiry made after a month revealed that the subcutaneous injection had not caused any abscess and the dog was doing quite well, except that his hair is falling off when scrubbed while bathing.

MOIST ECZEMA

By

SHEIKH CHINGISHAH SAHEB, G.M.V.C.,

Veterinary Assistant Surgeon, Parvatipur, Madras.

*Introduction:—*Eczema is an inflammation of the superficial layers of skin associated with Hyperaemia and the production of vesicles which may be either small and discrete or may be numerous and confluent. It is so to say a non-parasitic and non-contagious skin disease affecting various regions of the body characterised by erythema which causes the animal intense irritation, necessitating it to rub, scratch and lick, leaving a red raw surface denuded of hair.

Eczema manifests in two forms:—

- (1) *Dry Eczema:—*In which all that can be seen or felt are dry small elevations which can be picked off.
- (2) *Moist Eczema:—*In this there will be out-pouring of fluid, oozing from the surface which causes matting of the hair and great irritation.

*Occurrence:—*Calves below 6 months are generally affected. Moist eczema is not uncommon in cattle. During the past four years 39 cases including one pony were admitted in this institution for the disease. Occurrence is less in buffalo calves.

*Causes:—*The causes of eczema are not exactly known. It must be regarded as a non-contagious disease. Scrapings taken from moist eczema cases were got examined microscopically and found negative. In the case of calves, the following were found to be contributory causes: (1) The mother licking the umbilical and perineal region of the calf. (2) The calf being allowed to lie in the soiled cow shed, the floor of which was impregnated with urine and dung.

*Symptoms:—*The first prominent symptom observed in cases that attended the institution is the red raw surface weeping in appearance affecting the internal aspect of thighs and lower part of abdomen. In the beginning, there is inflammation and formation of vesicles which become confluent due to excessive scratching. This results in the formation of a red raw surface denuded of hair. Sometimes cases come only when the skin is thick and corrugated. Parts affected are (a) inner aspect of thigh (b) lower abdominal surface around umbilicus (c) perineal region (d) elbow and (e) sometimes neck.

*Prognosis:—*Favourable.

Treatment:—During 1940-41 the orthodox treatment of applying antiseptic and emoliant skin dressing was found to be useless. Later on 17 cases were given 1 to 3 injections of sterile milk intramuscularly. One to three injections were necessary depending upon the extent and age of the disease. Subsequently in 1941 to 1942, 3 cases were tried with external application of an ointment prepared as follows:—

Ung. Iodi.	1 part,	
Ung. Hyd. Iodi. Rub	1 "	(1 in 12).
Paraffinum Molle.	1 "	

After the first application the affected part became slightly black, the discharge—the first noticeable symptom stopped. Mild blister action was observed which by 2 or 3 applications promoted the growth of hair. The applications were made on consecutive days (i.e.) daily.

Encouraged by the result of this treatment further trials were given subsequently. On the whole 22 cases were treated including a pony and all were cured. The period of treatment in this was comparatively shorter.

Acknowledgments:—My thanks are due to Mohammed Rahimmudin Saheb Bahadur, G. M. V. C., P. G. (Edin.), District Veterinary Officer, Vizagapatam, for his advice and encouragement to proceed further in this line of treatment and also to Sri C. V. Narasimham, G. M. V. C., for help rendered in compiling the data from the past records.

DISTURBING RESULTS FOLLOWING THE INJECTION OF CACODYLATE OF SODA (ITALIAN)*

By

Lieutenant-Colonel J. C RIX, R.A.V.C.

The subjects of this article were six English horses of the medium to heavy-weight hunter type, in fair condition and aged between 12 and 15 years. Together with nine others, they had, during the preceding four weeks, undergone treatment for debility and, although some improvement was observed, they remained harsh in coat and hide-bound. It was decided therefore to commence a course of cacodylate of soda treatment in order to improve the skin condition.

First Injection (12—3—43):— 10 c. c. of soda cacodilate (Istituto Chimico Farmaceutico Militare-Firenze, 1939) containing 5 gr. of the drug was injected into each of the fifteen horses in the usual presternal site. Neither local nor general effects were noticed.

* "The Journal of Royal Army Veterinary Corps" Vol. XV, No. 4.

Second Injection (15—3—43):—A further 10 c. c. was injected into the same area, no local swelling being observed from the previous injection. This time, however, it so happened that nine animals received their second injection from 10-c. c. phials taken from a box labelled "Sodio Cacodilato Gr. 5" (Istituto Chimico Farmaceutico Militare-Firenze, 1939). The nine horses showed no harmful effects whatever. Six horses each received a 10-c.c. phial taken from a box labelled "Cacodilato di Sodio Gramme 5" (Istituto Chimico Farmaceutico Militare-Torino, 1936). These six horses are the subject of this communication, and the following harmful results were observed:

16th March:—Large oedematous swellings around the site of injection, extending along the chest abdomen and as far down as the elbow in each fore limb. Great stiffness amounting to inability to move in one case, accompanied by fever varying from 102° to 106° F.

17th March:—Horse No. 470 collapsed and died during the night. Horse No. 399 showed increased swellings extending the whole length of both fore limbs, great prostration and signs of imminent collapse. The other four horses were about the same, one showing slight improvement and a fall of temperature.

18th March:—Horse No. 399 died at about 100 hrs. Of the remainder, three were slightly better in themselves, but the swellings were as extensive as ever, and on palpation they revealed the presence of gas. The fourth animal was feeding, had a normal temperature and the swelling had subsided a little. These four horses were transferred to the veterinary hospital, where they eventually recovered after sloughs as large as half a foot ball had come away from their sternal regions.

Post-mortem:—A *post-mortem* examination was made on both the fatal cases, and the following microscopic lesions were observed:

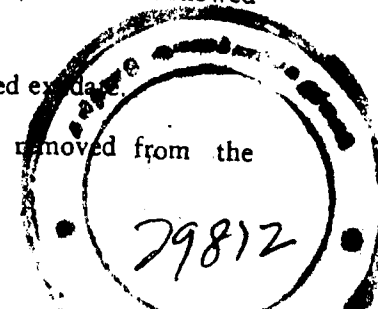
(1) An incision into the swelling revealed oedema and emphysema with a profuse blood-stained serus exudate. The general appearance of the incision somewhat resembled that made into the quarters of a beast dead from blackwater.

(2) Heart, liver and kidneys were pale in colour, friable and showed evidence of rapid degeneration.

(3) The peritoneal cavity contained blood-stained exudate.

The hide covering the swelling could not be removed from the underlying tissue.

KZ m 2



Pathological Examination:—Specimens of the following were submitted to the veterinary laboratory of the American University, Beirut, for examination, with the following results;

Heart, liver and spleen: cloudy swelling with areas of necrosis,

Exudate from the swellings was sterile.

In addition, two phials of the suspected drug but from another box were sent for chemical analysis: they were found to contain nothing but the drug specified on the phial.

Discussion.—These cases were of interest for the following reasons:

(1) A large quantity of captured Italian cacodylate of soda is held in the Base Depot Veterinary Stores and has given good results as a tonic and alternative. It is put up in sterile glass phials of 10 c. c., containing in one brand 5 gr. (grammes?) and in the other 5 grammes of cacodylate of soda.

(2) The deaths and harmful effects were the result of either (a) chemical poisoning with intense local destructive effects; or (b) contamination of the injected material with some spore-forming anacrobe of the gas-gangrene type; or (c) infection introduced by a contaminated needle.

Against (a) it may be said that specimens of like material failed to yield anything but the advertised drug and also an experimental injection into a "caster" produced nothing but minor local swelling. In the case of (b) and (c), it may be noted that no organism was isolated either from the *postmortem* specimens of the suspected material. If (c) was the explanation, how is it that only those animals receiving material of the same brand and from the same box showed symptoms?

It is difficult to arrive at any definite conclusion, but it would appear that this one box of drugs must have contained some poisonous material or contaminant other than that marked on the phial.

BOVINE RABIES*

By

WALTER E. FRITZ,
Silver Creek, N. Y.

This case report may be of value to veterinarians and veterinary students who have not had the opportunity to observe an outbreak of rabies in cattle. This disease has become quite a problem on the farm of one of my clients.

* "The Cornell Veterinarian" Vol. XXXIV, N. 3 (July 1944)

History of the case:—Fifteen one to two-year-old heifers were turned out in a pasture which joined on to another farm where I had attended three head of cattle with rabies one week prior. There had been only one case of dumb rabies in a dog in this township, about four weeks previous, six miles from this farm. There was no history or evidence that any of these heifers had been bitten.

Symptoms:—These symptoms were so pronounced that I feel that a veterinarian who has never seen rabies cannot possibly slip up on his diagnosis.

1. Cattle blat continually night and day until they go down and become too weak. Their voice may be changed.
2. They are nervous and lick their sides and legs.
3. Saliva is almost always about the mouth.
4. The nose protrudes and gives one the impression that the animal has a parrot mouth, or one may think that the lower jaw has receded. The muzzle is not square.
5. The eyes may look outward, in fact they may turn in any direction. As the disease goes on they recede, the conjunctiva is congested, and the vision is impaired.
6. There is rapid emaciation, due to dehydration.
7. They strain with their abdominal muscles and this is a very characteristic symptom. The best way to describe this symptom is to picture a heifer that has just been bred and then strains for a few days.
8. If one stands in back of the cow or heifer and watches the tail, it will be seen to make a screw-like movement. Starting at the base of the tail, it will move exactly like a worm crawling on the earth. This tail movement persists even when the animals are down and ready to die.
9. The temperature of a few cases was 103° F.
10. The bowels were rather loose, but as the animals strained, the stools finally became sort of gelatinous, or were in small balls or lumps.
11. The animal will be ravenous for water and no doubt it will be spilled if offered in a pail. The animals will try to get the water from the floor, but they are unable to drink. If they hear another animal drink, they may become excited and blat. One bull tried to hook the water pail and then tried to bite. This was the only one that tried to bite. They are unable to eat or drink but they may try.
12. **Paralytic Stage.** In this group they become paralysed on the fourth day. Most always they died on the fifth day, although one died on the sixth and another on the seventh. I noticed that the straining continued even while they were down and ready to die.

13. Affected animals will try to attack a dog. I remembered Dr. Udall's advice to roll a pumpkin. Not having one I rolled a large block of wood and an affected heifer went for it. I might say that this same heifer went through the fence to attack the team. She fell on her head, got up and went right back through the fence into the pasture.

Twelve remaining heifers were placed in the barn isolated from the dairy herd. In about four weeks three more came down with rabies. All of the clinical symptoms were present. The last two heifers died and were drawn outside. They did not have any Negri bodies, but on inoculation, check animals came down with rabies. These heifers were not vaccinated. They froze before I removed the heads which may be the reason for not finding Negri bodies in two positive cases. I never kill a rabid animal but allow it to die. You can see all the different symptoms and furthermore the brains will be in good condition for the laboratory boys.

In regard to the animals that came down last, I strongly believe that they contracted the disease from the others due to the fact that they were at the age when their teeth were erupting. No doubt they had sore mouths, so that by eating hay with contaminated saliva or drinking contaminated water (saliva) they could contract the disease.

CLEANING UP AN INFECTED HERD.

1. There is only one way to clean up a herd, that is, to vaccinate all animals. It is my opinion that the state should furnish the vaccine and then have the township pay the veterinarian for vaccinating the animals. This money could be taken out of the dog license fees.
2. Compel all dog owners to vaccinate at owner's expense.
3. Clean up and disinfect the barn and utensils.
4. Where animals die in the pasture, spade up and cover with lime or acid phosphate.
5. After consulting Dr. R. Knight, our country veterinarian, as to what to do with headless carcasses, we deemed it advisable to send the same to the rendering plant after telling the driver about the seriousness of the rabies. We did not have to worry about dogs and foxes digging up the bodies.

This is the way our township handled this herd.

1. Animals were appraised with a maximum valuation of \$100.
2. Veterinary fees were paid by town. I might say that the Veterinarians in Chautauqua County have decided on a common fee so that all of our bills to the various townships will be the same. The state furnishes containers to ship heads.

Our Mail Bag

Intravenous Chloral in Bovine Surgery. Contrary to rather frequently expressed opinion, intravenous chloral anaesthesia is both safe and practical for cattle surgery, according to Dr. James Farquharson, A. V. M. A., President-elect and head of the Division of Veterinary Clinic and Surgery at Colorado State College.

Cattle should be kept off feed before use of chloral and the solution (7 per cent) should be given slowly.

When giving intravenous anaesthesia to heavy bulls, the skin over the jugular injection site is anaesthetized with procaine solution through a fine needle. This eliminates tensing of the neck muscles and resistance when the larger gauge intravenous needle is pushed into position.

A practical demonstration of the versatile Coloradoan's method was shown in a movie on anaesthesia at the recent Nebraska meeting. A Hereford herd bull, valued at \$10,000, toppled over like a "shanghai" sailor after receiving 7 ounces of chloral intravenously. Four hours after an operation for a subscrotal peritoneal repair, the bull was shown peacefully eating grass.

No restraint whatever was used during the operation.

"The Jen-Sal Journal", March-April 1944.

An Unexplained Enteritis in Cattle. In one Missouri locality last fall, several heads of cattle suffered death losses from an as yet undiagnosed condition. After an illness lasting from a few hours to a day or two, the predominant lesion found on autopsy was an intense inflammation of the small intestine with blood clots and free blood in the lumen of the bowel. Scrapings failed to reveal any coccidia and no history of access to lead or other irritant poison was obtained.

If practitioners in other sections of the country are encountering similar trouble, we would appreciate their comments and opinions.

"The Jen-Sal Journal", March-April, 1944.

Susceptibility of fowl to salt. Fowl were found to be extremely sensitive to comparatively small amounts of common salt in drinking water, according to Selye (*J.A.V.M.A.*, 103: 798), a 0.9 per cent solution proving highly toxic, with marked kidney pathology (nephrosclerosis) a predominant finding.

"*The Jen-Sal Journal*", March-April 1944.

A new Preventive for Seasickness. A combination of atropine and prostigmine has proved to be almost a specific against seasickness, according to *Science News Letter* (Dec. 11, '43.)

The reflection in terms of veterinary medicine is that this new seasickness remedy, now in wide use by the army and navy, may prove helpful in preventing car sickness of dogs—an accident which has ruined many an otherwise happy holiday.

"*The Jen-Sal Journal*", March-April, 1944.

Clinical Aspects of Human Anthrax. "The gross appearance of the fully established human anthrax lesion is highly characteristic. In the clinical differential diagnosis, only two conditions need to be considered, namely, the rare gangrenous form of extragenital syphilitic chancre and a carbuncle with central gangrene following treatment with escharotics. Therefore, the clinical picture of a central, depressed, necrotic, brownish black eschar surrounded by multiple monolocular pinkish vesicles lying in a disproportionately broad zone of edema and situated over an exposed surface is of much diagnostic significance.

"Such a lesion should always arouse suspicion of cutaneous anthrax, especially in an individual whose occupation brings him into contact with animal hides. It is only in the earliest stages when the classical features of the lesion have not yet developed that difficulty in clinical diagnosis is encountered. Although simple pyogenic infections and chemical burns may strikingly resemble the initial and early gross lesion, they are painful. On the other hand, the cutaneous lesion of anthrax is notable for its absence of true pain. In practical experience, this has proved to be a differential diagnostic feature of considerable importance and value. There is an absence of throbbing pain as is observed in ordinary pyogenic infections....The absence of

true pain appears to be referable to axonal degeneration of the nonmedullated and medullated nerve fibres in the skin."—*Lebowich, McKillip and Conboy, Am. J. Clin. Path.* 13:505 (Oct.) '43.

"*The Jen-Sal Journal*", March-April, 1944.

The Safety Margin of Sulfonamides. How safe are the sulfa drugs? The answer is that in the hands of competent veterinarians who scale dosage according to pounds of body weight, who know indications and contraindications, and who are acquainted with such chemical incompatibilities as "sulfates and sulfas", the sulfonamides are as safe in usage as most other active drugs.

But even seasoned veterinarians may get some surprises. Dr. H. C. Smith, Sioux City, at the recent Iowa meeting, cited one such instance. Two yearling cattle weakened by shipping fever, were given sodium sulfathiazole intravenously. Simultaneously an intravenous injection of calcium gluconate was given. Both calves died within a few minutes.

Careless overdosage of calves suffering from scours with sulfaguanidine may result in kidney damage with subsequent poor growth and gain.

Too great liberality in dusting the viscera of small animals with sulfanilamide or sulfathiazole may inhibit infection, but may also result in a web of adhesions. Or, if too great an amount has been used, toxic blockage of kidney tubules may follow.

The fact is that the sulfonamides are not drugs to be tossed over the drug store counter to laymen like so much Glauber salts. Their misuse in the hands of the untrained may do more harm than good.

"*The Jen-Sal Journal*", March-April, 1944.

Induced Lactation in a free Martin Heifer with Stibestrol—Report of a case. "On April 6, 1943, a client asked me to examine a heifer possessing a normal estrual cycle that had failed to conceive. Several different brucellosis-free bulls, all fertile, had been used in vain.

"Physical examination revealed a grade Guernsey heifer of good type, 15 months old, weighing approximately 850 pounds. Pulse,

respiration, temperature and appetite were normal. The diet was well balanced. The animal was negative to a brucellosis test.

"The outer genitalia were small. Vaginal inspection with a Carlson speculum was accomplished only with difficulty and revealed a normal vagina and *orificium uteri externum*. Rectal palpation of the ovaries indicated that they were without cysts and, although very small, were apparently normal. The uterus was extremely small.

"Upon close questioning, the owner admitted that the animal was one of identical twins, the other twin being male and proved potent. A diagnosis of functional sterility, was established and so-called 'free Martin heifers' were carefully explained to him.

"Purely as an experimental procedure, it was agreed to attempt milk production through the use of diethylstilbestrol. The owner was dubious, stating positively that "only God could bring about milk production'.

"The commercial brand of diethylstilbestrol (Jen-Sal) was used,

Date.	Amt. Injected.	Results.
4-8-43	20 mg. sub-q	
4-9-43	20 mg. intram	
4-10-43	20 mg. sub-q	Estrus
4-13-43	20 mg. sub-q	Secretion
4-15-43	20 mg. sub-q	
4-17-43	20 mg. sub-q	Milk production RHQ-LHQ
4-27-43	20 mg. sub-q	Milk production RFQ-RHQ-LHQ
4-30-43	20 mg. sub-q	Milk production RFQ-RHQ-LFQ-LHQ

"(As a local stimulus, the act of milking was attempted April 13, 1943, and twice daily thereafter.)

"Milk production was 20 ounces on April 17, 1943, and had increased to 116 ounces by May 7, 1943. Undoubtedly milk production would have been greater if the animal had undergone a previous lactation period. In this case, the udder was undeveloped and very small, the teats being only about 5 cm. in length.

"The milk was Babcock tested on April 28, 1943, testing 3.7% butterfat.

"On May 8, 1943, the owner entered the army and the heifer was sold for beef. A postmortem examination was impossible.

"The case is of peculiar interest, at least to the writer, in that definite milk production was reached and was increasing when the

animal was sold. There is some question in my mind as to whether or not diethylstilbestrol would not be indicated in those cows that fail to come to peak production after calving.

"Incidentally, I regret to state that the owner of the heifer had lost some of his faith in God as a result of this experiment."—R. B. Castle, D.V.M., Ithaca, Mich.

"The Jen-Sal Journal", March-April 1944.

Rabies Vaccine Dosage For Large Animals:—What is the usual preventive dose of rabies vaccine for large animals? This question often arises in areas where the disease is common among dogs and such wild life as shunks and foxes.

The average prophylactic dose for non-exposed horses and cattle is 50 c. c., given intramuscularly, preferably at two or more points of injection. Many prefer the pectoral muscles of the breast to the cervical regions as a site of injection.

When large animals have been bitten, it is always best to give an initial 100 c. c. dose, then 50. c. c. each forty-eight hours for two doses—a total of 200 c. c. Brood sows and ewes should receive an initial 50 c. c. dose with two subsequent 25 c. c. doses.

The proper preventive dose of vaccine for non-exposed dogs is 1 c. c. for each 3 pounds of body weight.

"The Jen-Sal Journal", May-June 1944.

Sodium Iodide In Milk Fever:—"Many times in milk fever it is necessary to make a second injection of calcium gluconate. In some instances the animal has not responded from the first injection and sometimes an interval of twenty-four hours has elapsed before she goes down a second time. For several years, I have been injecting about three-fourths of a therapeutic dose of sodium iodide intravenously immediately ahead of my calcium gluconate injection. This has given excellent results in keeping the animal up. I also use this same injection when I first see the animal if the condition present would lead me to believe that it is one of the slow, stubborn cases. The use of sodium iodide in this capacity has been more than satisfactory. It has a rather sound therapeutic background since the iodides are a powerful glandular alterative. The functional glandular cycle of the animal involved has been changed and this affects

the calcium-glucose balance. In this instance, then you would be replacing the calcium and glucose which is deficient and likewise stimulating the glandular cycle back into proper function.' Dr. Kent R. Dudley, *Iola Kan., in the Kansas V.M.A. Bulletin.*

"The Jen.Sal Journal", May-June 1944.

The Symptoms of Manganese Deficiency:—Shilas and McCollum (*J. Nutrition 26:1*) have found that Manganese deficiency in test rats was characterised by rapid death of young after birth, slow growth of females, and sterility in males—all of which was reversed by addition of manganese to the ration. A hitherto unrecognised symptom of manganese deficiency in rats born of deficient mothers was loss of equilibrium, and incoordination (*Vet. Bul. 14:1*).

Manganese deficiency may be one of the factors implicated in newborn pig losses for the symptoms are often identical to those shown by test rats.

Correction may be accomplished by a 1:20,000 solution of potassium permanganate as drinking water for the sows.

"The Jen.Sal Journal", May-June 1944.

Common Dog Ticks as Vectors of Human St. Louis Encephalitis Virus:—Common dog ticks, *Dermanocenter variabilis*, are capable of being infected with the virus of St. Louis encephalitis by feeding on infected animals and, once infected, can transmit the virus to normal susceptible animals by bite. (*Blattner and Heys, Exp. Med. 79:4*). A female tick can transmit the infection through the egg to her offspring; thence through all stages of metamorphosis of the second generation into the third generation. Eggs from virus-infected female ticks when stored in a refrigerator for ten months still carried virus, and larval ticks hatched from such eggs also proved infective.

While equine encephalomyelitis virus and St. Louis encephalitis virus are biological variants, the horse is infective for humans and the human virus for horses. Hence, any transmission of equine encephalomyelitis in nature by ticks as vectors merits further investigation. Kitselman, and Grundmann, of Kansas State College, were unable to isolate, western strain encephalomyelitis from the common dog tick. On the other hand, Gwatkin, of Canada, proved positive transmission through a related tick, *Dermanocenter andersoni* in experimental animals.

"The Jen.Sal Journal", May-June 1944.

Sulfanilamide in cat "Distemper". "A report on the use of sulfanilamide in so-called 'feline distemper' both as a therapeutic and as a prophylactic agent. No losses were recorded in animals on which treatment was carried out for three days or more, nor were any relapses noted. (As no blood examinations were made of affected animals it cannot be determined whether the conditions reported were due to a virus. Feline distemper caused by virus causes a marked panleucopenia.)"—*Gendreau, Canad. J. Comp. Med. 5:56-57. Abs. Exp. Sta. Record.*

"The Jen.Sal Journal", May-June 1944.

Sulfur in Lamb Coccidiosis. The U. S. Department of Agriculture reports that addition of ground crude sulfur to the ration of lambs, using a level of 0.5 to 1.5 per cent of the total ration, served well as a preventive of coccidiosis among lambs. In the controlled experiment, 1400 lambs were used. The ration consisted of chopped alfalfa hay and ground corn, moistened with molasses and water, and fed in long troughs.

"The Jen.Sal Journal", May-June 1944.

Wheat Poisoning in Cattle. "The severe shortage of feedstuffs in the South has caused stock raisers to look for feeds from other sources. Ground wheat has recently been obtained from Canada and the Northwestern states as a feed supplement.

This feed is strange to the cattle of the southland and stockmen will have to learn how to feed the ration. I have certainly been called to diagnose a condition on one farm where the feed is being tried. Several cows were prostrate; one would rise occasionally, stagger around and then fall.

They show a decreased respiration, and resemble cattle down with parturient paresis, with their heads to their sides and a pronounced posterior paralysis, with little or no bloating.

After speaking with the owner a few moments as to their feeding, he remarked that he had just received a cartload of ground wheat and was feeding it in his ration. These cattle were in the feed lot and had no access to any other feed other than what he placed in their troughs.

His ratio of feeding was as follows:—

100 lbs.	Wheat bran
200 lbs.	Ground wheat
200 lbs.	Cottonseed meal
200 lbs.	Crushed corn.

The cattle also have access to a good grade of alfalfa hay. I diagnosed the trouble as wheat poisoning. Treatment consisted of 500 c.c. Dextro-Calci-Nate intravenously; 10 c.c. camphorated oil was administered intramuscularly.

The cattle that were not down over thirty-six hours made a complete recovery.

Advice was given to the stockman to reduce his ground wheat feeding considerably until his cattle can become accustomed to this new feed.

I am, therefore, passing this information along to all southern veterinarians to do likewise if they are having any similar trouble.

Stockmen in South Mississippi are experiencing a pronounced shortage of cottonseed meal and hulls which has heretofore been a foundation feed for their cattle and are, therefore, turning to ground wheat which will make a good substitute after they learn how to feed it."—H. B. Title, D.V.M., Laurel, Miss.

"The Jen-Sal Journal", Jan. Feb. 1944.

College News

MADRAS VETERINARY COLLEGE

List of students who were successful in the G. M. V. C. Diploma final examination in October 1944.

- | | |
|-----------------------------|-----------------------|
| 1. Krishnaswami, M. | 4. Srinivasa, Rao, S. |
| 2. Rajaram Mohan Roy, K. S. | 5. Venkatarathnam, A. |
| 3. D'Rozario, V. M. | 6. Dakshinamurthi, G. |

List of students who were successful in the B. V. Sc. Degree examinations, October 1944.

B. V. Sc. Preliminary	B. V. Sc. Intermediate Part II.
1. Chinnadurai, P.	1. Kasiviswanathan, E. N.
2. Rama Rao, T.	2. Narayanan, S.
3. Sahasranamudu, C.	3. Panduranga Rao, P.
4. Umamaheswaran, V.	4. Ramakrishnan, M. A.
	5. Vasudeva Tilak, C. T.

B. V. Sc. Intermediate, Part I.	B. V. Sc. Final
1. Chidambaram, P. R.	1. Michael, R. D.
2. Ganapatiraman, S.	
3. Karumbayya, P. P.	
4. Krishnamurthi, A. S.	
5. Natarajan, P. S.	
6. Natarajan, S. G.	
7. Rangamannar, R.	

Madras, }
6—11—44 }

K. S. NAYAR, G.B.V.C., M.R.C.V.S.,
D.T.V.M.,
Principal, Madras Veterinary College.

Association News

COORG VETERINARY ASSOCIATION

Proceedings of the extraordinary general body meeting held at Ammatty on 5—9—44 under the Chairmanship of Dr. C. B. Somanna, the President of the Association.

The Patron (the Chief Commissioner) and Messrs. Iver Bull, O.B.E., A. C. Thimayya, M.A., (Cantab), Committee member, Coorg Cattle Show, and Mr. K. M. Poovaiah, Secretary, Coorg Orange Growers Association, were present as visitors.

All the members of the Coorg Veterinary Association except Dr. S. N. Tammaiah and Lt. A. B. Belliappa were present.

RESOLUTIONS

The following resolutions were then duly proposed, seconded, and carried unanimously:—

1. This Association regrets that inspite of the individual memorials and the recommendation made by the C. V. O., no action has been taken by the Government, so far to raise the scale of pay of the Veterinary Assistant Surgeons to the level of that of the Veterinary Assistant Surgeons of the Madras

C. V. D. and presses the benign Government to introduce the scale immediately and relieve the distress and discontentment of the staff.

2. This Association requests the Government to forward a copy of "The Thousand Crore Scheme" for the improvement of the animal husbandry prepared by the Advisory Board of the Imperial Council of Agricultural Research to enable this Association to formulate a plan and a scheme for Coorg.

3. This Association requests the Government to nominate the President of this Association as one of the members of the Post War Reconstruction Committee.

4. This Association resolves that a series of short articles in Kannada on live stock in health and disease prepared by members and passed by the President be printed at the Government press for wide publication in the Province.

5. This Association requests the patron to open the second All Coorg Veterinary Conference that is proposed to be held during Christmas week.

6. In view of the fact that it is the every day experience of the Civil Veterinary Assistant Surgeons not to be able to attend in time the valuable Forest Department livestock, it is resolved that the Chief Commissioner may be pleased to reconsider his order passed in his No. 2873/df 78 of 44 dated 14th March 1944 on this subject.

7. This Association thanks the Chief Commissioner for being graciously pleased to provide appointment of six stock men in the current year to combat the present wave of rinderpest and facilitate animal husbandry work in the Province.

8. This Association regrets to bring it to the notice of the Government that there is an earnest desire on the part of the members of the Association to go to the general Department as scope for promotion in this Department is very limited.

9. Resolved that this Association requests the Government to have 30 percent of the permanent cadre on 1st grade of Rs. 155-15/2-200 as in Madras.

10. Resolved that the post of C. V. O. be gazetted.

11. Resolved that in view of the fact that refusal by some owners to get their cattle protected against epidemic has resulted in wide spread of the disease, this Association recommends to the Government to bring the Coorg Cattle Disease Act immediately into force.

12. This Association regrets to bring it to the notice of the Government that while the Director, C. V. D., Madras and Animal Husbandry Commissioner with the Government of India strongly recommend to convert the Mercara Veterinary Dispensary into a hospital, it is being run now without a Veterinary Assistant Surgeon and being managed by the C. V. O. As this arrangement will impede the progress and usefulness of the Department and act as a retrograde step, this Association recommends to the Government to introduce the Madras scale immediately to overcome the difficulties of obtaining suitable hands.

C. B. SOMANNA.
Chairman.

Correspondence

The views expressed in letters addressed to the Editor represent the personal views of the writer and must not be taken as expressing the opinion or having received the approval of the A. I. V. A.

National Universities and Indian Veterinary Graduates

Dear Sir,

I appreciate the views expressed by Dr. O. S. Bhatnagar, in your September issue. It is indeed most unfortunate that the various Indian Universities have so far miserably failed to appreciate the true value of Veterinary Science and its innumerable votaries all over this wide subcontinent. The Indian Veterinary Graduates have rendered to our country invaluable service and their contribution to the scientific world is of no mean order and any country should be proud of them. But the Indian Universities have completely shut their doors against them. So far there is not a single case where any Indian Veterinary Graduate has been honoured by the Indian Universities for his work and achievements. It does not mean that no Indian Veterinary Graduate has ever done any outstanding work here in India. The University of Nagpur admits for the M. Sc., degree, in exceptional cases non-graduates. There are more than 8 L. Ag's who have taken the M. Sc. Degree by thesis. I know definitely that one of the eight has taken even the Ph. D. doctorate, only by thesis. The Madras University allowed a number of L.M. Ps. to complete the M.B., B.S. degree course in two years, and there are a number of L. M. Ps. who have successfully passed the M.B., B.S. degree examination. The Punjab University allowed the L. Ags. to take up the final B. Sc. Ag. degree examination when the L. Ag. diploma course was abolished. Among so many Indian Universities, only the Madras and the Punjab Universities have introduced the Degree course in Veterinary Science. But both the Universities have made absolutely no provision for the past students of the various Veterinary Colleges in India.

It may be of interest to mention here that at least the foreign Universities recognize the Indian Veterinary graduates. The Brno university of Zeslovakia recognizes the L. V. P. and admits them for the M. V. Dr. doctorate. It recognizes the four years course as equivalent to its Bachelors degree and admits to the Doctorate degree all those who have put in three years service and done some original work. The University of Toronto (Canada) admits the L. V. Ps. into the final year class and there are two L. V. Ps. here in India who have

successfully passed the B. V. Sc. degree examination in eight months time. A number of the American State Universities admit the Indian Veterinary Graduates into the final year class of the D.V.M., V.M.D., or D.V.S. degree class. There are also some other state Universities which admit the Indian Veterinary Graduates into the M. Sc. degree class. But it is not within the reach of the majority of the Indian Veterinary Graduates to visit the foreign countries for these degrees.

It is therefore urged that the Indian Veterinary Graduates should be given some concession by the Indian Universities, particularly the Madras and the Punjab Universities, in a suitable way. For those who have laboured for the countrys' dumb millions let the Universities have a Universal recognition.

Calcutta, }
10-10-44 }

J. D. SAMPATH KUMARAN,
B.S.A., L.V.P. of I.A.R.I.

Is it Hypomagnesaemia?

Sir,

The subject of the case was a Mysore bullock about 6 years old in excellent condition. The owner, a very wealthy landlord was looking after it well and was using it for light cart work. In my camp in his village on 17-5-1944, he reported to me that for the previous two months the bullock used to drop down suddenly to the ground at intervals of two days or even less, remain in a state of unconsciousness for about 10 or 15 minutes, then rise up without help and behave normally. Otherwise, the bullock was reported to be quite normal in all respects.

I examined it the same evening. Fortunately the bullock fell down suddenly in my presence, remained in a state of coma for about 10 minutes, then got up of its own accord and looked normal. Being unable to arrive at a definite conclusion, I sent its dung, blood smear, urine and nasal washings for examination. Pending receipt of the results of the specimens, I prescribed the following:—

Shark Liver Oil—to be given morning and evening after feed.

Wheat bran as substitute for rice bran.

Plenty of water at its disposal and complete rest.

Usual ration of horse-gram and cocoanut cake to be reduced to half the quantity.

The owner was not able to obtain wheat bran. He therefore began regulating the feed and giving shark liver oil as advised. I had to leave the village on 19-5-44 and the owner after five days reported to me

that there was no appreciable improvement in the condition. By then, the results of the specimens—that nothing unusual could be detected in any—were received.

I suspected that the case might be one of Hypomagnesaemia and prescribed the following:—

R/-	Mag. Carb. Levis	... ounces II.
	Bismuth Carb	... ounce I.
	Sodi Carb	... ounce I.

Pulv 1—to be given as electuary morning and evening after feeds.

After the sixth day, the owner met me and reported that the animal had only one attack on the second day and that there was no further attack, which fact he said was a definite improvement. Thereupon, I advised him to continue the powder and report about its progress. It is now more than two months and the bullock had only one attack on the seventh day. The powder is being continued on alternate weeks only.

From the way, in which the bullock had responded to the treatment with Magnesium Carbonas, I believe that the case might have been Hypomagnesaemia only. The owner informed me that there were two such cases suffering from similar complaints in his house some time before and I am therefore led to believe that the disease may be due to the fall of magnesium level in the blood caused by the deficient fodder supplied to his cattle.

J. SEETHARAMAN, G.M.V.C.
Touring Veterinary Assistant Surgeon,
Kasargod, (S. Kanara)

Veterinary Instruments

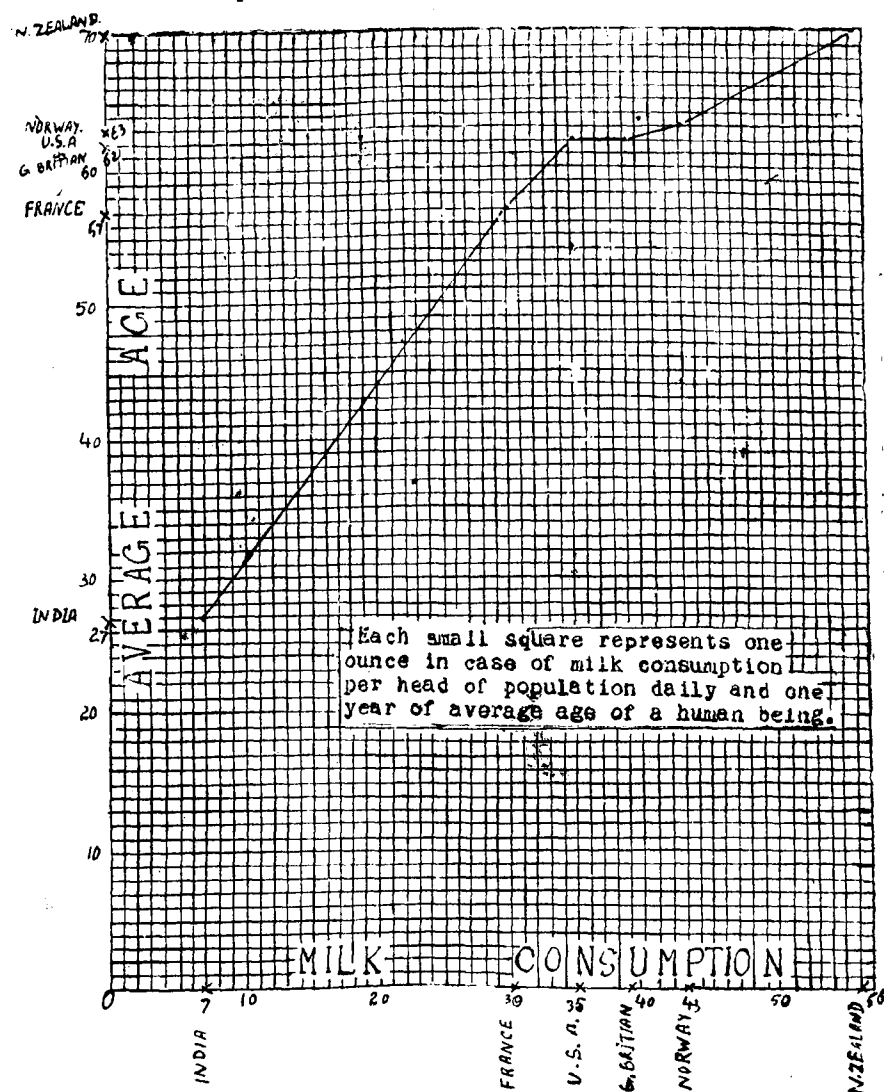
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When writing to advertisers please mention this Journal.

'Importance of a Veterinarian in India.'



The article under the caption 'Importance of a Veterinarian in India' published in the September 1944 issue of this *journal* under correspondence is only the summary of the speech delivered by Dr. S. Karnail Singh at the 9th Annual General Meeting of the Punjab Subordinate Veterinary Service Association, held on the 1st January 1944. The speaker thanked Harkishan Lal Esq., B.Sc., M.R.C.V.S., Veterinary Investigation Officer, Punjab, for the valuable suggestions in the preparation of this speech.

The third paragraph from the last is not the speech of His Excellency the Viceroy as may be understood, but it is the remark of the speaker.

The graph which could not be published last time due to scarcity of paper, we are publishing this time, since it greatly increases the importance of the article and is self convincing.

Each small square represents one ounce in case of milk consumption per head of population daily and one year of average age of a human being. [Ed. I. V. J.]

Extracts

ARMY'S FOUR-FOOTED SOLDIERS.*

By

Lt. Col. DOUGLAS PARMENTER, A. U. S.,
Washington, D. C.

The Army's war dogs are not pampered pets by any means, and they are by far the best trained, best equipped, and best cared for dogs in the world. From the moment they are inducted into the service until they are finally sent to the field for patrol, sentry or other active duty, their health, equipment, diet, care, and training are the subjects of vital concern to everyone connected with the dog-training programme. And, by the time they have been trained by the Quartermaster Corps for active duty, they are in perfect physical and mental condition, ready for the exacting jobs they are to do.

Clothing and Equipment Issued. Just as clothing and equipment are the first items a soldier receives when he enters the Army, so are canine wearing apparel and equipment the first things a dog receives. The TBE, or Table of Basic Equipment, for a war dog includes two collars - a leather kennel collar and a chain working collar - a leash, a 30-ft. exercise longe, a kennel chain, a brush and comb, a muzzle, water repellent blanket and individual feeding and watering pans. Every item of his equipment is individually issued and, as a rule, is never used for another dog except in the case of nail clippers and file. These are not needed often enough to warrant issuing separate ones for each animal.

Tattooed in Lieu of Tags. The Army dog doesn't wear the famous Army dog tag. His identifying serial number is tattooed on the inside of his left flank, and there are soldiers, irritated by the two identification discs dangling at the end of a chain around their necks, who will tell you that in this instance, at least, the dog gets a break. The tattooing is done with ordinary, commercial equipment originally developed for marking farm animals and poultry, and is permanent and virtually painless. The tattooing probably bothers the animal much less than the indignity of being held on his back while it is being done.

Vaccinated Against Distemper. He has his "shots" for distemper and other canine ills. He is constantly under the eyes of Army veterinarians and trainers who watch for sign of illness or other manifestations of inefficiency. After all, a war dog must be in the peak of condition, both mentally and physically, all the time, or the special senses and perceptions which make him valuable to the Army are blunted and his value seriously impaired. He takes vitamin pills to supplement a balanced diet of meats and commercial dog foods which are given to him by the same man at the same time every day. His life is regulated as carefully as any soldier's.

Has Service and Lounging Collars. Perhaps the most important items of his equipment are the two collars, each of which is intended for a specific purpose. The leather collar is the dog's equivalent of a lounging robe. When he is wearing it the dog knows he is off duty - at ease. When the chain collar is put on, he knows he is on duty and departs

* *Journal of A. V. M. A.* February 1944.

himself accordingly, for a change in collars becomes significant to the animal early in his training. Like a baby in a sun suit, the dog in a leather collar is a frisky playful, noisy, carefree creature; in a chain collar, he becomes menacingly quiet, every nerve tense for an unfamiliar or unfriendly scent or movement, a trained, obedient animal sensitive to every gesture, every order, every movement by the man who works him. By some native instinct, aroused simply by a change in neck-wear, he knows what is expected of him and gives it generously.

The other items of his equipment are important, too, but relatively less important than the two collars. The other articles are routine - static - and are a part of the possessions of every well-kept dog. An Army dog could get along on no less.

Muzzle Rarely Needed. Special conditions or unusual considerations may require working of the animal on the 30-ft. exercise longe instead of at the end of the short lead. In such cases, the longer line is used without hesitation. Wet weather may dictate that he wear his blanket, a purely utilitarian garment in water - repellent, olive drab cotton, warm enough to prevent his being chilled, or to warm him if he becomes chilled. His muzzle is used rarely, and then only when he is in exciting, strange surroundings or unavoidably mingling with unfamiliar persons. Under training and under conditions surrounding the quartermaster corps training centers, he has never muzzled, for his basic training inculcates in him the ability to get along amicably with other dogs and with the soldiers who are training them. A fight among Army dogs, even cooped up five or six deep in a truck, is rare.

No Whipping. One item definitely not in the Army dog's equipment is whip. When a little persuasion is necessary, the loose end of the leash is adequate. Even this is used sparingly. Army dogs are "good" dogs; they mind their own business, restrain their curiosity about so many things dogs are curious about and work hard whenever they are called upon, sometimes twenty-four hours in a stretch.

Recreation. But a dog's life in the Army isn't all work. He plays too. After working-hours, on Saturday afternoons, and at odd moments during the day, he puts duty behind him and chases a rubber ball, rolls round on the ground or plays touch and go with his handler, chews a stick or a friendly but well-gloved hand, learns tricks and goes through paces that would seem undignified in anything but a kitten or a lap-dog. Even this play is a part of his training. It toughens him, teaches him to catch or retrieve, run or return when an order is given, and to obey implicitly the man who is directing him. He's a one-man dog and probably would permit himself to be burned alive before he disobeyed that man's orders.

SEX DETERMINATION IN FARM ANIMALS *

BY

R. R. TAVARGERI, G. B. V. C.

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Sex control is the predetermination, by artificial means, of the sex of offspring; in other words the production of male or female progeny at will. The evolving of some method of predetermining sex would be of

* Indian Farming Vol. IV. No. 9.

immense advantage to animal husbandry, particularly to dairy farmers, to whom the birth of a number of bull calves is an economic loss.

Early theories and superstitions.

Until recently it was believed that the sex of offspring was a matter of chance, quite beyond human regulation; though, indeed, numerous superstitions and empirical theories regarding methods of control have existed from time immemorial. The sex ratio was said to vary with the seasons of the year, the breed, the strain and the manner of the matings. For example, it was believed to depend upon the time of service during the oestrus period, mating early in heat resulting in female calves. A preponderance of sexual excitement on the part of the female was considered to lead to the production of male offspring and *vice versa*, while malnutrition among females was thought to lead to the birth of male progeny. This latter theory was actually given scientific support when it was demonstrated that a group of 150 well-fed ewes produced 70 per cent females, while 150 undernourished ewes gave birth to a similar percentage of males.

Another theory, and one credited for a time by the writer, was that the successive ova being alternately male and female, all that was needed to produce the desired sex was to choose the proper heat for service, that is to say if the last young was a female, then services at the first, third and fifth subsequent heats would produce males. This theory failed to stand up to actual test. Numerous other existing superstitions are obviously too hopelessly unscientific even to deserve mention.

Determination of sex in nature.

Recently researches have shown that sex in animals is determined at conception by the sex chromosomes present in the male sperms and the female ova. There are 24 pairs of chromosomes in man, and 23 of these are identical in both male and female. The twenty-fourth pair differs, however, in that the two chromosomes in the pair are of equal size in the female, whereas in the male one is equal in size to each of those in the female, and the other is smaller. The term X is given to the two sex chromosomes in the female and also the one in the male that is of the same size. The term Y is applied to the small sex chromosome in the male. Whenever, therefore, an X from the female unites with the X of male, a female will result because of the XX combination. On the other hand, whenever an X from the female unites with the Y of the male, a male will result because of the XY combination. The possibility, therefore, arises of attempting to determine sex by some means, which will sort out the two types of sperms or kill off one sort while leaving the other intact.

Artificial determination.

Cole and Davis (in the United States) demonstrated in rabbits the effect of alcohol on the sperms and thereby furnished convincing proof that the chromosomes can be influenced artificially.

In 1930, a German scientist, Unterberger, while treating cases of sterility by douching the vaginal tract with a solution of sodium bicarbonate, found the resultant offspring was invariably a male. This led him to the belief that an alkaline condition of the vagina during service might predetermine the sex of the resulting young. This theory he put to the

test in two series of experiments on human beings. In one series, he obtained, out of 54 cases, 53 males and only one female. In the other, he found that out of 20 cases, 19 women gave birth to male babies, while only one out of the 20 brought forth a female child. In the latter case, he could not ascertain whether or not his directions had been faithfully followed.

In 1938, Durfee, an American biologist, undertook a series of mass experiments at the Rockefeller Institute with small animals and convincingly established the acid and alkaline method of controlling sex. The douching of rats and rabbits with soda resulted in 167 out of 175 births being males, 7 male-female ties and only one female. Application of this acid-alkali method to large animals such as cows and mares has yielded equally good results. Dr. Elmer Roberts of Illinois, in experiments with more than 1800 rats, produced further striking proof of the value of this method. Additional confirmation has also been supplied by the work of Gilbert Lanterman in New Jersey and Dr. J. D. Cummings in Canada.

Animal husbandmen in Europe and America are already putting this method to practical use in the field with beneficial results. The writer also has found it very satisfactory for some time past and after a further period of experimentation intends to publish his data.

It should be remarked that this method can only be applied to mammals and is useless in the case of birds, fishes, amphibians and insects, whose methods of reproduction are different from the above.

The acid-alkali method.

(a) *For the production of female offspring.* An hour before mating irrigate freely the vaginal passage twice with a 2 per cent solution of lactic acid, taking care that the solution reaches all the vaginal folds.

(b) *For the production of male offspring.* Irrigate as above, substituting a 2 per cent solution of sodium bicarbonate for the lactic acid solution.

The solutions must be of the exact strength quoted and neither stronger nor weaker if the desired effects are to be obtained.

THERAPEUTIC USES OF PENICILLIN *

Penicillin, the newest of the antibacterial agents, a metabolic product of *Penicillium notatum*, has passed its initial tests with flying colours and, while not a cure-all, has assumed a high ranking position as a therapeutic agent in the treatment of infections. To date, there have been no reports in the literature on the use of penicillin in veterinary medicine, but preliminary investigations in several fields are already underway. No doubt, unless research relating to the specific disease problems of animals can progress most rapidly, penicillin will be available to the veterinarian before the results of all such investigations are made known. However, as with the use of the sulfa drugs, the careful practitioner will be able to apply, in the field of veterinary medicine, much of the knowledge already available

* *The North American Veterinarian*, June 1944.

to the physician and, while the results of specific investigations are being awaited, he can do a little pioneering himself in the field of animal diseases. With this thought in mind, the latest information which may be applicable on the use of penicillin in veterinary practice is presented.

Infections that Respond to Treatment

Penicillin is the best therapeutic agent now available for the treatment of the following conditions, in man, but the effectiveness of this agent in comparable conditions in animals, while theoretically the same, can be determined only by trial.

- (1) All *staphylococcal infections* with and without bacteriemia, including wound infections, meningitis, soft tissue abscesses and empyema.
- (2) All *hemolytic streptococcal infections* with bacteriemia and all serious local infections, including peritonitis, empyema and cellulitis.
- (3) All cases of *clostridial infections*, including gas gangrene and malignant edema.
- (4) All *anoerobic streptococcal infections*.

Penicillin is an effective agent in the treatment of actinomycosis and bacterial endocarditis in man, but the degree of its effectiveness has not been definitely defined.

Penicillin has been found to be ineffective, and for that reason is not recommended for use in a number of conditions. Whether this drug will prove ineffective in the corresponding disease in animals, while likely, must be demonstrated. These conditions include:

- (1) All *Gram-negative bacillary infections*, including typhoid, paratyphoid, tularemia, dysentery and undulant fever, and those infections caused by *Eberthella coli*, *Bacillus proteus*, *Pseudomonas pyocyaneus*, *Kiebsiella pneumoniae* (Friedlander's bacillus) and *Hemophilus influenzae*;
- (2) tuberculosis, (3) coccidiomycosis, toxoplasmosis, (5) acute rheumatic fever and (6) moniliasis.

Penicillin is of questionable value in mixed infections of the peritoneum and liver in which the predominating organism is Gram-negative, such as liver abscesses and urinary tract infections.

Preparation and Administration

Penicillin is packaged as a dry powder, each container holding a certain number of units, the measure upon which dosage is based. The activity of penicillin is measured in the Oxford unit, one Oxford unit being the amount of penicillin which, when dissolved in 50 cc. of meat extract broth, just inhibits completely the growth of the test strain of *Staphylococcus aureus*. However, due to the various methods of assay, the unit, as used for example in the work done at the Mayo Clinic (described later), is not a true Oxford unit. Penicillin is freely soluble in water and in oil.

The three common methods of administering penicillin are: intravenous, intramuscular and topical. Subcutaneous injections are likely to be painful and, for this reason, should be avoided. Repeated intramuscular injections would seem to be the method of choice for the treatment of animals. While these are tolerated less well than repeated or continuous

intravenous injections, the latter methods are not particularly applicable to animal patients. Since the total volume should be kept low in intramuscular injections, saline solutions containing 5,000 units per cc. are preferable. Penicillin should be used topically, that is applied locally, in solutions containing 250 units per cc. to surface burns of limited extent, and injected directly into the subarachnoid space in the treatment of meningitis and into the pleural cavity in the treatment of empyema. The powdered form of the sodium salt is irritating to wound surfaces and should not be used, but physiological salt solutions containing from 250 to 500 units per cc., are satisfactory.

Dosage

The objective in every case is, of course, to bring the infection under control as soon as possible. The dosage of penicillin will vary, depending upon the animal to be treated and its size; the type and the severity of the infection, and the susceptibility of the animal to penicillin. The drug is excreted rapidly in the urine and all traces of a single injection disappear from the blood in from two to four hours. Therefore, it would seem that animals should be given divided doses of penicillin intramuscularly at intervals of from three to four hours. Theoretically, on the basis of the human dosage, it would seem logical to give a 20-pound dog about 5,000 units per day, divided into four equal doses, but other factors may be involved and it is entirely possible that calculation of dosage may not be so simple.

An interesting feature on toxicity was brought out in recent experiments of Heilman¹ and Herrell, of the Mayo Clinic. Although toxic effects of penicillin were not observed in mice receiving 1,000 units of sodium penicillin subcutaneously, in daily divided doses up to seven days, penicillin caused toxic effects in guinea pigs, and young guinea pigs, receiving from 1,000 to 5,000 units of sodium or calcium penicillin daily in divided doses, died after several days. These investigators reported:

Death was preceded for a day or two by a state of apathy during which anorexia, loss of weight, ruffled fur and rectal temperature at the lower limits of the normal were noted. Examination of such animals revealed a state of generalised vasodilation.....Animals injected with penicillin frequently had pronounced erythema at the site of, and adjacent to the point of injection. The reaction was most severe in animals which died later from treatment with the drug and in some cases appeared to affect much of the body surface. This reaction was much more evident in albino animals than in those in which the coat was coloured. The susceptibility of individual animals of similar weights to the toxicity of Penicillin varied greatly. The toxic effects also varied with the dose of the drug.

However, with two guinea pigs in which infection had been active for three days, 5,000 units of penicillin given daily in divided doses for seven days produced no evident generalized toxic effect.

* 1. Heilman, F. R., and Herrell, W. E.: Penicillin in the treatment of experimental leptospirosis icterohaemorrhagica (Weil's disease). Proc. Staff Meetings Mayo Clinic 91 (1944) 89-99.

If the animal shows no toxic effects following treatment, the dosage may be increased, depending upon the seriousness of the infection and the response to treatment. After the temperature returns to normal, the penicillin may be stopped and the course of the disease watched carefully. Penicillin should never be used as an irrigant. It requires at least six to eight hours for a maximum effect of penicillin.

Leptospirosis

Although investigations at Oxford University concluded from *in vitro* tests that *Leptospira icterohaemorrhagiae* was relatively resistant to the action of penicillin workers at the Mayo Clinic have found the therapeutic effectiveness of penicillin on infections produced by this organism in guinea pigs makes it seem reasonable to believe that penicillin will be useful in the treatment of this infection in other subjects. The Veterinarian will be particularly interested in the application of this drug in treating leptospirosis in dogs; and it is possible that good results might be experienced not only in curing clinical cases but in clearing up the so-called carrier and chronic cases.

After some concern with the toxicity of penicillin for the guinea pig, as discussed previously, Heilman and Herrell found that a daily dose of 800 units of calcium penicillin would protect guinea pigs weighing 200 gm, against fatal infections and yet not be too toxic. Thirty-two treated and 32 untreated guinea pigs were inoculated, from 17 to 24 hours before treatment was begun, with from 2 to 3 c. of blood from guinea pigs infected with leptospira (from four to six times a lethal dose). Penicillin suspended in sesame oil, was given subcutaneously—200 units at 3-00 p. m. for a period of seven days.

None of the 32 treated animals died of leptospirosis. However nine gave evidence of relapse, as indicated by a rise in temperature from three to seven days after treatment was discontinued. In these cases penicillin was again administered for three or four days and the temperature returned to normal. Since the febrile relapses responded promptly to additional penicillin therapy, the investigators pointed out that had guinea pigs not been so susceptible to the toxic effects of penicillin and larger doses could have been given, the infection could have been more easily eradicated. At it was, three of the treated animals died from the toxic effects of penicillins. However, the untreated controls had a mortality rate of 91 per cent.

Penicillin, in relatively large doses (5,000 units daily for seven days), produced no toxic effects in two 250 gm. guinea pigs in which infection with *L. icterohaemorrhagiae* was already established. Three days after infection, when both animals showed high temperatures, treatment was begun, resulting in a prompt temperature drop. The temperature remained normal for the remaining 25 days of the experiment and at autopsy no lesions of leptospirosis were found.

Ornithosis

To date no form of therapy, including a sulfa drugs, has proved of value in the treatment of either experimental produced or clinical ornithosis. Heilman and Herrell² have found that penicillin exerted a protective effect on mice infected with the strain of ornithosis virus used. Of 40 virus-infected mice treated, only two died from ornithosis while 35 of the

40 untreated controls died. However, penicillin did not eliminate the virus from the bodies of the treated mice and virus was isolated from twelve of 16 of the recovered mice.

NEW BRAND OF PENICILLIN
RESULT OF RESEARCH BY INDIAN DOCTOR.

Bombay, Sept. 7, 1944.

Penicillin, the wonder drug, is not new to India but it has received a new and wide recognition throughout the world as a result of this war. A new brand of Penicillin has been discovered by a Bombay medical man, Dr. M. B. Cooper, M.B. (London), who has devoted nearly 25 years to the research on this powerful bactericide. Dr. Cooper believes that his Solu Penicillum will be more effective and successful in curing all diseases since, besides spores it contains moulds, which, he says are wanting in the Penicillin so far available. Solu Penicillum, according to Dr. Cooper, is a highly refined and sterilised preparation containing the Penicillum, moulds and spores, and its therapeutic effect is more prolonged and powerful.

Explaining his brand to a representative of the United Press Dr. Cooper narrated how, while experimenting with Mahawaz, the patent and most successful remedy for tuberculosis, he came across a type of fungi that is generally observed on cheese, bread or bran. This was in the year 1924. He then prepared Penicillum for oral administration with a certain amount of success. Improving on this discovery, Dr. Cooper carried on his experiments for nearly two decades with the result that he was able to present to the medical world the concentrated form of this non-toxic and non-irritating Solu Penicillum.

Solu Penicillum, Dr. Cooper claimed, compares very favourably with the sulpho-group of medications but has a larger range of application in several diseases than the latter, as it is non-ionic, non-cumulative and non-poisonous. For its intrinsic virtues as a bactericide and as non-toxic product Solu Penicillum is bound to replace in future sulphonamide and its modifications in several diseases. In support of his claim, Dr. Cooper enumerated a number of diseases and ailments where Solu Penicillum as a remedy was called for—U.P.I.

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