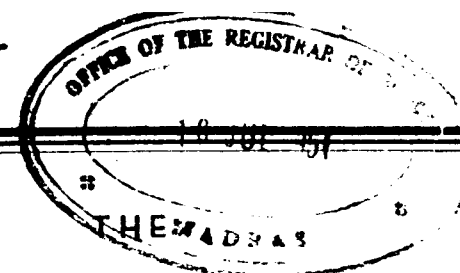


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INDIAN VETERINARY JOURNAL

PUBLISHED BI-MONTHLY

THE JOURNAL OF THE ALL-INDIA VETERINARY ASSOCIATION)

25, WALLAJAH ROAD, MADRAS-2 (S. INDIA)

Vol. XXVII

MAY, 1951

No. 6

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Owing to the recent revision of the rules relating to V.P.P. articles our subscribers are informed that it would not be to their advantage to send the next volume by V.P.P. and they are therefore particularly requested to send their subscriptions in advance.

Those who are in arrears of subscription are also requested to send in their dues immediately so that their accounts for this volume may be correctly adjusted.

Madras,)
1st June 1951

EDITOR.

Vol. XXVII

May 1951

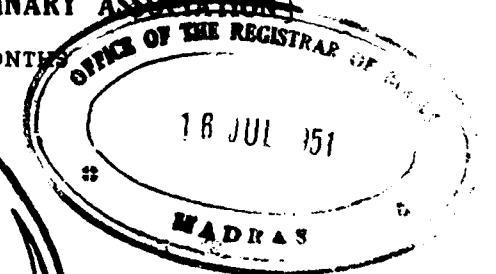
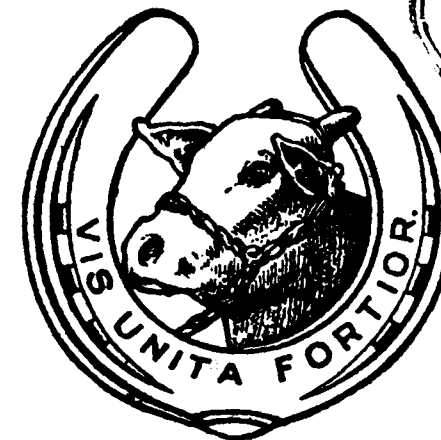
No. 6

THE INDIAN VETERINARY JOURNAL

[THE JOURNAL OF THE ALL-INDIA VETERINARY ASSOCIATION]

PUBLISHED ON ALTERNATE MONTHS

A BI-MONTHLY
RECORD OF
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(ESTD. 1924)

EDITOR

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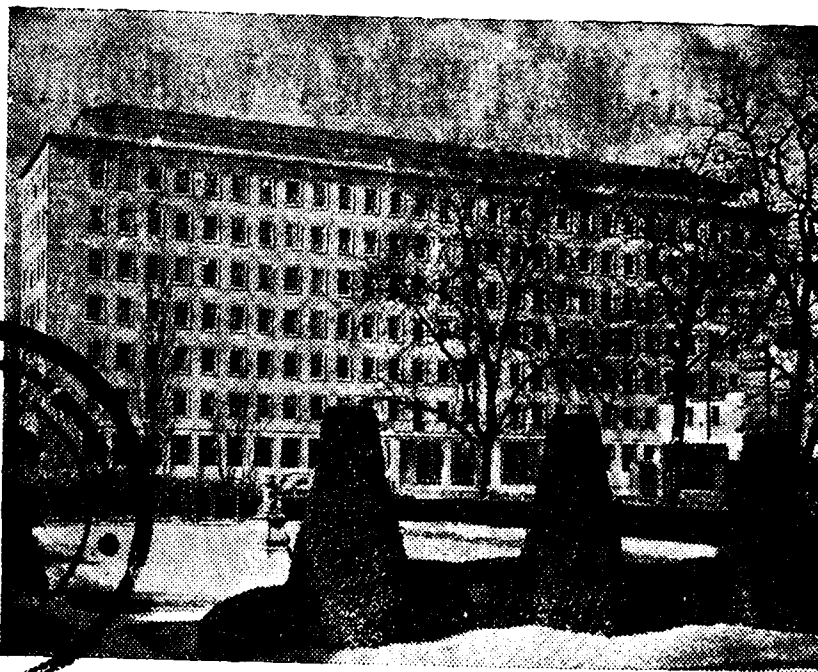
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THE

Indian Veterinary Journal

(The Journal of The All-India Veterinary Association)

Vol. XXVII

MAY, 1951

No. 6

General Articles

PROBLEM OF FOOT AND MOUTH DISEASE IN INDIA*

By

DR. S. DATTA,

Director, Indian Veterinary Research Institute,
Mukteswar/Izatnagar.

Introduction

The importance of conserving and improving animals as a source of essential human foods and the imperative necessity of diets being adequate and balanced in animal proteins as a means of raising the standard of life and health in under-developed countries has not yet been sufficiently realised. While the overall shortages of cereals are inconsiderable as compared with those in animal proteins and fats, more thought and endeavour are being devoted to maximising cereal outputs to a neglect of livestock. It is true the shortage of cereals is more obvious and that of animal proteins insidious and less startling, but the degenerate and stunted human physique so commonly seen must be referable more to nutritional imbalances than to genetic or other factors. Absence of sufficient statistical data has been a limiting factor in the proper appreciation of the real significance of the prevention of diseases and pests of animals as a definite factor in human welfare. It is in the fitness of things therefore that Foot and Mouth disease problems should receive attention as a food-problem of the human race and provide a field of international co-operation.

The veneration that is given to cattle in India is a testimony to the fact that cattle form the basic key to the whole economic structure and rural life and the welfare of the masses. At the threshold of a new era of progress our new Republican Constitution has given a directive that animal

*Presented to the World Meeting on Foot and Mouth Disease held at Paris during May 15th to 20th, 1950.

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husbandry will be organised on modern and scientific lines and steps would be taken to preserve and improve the breeds of cattle. We have been woefully behind the rest of the world in many matters because of great under-development of our resources, which in some respects are unequalled with regard to their potentialities. We have go-ahead men at the helm of affairs who are straining every nerve to the removal of poverty, dirt, disease and ignorance, and, with a view to developing the resources of this vast country and its teeming millions, a National Planning Commission is now engaged in evolving blue prints on a more fundamental and realistic basis than ever before.

It is appropriate, therefore, at this time, to assess the potentiality of Indian livestock in national welfare and the place they occupy on the map of the world. Indian livestock represents a large proportion of the world's stock and the potentialities already recorded not only for meeting internal requirements but also for supplying foundation stocks to under-developed countries for reconstruction are great. The characteristic resistance of Indian cattle to unfavourable environments and the enormous possibilities of development under better conditions of animal management are now well-known. In view of the shortage of livestock prevalent in many countries and the continuously rising pressure on the livestock industry for the maintenance of human health, the production of food crops and the increase of soil fertility through livestock in many countries the world organisations such as the F. A. O. should interest themselves more in India's livestock. Livestock interests can, therefore, be no longer relegated to the background as hitherto, and veterinarians all over the world should not only educate themselves but the general populace of what role livestock can play to improve the lot of the common man in his daily life in improving health, wealth and happiness.

As already stressed cattle mean much more and play more vital role in India than anywhere else. Small and large scale industries have no doubt their own vital position in Indian national economy and much money and effort are being expended to increase productivity, but if national income from several industrial commodities not directly connected with animal husbandry is compared with that obtained from livestock, it is found that they fall a large way behind the undeveloped and neglected animal husbandry of the country so far as national prosperity is concerned.

Estimates show that the total cash value of Indian livestock and livestock products amount to well over rupees 3,000 crores (£. 2,143 millions) per year and the direct contribution of the livestock towards the peoples' purse is about 16% and, if to this, the income from agricultural products which is indirectly derived through animal is added, the total contribution of livestock made directly or indirectly approximates to about

2/3rd of the total income of the country. It is important to note that these figures represent only the basic estimates of an undeveloped industry in its present neglected state, and the scope and potentiality for development, which can be visualised from the achievements of advanced countries are truly far-reaching. Judged by world standards we are a long way behind to derive the maximum possible benefit from our livestock.

Though phenomenal results have been achieved in the substantial control of all epizootics, yet the annual losses through diseases alone is still about a million heads and a much greater number remain unthrifty and unproductive totally or for considerable time. The export trade of Indian cattle has ceased. If freedom from certain diseases could be guaranteed, countries which are keen to import Indian cattle and who require them urgently for their rehabilitation could help themselves and India to a large extent. The economic loss may be only 10% of what they used to be but is still serious enough to militate against the prosperity of the masses. Fortunately most of these losses are preventable, if the full financial support to the control programme could be made available. Otherwise epidemics continue to take with them their toll of precious animals, particularly when more and more animals are required for the preparation and maintenance of more and more land for self-sufficiency in food production and the Grow More Food campaign.

The extent of economic loss

As compared to other countries Foot and Mouth disease in India is actually not serious as a fatal disease, but it is enzootic and occurs in all parts of the country and in all seasons while its severity is observed more in the summer. It is estimated that a minimum of five thousand heads of animal die of the disease every year, apart from the devastating disability suffered by the millions which survive the attack. Besides, economic loss to India from this disease includes that sustained due to the cessation of livestock exports and the serious interference caused to agricultural operations at most unexpected times.

Roughly the loss is estimated as follows:—

1. Loss due to actual mortality.	Rs. 0.5 million (£. 35,700)
2. Loss due to reduced working capacity.	Rs. 8.7 millions (£. 621,400)
3. Loss due to reduced breeding capacity and loss in flesh.	Rs. 1.8 millions (£. 128,600)
4. Loss due to reduction in milk yield.	Rs. 14.0 millions. (£. 1 million)

The total monetary loss would thus amount to much above Rs. 25 million (£. 1,786,000) annually. These rough data are sufficient to show how the

national prosperity could be greatly enhanced if adequate control measures were evolved.

Research work done in India

It was not possible to devote any concentrated attention on this disease until 1943 when the Indian Council of Agricultural Research sanctioned a special scheme to be operated at the Indian Veterinary Research Institute, Mukteswar. Experience has shown that Mukteswar is well-suited topographically and in being sufficiently remote from populous areas to eliminate the risks of the disease spreading from the experimental herds to surrounding districts. The work under the scheme could not progress smoothly due to unexpected difficulties. Facilities for Foot and Mouth disease research are not available anywhere else in India. It thus becomes advisable to remember that some European and other countries have found it necessary to employ large specialised research teams exclusively for meeting the requirements of Foot and Mouth disease work.

In India in the first instance attempts should be concentrated to evolve a cheap and efficient method of vaccination regarding the regional distribution of immunologically distinct strains.

Type determination of Indian field strains.—The Mukteswar Institute has facilities for the typing of Foot and Mouth disease virus. Standard types Vallee 'O', Vallee 'A' and Waldmann 'C' originally obtained from the Foot and Mouth Research Station, Pirbright, are being maintained at the Institute for typing. These are periodically tested for their purity.

The type determination is carried on guinea pigs only. Foot and Mouth disease in India is widespread and occurs throughout the year so that cattle available for experimental purposes are likely to have suffered from natural attacks due to one or the other strain of the virus. Type determination on cattle is therefore not reliable and when specially required the help of other countries notably England and Denmark will be appreciated.

During the last few years 169 specimens of Foot and Mouth disease virus were obtained from natural outbreaks of the disease in various parts of the Indian sub-continent (pre- and post-partition). Of these only 62 strains, including 5 strains from Pakistan, were received in a viable state at Mukteswar, and were available for typing. All the three types have been found to occur in this country as under :—

- 37 strains belonged to Vallee 'O' or 'O' variant;
- 17 to Vallee 'A' or 'A' variant;
- 7 to Waldmann 'C' or 'C' variant; and
- 1 atypical.

The atypical strain was isolated in 1944. The strain is immunologically distinct from the other strains and has maintained its immunological characters even after about 60 serial passages in guinea-pigs. The frequency occurrence of such a strain is being investigated. It may be noted that in India Vallee 'O' type is the most predominant strain, similar to the experience in other countries.

Data have been collected for a number of years to find out the relative frequency of outbreaks of Foot and Mouth disease in various parts of India and statistically analysed. The correlation of climatic and other meteorological factors with the incidence of outbreaks in various parts of the country is being studied.

Varying susceptibility of animal species

Cattle and buffaloes.—The disease affects cattle of all breeds and ages. The imported cattle or cattle with an admixture of European blood react more severely with a mortality rate of about 5 to 10% and sometimes even higher. Water-buffaloes are susceptible but the disease is not so frequent among them.

Sheep and goats.—Natural outbreaks among Indian sheep and goats are not infrequent but they usually go unnoticed because of the mild course of the disease in them. Even when infected artificially by inoculation on the tongue or on muscles no generalisation of the disease is observed. Experimentally goats appear to be more susceptible than sheep. The possibility of transmission of the disease from infected sheep and goats to cattle and *vice versa* was investigated. Whereas the disease could be easily transmitted experimentally from sheep and goats to in-contact cattle, sheep and goats kept in contact with infected cattle did not contract the disease. This observation brings out the significance of ovines in any campaign for the control of Foot and Mouth disease in cattle.

Camels.—Natural infection among camels is not known. Attempts to infect adult one-humped camels artificially were unsuccessful.

Wild mammals.—It is possible that wild mammals including rats may disseminate Foot and Mouth disease. In Europe the brown house rat (*Rattus norvegicus*) has been found to be readily inoculable and perhaps natural infection occurs in this species. The Indian house rat (*Rattus rattus*) however has been found to be only slightly susceptible but incapable of playing any important role in the spread of the disease. The Himalayan shining rat (*Rattus nitidus*) is much more susceptible, but fortunately, it does not frequently come in contact with cattle.

Some species of deer are nearly as susceptible as cattle and may be disseminators of infection.

Certain other animals like the martens, cats, flying squirrel, etc., could not be infected by artificial inoculation.

Arthropods.—Myiasis is the commonest complication of Foot and Mouth disease in India. These maggots often infect the foot lesions and feed on affected tissues, but the virus does not survive beyond 8 to 10 hours. The dejecta of such larvae as also the flies emerging from the maggots developing in the lesions of the disease were found to be free from the virus.

Ticks feeding on infected animals harboured the virus for a very short period.

In several experiments, guinea-pig placenta was found to be an effective barrier to the passage of the virus from the mother to the foetus and *vice versa*. This is surprising in view of the very small size of the Foot and Mouth disease virus particles.

The affinity of the virus for internal organs of cattle and guinea-pigs was studied and its presence in the lesions set up in the heart and rumen demonstrated.

Pathology

The pathological changes in the heart of adult hill cattle and cross-bred calves dying of experimental and natural infection were studied. In adult cattle an acute multiple myocarditis was found while in calves the change was essentially the same but more diffuse. No degenerative changes were apparent in the skeletal muscles but albuminoid degeneration was seen in the muscles of the tongue and the heart. In the rumen of nearly all the cattle dying of Foot and Mouth disease, vesicles and ulcers were found on the 'Pillars' and other non-papillated areas of the mucous membrane resembling those in the mouth.

Sequelae of Foot and Mouth disease

As a result of the disease, animals are rendered unthrifty and emaciated, and also unproductive. The effects on the milk yield were especially studied in the case of Military Farms (data collected by the Indian Council of Agricultural Research) and it was observed that the reduction in milk yield during the outbreak of the disease may be as much as 50%. The loss to the industry on this score is estimated at 5,000 maunds (411,250 lbs.) valued at Rs. 14 million (£. 1 million) per year.

A number of affected animals become 'Panthers' and the incidence is 8.4% in cross-bred cattle and 2.4% in indigenous breeds. Panthers, when put to work during the day in hot season, show laboured breathing, frothy salivation from the mouth and are unable to work. The animals appear to suffer from a microcytic anaemia and the normal function of the heat regulation centre is upset due to defects in the pituitary thyroid—adrenal function.

Virus production and methods of vaccination

Virus for the production of vaccine is obtained from hill cattle of the Kumaon and Garhwal ranges of the Himalayas. These animals are quite

small in size, weigh about 300 lbs. and are easy to handle. Animals in good condition are selected and inoculated under the lingual epithelium with standard strains of 'O', 'A' or 'C'. Their temperature is recorded every four hours and the height of thermal reaction is reached usually about 18 hours after the inoculation. Typical vesicles appear on the tongue epithelium in 24 to 36 hours. The tongue epithelium along with the vesicular fluid forms the chief source of the virus for the preparation of vaccine. The blood at the height of thermal reaction contains a fair amount of virus and sufficient quantity of this is collected at this thermal stage and later mixed with the epithelial emulsion.

Types of vaccines.—Two types of experimental vaccines have been produced and tested in hill cattle, sheep and goats. At first the *Aluminium 'Gel'* adsorbed vaccine according to Waldmann formula as modified by the American Army authorities was prepared and tested. In our experience the quality of the 'Gel' vaccine in inducing immunity varied greatly from brew to brew, the probable factor being that the adsorptive power of the 'Gel' varied from brew to brew as also the minimum infective dose of the virus crop obtained for incorporation in the vaccine.

Crystal Violet vaccine.—Later, on the recommendation of the Foot and Mouth Research Committee at Pirbright, the 'Gel' vaccine was given up in favour of this vaccine, prepared according to the formula of Graub *et al.* Three main types of the vaccine were prepared as described below and tested on susceptible animals at Mukteswar.

The epithelium with the vesicular fluid is well triturated and suspended in a phosphate buffer pH 7.6 and filtered through Seitz filter. The filtrate is then mixed with the blood virus and sufficient quantity of the phosphate buffer is added to make a final concentration of 2½ per cent of epithelium. Crystal Violet is then added to give a final contribution of 0.03 per cent of the dye. The virus-dye mixture is incubated for 10 days at 37°C. Safety tests are carried out in cattle and guinea-pigs. Methods to standardise the vaccine are under study.

Dose Rates.—Experiments with both types of vaccines were carried out to determine the minimum dose of the vaccine required to protect cattle effectively against Foot and Mouth disease. 20 to 30 c.c. of the 'Gel' vaccine was required per 100 lbs. body-weight, whereas a dose of 12.5 c.c. of the Crystal Violet vaccine per 100 lbs. body-weight protected cattle. A dose of 10 c.c. per 100 lbs. body-weight of the latter vaccine did not produce a dependable immunity. It may be noted that the dose of the 'Gel' vaccine required for immunisation is far greater.

Duration of immunity.—The immunity resulting from the Crystal Violet vaccine has been tested at varying periods and the animals appeared to possess dependable immunity up to at least 2 years—the longest period so far tested.

From the above resume of work done on Foot and Mouth disease in India it may be seen that the Crystal Violet vaccine produces a dependable immunity. The greatest difficulty encountered in its preparation is the procuring of sufficiently large quantities of the epithelial virus. Experience shows that one hill bull yields as little as 10 grammes only of the epithelial virus and with this only 8 to 10 animals at the most can be vaccinated. The 'Gel' vaccine may be cheaper but the intricate technique of obtaining a stable 'Gel' with uniform adsorptive qualities, and the necessity of employing a larger quantity of vaccine have prevented its adoption. The Crystal Violet method has proved to be the method of choice being simple to prepare and cheaper in the long run.

The question of obtaining enough quantity of the virus in a sufficiently high concentration for vaccine production is still the main problem and it is possible that the efforts of some of the Western workers to cultivate the Foot and Mouth disease virus in artificial media or tissue cultures may provide a cheaper source of the virus for vaccine production. The proposed banning of the slaughter of cattle in India requires that the use of live cattle for virus production and vaccine manufacture may be obviated. India is, therefore, greatly interested in any work that may be carried out: (i) to grow the virus in artificial media and (ii) to adapt the virus to grow in embryonating hen or duck eggs.

Training

Training facilities required by India.—As already stated Crystal Violet vaccine has given satisfactory results. The cost of production of this vaccine is high, i.e. Rs. 5/- (7½ sh.) per dose of 30 c.c., as compared to Rs. 7/- (10½ sh.) per dose of 'Gel' vaccine if obtained from Copenhagen and it will not be economical to adopt this vaccine in the field considering the millions to be protected. A cheaper vaccine has to be evolved and perhaps the 'Gel' adsorbed vaccine in use in some of the Western countries may be the answer. Hence facilities will be required for an officer from India to see the details of the manufacture of the 'Gel' vaccine at suitable centres such as Amsterdam and also the sero-virus method at the French Foot and Mouth Serum and Vaccine Institute, Lyons. Visits to Pirbright and other centres may have to be included, if required.

Secondly, the difficulty has to be faced of obtaining the requisite quantities of the virus for mass production of the vaccine, whichever it may be—the Crystal Violet or the 'Gel' vaccine. It will be of great help to India if facilities are afforded to any of her research workers to get themselves acquainted with any advanced work that may be in progress elsewhere for the mass production of the virus particularly on artificial media or eggs.

On a previous occasion, the necessity of obtaining the services of an Expert through the F.A.O. and later on a team for organising a field campaign was considered. Work visualised include:—

- (i) To investigate the regional distribution of the various strains of Foot and Mouth disease virus.
- (ii) Extension of work on Crystal Violet vaccine.
- (iii) To evolve a cheaper vaccine preferably a 'Gel' vaccine.
- (iv) To elaborate methods of tissue culture for Foot and Mouth vaccine manufacture.
- (v) To organise and initiate a country-wide field campaign of control and eradication in collaboration with the different Indian States.

Training facilities that India can provide

- (i) Training in the type determination of Foot and Mouth disease virus.
- (ii) Training in the technique of preparation of Foot and Mouth disease vaccine now followed at the Indian Veterinary Research Institute, Mukteswar, viz. Crystal Violet vaccine.

Methods of coordinating Reporting system

Arrangement may be made by the Food and Agriculture Organisation for the rapid interchange of information and the pooling of resources.

A STUDY ON THE INTRAVENOUS USE OF FORMALIN AS A HEMOSTATIC IN DOGS

BY

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Hemorrhages from traumatic injuries and those arising during and after surgical operations are sometimes unavoidable, leading to serious consequences which may mean the life of the patient or even embarrassment on the part of the veterinarian. It is, therefore, of fundamental importance that a safe and effective agent to control bleeding be made available at all times. Its value in certain diseases accompanied by hemorrhages is too obvious to require comment.

During the past, researches were undertaken by various investigators to find out an effective hemostatic agent. Many have been tried and recommended but their use in veterinary practice is limited because of their high cost. Formalin solution is one of the most recent and least expensive of these agents discovered to have a hemostatic action.

According to Milks (6), intravenous injection of formalin in the strength of 1:5,000 in physiological saline produces no physiological reaction. It is recommended in the treatment of septicemia and purpura hemorrhagica.

Fieser (3) claimed to have successfully treated twenty cases of cows giving bloody milk by administering intravenously 500 c.c. of 2 per cent solution of formalin to each. In all these cases the bleeding stopped immediately after each administration. The same treatment was employed by him in a colt which had been castrated early in the morning and still bleeding the following night. The hemorrhage stopped almost instantaneously after the formalin treatment. In another instance, he treated a newly spayed bitch which had profuse bleeding from the abdominal incision one hour after the operation. After giving 10 c.c. of 5 per cent solution of formalin per vein, the hemorrhage was completely arrested. In all the above cases, recurrence of bleeding was not encountered.

Beckman (1) published an article about the use of 1 per cent formalin as a blood coagulant in cases of canine virus encephalitis. He claimed that formalin increased the thrombin content of the blood thus preventing its leakage through the blood vessel walls into the brain and that the blood recovered from animals suffering from this disease was very slow to clot.

The object of the present study is to contribute some data to the limited information on the use of formalin as a general hemostatic.

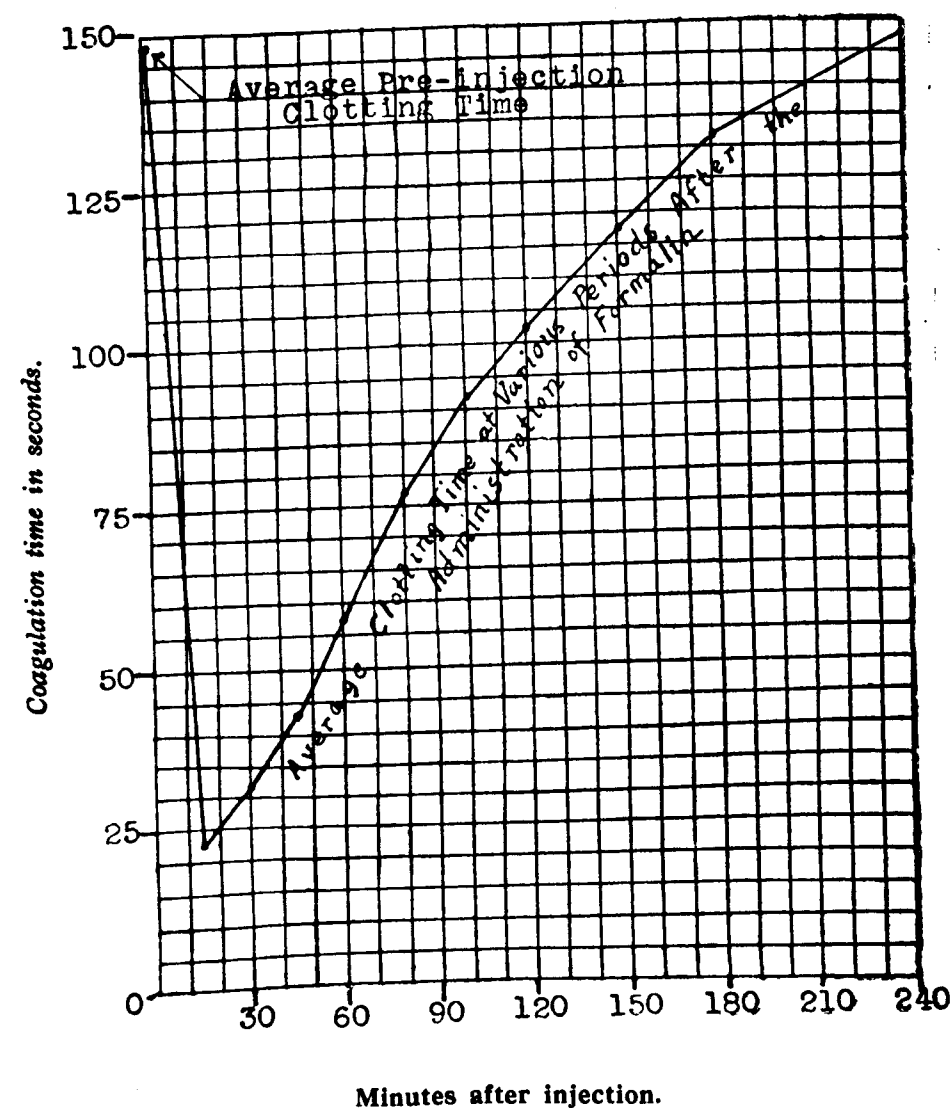
Materials and Methods

Twenty apparently healthy native dogs were used in this study. Seven were taken from the Manila City Pound, and the rest were owned and kept by relatives and friends. Nine of these were females and eleven were males.

The dogs taken from the City Pound were kept in cages for two weeks to be sure they were not suffering from disease before subjecting them to the experiment. They were fed twice a day with boiled rice and milk, while the rest were taken care of by their respective owners at home.

The formalin used was procured from a local drug store. It was a 40 per cent solution (U. S. P.) of formaldehyde by volume, or 37.5 per cent by weight. A 5 per cent solution of formalin was used in this study. In preparing this 5 cc. of formalin were placed in a graduated cylinder and distilled water added to make 100 cc. Bottles with rubber caps were used as containers of the solution.

The approximate clotting time of the blood was determined with the use of a stop-watch by the slide method as suggested by Kolmer and Boerner (5) and employed by Gonzaga (4) in his work on oxalic acid. The blood for the experiment was taken from the ear by cutting a slit on the edge with a pair of scissors after preliminary shaving, cleansing and disinfection of the part.



GRAPH SHOWING THE INFLUENCE OF FORMALIN SOLUTION ON THE COAGULATION TIME OF THE BLOOD OF DOGS.

To have a basis for comparison, the coagulation time of the blood of each dog was taken immediately before the injection of the formalin solution. At least two trials were made on each subject and the average taken as the pre-injection record. Then 5 c.c. or more of the solution, depending upon the weight of the dog (about 1 c.c. per kg. body weight), was given carefully and slowly either into the saphenous or radial vein. After 15, 30, 45, 60, 80, 100, 120, 150, 180, and 240 minutes, the coagulation time of the blood was again taken using the above method. After the fourth hour, no further determinations were made, as the pre-injection coagulation time was almost equalled.

Results and discussion

As shown in the accompanying Table, the pre-injection clotting time of the dogs observed ranged from 100.5 seconds (1 minute, 40.5 seconds) to 195 seconds (3 minutes, 15 seconds) with an average of 149.2 seconds (2 minutes, 29.2 seconds). This result almost equalled the coagulation time of 2½ minutes given by Dukes (2) for dogs.

Fifteen minutes after the administration of formalin solution per vein, the clotting time of the blood dropped to less than 1 minute, ranging from 10 to 38.5 seconds with an average of 23.35 seconds. Subsequent results showed that the coagulation time continued to rise in 3 to 4 hours to almost the pre-treatment level.

The results are graphically illustrated in the graph taking into consideration the averages of the clotting time.

The data herein presented fully support the views of Fieser (3) and Beckman (1) that formalin solution is an effective hemostatic agent.

It is really surprising to note that formalin which is highly irritating to the tissues and mucous membranes and has long been used as a preservative can shorten the clotting time of the blood.

In all the animals used in this study, the writers observed no ill-after-effects beyond polypnea and epiphora which lasted less than 10 minutes. These conditions were also observed by Fieser (3). This investigator warned that care must be observed in the administration of the formalin solution because it will cause sloughing of the tissues at the site of injection.

The action of formalin in the physiological process of blood clotting is not definitely known, although it has been suggested that it probably increases the thrombin content of the blood and in this way favours coagulation.

Summary and Conclusions

1. A study on the influence of formalin as a hemostatic agent in 20 native dogs is herein presented.
2. The blood coagulation time which ranged from 100.5 seconds (1 minute, 40.5 seconds) to 195 seconds (3 minutes, 15 seconds) with an average

Table showing the influence of Five Per Cent Formalin solution on the Clotting Time on the blood of dogs.

Animal No.	Sex	Pre-injection clotting time (sec.)	Weight (Kg.)	Dose (cc.)	Coagulation time in seconds at various periods after treatment									
					15 min.	30 min.	45 min.	60 min.	80 min.	100 min.	120 min.	150 min.	180 min.	240 min.
1	M	160.5	5.2	5	20.0	28.5	40.0	63.5	80.5	102.0	115.0	130.5	143.0	160.0
2	F	140.0	5.2	5	15.0	25.5	36.0	55.0	72.0	88.0	100.0	109.0	125.0	140.0
3	M	190.0	6.8	7	30.5	45.0	66.0	85.5	105.0	123.0	135.0	153.0	171.0	190.0
4	F	150.5	4.9	5	26.0	30.0	39.0	55.0	72.0	85.0	94.0	110.0	119.5	150.5
5	F	160.5	5.8	6	23.0	30.0	43.0	60.5	78.5	100.5	114.0	129.5	141.1	160.0
6	F	180.5	7.0	7	36.5	45.0	50.0	68.0	95.0	105.5	117.0	128.5	153.0	180.0
7	M	195.0	7.3	7	38.5	50.0	64.5	80.0	102.0	118.5	126.0	148.0	172.0	194.0
8	M	130.0	5.8	6	24.0	29.0	36.0	45.0	61.0	78.0	85.0	102.0	116.5	129.5
9	M	120.5	5.8	6	21.0	25.5	34.0	49.5	62.0	71.5	83.0	96.0	112.0	120.0
10	M	160.0	7.1	7	18.0	30.0	43.0	62.5	79.0	98.5	113.5	131.0	140.0	159.5
11	F	120.0	5.2	5	17.5	24.5	34.0	47.5	59.5	71.0	83.0	95.0	104.0	120.0
12	F	190.5	7.1	7	35.0	47.5	68.0	86.5	103.0	120.0	132.0	151.5	172.0	190.0
13	M	180.0	7.2	7	30.0	41.0	53.0	70.0	98.0	109.0	120.0	130.0	155.0	180.0
14	M	155.0	6.3	6	20.0	30.0	45.0	67.5	88.5	108.0	123.0	135.0	147.0	154.5
15	M	150.0	5.9	6	18.5	28.0	40.5	58.0	70.5	88.5	96.0	111.5	120.0	150.0
16	M	120.5	5.9	6	15.0	22.0	32.0	47.0	56.5	70.5	82.5	94.0	103.5	120.0
17	M	100.5	4.9	5	10.0	18.0	28.5	41.0	55.5	66.0	74.0	89.0	95.0	100.0
18	F	110.0	7.1	7	20.5	33.0	42.0	42.0	58.0	68.0	76.0	90.5	100.0	109.5
19	F	150.0	7.2	7	23.0	28.0	35.0	46.0	71.5	89.5	98.0	110.0	122.0	150.0
20	M	120.0	6.9	7	25.0	29.5	33.5	48.5	60.5	69.0	78.0	91.0	100.0	119.0
Minimum		100.5	4.9	5	10.0	18.0	28.5	41.0	55.5	66.0	74.0	89.0	95.0	100.0
Maximum		195.0	7.3	7	38.5	50.0	68.0	86.5	105.0	123.0	135.0	153.0	171.0	194.0
Average		149.2	6.2	6.15	23.35	31.6	42.73	58.93	76.4	91.45	102.28	116.75	130.6	148.83

of 2 minutes and 29.2 seconds before the injection of the formalin solution dropped abruptly to less than 1 minute, ranging from 10 to 38.5 seconds with an average of 23.5 seconds, 15 minutes after the injection. Thereafter, the coagulation time increased continuously in 3 to 4 hours to the pre-treatment level.

3. The data obtained in this work point to formalin as an effective hemostatic agent.

4. As used in this study, formalin was found to produce no permanent ill-after-effects.

Acknowledgment

The writers wish to thank the owners of dogs employed in this work for permission to use their animals, and to our friends who helped us in some way or other.

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THE LATEST METHODS EVOLVED FOR THE CONTROL OF RINDERPEST AND THE PROBLEM OF ITS ERADICATION FROM INDIA

BY

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The three categories of prophylactics that have been evolved from time to time for the active immunization of rinderpest are

- (1) the inactivated virus vaccines,
- (2) the serum-virus simultaneous method of vaccination, and
- (3) the attenuated virus vaccines.

Of these prophylactics, number (1) and (2) do not here deserve more than a mention as they have very little utility in a country like India where the disease is widely spread and requires more effective prophylactics which may be at once cheaper, easy of application as well as capable of conferring a lasting immunity.

The inactivated virus vaccines

Products belonging to this category are prepared by inactivation of the virus by treatment of the virus suspension with chemicals such as chloroform, formalin, glycerine, phenol, etc. As their cost of production is high and the immunity conferred by their use is of a short duration, they cannot be recommended for general use except in countries where the disease may not occur and where short duration immunity may be required to combat an infection which may get introduced accidentally.

The serum-virus simultaneous method of vaccination

This method involves the use of virulent bull virus which is inoculated simultaneously with an adequate dose of immune-serum to control the severity of reaction. The method was adopted in this country some years ago but as it necessitates a very careful adjustment of the dose of serum in animals of varying susceptibilities and requires the vaccinated animals to be segregated to prevent spread of infection and closely observed during the period of reaction, the method soon fell out of use. Modified form of serum-virus simultaneous method using goat-adapted virus is still in vogue in certain parts of India, notably Madras, for use in animals which react more severely to goat virus alone, but the high cost of vaccination usually makes its large-scale adoption a prohibitive proposition.

Attenuated virus vaccines

These vaccines have been evolved by adapting the virulent rinderpest virus to propagate in living animals other than the normal susceptible hosts or in embryonating eggs by continued serial passages as a result of which the virus gets reduced in its virulence without any appreciable effect on its immunogenic properties. Inoculation of such a modified form of virus into a susceptible animal produces a mild form of the disease depending upon the degree of attenuation of the strain and the animal, on recovery, develops a strong and lasting immunity to a subsequent attack of the disease.

Three different strains of rinderpest virus evolved in this manner have gained world-wide recognition and have gone to the formation of three important vaccines, viz. (i) the well-known goat-tissue vaccine, popularly called *Goatis* in India, (ii) the lapinised or rabbit-adapted virus vaccine and (iii) the avianised or egg-adapted virus vaccine.

(a) *Goat-tissue vaccine—Goatis.* Edwards in 1927 successfully adapted rinderpest virus to goats by serial passages mainly for obtaining a virus free from piroplasmosis for serum-simultaneous inoculations. He observed that this virus had lost a great deal of its virulence for cattle and could be inoculated into highly susceptible hill bulls without causing

death. This resulted in its being used as a vaccine for large-scale immunization against rinderpest, and is till to-day the method of choice in India and certain other countries for vaccination of plains cattle and buffaloes either alone or in conjunction with a small dose of immune serum. The immunity conferred by the goat-virus vaccine has now been tested to last upto 14 years.

Commenting on the utility of this virus, it may be noted that while the virus is a fairly stable one, cheap to produce and is of great value for vaccinating cattle possessing some degree of resistance to this disease, such as the plains cattle of India, it is observed to be too virulent for certain types of animals such as imported cattle, cattle of pure bred progeny, hill cattle, water buffaloes as well as animals in advanced pregnancy unless administered in conjunction with serum which eventually makes the immunization costly, more cumbersome and sometimes ineffective, if the dose of serum administered happens to be too large.

(b) *Lapinised vaccine*.—The priority for successfully propagating rinderpest virus in rabbits goes to Edwards in India (1924, 1927) although his virus faded out before any experiments could be undertaken to assess its immunizing properties. Later, Nakamura and his co-workers (1942) in Japan and Haddow and Idnani (1947) in India independently developed rabbit adapted rinderpest virus but only the former, now popularly known as Nakamura III strain got 'fixed' in its virulence for most species of susceptible animals without a corresponding loss in its immunizing properties even after 1045 passages in rabbits. The strain is less virulent than the goat virus strain and has gained great popularity in some countries as an effective immunizing agent against rinderpest and its introduction in India for mass vaccination is under active consideration.

The vaccine strain (795th) passage was obtained on request from China in 1948 through the courtesy of the F. A. O. and has since been successfully maintained at Mukteswar in Indian bred rabbits for over 250 passages. As a result of these serial passages in rabbits the strain shows slight increase in its virulence for this species although its general characters for other susceptible species such as cattle, buffaloes, goats, etc., have remained unchanged.

Reaction in rabbits.—For the production of the vaccine a continuous supply of good healthy rabbits, free from other diseases is essential. Rabbits inoculated with lapinised virus usually show a sharp rise of temperature upto 105–106°F. two to three days after inoculation. During the febrile stage the rabbits are dull and off feed and show a certain degree of distressed breathing. Indian rabbits usually die on the 4th to 6th day after inoculation, if not destroyed for harvesting the virus.

Lesions.—Infected rabbits show large numbers of closely packed grayish white granular foci which are most pronounced in the lymphoid tissues, particularly the Peyer's patches, which are enlarged in size as well as in the mesenteric glands and caecum and are readily seen on opening the abdomen.

The vaccine.—The vaccine consists of a 1:500 suspension in normal saline solution of spleen and mesenteric lymph glands collected from a rabbit showing typical lesions on the 3rd or 4th day of inoculation. The dose is 1 ml. of this suspension injected subcutaneously. The suspension loses its potency rapidly and has to be prepared fresh at the scene of inoculation.

Laboratory and field trials in India.—The vaccine has been extensively used for protecting susceptible animals in China but on account of great variations in the susceptibility of different species of animals as well as of different breeds within the same species it has been considered necessary to make adequate laboratory as well as field trials and get a comprehensive idea of the nature of immunity produced before recommending its introduction into the country for large-scale vaccination.

Experimental vaccination of calves of highly susceptible breeds and adult dairy cattle (Datta *et al*, 1951) is accompanied by nothing except a mild, almost negligible thermal reaction. Tests carried out on some of the animals with virulent virus upto a period of 15 months after vaccination have shown the immunity to be perfect.

Field trials have been carried out on some 841 cattle of different breeds in different parts of India (Uttar Pradesh, Punjab and Madras) including some cows in milk, 24 buffaloes, 108 goats and 186 sheep. The vaccination reaction consisted of a mild thermal reaction observed in only a small proportion of the animals of all species. In some of the cattle tested for immunity after a period of 14 months, the protection was absolute. More extensive field trials on animals of different species and belonging to different age groups under varying conditions met with in India are contemplated and, although the results obtained so far are quite encouraging, mass vaccination of all susceptible stock would not be advisable until precise information about the nature of immunity conferred under all the conditions mentioned above is available.

The seemingly negligible reaction that one gets with the lapinised vaccine will not enable a field worker to judge its potency. For its success in the field, it is very necessary that the vaccine should be made available in a fully potent state. It is equally necessary that the manufacture of the vaccine should be entrusted to people who are fully acquainted with the typical lesions produced by the virus in the donor rabbits.

Lapinised virus has been successfully passaged through goats at Mukteswar for nearly 100 passages without any marked changes in its character and it is likely that the virus may be obtained in large quantities in this manner and thus provide a cheap source of vaccine.

(c) *Avianised vaccine*.—Work on growing rinderpest virus in the developing chick-embryo was first successfully carried out during the last World War by American and Canadian workers in Grosse Isle in Canada with the object of producing a suitable vaccine to safeguard against the introduction of this disease into the North American continent by the enemy. Adaptation of rinderpest virus to the developing chick-embryo can be brought about by the virulent virus in serial passages on the chorio-allantoic membrane and later in the yolk sac of embryonating eggs. After a certain number of passages the virus can grow well on the membrane but no attenuation occurs until the virus gets adapted to the yolk sac. Different strains require different numbers of passages in yolk sac before they get sufficiently attenuated. During its growth in the egg the virus does not produce any visible lesions in any part of the embryo and in order to detect its presence or ascertain the degree of attenuation, it is necessary to resort to inoculation of susceptible cattle after every five egg passages. It is noteworthy that not all strains of virulent virus can be in eggs as certain strains have been found to resist growing in this manner. Prolonged cultivation of the virus in eggs may ultimately result in a complete loss of its protective power and this has to be guarded against by careful preservation of the virus for seed material when correct degree of attenuation has been achieved. The preservation of the virus is satisfactory only at a very low temperature and a deep-freeze apparatus is very essential. For the manufacture of the vaccine the fluids as well as the embryos from the inoculated eggs are used, and the actual process requires elaborate laboratory arrangements.

Avianised vaccine has been used on a fairly large scale in China where it is reported to have averted outbreaks of rinderpest in the areas where it was used. The virus as used in China is apparently more attenuated than any other live attenuated strain. This has also been observed at Mukteswar where the avianised virus obtained through the F. A. O. did not produce any reaction in hill bulls although these animals subsequently resisted a challenge dose of virulent bull virus.

For use in the field, avianised vaccine requires constant low refrigeration and this coupled with the elaborate process involved in its manufacture and other difficulties that may present themselves in India in connection with its transport etc. may not make this product very suitable for adoption in this country.

Eradication of Rinderpest from India

From the above brief account of the comparative value of the different biologicals it would appear that susceptible animals can be successfully immunized against rinderpest by the judicious application of one or the other of the attenuated vaccines, rendering them lastingly immune to subsequent natural attacks of the disease. If vaccination of all susceptible stock in the country could be undertaken, the disease would naturally die out. It naturally follows, therefore, that eradication of rinderpest from India is a practical possibility.

Essential factors in the eradication plan. The main points in the eradication are :

- (i) Introduction of compulsory vaccination of all species of susceptible animals. For this legislation may have to be introduced,
- (ii) Exercise of an effective control on the movement of cattle and other animals susceptible to the disease from one state to the other with a special check on livestock traffic on the main cattle routes.
- (iii) Immunization of the progeny of the vaccinated stock soon after they attain the susceptible age.

Choice of a vaccine.—A careful analysis of the results obtained with the three attenuated virus vaccines shows that lapinised vaccine is probably the most suitable for adoption in India for mass immunization as it produces a minimum reaction in all breeds of cattle, buffaloes, sheep and goats, it does not interfere with the working of the vaccinated animals for very long, it confers a good grade of immunity, it has relatively good keeping qualities and it is also cheap and easy to administer. The problem of mass production of this vaccine would mainly depend on the availability of sufficient numbers of rabbits and necessary equipment.

Goat "Reactor" Virus.—As stated earlier, some preliminary researches carried out to explore the possibility of utilizing blood or tissues collected from goats inoculated with the virus for immunizing susceptible stock have given encouraging results and it is very likely that cheap virus for mass production of lapinised vaccine may be obtained in this manner.

The avianised vaccine has not been given extensive trials in India, but it is felt that this vaccine, too, may prove suitable for use in this country, if preliminary difficulties of procuring the necessary apparatus etc. can be got over. A large number of fresh, disease-free eggs will have to be made available for the production of this vaccine and may necessitate the attachment of a well-established Poultry Farm with the Vaccine Production Centre.

The goat-tissue virus, in spite of all its various qualities, is not likely to prove very successful in any eradication plan as, unlike lapinised vaccine, it cannot be indiscriminately used for vaccination of all species of animals, and a certain amount of anti-serum has to be made available for use in conjunction with it in the case of certain breeds of cattle and perhaps other species of animals.

Keeping the above in view, a scheme for the eradication of rinderpest from India at an approximate cost of 4.1 crores spread over 5 or 10 years has been prepared and submitted to the Government of India. This scheme visualises that, what the different states in the Indian Union in the present set up, would jointly spend in 12 years for keeping rinderpest in partial check, if concentrated in 5 or 10 years would result in the total eradication of the disease from this country and effect a perpetual saving thereafter. Before the necessary funds could be provided for and the necessary trained men made available for the scheme to be set on foot, a short term pilot scheme for applied research on rinderpest with a view to get preliminary information regarding the suitability of the two vaccines for extensive field use has been planned and is under the active consideration of the Indian Council of Agricultural Research.

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THE USE OF LAPINISED VIRUS VACCINE TO SUPPRESS ACTIVE RINDERPEST IN SUSCEPTIBLE GRADE CATTLE*

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Viable lyophilised vaccine, prepared from the tissues of rabbits infected with the "lapinised" strain of rinderpest virus, has been used successfully in East Africa since 1948 to immunise some types of cattle against rinderpest. A detailed paper on the vaccine and the results obtained with it is being prepared for publication. The natural disease had often been in the vicinity of cattle so immunised, but hitherto had never actually been present in the herds, and, consequently, particular interest was attached to the outbreak to be described, which presented the opportunity for a field trial of the properties of the vaccine

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in the face of severe infection. Pilot experiments at the laboratory had indicated that cattle inoculated with the vaccine resisted infection by parenteral challenge with virulent bovine virus within 100 hours after vaccination. This phenomenon was observed by Pfaff, G. (1938), working with attenuated goat virus vaccine, when he recorded that 0.00025 g. of dried virus induced a serviceable protection in cattle within 24 hours. Daubney and Hudson (1939) observed that attenuated goat virus afforded some protection in 48 hours and adequate protection in 72 hours, long before antibodies could have been produced.

History of Farm.—The farm lies in the Rift Valley, some 25 miles from the laboratory and produces both milk and beef. The cattle, with the exception of a few work oxen, were high grade animals of Hereford and Ayrshire breeds. No rinderpest immunisation had been carried out on this farm for at least ten years, consequently the cattle were highly susceptible.

Disposition of Herds and Management on the Farm.—The farm of 20,000 acres is divided by a main tarmacadam road, one-third of the acreage lying to the east and two-thirds to the west. To the east was situated the milking byre with ancillary buildings, the crush and the dip; the cattle comprised the two milking herds, the "in-calf" herd, the hand-reared calves, the pure-bred bulls, and a small herd of heifers running with two bulls. To the west there were five herds disposed over a large acreage; these consisted of an adult steer herd, two foster-mother herds, a "dry" herd and a herd of young steers and heifers. Activity was centred around the main buildings where milking was carried out twice daily, where the calves were housed and bucket-fed and where all cattle converged once a week for dipping.

Distribution of Disease.—By September 4th, 1950, a few deaths had occurred amongst the calves and three adult steers had died. No definite diagnosis could be made by *post-mortem* examination, but rinderpest was confirmed by herd examinations on September 6th. By this time 30 adult steers had severe clinical symptoms of rinderpest and many were ill, showing varying degrees of diarrhoea and lachrymation. Calves exhibited a similar syndrome. From the distribution of the herds it was noted that the disease was present on both sides of the farm and that all herds could have been exposed to infection when coming in to be dipped or milked. The cattle in closest contact with the infected calves were the milk cows and the bulls, while the young heifers and steers to the west had been grazing in close proximity to the infected adult steers. It was not possible nor desirable to examine herds other than those already infected, but animals with clinical manifestations of rinderpest were seen when the various herds were presented for inoculation.

Action Taken.—The owner was informed that three courses were available: (1) To inoculate on three successive occasions at intervals of one week with formalised spleen vaccine, which, while it would eventually protect, would not induce immunity for at least ten days following the first inoculation. (2)

To inoculate with Kabete attenuated goat virus vaccine (K.A.G.), which would certainly check the disease, but which would also severely affect general condition and milk yield and possibly cause some mortality in grade cattle. (3) To inoculate with lapinised virus vaccine, which was still in the experimental stage. It was explained that laboratory trials of this vaccine were favourable and that its use in grade cattle was not likely to cause a severe reaction. The owner elected the third alternative for all his stock except the adult steer herd, in which the disease was already rife.

The lapinised virus vaccine used was batch K 21. On titration at the laboratory the minimum immunising dose of this batch which would protect cattle against a subcutaneous inoculation of virulent bovine virus was 0.005 g. On the farm a dose of 0.01 g. in 2 ml. normal saline was given subcutaneously, so that each animal treated received 20 minimum immunising doses.

Results after Treatment in Herds

In addition to the calves and adult steers, symptoms of rinderpest were noted at the time of inoculating, in the milking cows, the bulls and the young steers and heifers. Rinderpest is also known to have been present among the "dry" and the "in-calf" cows, because animals showed typical symptoms immediately after inoculation, but recovered. No cattle in the two foster-herds were ill and none died.

It was impossible to estimate the number of infected animals which recovered, as, except for the milking cows, the distance between herds and the necessity for maintaining isolation prohibited handling of the cattle. The extent of disease in any herd has therefore been deduced from the number of deaths due to rinderpest in that herd, except in the case of the milking cows.

A summary of the history in each herd is given below, indicating the original numbers of animals, deaths which occurred prior to vaccination, the treatment, and the number of animals which died after treatment.

Adult Steer Herd.—As the disease was well established, it was decided to give 250 ml. of hyper-immune serum to advanced clinical cases and to treat the remainder with K.A.G.

Died of rinderpest prior to 7-9-50	3	Died	...	...	3
Treated K.A.G. 7-9-50	...	119	Died	...	51
Treated with serum 7-9-50	...	34	Died of natural rinderpest	...	20
Original herd	...	156	Loss	...	74

Calves Under Five Months Old.—Only some 20 calves were given lapinised virus vaccine as the majority were showing severe symptoms of the disease and these were given serum.

THE USE OF LAPINISED VIRUS VACCINE

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Died of rinderpest prior to 7-9-50	6	Died	...	...	6
Given lapinised vaccine and/or serum	...	...	...	...	66
Original herd	...	101	Loss	...	72

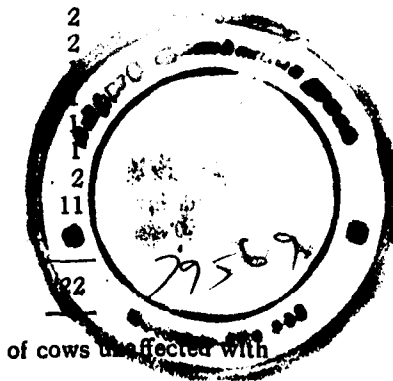
It is not possible to state what proportion of deaths occurred in calves given the vaccine.

Dairy Cattle

Died of rinderpest prior to 6-9-50	nil	Died of natural rinderpest	...	22
Treated lapinised vaccine 6-9-50	209	Loss	...	22
Original herd	209			

Altogether, some 40 cows were ill, of which about 18 recovered. The distribution of deaths shown below was significant, as this indicated the early protective power of the lapinised virus vaccine and that a number of cows were in the incubative and infective stages at the time of inoculation.

Died	8-9-50	...	...	2
"	9-9-50	...	...	2
"	10-9-50	...	...	1
"	12-9-50	...	...	1
"	13-9-50	...	...	2
"	14-9-50	...	...	11
"	15-9-50	...	...	2
"	16-9-50	...	...	1
"	30-9-50	...	...	1
Total	...	...	...	22



The milk records cited showed that the majority of cows unaffected with the disease continued to milk satisfactorily.

Date	Cows in Milk	Yield gallons	Average Yield gallons
1-9-50	140	303'25	2'2
6-9-50	142	314'00	2'2
7-9-50	144	305'00	2'1
12-9-50	143	303'00	2'1
18-9-50	136	275'50	2'0
25-9-50	128	270'00	2'1

"In-calf" Herd

Died of rinderpest prior to 7-9-50	...	nil	Died	...	...	nil
Treated lapinised vaccine 7-9-50	140		Loss	...	...	nil
Original herd	...	140				

JL

KZm2, N24

NT1.27.6

Several animals were noticed to be ill for two weeks following vaccination, with mild symptoms of rinderpest, but all recovered. Six cows produced dead calves at full term.

"Dry" Herd

Died of rinderpest prior to 7-9-50	nil				
Treated lapinised vaccine 7-9-50	157	Died	...	...	nil
Original herd	...	157	Loss	...	nil

A small undetermined number of animals became ill, but all recovered.

Foster-mother Herds

These two herds were at the farthest point of the farm and away from the disease, but for dipping and inoculation they had to be brought to the central crush, which was also the focus of infection.

Died of rinderpest prior to vaccination	...	...	nil		
Treated lapinised vaccine 7-9-50	...	605	Died	...	...
Original herd	...	605	Loss	...	...

Work Oxen

These were Zebu cattle and had been working all over the farm.

Died of rinderpest prior to 7-9-50	nil				
Treated lapinised virus vaccine 7-9-50	...	17	Died of natural rinderpest	...	1
Original herd	...	17	Loss	...	1

Pure-bred Bulls

Died of rinderpest prior to 6-9-50	nil				
Treated lapinised virus vaccine 6-9-50	...	12	Died of natural rinderpest	...	4
Original herd	...	12	Loss	...	4

Heifers with Bulls

Died of rinderpest prior to 6-9-50	nil				
Treated with lapinised vaccine 6-9-50:—					
Pure-bred bulls	...	2			
Steers (Teasers)	...	2			
Heifers	...	51	Slaughtered, clinical rinderpest	3	
Original herd	...	55	Loss	3	

Of three heifers which became ill on 30-9-50 two were slaughtered on 9-10-50 and the other the next day. These animals might have recovered, but were a continuing source of infection, so were eliminated. This herd was vaccinated with lapinised vaccine on 6-9-50, immediately after the dairy herd, and at this time none of the animals showed symptoms suggestive of rinderpest. The herd was grazed in close proximity to the milking cows both before and after vaccination, but when three heifers contracted rinderpest the herd was moved. It was assumed that all animals in the herd did not acquire immunity at the inoculation; on the other hand, as the remaining 52 animals showed no signs of illness on 11-10-50, it was assumed that infection had not spread as it would have done had they all remained fully susceptible. In order to test the immunity of this herd following the lapinised vaccine and to eliminate a possible focus of the disease, all cattle were given K.A.G. on 12-10-50.

To all appearances the herd remained healthy after this inoculation with K.A.G.; no animals were reported sick and no symptoms were seen. Temperatures were taken on 19-10-50, the eighth day following reinoculation and seven animals recorded a high temperature:—105.4, 105, 105, 104, 104, 103.8, 103.8° F. There were no mouth lesions, diarrhoea or other signs of rinderpest.

Young Heifers and Steers

Died of rinderpest prior to 7-9-50	nil				
Treated lapinised virus vaccine 7-9-50	...	342	Died	...	20
Treated K.A.G.	...	92			
Original herd	...	434	Loss	...	20

This was the last herd on the farm to be inoculated, and 92 animals were given K.A.G. as available supplies of lapinised virus were exhausted.

A Summary of Mortality

Total of Animals Prior to Outbreak	Died
"In-calf" herd	140
Dry herd	157
*Foster-mother herd (1)	237
*Foster-mother herd (2)	368
Dairy herd	209
Adult steers	156
Calves	101
Oxen	17
Young heifers and steers	434
Bulls	12
Heifers with bulls	55
	1,886
	196

Total Mortality 10 per cent.

* Herds which were uninfected before inoculation. All other herds were infected or exposed to infection prior to vaccination.

Situation on Neighbouring Farms

Three unfenced farms bordered the infected area to the west, and it was ascertained on 11-9-50 that no extension of the disease had occurred. All were carrying a proportion of susceptible, native and pure-bred stock and arrangements were made to inoculate them with lapinised virus vaccine:—

Farm M: 15-9-50

513 native cattle given lapinised virus vaccine.

16-9-50

7 pure-bred Ayrshire bulls given lapinised virus vaccine.

Farm S: 16-9-50

415 grade cattle annual reinoculation with formalised spleen vaccine.

177 grade cattle given lapinised virus vaccine.

Farm K. M.:

57 native cattle given lapinised virus vaccine.

No evidence of rinderpest has been found on any of these farms eight weeks after vaccination.

Discussion

From the history of the disease on the farm under discussion it is evident that rinderpest appeared simultaneously in the young calves and adult steers. Although a few steers may have died from the effects of K.A.G., taking the disease sequence on the farm as a whole, it would serve no purpose to compare the efficiency of K.A.G. and of serum with that of lapinised virus, as rinderpest obviously obtained an earlier start in those two herds. In view of the mortality in adult steers and calves which received massive doses of serum, it is certain that the majority were already affected beyond hope of recovery.

From the other herds it is possible to obtain information about the efficacy of lapinised virus vaccine.

Milk Herd.—The cows had every opportunity to contract the disease by contact with the heavily infected calves and clinical cases were noticed among the cows when they were vaccinated. The greatest number of cattle died ten days after inoculation on 16-9-50 and it is postulated that these cattle and those dying on the preceding days contracted the infection before 8-9-50. It seems likely, therefore, that lapinised virus vaccine inoculated on 6-9-50 so interfered with the extension of the infection that rinderpest was prevented from decimating the herd.

The fact that the milk yield did not show a serious drop was also gratifying.

Bulls.—The pure-bred Ayrshire and Hereford animals suffered a comparatively high mortality, but were in close contact with the calves in which the disease started.

Young Heifer and Steer Herd.—Animals in this herd had the opportunity to contact infection from the adult steers and obviously did, as cases were noted at the time of inoculating. The mortality remained low, however, but it was not possible to obtain the distribution of deaths owing to the inaccessibility of the herd. As 92 animals received goat virus (see p. 427), a few deaths may have been due to severe effects of reaction to this vaccine. The first deaths occurred after 10-9-50 and the last deaths before 30-9-50.

Foster-mother Herds.—No clinical cases were seen, and it was assumed that the animals did not contract infection before inoculation. At that time, and afterwards, it would be almost impossible for contact with the disease to have been avoided, either at the crush, or from the remains of carcasses carried by carrion which flocked to the area. All cattle remained healthy in these two herds, which comprised nearly one-third of the number of animals given lapinised virus vaccine. There are therefore strong grounds for concluding that the losses and symptoms occurring in the other herds were not attributable to the vaccine used, but to natural rinderpest.

"Dry" Herd and "In-calf" Herd.—These cattle contracted rinderpest in a mild form and although animals were seen to be ill all recovered and appeared normal four weeks after vaccination. That six cows each produced a dead calf at full term during this time is attributed to the effects of the natural disease. Previous experience had shown that lapinised vaccine used in 200 pregnant native cows of the Serenli breed did not cause either abortion or stillbirth of calves. (Paper in preparation.)

Heifer Herd with Bulls.—On evidence, it appears that three heifers contracted rinderpest and that seven remained susceptible after the original inoculation with lapinised virus vaccine. It must be remarked that the three animals were shot only to remove a source of infection and that the seven remaining susceptible reacted very mildly to K.A.G. The remaining 52 cattle resisted the inoculation with K.A.G., which in susceptible grade cattle would most certainly have provoked a marked reaction. There was no evidence of clinical rinderpest having spread amongst this herd.

Neighbouring Farms.—It is significant that the disease did not spread to neighbouring unfenced farms, in spite of the large focus of infection on the nearby farm and of the influx of carrion from carcasses. Susceptible cattle were vaccinated on September 15th and 16th, about the time when cattle were beginning to die in large numbers on the infected farm.

Summary

(1) Circumstances under which lapinised virus vaccine was used in highly susceptible grade cattle in the presence of active rinderpest are described.

(2) In a large milking herd, the vaccine appeared to curtail the course of the disease and to have little adverse effect on the milk yield.

(3) In other herds, either infected or with reasonable opportunities for contact, the vaccine established a firm immunity.

(4) The immunity established by the vaccine prevented extension of the disease to cattle on remote areas of the farm and to cattle on neighbouring farms.

Acknowledgments

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STUDIES ON THE FEEDING OF INSECTICIDES FOR THE CONTROL OF ECTOPARASITES

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Introduction

At present a large number of chemicals and plant products are in common use for the control of ectoparasites of man and animal. Some of them have been proved to be of great value, yet some are highly toxic to the host. Thus the search for less toxic and more effective insecticides continues. With the discovery of new insecticides their mode of application has drawn the attention of scientists with a view to simplifying the procedure. It was generally believed that no chemical administered internally could protect animals from external parasites. Only very recently a few workers have administered orally insecticides to livestock (cattle, rabbit, poultry, etc.) to control their ectoparasites. If this method of administration of insecticides for ectoparasite control succeeds, it will be a great advance in the chemical control of arthropods affecting livestock because the treatment of individual animal by spraying, dipping or dusting is very difficult. Much more work, of course, has to be done to ascertain

the correct dose which will not injure the health of the host or render its products unfit for human consumption, but will be lethal to the ectoparasites.

As for the previous literature on the subject, Parman *et al* (1928) tried thirty chemicals (Magnesium sulfate, Sodium carbonate, Calcium thiosulfate, Ferric oxide, tartar emetic, etc.) and seven proprietary preparations (containing lime sulfur solution, ferrous sulfate, nux vomica, mustard, red pepper, etc.) on external parasites (body, shaft and head lice, scaly-leg and red mites, ticks and sticktight fleas) of poultry by feeding different doses of the drugs, but they did not get any encouraging result. It seems their choice of chemicals was not very satisfactory. Later on, Lindquist *et al* (1944) reported hundred per cent mortality in bed bugs fed on a rabbit having DDT three to five hours earlier by the oral route at the rate of 228 to 400 mg. per kilogram of body weight. They obtained similar results with bed bugs and stable flies using pyrethrum extract. Recently, the Dominion of Canada Department of Agriculture (1948) reported failure to control mites of poultry, keds of sheep and biting lice by the administration of BHC through oral route, but they got very successful results in controlling sucking lice of cattle by the same process. Further work in this line may explain the failures in the three previous cases. Wilson (1948), working on the relative toxicity and efficacy of DDT and BHC, found that though a larger dose of the former could be tolerated by bovines, the latter was more effective in the control of ticks and tsetse flies. Furman (1947) reported that BHC (12% gamma) showed no ill effects to cattle whether supplied orally at 0.074 gms. per kilogram body weight, or as sprays containing 0.32 per cent BHC, or as dips containing 0.5 per cent. There was no marked cumulative effect. Dipping and spraying tests showed that fatal doses could be absorbed through the skin. Barlow (1947) reported that BHC when orally taken by cattle appeared to persist in the blood for a considerable time; sprayed in oil solution it was absorbed through the hide and remained for several days in the blood. Incidentally a reference may be made to the work of Knipling (1938) and Bruce (1939) who reported the failure of horn fly larvae to develop in the manure of cattle fed previously with phenothiazine.

The present note embodies the results of a series of experiments on the effect of feeding different doses of a few insecticides, both vegetable and chemical, to chickens on their ectoparasites, such as lice and ticks.

Technique and Materials

The drugs used were DDT (technically pure), BHC (five per cent containing 0.6 per cent gamma isomer), Pyrethrum (two per cent extract) and Derris root powder (five per cent rotenone content). Different doses of these drugs mixed with water were administered orally to chickens by means

of a syringe fitted with a small piece of narrow rubber tubing. Birds used in these experiments were white leghorns about eight months old. The lice present on these birds belonged to the genera *Menopon* Linn. and *Goniocotes* Nitz. The birds were examined daily for a period of seven days to note the increase or decrease in lice population. The procedure adopted in feeding the ticks (*Argas persicus* Oken) was as follows: The birds were immobilised and kept in tall glass jars in which known numbers of ticks were released. The mouths of the jars were closed with fine muslin. The following morning the ticks which had fed themselves on the birds were removed and counted and kept in clean glass tubes and daily mortality counts were made for two days. In all the experiments equal number of control birds were kept.

Observations

Effect of feeding DDT, BHC, Derris and Pyrethrum to birds infested with poultry lice.—Fifteen lice-infested birds used for this series of experiments were divided into five batches of three birds each. Each of the four batches received one of the drugs DDT, BHC, Derris root powder and Pyrethrum and the fifth batch remained as control. The birds in one batch were dosed orally as follows: first at the rate of 1 gm. per kilogram body weight for one day, second 0.5 gm. per kilogram body weight for two days successively and the third 0.25 gm. per kilogram body weight for six days consecutively. Pyrethrum extract was measured in fluid c.c.s. taking one gram equivalent to one c.c. The birds were examined daily for a period of seven days to note the increase or decrease in lice infestation. At the end of the period a gradual reduction in lice population in all the treated birds was noticed but at no time the birds were absolutely free of lice. No noticeable reduction, however, was observed in the first twenty-four hours. Throughout the experiment the infestation in the control birds was either stationary or slightly increasing.

The administration of BHC and Pyrethrum extract in the doses mentioned above did not have any bad effect on the general health of the birds. The birds treated with Derris root powder in doses of 1 gm. and 0.5 gm. per kilogram body-weight by the oral route did not survive for twenty-four hours as the doses proved to be lethal, but a daily dose of 0.25 gm. per kilogram body weight for six days was tolerated by the birds. DDT in a daily dose of 0.25 gm. and 0.5 gm. per kilogram body weight for six days and two days respectively was tolerated by the birds as no ill-effect was noticed in the health of the birds. But a single dose of 1 gm. DDT per kilogram body weight was found lethal as the bird died on the seventh day showing symptoms of great prostration, laboured breathing, paralysis of legs and slight diarrhoea. Post-mortem examinations of all the birds died in DDT series as well as Derris series revealed

haemorrhagic patches in the intestinal tract and gross pathological changes in the liver and urinary system. The details of this experiment are given in Table I.

Oral administration of DDT, BHC and Pyrethrum to birds and their effect on poultry ticks.—In these experiments, taking advantage of the observations of Lindquist *et al* (1944) who got cent per cent kill of bed bugs after feeding on rabbits treated three to five hours previously with DDT, we administered DDT at doses of 0.5 gm. and 1.0 gm. per kilogram body weight, BHC (5%) at doses of 1 gm. and 2 gms. per kilogram body weight, and Pyrethrum extract (2%) at doses of 1 c.c. and 2 c.c.s per kilogram body weight by oral routes to different batches of birds and after four hours of administration of the drugs, ticks (*Argas persicus* Oken) were fed on the birds and the mortality of the fed ticks was recorded in each batch.

The result obtained in the DDT series was very encouraging. A kill of 84.6 per cent to 88.2 per cent of the ticks was obtained after 48 hours with a dose of 1 gm. per kilogram body weight. But with the reduction of the dose to 0.5 gm. per kilogram body weight the kill was reduced to 40 per cent after 48 hours.

With BHC at the above dose there was a kill of 30 per cent to 50 per cent with 1 gm. and 2 gms. per kilogram body weight respectively. Here it should be mentioned that the BHC used was only a five per cent product and as such one gram actually contained only 0.05 grams of BHC. As there was no ill effect on the health of the birds increased dose of the drug may be tried with better result.

In the pyrethrum series, a kill of 43.75 per cent and 60.0 per cent of ticks (*Argas persicus* Oken) was recorded with 1 c.c. and 2 c.c. per kilogram body weight doses respectively. In this series also it is felt that the result may improve by increasing the dose which may be tolerated by the birds.

With a view to test for how long the drug may be retained in the system of the vertebrate host, trial was made with one bird. A batch of *Argas persicus* Oken was fed on the bird three days after administration of DDT (1 gm. per kilogram body weight). A kill of 80 per cent of the fed ticks was obtained. Thus the drug remained highly effective up to three days after its administration to the bird. The detailed results in these series of experiments are shown in Table II.

Discussion

The internal administration of drugs and herbs by oral route is an ancient procedure. But it was largely employed for the control of endo-organisms, external application of drugs being used for the control of

TABLE I
Feeding DDT, BHC, Pyrethrum and Derris to birds and their effect on poultry lice.

Batch No.	Drug used.	Bird No.	Wt. of bird.	Dosage.	Species of lice	Result
I	DDT	3902	1.48 Kgm.	0.25 gm. per Kgm. body wt. for 6 days	Menopon & Goniotocotes	Reduction in lice population, but no complete eradication.
	"	2555	1.46 "	0.5 gm. per Kgm. body wt. for 2 days	Do.	Do.
	"	1110	1.73 "	1.0 gm. per Kgm. for 1 day	Do.	Bird died on the 7th day.
II	BHC	2319	1.48 "	0.25 gm. per Kgm. for 6 days	Menopon	Reduction in lice population, but no complete eradication.
	"	696	1.85 "	0.5 gm. per Kgm. for 2 days	Menopon & Goniotocotes	Do.
	"	3308	1.76 "	1.0 gm. per Kgm. for 1 day	Do.	Do.
III	Derris	651	1.36 "	0.25 gm. per Kgm. for 6 days	Do.	Do.
	"	4071	1.59 "	0.5 gm. per Kgm. for 2 days	Do.	Do. Bird dead next morning after initial dosing.
	"	1132	1.99 "	1.0 gm. per Kgm. for 1 day	Menopon	Do. Do.
IV	Pyrethrum	1471	1.64 "	0.25 cc. per Kgm. for 6 days	Do.	Reduction in lice population, but no complete eradication.
	"	3876	1.82 "	0.5 cc. per Kgm. for 2 days	Menopon & Goniotocotes	Do.
	"	3481	1.67 "	1.0 cc. per Kg. for 1 day	Do.	Do.
V (Control) Nos. 3750, 1248 and 729. Lice population stationary (3750 and 1248) or slightly increasing (729).						

TABLE II
Feeding DDT, BHC and Pyrethrum extract to birds and their effect on poultry ticks.

Batch No.	Drug used.	Date of feeding.	Bird No.	Wt. of bird.	Dosage.	No. of ticks fed.	No. dead after 48 hours.	Percentage mortality	Remarks.
I	DDT	25-8-50	3271	1.27 Kgm.	1 gm. per Kgm. body wt.	26	22	84.6	Bird died on 7th day.
	"	28-8-50	3272	1.38 "	Do.	34	30	88.2	Do.
	"	*31-8-50	Do.	Do.	Do.	20	16	80.0	Refedding of bird No. 3272 after 3 days.
II	"	11-10-50	3273	1.44 Kgm.	0.5 gm. per Kgm. body wt.	20	8	40.0	
	BHC	16-10-50	3275	1.23 "	1 gm. per Kgm. body wt.	20	6	30.0	
	"	24-10-50	3276	1.75 "	2 gm. per Kgm. body wt.	20	10	50.0	
III	Pyrethrum extract	11-10-50	3274	1.80 "	1 cc. per Kgm. body wt.	16	7	43.7	
	"	24-10-50	3277	1.61 "	2 cc. per Kgm. body wt.	20	12	60.0	

*Date of refedding ticks on the same bird after 3 days.

ecto-organism. The present conception of internal administration of drugs for the control of ectoparasites is recent and if proved thoroughly successful it will be a great advance in the chemical control of arthropods. The main advantage of this method will be its easy administration and its effectiveness in the control of even those parasites which may not be affected by external application. But intensive work awaits finalising the doses for each drug which will be lethal to the ectoparasites but will not affect the health of the host. Further, the possible injurious effects on human health through the use of animal products of the treated host has to be examined, for Lehman (1948) has shown that the alpha, beta, gamma and delta isomers of BHC and DDT, Toxaphene, Chlordane and other insecticides are capable of being stored in animal fat and hence could be deposited in man when the animal products are eaten. However, when the method is perfected, all that will be necessary for the control of ectoparasites of animals will be to mix a suitable quantity of the drug to their feeds.

In our series of experiments it was noticed that drugs like DDT, BHC, Pyrethrum, etc., when administered internally had no marked effect on poultry lice whereas a high percentage of kill was obtained in the case of poultry ticks, *Argas persicus* Oken. The former come under the group Mallophaga or biting lice which mostly live on the debris of epidermis and barbs and barbules of feathers whereas the latter are blood suckers. But the gradual reduction in lice noticed may be explained as due to the deposition of minute quantities of the drugs on the epidermis. More work has to be done to throw further light on the subject. Our experiments, though limited, prove that sufficient DDT is retained in the system for three days or longer so as to yield a high percentage of kill in the blood sucking arthropods. It will have to be worked out how long this concentration is retained in the vertebrate circulation.

Summary

Varying doses of DDT (technically pure), BHC (5% containing 0.6% gamma isomer), Pyrethrum extract (2%) and Derris root powder (containing 5% rotenone) were administered orally to chickens infested with body and shaft lice (*Menopon* Linn. sp. and *Goniocotes* Nitzsch sp.). In all cases there was definite reduction in lice population but at no time the birds were absolutely free.

DDT in doses of 1 gm. and 0.5 gm. per kilogram body-weight, when administered orally to chickens on which *Argas persicus* Oken were allowed to feed after four hours of dosing, gave a maximum kill of 88.2 per cent and 40 per cent respectively.

When the ticks were allowed to feed after 72 hours of closing with DDT at the rate of 1 gm. per kilogram body-weight, the mortality obtained was 80 per cent.

Likewise, BHC (5%) in doses of 1 gm. and 2 gms. per kilogram body-weight gave a maximum kill of 30% and 50% respectively, while with pyrethrum (2%) in doses of 1 c.c. and 2 c.c. per kilogram body-weight 43.75% and 60.0% kill was obtained. The administration of BHC and Pyrethrum extract in doses described above did not have any ill-effect on the health of the birds.

DDT in doses of 1 gm. and Derris in doses of 0.5 gm. and 1 gm. per kilogram body-weight were found lethal to the birds.

Acknowledgment

The writers wish to express their thanks to Dr. S. Datta, Director, I.V.R.I., for giving necessary facilities for this work.

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VETERINARY ENTOMOLOGY IN INDIA*

By

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Veterinary Entomology in general is of recent origin. In fact it had its birth with the great discovery of Theobald Smith and F. L. Kilborne, of the Public Health Service U.S.A., who, in 1893, proved beyond doubt the transmission of *Babesia bigemina*, the causal organism of the Texas Cattle fever, from animal to animal through the agency of *Boophilus annulatus*—the common cattle tick. This, however, did not attract the attention it merited. Two years later in 1895, Sir David and Lady Bruce, working in Zululand under conditions of incredible hardship discovered the transmission of *Trypanosoma brucei*—the causal organism of Nagana—by *Glossina morsitans*, the tsetse fly, and also worked out the transmission cycle of the causal agent of the disease. This was a discovery of enormous importance and it paved the way for a number of subsequent discoveries in this field. In 1903, Marchoux and Salimbeni proved that fowl spirochaetosis is a tick-borne disease and that the common fowl tick (*Argas persicus*) is responsible for its transmission. Subsequently a number of such discoveries came up from various countries.

In the absence of any organisation for dealing with problems of Veterinary Entomology in India, work of exploratory nature had been largely incidental to other activities of the Veterinary Department and also to those of the Medical and Agriculture Departments and the Zoological Survey of India. In 1907, Howlett joined the Indian Agricultural Research Institute as Second Imperial Entomologist and in 1912 his designation was changed as Imperial Pathological Entomologist. Isaac took up the place of Howlett in 1922. Howlett and Isaac studied the order Diptera, including those that are parasitic on domestic animals.

In 1919, Howlett worked out a scheme for the creation of a separate organization to deal exclusively with the problems of Medical and Veterinary Entomology in this country. This organisation was to consist of 10 officers and 46 assistants. The first meeting of the Veterinary Officers held at Lahore in 1917 considered and accepted the proposal. As nothing happened till 1923 the same question came up again in the second meeting of the Veterinary Officers held in 1923 and the following resolution was passed. "On account of the great importance of insects in the transmission of animal diseases, as causes of direct injury to live-stock in India and the degree of specialization necessary for the proper appreciation of the various aspects of entomology, the staff of the Imperial Entomologist should be strengthened

[*Extract from the Presidential Address at the 37th Indian Science Congress, Poona, 1950.]

to the degree requisite for rendering assistance to investigators into the insect problems connected with animal diseases. Similarly facilities should be rendered for the establishment of a staff attached either to the Imperial Entomologist or to the Zoological Survey of India for the study of ticks and mites concerned with animal diseases". This led to the creation of a post of an Entomologist at the Imperial Veterinary Research Institute in 1933 and S. K. Sen was appointed to it. Sen's place was taken by B. C. Basu in September 1941 as Entomologist, Indian Veterinary Research Institute. Basu joined Indian Veterinary Research Institute in June 1939 as Assistant Entomologist. Basu's place was taken by B. N. Soni as Assistant Entomologist.

The Indian Council of Agricultural Research financed a number of schemes on various aspects of Veterinary Entomology, such as, ox Warble fly, tick etc.

Transmission of animal diseases

The study of the transmission of diseases of animals through the agency of arthropods has been one of the main items of investigation on Veterinary Entomology at the Indian Veterinary Research Institute. Important diseases studied so far from this point of view are, Surra, rinderpest, anthrax, haemorrhagic septicaemia, theileriosis, fowl spirochaetosis and hump sore.

The attention of the Veterinary Officers in India was early drawn to the question of transmission of *Trypanosoma evansi*—the causal organism of Surra—a fatal disease of horse, camel and mule and a chronic disease of cattle. This was the start of Veterinary Entomology in India. Rogers (1901) was the first person to test the possibility of *Tabanus* flies involved in the transmission of surra. Subsequent workers on the same problem were Baldrey (1911), Cross and Patel (1921-22), Kahan Singh (1925-26), Sen (1938) and Basu (1947). Basu at the Indian Veterinary Research Institute confirmed the *Tabanus* transmission of surra and proved experimental transmission of surra by *Haematopinus tuberculatus* and *Musca* (mostly *nebulo*).

Christophers (1907) and Shortt (1937), both while in Indian Medical Service, worked out the transmission of *Babesia canis* and *Pattonella gibsoni*, casual organisms of canine tick fever through the agency of *Rhipicephalus sanguineus* and *Haemaphysalis bispinosa* respectively.

Basu (1930) transmitted *Pasteuralla avicida*—the causal organism of chicken cholera—through the agency of *Argas persicus*. In a memoir, Knowles, Das Gupta and Basu (1932) gave a thorough account of the mechanism of tick transmission of *Spirochaeta anserina*—the causal organism of fowl Spirochaetosis—and the life history of the parasite in *Argas persicus*. In a memoir, Knowles and Basu (1935) worked out the tick transmission of *Spirochaeta cobayae*, the causal organism of relapsing fever of guinea pigs, the causal organisms being first described by the same authors,

Mehra (1941) showed that healthy rabbits contracted haemorrhagic septicaemia through *Otenocephalis felis*.

Sen and Minett (1945) succeeded to transmit anthrax through *Musca domestica*. Basu (1948) transmitted anthrax through *Musca nebulo*, *Otenocephalis felis* and *Hyalomma aegyptium*.

Sen (1926), Bhatia (1935), Kapur (1941) and Basu (1947) studied the possibility of arthropod transmission of rinderpest. Bhatia and Kapur succeeded to transmit the disease through *Stomoxys calcitrans* after a period of incubation of the flies at a temperature of 22°C.

Survey of insect and acarid vectors of livestock in India

Information concerning the distribution of arthropod vectors of many important diseases of livestock is being obtained with a view to control diseases in a particular locality in this country. Surveys carried out by the Entomological staff at the Indian Veterinary Research Institute and the Veterinary investigation Officers have resulted in the finding that several important pests of livestock are distributed over a much wider area in India than had been previously believed to be the case. *Hypoderma lineatum* and *H. crossi*—ox and goat warble flies respectively—and various species of cattle ticks and Tabanid flies of India have been mapped. A few interesting findings in this direction may be mentioned here. *Hunterellus hookeri*—the tick parasite—occurs in Dharwar in the province of Bombay; *Ornithodoros megnini*—the spinose ear tick—has been recorded from Saugor, Mhow and Ahmednagar; *Cyrtolichus nudus*—the Air Sac mite in fowls—was reported from Mukteswar. The list would be of considerable size if all such names are included.

Control of insects and ticks

Control of arthropods by insecticides, such as, D.D.T., Benzene hexachloride, Derris powder, Tobacco-lime mixture, Pyrethrum and several other preparations and by Biological methods has been under study for the past several years at the Indian Veterinary Research Institute. In the control of warble-fly successful results were obtained in the field in the Punjab by periodically singeing the hairs on legs of cattle during warble-fly season. Considerable amount of work has been done in the control of ectoparasites of cattle, sheep, goat and poultry.

Special efforts are being made at the Indian Veterinary Research Institute to artificially breed *Hunterellus hookeri* on a large scale with a view to eradicate completely susceptible ticks from this country.

Bionomics, life-history and anatomical studies

Bionomics and life-history of a number of ticks, warble-flies and other arthropods of Veterinary importance have been worked out under Indian conditions at the Indian Veterinary Research Institute as well as in other laboratories.

Mechanism of feeding ticks was studied and a structure was discovered in them which is a homologue of the hypostome of insects.

Systematic Veterinary Entomology

Considerable amount of work has been done on this aspect of the subject. Brunetti published three volumes dealing with Diptera in the series of the Fauna of India (1912, 1920 and 1923) besides a large number of articles in the Records of the Indian Museum. Patton and Cragg (1913) published a comprehensive book embodying available information on the arthropod pests of Indian livestock besides their original observations. Senior White published two useful catalogues dealing with culicidae and Tabanidae of the Indian Region. Patton (1937) published a very useful synopsis of the oriental species of *Musca*. Senior White, Aubertin and Smart (1940) published an equally useful volume on the Family *Calliphoridae* in the Fauna of Indian series. Puri (1932-35) published a series of articles of Indian simuliids. Sharif (1924, 1928) made notable contribution on the Indian species of Family Ixodidae and order Siphonoptera. Fletcher and Sen are writing a report on Veterinary Entomology in India which when published will be of immense use to workers in the field.

Importance of veterinary entomology

Over 60 per cent of the country's national income was derived from agricultural, livestock and allied pursuits. Of this, the cattle industry contributed over 50 per cent roughly Rs. 2000 crores annually. The growth of India's agriculture depends largely on cattle wealth—they are nearly 25 per cent of the world's cattle.

A significant portion of mortality amongst cattle and other livestock in India can be attributed to arthropodal invasion. In live animals, moreover, they inflict a variety of damages; to mention a few of the more important, these are defective growth, decreased vigour, lowered reproductive capacity and reduced production of milk, meat, egg, wool and work. Considering the country's huge livestock population, these damages are enormous and may cost many crores of rupees annually. Hide and Cess Committee worked out a monetary loss of two crores of rupees annually to Indian due to damage to hide and skin caused by Warble flies.

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Editorial

ERADICATION OF RINDERPEST

By far the most important of the deadly contagious diseases in this country levying a heavy toll of cattle every year is Rinderpest, or, to give it its more expressive popular name, Cattle-plague. This disease has been with us from the earliest days and has been the subject of study for a very long time. A good deal of intensive research work has been done on the various aspects of the disease, especially, on its preventive aspect, and, during the last two decades, the progress in this direction has been very striking. The prophylactic remedies have been greatly simplified enabling their practical application in the field far easier. In this connection, we invite the attention of our readers to an interesting article on this subject by Dr. S. Datta and Sri Dhanda which we have published in this issue of the *Journal*. We are told that the lapinised virus, which was first introduced in 1924 by Dr. Edwards at the Indian Veterinary Research Institute, Mukteswar, when he was the Director of that Institute, has been greatly improved and that it can now be used with safety in the field. This, if successful, would be a tremendous improvement over the present Goat Blood Virus which has its own 'limitations and cannot be used with impunity on all types of animals'. Still, in spite of all this progress, it is a matter for regret that the mortality figures of the disease continue to be high. We would not be far wrong if we estimate these at nearly 3 lakhs of animals every year. In terms of cash value, these losses represent a sum of nearly 4 crores of rupees. In addition to these losses from the actual deaths, there are further losses resulting from the deterioration in the health of the animals recovered from the disease, the loss of milk-yield, the diminished working capacity etc. These losses, if calculated on

a monetary basis, would run into many crores and would give us a vivid picture of the enormous annual drain caused by this disease. The eradication of this disease has, therefore, been felt as a great necessity by the livestock workers in this country as an essential pre-requisite for cattle improvement. An all-out effort to protect every animal against this disease has often been suggested but it has not been possible to give effect to it for a variety of reasons, the chief of which has been the want of adequate trained skilled personnel. We are now given to understand—and it is very heartening to hear it—that a scheme for the eradication of this disease at a cost of about 4 crores of rupees spread over a period of 5–10 years has been prepared by the Director of the Indian Veterinary Research Institute, Mukteswar, and that 'a short-term pilot scheme for applied research on rinderpest with a view to get preliminary information regarding the suitability of the two vaccines for extensive field use has been planned and is under the active consideration of the Indian Council of Agricultural Research.' We are sure that this scheme would be acclaimed as one long overdue and we do hope that this would be sanctioned early and put into action soon. The cost of the scheme may, on a casual examination, appear to be high but, on a closer study, it would be realised that that cost is practically nothing when the benefits resulting from it are properly assessed. The enormous recurring annual losses would then be totally prevented and would be a thing of the past, while the cattle owners would be freed of the dread of this fell disease once and for all.

A SATISFACTORY ENDING

We are extremely glad to learn that the unfortunate misunderstandings over the DIAMOND JUBILEE CELEBRATIONS of the Bombay Veterinary College have all been cleared and that a final decision has been arrived at to have the celebrations conducted at an early date under the auspices of the Bombay Veterinary Medical Association. All's well that ends well and we appeal to all concerned to work unitedly hereafter and make the celebrations an unqualified success.

The Bombay Veterinary Medical Association has issued an appeal (published elsewhere in this issue) to all the members of the profession for their help and co-operation 'in all possible ways', with a special request to those who had not contributed to the Celebrations Fund to 'kindly send in their contributions without the least delay'. We cordially endorse this appeal and commend it to the earnest consideration of all concerned. The Bombay Veterinary College is the oldest of the Veterinary Institutions in our land and its *alumni* were the earliest pioneers in the Veterinary profession in practically every part of this country. As such, the profession must take a special pride and interest in celebrating the Diamond Jubilee of that Institution. One of the suggestions before the Celebrations Committee is to utilise the funds collected for instituting medals and prizes in commemoration of the occasion to be awarded to the students of the Bombay Veterinary College. This is a laudable suggestion, indeed, and we are sure it will commend itself to the Committee. The contributors to the Fund may, therefore, feel assured that their donations will be put to very good use and we are sure they will respond to the appeal of the Bombay Veterinary Medical Association in an abundant measure.

THE KEY VILLAGE PLAN

What is known as The Key Village Plan for the development of cattle in rural parts has not been understood properly by many a people and, even in knowledgable circles, it is interpreted in different ways. The following description of this plan by Shri P. N. Nanda, the Animal Husbandry Commissioner to the Government of India, as published in the Golden Jubilee Number of the Indian Farming, may be taken as an authoritative one and will, we hope, be read with interest by all those interested in livestock work.

"The most important feature of this plan is that it introduces a system and a plan into the present methods of distribution of bulls according to which, the areas where the

improved bulls are distributed, no other will be allowed to work. The key village has been defined as a compact area consisting of one village or a group of contiguous villages containing a total adult cow population of 500. This area will initially be surveyed in order to ascertain the distribution of cattle, and various other matters like the productive capacity of the animals, the present arrangements for the production and distribution of milk, the resources in feeding materials and so on. All the bulls available in these areas, if not found upto the standard, will be removed or castrated and replaced by the necessary number of approved bulls. The first stage of this work is only the establishment of the key villages with a view to ensuring that only approved bulls serve in the areas. In the first stage a periodical recording of milk will also be done in order to find out what improvement has been brought about in the milk production. When this stage is completed, it is proposed to go a step further and to introduce all the measures necessary for the improvement of cattle, like the absolute control of breeding, marking of animals and their progeny for identification, recording of milk production and other cognate matters. By the end of the third stage, these key villages are expected to work as though they were Government cattle breeding farms. It is hoped, by then, that the breeders in the key villages will be combined into co-operative bodies which would carry on the work under a system of subsidy and supervision by the Government so that these bodies may be able to look after all matters connected with breeding, feeding, and disease control as well as the marketing of the livestock and livestock products. In view of the extreme shortage of approved bulls in the country, the feasibility of introducing artificial insemination in the key village centres has been taken up and a pilot scheme has commenced working in the ten villages selected near Delhi for development work under a scheme sponsored by the Indian Council of Agricultural Research."

Notes and News

Proposed British Veterinary Codex.—The General Secretary of the All-India Veterinary Association writes as follows:—In connection with the compilation of the proposed British Veterinary Codex—a publication on lines similar to the British Pharmaceutical Codex—by the Pharmaceutical Society of Great Britain, the National Veterinary Medical Association of Great Britain and Ireland suggested to the All-India Veterinary Association to secure the nomination of a corresponding member to each of the two sub-committees that had been formed, one to deal with Action and Uses of Drugs and the other with Biological Products. Agreeably to this suggestion, the All-India Veterinary Association has nominated Sardar Balwant Singh Bahadur of the Indian Veterinary Research Institute, Izatnagar, U.P., for the sub-committee on Biological Products and Shri M. R. Subramania Sastry, Retired Lecturer of Pharmacology of the Madras Veterinary College for the sub-committee on Action and Uses of Drugs.

Refresher Course at the Madras Veterinary College.—We are glad to note that the Refresher Course has been revived at the Madras Veterinary College from the official year 1950-51. The course extends over a period of three months—two months' course at the Madras Veterinary College to include artificial insemination, Ranikhet disease vaccination, patho-bacteriological training and clinical work and one month's course at the Livestock Research Station, Hosur Cattle Farm. The training at the latter place will be in the various sections of the Farm, such as Dairy section, Dry-stock and bull section, Poultry section, Garden and pastures and sheep section. We also understand that there will be four batches of 6 students in each undergoing the course each year.

Indian horse flown to London.—The champion Indian-bred horse, Balam, was flown to London from Bombay on the 19th of April 1951 and taken to George Dulles's Epsom stables.

The six-year-old Renala-bred horse, who was accompanied by Kheem Singh, one of the leading Indian Jockeys, is to run in the Festival of Britain races at Ascot, including the King George VI Stakes and Queen Elizabeth Stakes.

Balam, owned by Mr. and Mrs. M. K. Modi, of Bombay, won the Indian Derby in 1949, and last year was the biggest money-winner of the Indian turf.

'The Hindu', Madras.

Well-known Racehorse owner passes away.—The 61-year-old Maharaja of Rajpipla, the noted race-horse owner, who won the Epsom Derby in 1934 with Windsor Lad, died at his home at Windsor (Berkshire) to-day.

Besides horse-racing, the Maharaja was a keen polo player. He travelled extensively through Europe and America.

The Maharaja had been in ill-health for some months and was unable to go to India for the winter as he usually did. He had three sons and three daughters.

‘The Hindu’, Madras.

* * *

Racing in Western India.—According to the Special Correspondent of the *Sporting Star* of Bombay, it is reliably understood that the Government of Bombay is likely to relax their objections to horse racing in the State. He opines that when the Royal Western India Turf Club makes its formal application for renewal of its racing licence for the year 1951-52 season, Government will insist on a ‘numerically weightier’ representation of the Government in the R.W.I.T.C. controlling body of the Western India racing.

* * *

New Kind of Cow.—Soviet stock-breeders in the steppes of Siberia, east of Lake Baikal, have produced a new species of cattle, a cross between the Tibetan yak and the domestic cow. It has been named the Khainyk.

Collective farmers in the Buryat Mongol Republic, a mountainous region north of Outer Mongolia, already have large herds of Khainyk, reports “*Socialist Agriculture*”, a Moscow publication. The new breed can winter on the range in the severe Siberian climate, and does its own foraging in the snow.

It is capable of defending itself against marauding wolves; farmers make use of Khainyk to protect ordinary cattle from the attacks of wild beasts. Yet, in spite of their ferocity, they are friendly to human beings and obey commands in harness.

National Standard April 10, 1951.

* * *

Profit through Milk Powder.—Replying to a question in the Parliament on the 9th March 1951, Shri K. M. Munshi, Food Minister, said that an aggregate profit of Rs. 1,17,34,054 was made by the Government of Bombay during the period 1946-1950 from the sale of milk powder. The Minister also gave the information that the total value of imported milk powder for the whole of India in 1949-50 was 182 lakhs of rupees.

* * *

Electrocution at low voltage.—Mr. John D. Peele records the following instance in the *Veterinary Record* for January 28, 1950:—A pit pony, being led from his working place to his stable in the pit, seized the electric bell wires with his teeth. He trembled violently and then

dropped dead. The voltage running through the wires was 15 volts. Immediately after the accident an electrician tested at the place and confirmed a voltage of 15 volts. The pony was 10.2 h.h., five years old, and in excellent condition.

* * *

Stilboestrol Implantation in Cockerels.—Kathleen G. R. Kelley and R. S. Roberts, record in the *Veterinary Record* (No. 4, Vol. 62.) that implantation of Stilboestrol in a group of 30 cockerels did not result in a statistically significant increase in weight-gain. There was clear evidence of a striking improvement in the culinary qualities of the carcase, and it is suggested that the treatment should be recommended for this purpose. They are also of the opinion that further work is desirable to investigate the possibility of creating a special market category for treated birds.

Clinical Articles

A CASE OF OMASAL FISTULA IN A BULLOCK

By

G. B. SINGH, B.A., M.R.C.V.S.,

Director of Animal Husbandry and Veterinary Services, Orissa.

Subject:—A light brown country-bred bullock about 6 years old (weight about 450 pounds).

History:—The animal was brought to Cuttack Veterinary Hospital on 28-10-1949 with an opening on the right side of the abdomen from which liquid ingesta was coming out continuously for the previous 3 months. The owner could not give the cause of the injury. On 29-10-1949 the Veterinary Assistant Surgeon, Cuttack, curetted the sinus opening and applied Red Iodide of Mercury ointment in the hope of getting the opening to close by cicatrix. The procedure was repeated twice or thrice with no success. The owner at last gave up the animal and went away. The animal started losing condition and kept on licking this area which became excoriated.

I examined the animal and diagnosed it to be Omasal fistula, most probably an after-effect of the passage of a metallic body from reticulum into the omasum and then outside. The skin was closely adherent to underlying tissue.

10-10-1950—**Preparation:**—As long as the liquid ingesta was coming out there was little chance of my getting an aseptic site for the operation. So I decided to stitch a circular piece of oil-cloth over the

opening in an attempt to close the sinus temporarily so that by careful cleaning of the area all-round some sort of asepsis could be created.

The skin all-round the fistula was shaved prior to 24 hours of operation and it was thoroughly washed with hot water and soap. A circular piece of sterilised oil-cloth was stitched over the wound. Then the site was cleaned with Acriflavine-in-Spirit, 1 in 1000, and a sterile pad soaked in Acriflavine-in-spirit was bandaged over the site. The animal was muzzled and left in a loose box with a plenty of straw bed.

11-10-1950—An hour prior to the administration of anaesthesia, Chloral Hydras 6 drachms in $\frac{1}{2}$ pint of 01.Lini was administered followed by Chloroform as a general anaesthesia. Initially, $\frac{1}{2}$ an ounce of Choloform was given and deep anaesthesia maintained for 2 hours 15 minutes with two drachms more.

Operation:—The pad and bandage were removed by the assistant and the site again thoroughly scrubbed with Tincture of Metaphan. The animal was completely draped with sterile sheets leaving the site of the operation exposed over which a sheet with window was put and 4 towels kept in position by means of Bachaus towel clips. A slightly curved incision 8 $\frac{1}{2}$ " long was made through the skin circumventing the stitched oil-cloth. The skin was separated from the tissue underneath and draped with two sterile cloths kept in position with 3 Manhytems Towel Clips on each side. The knife and tissue forceps used were discarded. The muscles were torn by blunt dissection and the peritonium grasped and cut with scissors. There were extensive adhesions between the Viscera and the peritonium which were broken to some extent with difficulty. Efforts were made to stretch the incision by means of Rib Stretcher but with little success. Two assistants helped to stretch the opening by means of broad abdominal retractors. Two rubber-shod intestinal Clamps were put on the fistula, one just under the muscles and the other a little distance below. With a knife the fistula was incised between the two Clamps but close to the upper Clamp. I dissected the upper portion of the fistula still in Clamp with the portion of muscle, the skin underneath the oil-cloth and discarded it. This left a large gap in muscle, skin etc. but from my experience of the previous two occasions when I had operated on this animal I had no other alternative left. I further, tried to break down as many adhesions as possible in order to bring the Omasum out of the incision to facilitate closure but all my efforts failed. Thus, the Omasal opening had to be closed in the abdominal cavity with all its discomfort and disadvantages. From the lesson learnt from the previous failures, I decided to use silk for the first line of continuous sutures and cover it up with two layers of lembert sutures using No. (1) 20 days old intestinal Chromic catgut. This part of the operation was most tedious due to lack of space and inability of the tissue to stand

any tension on the sutures. The wound was covered with Sterile Granular Sulfanilamide and then with Omentum which was kept in position with 3 interrupted sutures. Peritonium and muscles were sutured in three separate layers with number 3 Chromic catgut. The skin was sutured with coarse nylon. This left a gap at the site of fistula which was not sutured. At first I had a mind to make two parallel incisions on both sides of the main incision and try to close the gap by undermining the skin and traction, but the skin around was so tightly adherent to tissue that I gave up the idea. The incision was covered with Tincture Metaphan and sterile pad. On top a pad of Oil-Cloth was placed and many tailed bandage applied. Time taken for the operation :—2 hours 15 minutes.

Post operative treatment:—Immediately after the operation :—

- (1) Adrenalin Chloride 4 c.c. was injected intramuscularly.
- (2) 500 c.c. of 5% of Dextrosal at body temperature were injected intravenously.
- (3) 10 pints of Normal Saline Solution at body temperature were injected subcutaneously.

Saline and Glucose were repeated daily till the 7th day.

Diet:— 1st day (11-10-1950)—No diet.

2nd day—Rice gruel and cooked broken rice.

3rd day—Rice gruel, cooked broken rice and green grass.

4th day— do do and bran mash.

5th day— do do

6th day— do do

7th day— do with bran mash and small quantities of concentrates.

8th day—Usual diet.

On the 6th day the bandage was opened and alternating skin sutures were removed. The wound was quite healthy and dry. It was cleaned with Acriflavin in Spirit and dusted with sterile Sulfanilamide powder. A sterile pad soaked in Tincture Metaphan was put and rebandaged. The remaining sutures were removed on the 9th day. The wound healed by first intention except the gap which looked healthy and granulating well. Acriflavine in Spirit was painted over it and bandaged. In 10 more days the gap filled up.

Observations:—

- (i) The case has been recorded for publication to show that the abdominal cavity of the bovines can be invaded time and again provided strict antiseptic and aseptic precautions are adopted.
- (ii) Failure of catgut on two occasions and final success with silk as inner-most suture material.

I operated on this case twice before on 5-2-1950 and 25-5-1950 following the above technique rigidly with the exception that on the third time I used silk for the innermost layer of sutures. The operated wounds healed up by first intention on both occasions, but the fistula would recur from 10—12 days after the operation. This gave me an idea to use silk.

(iii) I have seen a good few Reticular fistulae but never before an Omasal fistula.

Acknowledgments.—My grateful thanks are due to Messrs. M. M. Rao, D. Kohoro, A. Mishra, Veterinary Assistant Surgeons, for assistance during the operation and again Mr. M. M. Rao for careful nursing of the case.

PUS IN THE ANTRUM OF A DOG

By

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Subject.—A grey Alsatian Dog aged about 1½ years.

History.—It was reported by the owner that, for the last six months, the dog had been treated at several hospitals in the State for a small sinus wound below the left eye which failed to heal. I examined the dog at the Veterinary Hospital, Cuttack, on 13.7.50, diagnosed it to be a case of Pus in the Antrum and advised the extraction of the 4th upper molar. The owner expressed his unwillingness for the operation against a definite advice that until and unless the tooth was extracted the external wound would never heal.

Description of wound.—The wound was irregularly oval in shape with a small hole in the centre; when probed the bone inside could be felt. There was continuous flow of pus from the sinus causing excoriation or skin abrasion.

Treatment.—Since the owner did not listen to my advice, the Veterinary Assistant Surgeon, Cuttack, treated the case with Acriflavin lotion, Glycerine-Iodine, Sulfanilamide powder and lastly with Penicilline for a period of 3 weeks without any result. At last the owner gave his consent.

Operation.—On 16-8-50 under Intraval Sodium the molar was extracted with great difficulty and with the help of a Dental Surgeon. On extraction, one root was completely gone, second one partially damaged and the third was healthy.

Post operative treatment.—The wound was flushed daily with light Potassium Permanganate Solution and it completely healed up in about a fortnight's time.

Acknowledgment.—My thanks are due to Dr. G. Patnaik, Dental Surgeon, Cuttack for help in the extraction of the molar tooth and Mr. M. M. Rao and Mr. D. Kohoro, Veterinary Assistant Surgeons for assistance during the operation.

A CASE OF FACIAL FIBROUS TUMOUR IN A BULLOCK

By

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Veterinary Assistant Surgeon, Cuttack.

OPERATED BY

G. B. SINGH, B.A., M.R.C.V.S.,

Director of Animal Husbandry and Veterinary Services, Orissa.

Subject.—A grey country-bred bullock aged about 6 years.

History.—The bullock has been developing a tumour on the face just above the left nostril for a period of 3 years. It was brought to the Veterinary Hospital, Cuttack on 16-3-50.

Size of the tumour.—Size of a foot-ball No. 5.

Condition of the tumour.—It became septic with an external wound; perhaps due to pecking by crows.

Histo-Pathology of the tumour.—Hard fibroma—Dense Fibrous tissue in bundles—Cells scanty.

The owner was warned of a propable danger to the life of the animal due to shock, since effective anaesthesia was not possible owing to the inconvenient position of the tumour.

Preparation of the site.—The skin all round the tumour was shaved 24 hours prior to the operation, scrubbed with hot water and soap and a gauze soaked in 1 in 1000 of Hg. Perchloride lotion was put over the part and bandaged.

Preparation of the patient.—The bullock was kept fasting for 24 hours.

Anaesthesia.—An hour prior to the operation, Chloral Hydras six drams in Oil of Linseed was administered. 40 c.c. of 2% solution of Procaine Hydrochloride was infiltrated all-round the base of the tumour with 4" long needle.

Technique of operation.—The site was scrubbed with Tincture Iodine. Then the tumour was extirpated by blunt dissection and the blood vessels were ligated. There was practically no bleeding throughout the operation. After complete extirpation, the wound was irrigated with hot normal saline solution, insufflated with sterile Sulfanilamide powder, padded and bandaged. Due to awkward site there was difficulty in bandaging.

Post operative treatment.—Soon after the operation.

- (i) 8 pints of normal saline solution at body temperature was injected subcutaneously;
- (ii) 60 c.c. of 5% dextrosal at body temperature was injected intravenously;
- (iii) Country liquor, half pint, was administered.

The bandage was opened on 22-3-50. There was formation of pus. The wound was irrigated with hot normal saline solution. Iodine in Glycerine applied and rebandaged.

The dressing was repeated for 15 days whereafter the wound appeared healthy without any pus formation. Then dry dressing powder was dusted over the part for another fortnight by which time the wound completely healed up with formation of new skin.

PRELIMINARY NOTE ON THE TREATMENT OF SPIROCER- COSIS IN DOGS WITH A PIPERAZINE COMPOUND CARICIDE (Lederle)*

By

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Infestation of dogs with the nematode *Spirocerca lupi* (*S. Sanguinolenta*) is not uncommon in Ceylon. It was described by Linstow (1906) and was found in many dogs and jackals by Crawford (1935, 1936, 1937, 1938, 1939), formerly Chief Veterinary Officer in Ceylon. The writer has had the opportunity of examining many live or dead dogs, but has found the lesions and parasites in three dogs and has seen five live dogs showing typical clinical signs. These included dysphagia, frequent vomiting and retching, accelerated pulse and respiration rates, tumultuous heart sounds, emphysema of the lungs, dullness and emaciation. The aneurysms and other lesions in the arteries may lead to secondary bacterial infection and acute fatal illness.

*From the Veterinary Record No. 51, Vol. 62.

The object of this communication is to record the beneficial effects of 1-diethyl carbamyl-4-methyl piperazine dihydrogen citrate, issued by Lederle Laboratories Division, American Cyanamide Company, under the trade name of Hetrazan, 50 mg. tablets (used for the treatment of human beings effected with filariasis) and Caricide, 400 mg. tablets for the treatment of canine filariasis. Hitherto no other drug appears to have been used successfully in the treatment of spirocercosis.

Case 1. Subject:—Alsation bitch, one and a half years. History of frequent vomiting and retching. She was in poor condition, rapid pulse and respiration rates, tumultuous heart sounds, temperature normal. Infested with hookworms. The dog was treated with tetrachlorethylene and improved to some degree, but vomiting, retching, accelerated respiration and pulse rates continued. A full brother of this bitch had died after an acute illness; the present writer was asked to make a *post-mortem* examination and found among other lesions two large nodules about $\frac{3}{4}$ ins. in diameter in the wall of the oesophagus in the cardiac region containing several spirocercae; there was also an aneurysm in the posterior aorta. Both the dog and the bitch had been in the habit of catching and eating dung beetles, the intermediate host of *Spirocerca lupi*.

Through the kindness of Messrs. Millers, Colombo, Agents for Messrs. Lederle, a supply of Hetrazan was available. The bitch was given 10 tablets i.e. 500 mg. a day for ten days. At the end of this period she was greatly improved in health, vomiting and retching had ceased, appetite was good, pulse and respiration rates were almost normal. A supply of the drug in the form of Caricide was now available and administration of 500 mg. per day was continued for a further ten days. The bitch continued to improve and has maintained this improvement for over three months after beginning treatment.

Case 2. Subject:—Irish Terrier dog, nine years. History of vomiting and retching, dysphagia and dullness. The temperature was normal, the pulse and respiration rates were very rapid, the thorax distended, and there were loud thumping heart sounds. The dog was very apathetic. Caricide in doses of 500 mg. a day was prescribed. After 10 days there was amazing improvement in its condition. Appetite had returned, there was no difficulty in swallowing, vomiting and retching had ceased, the pulse and respiration rates were approaching the normal and the dog had regained its former lively disposition. The owner, delighted with the efficacy of this treatment, continued it for another three weeks and reported that the dog was maintaining its improved health.

Case 3. Subject:—Cocker spaniel dog 4 years. History of persistent coughing, especially at night, retching and vomiting of viscous sputum, capricious appetite. This dog had a temperature of 104.5°F and was found

to be affected with Piroplasmosis. Treatment for this latter infection was begun and, in addition, Caricide, 400 mg. *per os* was given. For the first two days of treatment nausea and vomiting occurred even when the tablets were given after a light meal, but on the third day the drug was retained and after four days of treatment the persistent coughing ceased and appetite improved. The temperature dropped to 102.4°F, but unfortunately there was a recurrence of the piroplasmosis and the temperature rose again to 103.4°F. The administration of Caricide was discontinued until the treatment for piroplasmosis had proved effective, but has since been resumed with apparent maintenance of improved health.

Case 4. Subject.—Dachshund bitch, four years. History of cough, particularly at night, occasional vomiting and retching, capricious appetite, dullness. The temperature was normal; the dog was very constipated, an enema was given and milk of magnesia administered. Caricide at the rate of 150 mg. a day was given for seven days. At the end of that time the owner reported that the cough had ceased, appetite had returned, the dog had regained its lively disposition and there had not been any vomiting and retching.

Remarks.—It is always difficult and often impossible to establish a diagnosis of *Spirocerca lupi* infestation by the examination of faeces and vomitus; apparently the nodules in the oesophagus and stomach do not always communicate with the lumen of the alimentary tract, or it may be that the ova are discharged in very small numbers or only intermittently. Diagnosis must depend on the chemical signs and history of vomiting and retching. Moreover, there is usually the history that the dog is in the habit of eating dung beetles.

It should be mentioned that these dogs were examined for microfilaria and that none was affected. Filariasis of dogs, caused by *Dirofilaria ripens*, is very common in Ceylon; the usual signs are lassitude, skin disorders, loss of condition. Caricide is being tested on a number of infected dogs with good results, but a prolonged course with heavy dosage appears to be necessary.

Summary.—Caricide (Hetrazan), in doses of approximately 10 mg. per lb. bodyweight, had a beneficial effect on four dogs with the clinical signs of *Spirocerca lupi* infestation.

A fifth case has been treated by a Veterinary practitioner in Colombo. A Maltese terrier with a history of persistent vomiting and retching was given Caricide at the rate of 10 mg. per lb. body weight. After four days of treatment vomiting and retching ceased and the dog has greatly improved in health.

Acknowledgments.—It is a pleasure to acknowledge advice from Mr. M. Crawford, M.R.C.V.S., and the generous supply of Caricide from

Lederle Laboratories Division, American Cynamide Company, also the kind offices of Mr. W. Worsley, Manager of the Drug Department, Messrs. Millers, Colombo.

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FASCIOLIASIS IN BUFFALOES

By

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During the course of my tour in the village of Todalbagi in Jamkhandi Taluka to attend to epidemics in cattle on the 13th and 14th April 1950, cases of diarrhoea amongst buffaloes were brought to my notice. On enquiry, I learnt that these cases have been occurring in the village for nearly two years and that, during this period, there have been 44 attacks and 34 deaths. I also learnt that the complaint was confined to buffaloes and that the course of the disease varied from three to six months.

The symptoms observed were as follows:—The animals which were in fairly good condition began to lose flesh and became thin although they fed well. The dung became semi-solid in the first instance, then liquid and finally watery with foul odour. As the diarrhoea advanced, the milk yield became less and less. Wasting continued and death resulted from exhaustion.

An enquiry of the village Harijans who cut open the carcasses revealed that the predominant lesion was the great enlargement of the liver which, on section, was seen engorged with flat leafy worms in clusters. No post-mortem examination could, however, be performed by me personally.

Suspecting Fascioliasis, samples of dung from affected buffaloes were sent on two occasions to the Disease Investigation Officer, Poona, who found ova of *Fasciola gigantica* in them.

A study of the locality and the source of water supply showed that the livestock of the village depended for their drinking water on a perennial *nulla*, the water from which collected in two or three ponds round about the villages. On a careful examination of the *nulla*, numerous water snails were observed. These were collected and sent to the Disease Investigation Officer, Poona, who kindly identified them to be *Lenia-amniata*.

Treatment adopted.—Coopers 'Rex' liver-fluke remedy, Hexachlorethene, was selected for treating the affected animals, as detailed below :—

Sl. No.	Species.	Date of 1st dose of 'Hex'.	Result.	Date of 2nd dose of 'Hex'.	Result and remarks.
1.	She-buffalo.	14-4-50	Improvement Satisfactory.	21-5-50	Cured
2.	do.	14-4-50	do.	21-5-50	do.
3.	do.	29-4-50	do.	21-5-50	do.
4.	do.	1-5-50	Died on 6-5-50	—	—
5.	Buff-heifer.	1-5-50	Improvement satisfactory.	—	Cured
6.	She-buffalo.	1-5-50	do.	1-6-50	do.
7.	do.	12-5-50	do.	14-6-50	do.
8.	do.	16-6-50	do.	—	do.
9.	do.	20-6-50	do.	—	do.
10.	do.	29-6-50	do.	—	do.

From the above statement, it can be seen that out of 10 buffaloes treated with 'Hex', 9 were cured and one animal which was in a advanced stage died. The result of treatment of Fascioliasis with Coopers 'Hex' has therefore been most encouraging.

Preventive measures :—The only effective preventive measure would be the destruction of the intermediary host *Lenia-amniata*, found in abundance, in the *nulla*. The Disease Investigation Officer, Bombay State, Poona, is learnt to have submitted a scheme for this purpose and it is hoped that the scheme will be sanctioned early.

I acknowledge with thanks the assistance rendered by the Disease Investigation Officer, Bombay State, Poona, in identifying the intermediary host and the species of the liver-fluke.

PENICILLIN (OILWAX) IN THE TREATMENT OF BOVINE MASTITIS

By

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In a majority of cases of bovine mastitis the causal agent is either a Streptococcus or a Staphylococcus. Many species of these micro-organisms are susceptible to the action of Penicillin. Thus with the introduction of this antibiotic agent new hopes were linked with this important disease of dairy cattle. In the beginning many workers tried this drug on cases of mastitis by injecting it intravenously, subcutaneously or intramuscularly, but Penicillin not being excreted through mammary glands, these means of administration proved of no avail in the treatment of the disease.

In their book—"ANTIBIOTICS"—Flory and others give reports of various workers who tried Penicillin intravenously, subcutaneously and intramuscularly both in cows and on lactating women but were unable to detect it in their milk. Welsh, Langer, Burkhart and Schroeder (1948) tried very large doses of this drug intravenously and showed that only sufficiently high concentration of the drug in blood gave rise to the steady excretion of significant amounts of it in milk. On the other hand, direct infusion of comparatively small doses of Penicillin solution into the mammary glands was able to keep a bacteriostatic level of the drug for a sufficiently long period. Kakavas (1944) was the first to successfully treat cases of mastitis by local instillation of the solutions of Penicillin into the teat canals. There are certain handicaps in this method as well. Penicillin has to be given dissolved in sterile distilled water. The solution of Penicillin in water being unstable, has to be prepared afresh every time before use. This requires elaborate procedure by the operator. Moreover, the excretion of the drug is rapid in this manner and instillations have to be carried out every three hours to keep up the bacteriostatic level.

To overcome these drawbacks, certain drug manufacturing companies have prepared oil suspensions of the drug in collapsible tubes. In this way Penicillin, apart from being handy, is excreted very slowly. This preparation was tried by the authors at the Civil Veterinary Hospital, Hissar on a number of cases. The suspension used was 50,000 units of Penicillin (Calcium Salt) per tube in Arachis oil and wax manufactured by Messrs. May & Bakers Ltd., Dagenham, England. The results were very encouraging and improvement was noticed after 24 hours of treatment. Three such cases are detailed below for the information of the profession :—

Case No. 1.—A buffalo-cow was brought to the hospital on 19-2-50. with the history that she had cracks on the teats about a fortnight back

which gradually developed into large wounds on all the four teats. On examination, the left hind quarter was seen to be more seriously affected. It was swollen at the lower part, was warm and the animal resented manipulation. Milk from this quarter was flocculous while in the other quarters it was normal. Microscopical examination of the milk containing flocculi revealed the presence of Streptococci in long coiled chains. The wounds were washed with Condy's lotion and dressed with Penicillin (Oilwax) and bandaged.

20-2-1950.—The wounds showed remarkable healing. Udder was completely emptied and one tube of Penicillin (Oilwax) suspension was instilled into the affected quarter. Wounds were cleaned and dressed with Zinc ointment. Penicillin (Oilwax) suspension was repeated in the evening.

21-2-1950.—There was remarkable improvement. The inflammation had greatly subsided. The treatment was repeated morning and evening.

22-2-1950.—The secretion from the effected quarter resembled milk but was lighter in colour and contained only a few flocculi. Treatment repeated.

23-2-1950. to 24-2-1950. Treatment repeated.

25-2-1950.—Milk was absolutely normal and contained no flocculi. Treatment was repeated for another two days and the animal was declared having been cured of mastitis. Slight wounds remained on the teats which were treated antiseptically for another week and the animal was discharged as cured.

Case No. 2.—A buffalo-cow came for treatment on 28-2-1950. The owner of the animal stated that, for the last five days, instead of milk, a watery secretion containing flocculi was coming from the right hind quarter. Examination of the udder revealed slight swelling of the affected quarter. Microscopic examination of the watery secretion proved positive for streptococci. On 28-2-1950 only Glycerine Belladonna was rubbed on the affected parts. From 1-3-50 to 6-3-50 Penicillin (Oilwax) treatment was given as for case No. 1. The improvement noticed during all these days was wonderful. The animal was completely cured by 6-3-50. The inflammation subsided and the milk was normal.

Case No. 3.—On 27-4-50 a Haryana cow was brought to the hospital with the complaint that the animal had some trouble with the udder. On examination the left hind quarter was found to be inflamed. Milk from this quarter was watery and contained flocculi. Milk from other quarters was normal. From 27-4-50 to 30-4-50 Penicillin (Oilwax) was instilled once in 24 hours. The flocculi completely disappeared from the milk by 30-4-50 and there was no inflammation either.

Summary

Penicillin (Oilwax) suspension was tried in many cases of bovine mastitis. Details of three such cases are given. The results in all the cases were encouraging.

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A CASE OF HYDROS AMNII IN A COW

By

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On 7-11-50 I was called to attend on a case of dystokia in a cow, aged about ten years, in its fourth pregnancy. The history of the case was that the animal had unusual enlargement of the abdomen from the 7th month pregnancy onwards and the owner, suspecting twin pregnancy, evinced great care in the management of the animal.

Labour pains started about 12 hours previously and there was profuse discharge of amniotic fluid which according to the owner was several buckets, and flowed over the entire stall.

On examination the foetus was found in the posterior presentation, lumbo-sacral position with hind limbs not well extended. After correcting the position, both the hind pasterns were tied with ropes and by gentle traction the foetus was removed.

The calf was dead. It was under-developed and had peculiar short, crooked limbs with hocks bending backwards. The cow was exhausted after removal of the calf but was soon alright with appropriate treatment.

Cases of Hydros Amnii are extremely rare and hence this case may be found interesting.

METHYLATED SPIRIT IN YOKE GALL

By

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Having read the article "Spirit Methyлатus in Yoke Gall" by Shri F. C. Bhuyan, G.B.V.C., Veterinary Assistant Surgeon, Nowgong, Assam, published in the issue of March 1948 of the Indian Veterinary Journal, I would like to publish my own experiences on the subject in the columns of this *Journal*.

Eleven cases of inflamed neck in bovines were treated by me during the period of three months i.e., from May to July 1948 at the Veterinary Dispensary Akola, Ahmednagar District, when I was in charge of the said dispensary.

Case No. 1.—The first case was a bullock admitted on 4-5-48 for inflamed neck. The swelling was hot and painful and was of the size of a coconut. I injected subcutaneously, on 4-5-48, 2 c.c. of Spirit Methylatus—one c.c. on each side of the base of the swelling. On the fourth day, the swelling was reduced to a fourth of the original size and by the application of Liniment Ammonia for two days more, the swelling vanished completely.

Case No. 2.—The second case was a bullock admitted for inflamed neck on 8-5-48. Injected on 8-5-48, 2 c.c. of Spirit Methylatus. By 12-5-48, the swelling had become reduced completely.

Case No. 3.—The third case was a bullock admitted on 25-5-48. With 2 c.c. of Spirit Methylatus injected subcutaneously the swelling subsided in five days.

By the results of these three cases, I was encouraged to try the treatment in all the further cases and, during the period from 31-5-48 to 14-7-48, eight cases were treated by me by injecting Spirit Methylatus. The swellings in six cases subsided completely within a course of 4 to 8 days. In one case admitted on 4-6-48, there was no improvement. The part was then blistered and the swelling subsided by 20-6-48.

In the last of the eight cases admitted on 14-7-48, a second injection of Spirit Methylatus was given on 20-7-48 which brought about a complete cure on 27-7-48.

In all the cases, the owners were advised to give the animals complete rest for a fortnight before putting them on the usual work.

Reviewing these cases, it is seen that, if the inflammation is simple with no pus formation, only one injection is usually sufficient to give complete cure. The percentage of success in the present experiment works out to 90%. This is a very cheap and effective drug for cases of inflamed neck and deserves trial at the hands of the other members of the profession.

SOME OBSERVATIONS ON THE TREATMENT OF COMPLICATED FRACTURES WITH THE AID OF GOOD SURGICAL TECHNIQUE, MODERN ANTIBIOTICS AND UNPADDED PLASTER CAST

By

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In connection with the article on the above subject, which appeared in the March 1951 issue of this *Journal*, the following case reports on the subject would be found interesting.

Case Reports

Case No.	Description of patient.	Nature of accident.	Date of fracture.	Date of plaster.	Procedure.	Date of removing plaster.	Remarks.
1.	C. B. Fowl, Cock.	Compound fracture of Tibia.	12-7-49	13-7-49	(1) The part was closely shaved all round the wound and thoroughly scrubbed with hot water & soap. (2) All the lacerated soft tissues and blood clots removed. (3) The wound irrigated with hot N.S.S. till it started cozing. (4) The wound packed with sterile Sulphanilamide powder. (5) Gauze soaked in sterile vaseline wrapped over it. (6) Unpadded plaster bandage was put after reducing the fracture to the correct position. As per Serial No. 1.	1-4-49	(1) Wound healed up. (2) Bone united. (3) There was slight lameness.
2.	C. B. Fowl, Pullet.	Compound fracture of the Metatarsus.	16-7-49	16-7-49	As per Serial No. 1.	1-4-49	do.
3.	C. B. Cow.	Compound fracture of Metacarpus.	24-10-49	24-10-49	As per Serial No. 1 besides Penicillin 2,00,000 units was injected into the wound.	...	The animal was alright up till three weeks and was putting weight on the affected leg but met with an accidental fall and succumbed to the injuries as she was in advanced stage of pregnancy. As per Serial No. 1.
4.	W. L. H. Pullet.	Compound fracture of Metatarsus.	30-10-49	30-10-49	As per Serial No. 1.	5-12-49	do.
5.	C. B. Cock.	do.	11-11-49	11-11-49	do.	27-12-49	do.
6.	W. L. H. Pullet.	do.	21-11-49	21-11-49	do.	7-1-50	do.
7.	C. B. Bullock.	do. at the lower extremity involving fetlock joint	24-11-49	5-12-49	As per Serial No. 3	...	Destroyed on 3-1-50.

[Continued in next page]

S	C. B. Heifer.	*Metacarpus Compound fracture.	4-12-49	20-12-49	On 19-12-49 the wound was thoroughly scrubbed with soap and hot water. All maggots removed. Both soft and hard dead tissue incised and washed with hot normal Saline till the wound started oozing. 2,00,000 units Penicillin in double distilled water was injected into the cavity and surrounding tissue and again packed with sterile Sulfanilamide powder. On 20-12-49 as serial No. 3.	5-2-50	As per Serial No. 1 *On 19-12-49 the animal was presented at the hospital with a maggotised compound fracture of the metatarsal involving fetlock joint. Lay attempts had been made to amputate the leg without success.
9.	Maina (wild bird).	Compound fracture of Metatarsus.	11-12-49	11-12-49	As per Serial No. 1	26-1-50	As per Serial No. 1
10.	C. B. Heifer.	do. infested with maggots.	1-1-50	10-1-50	do. with Penicillin as per Serial No. 8	25-2-50	do.
11.	Pigeon, (Property of Orissa Police)	do. Compound fracture of both wings and both Metatarsals.	4-2-50	4-2-50	do. except Penicillin	18-3-50	do.
12.	Pigeon, (Property of Orissa Police)	do.	do.	do.	do.	do.	do.
13.	C. B. Dog.	Compound fracture of Metatarsus.	10-7-50	11-7-50	do. with Penicillin.	26-8-50	do.
14.	C. B. Dog.	Compound fracture of left Hock Joint.	4-8-50	18-8-50	do. with Penicillin under general anaesthesia Intraval Sodium.	Replaced on 2-9-50. Removed on 1-10-50	do.
15.	C. B. Kid. Female	Compound fracture of Metacarpus.	17-9-50	17-9-50	do. except Penicillin.	3-11-50	(1) Wound completely healed up. (2) Animal walked normally.
16.	Sidney Silky Terrier Bitch.	do.	Not known	15-10-50	As per Serial No. 1 with Penicillin.	Replaced on 4-11-50 & moved on 15-12-50	As per Serial No. 1
17.	W. L. H. Pullet.	Compound fracture of Metatarsus.	16-12-50	16-12-50	do. without Penicillin.	30-1-51	As per Serial No. 1
18.	Duck.	do. of Tibia.	4-3-51	4-3-51	do.	16-1-51	do.
19.	Grey C. B. Bullock.	Compound fracture of pastern.	16-2-51	18-2-51	do. with Penicillin.	6-4-51	do.

Abstracts

Snake Venoms in Pharmacology and Therapeutics

[In view of the frequent enquiries we receive about the use of snake venom in Veterinary practice, the following information issued by the Director of the Haffkine Institute, Bombay, will be found instructive—Ed. I.V.J.]

The rationale of application of venom in therapy.—The therapeutic use of venoms in medicine is based on the presence of the various active principles like neurotoxin, cytolyisin, coagulative and haemorrhagic enzymes etc. The characters of these are given below.

Neurotoxin.—This principle, though present in all snake venoms, predominates in cobra venom. It has a strong depressant action on the higher centres, particularly on the vasomotor and the respiratory centres. In small doses it has an irritant action, but in large doses or on prolonged contact it produces paralysis of both the sensory and motor end-plates. The venom, therefore, in graduated doses may be used to depress the higher psychical centres and is useful in delirium, hallucination, aphasia and melancholia. Improvement may occur in apoplexy, meningitis, hysteria and chorea. It may be used to depress the respiratory spasms of the asthmatic attack. In small doses it may be useful in early stages of hemiplegia and paraplegia. On account of its producing anaesthesia by paralysing the sensory nerve endings it has been used locally to stop the severe pains of inoperable carcinoma.

Cytolyisin and tissue absorption.—Cobra venom has the property of destroying granulation tissues and all the neoplastic cells formed in the tissues. This property has been utilized in the treatment of malignant growths with the idea of absorbing the neoplastic cells of the tumour. Laignol-Lavastine and Korossios, N. T. *Jour. Med. Paris*, Vol. LIII, p. 652, (1933) have shown that in this way the growth of the neoplasm is retarded and even distant metastases may disappear. This is doubtful as no definite case has been reported so far.

Protein and histamine desensitization.—Chopra, R. N. and Chowhan, J. S. (*Ind. Med. Gaz.* Vol. LXX, P. 445-452, 1935), have shown that viper venom produces fall of blood pressure and symptoms of shock from paralysis of the capillaries. The shock produced appeared to be similar to that of histamine or protein. The venom in graduated doses may also be used to desensitize persons against protein sensitivity. This has been done in asthma, or as non-specific protein therapy against erysipelas, carbuncles, epilepsy etc., and it acts by producing protein shock or suppressing allergic symptoms.

Use of Venom in Certain Diseases

Carcinoma.—Cobra venom has been used in the diagnosis and treatment of carcinoma. It has the property of destroying neoplastic

cells and granulation tissues. Laignel-Lavestine and Korossios experimented in the algeias of cancer patients. They found that injections of 0.001 milligram of cobra venom relieved the pains in in-operable neoplasms in patients who otherwise had to use morphine injections daily. The injections needed repetition every 8th or 10th day.

Very small doses of venom, which provoke neither suppuration nor general reaction, lead to relief of pain and cicatrization and produced other signs of healing. Epithelioma of the rectum has also been treated in this way and distant metastases are said to have disappeared. This is doubtful but whatever else may have happened cobra venom is declared to be a good analgesic and promises to be of use in the symptomatic treatment of cancer.

Haemorrhages due to Haemophilia and other causes.—The coagulant action of Russell's viper venom was found to be by far the most powerful agent against haemorrhage. In certain internal haemorrhages e.g. retinal, uterine, etc., intramuscular injections of Russell's viper venom have been tried with encouraging results in a few cases.

Certain Painful Conditions.—Chopra, R. N. and Chawan, J. S. (*Ind. Med. Gaz.* Vol. LXXV, No. 2, p. 69-75, Feb. 1940) used cobra venom solutions in leprosy, neuralgia and similar conditions, sciatica, lumbago and fibromyositis, osteochondroma and arthritis, paraesthesia etc. Their results showed that 35% had marked relief, while another 35% had definite relief, others were doubtful or had no effect whatever. Pain disappeared slowly but the effect was lasting. No untoward symptoms were present.

On the other hand Steinbrocker, Otto, et. al (*Jour. Amer. Med. Assoc.* Vol. CXIV, No. 4, P. 318-322, 27th January 1940) studied a few cases with arthralgias and experienced some gradual but rarely complete relief of pain and in a lesser number of cases improved mobility, during administration of cobra venom. Careful evaluation at this time indicates on the whole, some limited effectiveness of cobra toxin as compared with controls treated with saline solution. As an added comforting measure, to tide patients over an intractable period of treatment in acute or chronic arthralgia or neuralgia, cobra venom in certain cases appears to offer some supplementary analgesic effect. Accurate determination of such therapeutic value requires further controlled investigation in a large series of the various rheumatic conditions.

The preliminary dose of cobra venom should be from 1-22 mouse units only.

Epilepsy.—Chowhan, J. S. (*Ind. Med. Gaz.* Vol. LXXV No. 6 p. 382, June 1940) suggests the following routine treatment of epilepsy with venoms. He advises the use of cobra and Russell's viper venoms together.

Routine treatment of epilepsy with venoms

A. Drugs to be used :—

- (i) Cobra venom 1 to 10 mouse units (m.u.)
- (ii) Russell's Viper venom 2 to 20 mouse units.

B. Treatment :—

Intramuscular bi-weekly injections of cobra and Russell's viper venom mixed together in the following doses.

Dose No. 1 Cobra venom 1 m.u. and Russell venom 2 m.u.

Dose No. 2 Cobra venom 2 m.u. and Russell venom 4 m.u.

Dose No. 3 Cobra venom 3 m.u. and Russell venom 6 m.u.

So on till 10 doses are administered. Rest for one month and repeat the above course again. Three to four such courses to be completed, later on course every six months.

In addition to these the author advises extract *Rauwolfia serpentina* 10 to 30 drops in water, twice daily to be given by mouth.

Conclusions:—The use of snake venoms viz. cobra and Russell's viper as therapeutic agents is slowly but surely being recognised. Cobra venom acts as an analgesic whereas Russell's viper venom has haemostatic properties.

The technique for local application of Russell's Viper venom solution 1 in 1000.

The wound—e.g. a tooth socket—is gently but thoroughly cleared of pus, blood and debris by iced saline or hydrogen peroxide. A piece of wool soaked in 1 in 10000 venom is inserted lightly on to the whole of the bleeding surface. The haemorrhage quickly stops and a firm clot remains. If the bleeding is brisk, light pressure is permissible while coagulation takes place; if the venom at ordinary temperature is not effective, it is warmed to 50°C. Splinting of the part or area by bandaging and other methods—e.g. a dental plate—is essential to keep the dressing in position and the clot intact, but pressure on the wound must be avoided.

Precautions :—

- (1) The dressing must not project from the wound, as movement may dislodge it, together with the clot, and thus restart the bleeding.
- (2) Pressure or tension on the wound by plugging, dressing, splints bandages, or by a dental plate must be avoided so that the viability of the tissues and therefore their power of repair is undiminished.

- (3) Sepsis. When sepsis is present the venom dressing is changed once, thrice or more often daily to minimise soiling and tissue destruction by bacterial action which would prevent the wound from healing.
- (4) Adrenalin is never used because it exerts a deleterious effect on the tissue viability even though it may be temporarily haemostatic.

Russell's Viper Solution 1 in 3000

(For Intramuscular injection)

Direction:—Initial dose is usually 0.1 cc. diluted with an adequate quantity of normal saline. The dose can be given bi-weekly and increased upto 1 cc. The local or general reaction produced should guide the physician during the administration of the course.

Injections are to be given intramuscularly—the sites of successive injections being at least 10 cm. apart preferably in different limbs.

The Haffkine Institute prepares venoms in the following doses:—

COBRA VENOM: 1 cc. ampoule of 5 mouse units each*
 1 cc. ampoule of 10 mouse units each
 1 cc. ampoule of 15 mouse units each
 1 cc. ampoule of 20 mouse units each
 1 cc. ampoule of 25 mouse units each

RUSSELL'S VIPER VENOM: } 1 cc. ampoule of 1 in 3000 dilution = 26.6 m.u.
 1 cc. ampoule of 1 in 1000 dilution = 8 m.u.

* Preliminary doses should be from 1—2 mouse units only.

Cobra venom and Russell's Viper venom can be had at the Institute at the rate of annas ten for each ampoule. A box containing 3 ampoules of 1 cc. each of 5, 10, 15, 20 and 25 mouse units of cobra venom only can be had at Rs. 8/-. Other dilutions can be prepared at special rates as required by the physician.

As definite data about the results of treatment with venom solutions are not known, practitioners are requested to send detailed particulars of cases to the Director of the Institute.

Correspondence

RANDOM THOUGHTS ON CATTLE BREEDING

To The Editor, I.V.J.

Sir,

It is a known fact that for successful agriculture livestock should fit in the most profitable manner. Indian agriculture is admittedly not very efficient. Viewed from this angle the livestock of the country is suited to the needs of the cultivator. He spends very little on cattle by way of keeping or feeding. No special scheme is adopted for breeding. He does not "Make an unusual sacrifice" for their well-being. He is able to till the land with his half-famished bullocks, get a calf occasionally from the female of the species and even supplement the family larder with a little milk. All these may be agriculture at a low level. But it fits in with his needs and resources. If agriculture is improved the livestock of the place gets automatically superior. We see this phenomenon in nearly all countries. The Harianas of the Punjab, the Kankrej of Bombay, the Ongoles of Andhradesha, and the Kangayams of the South are good examples where better cattle have been evolved in answer to the needs of the agriculture of the place. The main concern of the stock breeders of the past was to evolve a hardy plough animal. It is unquestionable that he has been successful to a great degree. All honour to the unknown pioneers!

It is only lately that the cry of "milk" has been raised. Nutritional surveys and demands for more milk from growing cities have brought the problem of milk production to the forefront. War-years taught us the lesson that surplus milk in the country is little and a great deal of organisation was necessary to get the required quantities of milk for the needs of the army. Our nutritional plane would certainly be higher if we can induce a little more milk in the well-known draught breeds of India to cater for the requirements of the calf and also for the human baby at the same time. The Indian Council of Agricultural Research has rightly started the scheme in the Kangayam area to study—I shall even say to demonstrate—the effect of increased milk yield on draught quality. This scientific approach to the common problem of developing a dual purpose animal for draught and milk is a correct solution.

To my mind, work and milk-yield should not be antagonistic to each other. The dual purpose cattle of the west presupposes a slaughter animal and a high milk-yielding cow in one and the same breed. These qualities may not go well in one breed, although dual purpose strains within the breed have been successfully established. As examples, I may cite the Short-horns and the Devons. In the beef animal, carcase size, early maturity, maximum gain on minimum food etc. are looked for. The breeders of this type of stock require a calf weighing about 80 pounds at 6 months' of age to grow up to beef animal of 1400 pounds and over in the next 24 months' time—an

average increase of two pounds daily! On the other hand the breeder of dairy cattle stresses on angularity of form and freedom from heavy fleshing. He wants the mammary system to be well developed, capacious and withstand the stress and strain of successive lactations. The fat and flesh producing capacity and the capacity for yielding high grade milk are difficult to be combined in one and the same breed.

A breed may be considered to be a group of individuals that may be recognised as a distinct one within a species by the presence of a collection of common characters. There are certain well tried methods for improving livestock. By adopting suitable plans even new breeds can be created. Although certain breed characters overlap on others, particularly in contiguous areas, and given different breed names, India possesses some distinct breeds of cattle. It is apparent to the casual observer that Sahiwals of the Punjab are different from the Ongoles. But a trained eye is required to distinguish the Amritmahal, the Hallikar, the Alambadi and the Khillati from each other. For perputating breeds with small differences herd book formation and registration are proper methods. The Bombay Government has done the right thing in establishing a herd book for the Khillari breed. It is again Bombay among the states that has opened a herd book for the Kankrej breed of cattle. Central Herd Books have also been opened for the Haryana, the Red-Sindhi and the Sahiwal breeds as well as for the Murrah breed of buffaloes by the exertion of the Indian Council of Agricultural Research.

Herd books formation had an interesting development in the west. The first herd book in the world for cattle was opened in 1822 in England for Shorthorn cattle. This was done by the enthusiasm of one person named Coates. Continental countries came later while the first American herd book was established in 1868 for Jersey pure breeds. Nearly all these enterprises are the result of a few enthusiasts of a locality interested in some particular breed—Governments had no hand in the formation of breed associations in foreign countries. I am of the view that Government sponsoring is undesirable in these matters. One chief evil is that control of associations would be in the hands of the Government and breeders themselves have to take orders from Government officials. Further any government agency is suspect from its inception as having ulterior motives as the possibility of taxation, or price control, or something similar and co-operation is not coming forward to the full. Again any government agency is expensive and probably not too efficient.

Any observant person can see that many of our established breeds are getting watered, some have even disappeared. There is very little done to stop this rot. The surveys that are going on in certain breeding areas, with a view to establish herd books, are progressing slowly and in some cases even pointless. What is now required is for some of the influential breeders of the home tracts to come together without delay and establish herd books. Breed societies and

associations would immediately follow. Purely from self-interest alone the breeders are likely to organise themselves and form councils of their own.

It is not difficult to open a herd book. But I have not seen any great desire among the breeders themselves to come together and to discuss matters of common interest as breed points, milk production, draught quality and such other related subjects. Want of organisational capacity has been a major reason for this lack of proper records of their stock. The breeder knows a good deal about his own livestock, but he has little information of the advances made in the art of breeding in other countries or the scientific aspect of breeding. Even the most reputed breeders have no records of their animals. Probably the prospective customer has not desired to get this information. Any one with a knowledge of scientific breeding would insist on getting the family history of his purchase as he wants to gauge the inherent worth of the animal. Since the average breeder happens to be poor and ignorant he does not know the great value to him of such important information.

Herd books when opened should not be a collection of names, but should have information about production tests. The methods for evaluating dairy cattle are well-known. Draught cattle which are peculiar to our country should have additional information about (1) Yoke efficiency in ploughing or mhothe work (2) Endurance road work and (3) Pulling tests. Herd Association and societies are for keeping up the existing standards of the breed, improve the breed and help the business side of its members.

The least that State Governments can do is to place some high ranking officers of experience exclusively for carrying propaganda among the breeders, for organising breed societies in well-known breeding tracts and help them to open herd books for all our well defined breeds.

Hyderabad }
13-3-51 }

K. S. NAIR.

[Our readers will remember that Sri K. S. Nair, G.B.V.C., M.R.C.V.S., D.T.V.M. who is now the Professor of Animal Husbandry, Osmania Animal Husbandry and Veterinary College, Hyderabad-Deccan, retired from the post of Joint Director of Animal Husbandry, Madras, sometime back. His views, or as he prefers to call them, random thoughts on cattle breeding is deserving of close attention and we are sure they will be read with interest by our readers. Ed. I.V.J.]

'Studies on Myiasis and its Treatment'

To The Editor, I.V.J.

Dear Sir,

The above article by Sen Gupta, C.M., Balarama Menon, P., and Basu, B.C. published in the *Indian Veterinary Journal* XXVII, 5, 341-350 refers to controlled experiments in the treatment of this condition by several agents including benzene hexachloride (BHC). Benzene hexachloride consists of a

mixture of alpha-, beta-, gamma-, and delta isomers, of which the gamma-isomer has outstanding parasitocidal properties. The efficiency of a BHC preparation therefore depends on its gamma-isomer content which may vary from 13% (pure BHC) downwards according to the specific parasitism to be treated. In addition to a gamma-isomer content adequate for the purpose the efficiency of the preparation also depends on the method of application, e.g., pure BHC diluted by an inert powder and dusted on; a water-dispersible powder sprayed as a solution or used as a dip; an alcoholic concentrate diluted and sprayed, etc.

The article under reference gives no data of gamma-isomer concentration in the BHC preparation used, and so no valid conclusions can be drawn. In addition further consideration of the most suitable method of application for the condition under treatment would have enhanced the value of this work. Both DDT and BHC are stated to have been dusted inside the infested wounds which were then plugged with cotton wool. As both these preparations in powder form are practically insoluble in tissue fluids the efficiency of their contact with burrowing maggots in a wound would be limited.

Calcutta }
21st May '51 }

Yours faithfully,
For I.C.I. (INDIA), LTD.,
G. V. SHORT, M.R.C.V.S.

Association News

BOMBAY VETERINARY MEDICAL ASSOCIATION

The Diamond Jubilee Celebrations of the Bombay Veterinary College

[An advance appeal by the Bombay Veterinary Medical Association, Bombay]

Friends,

The Bombay Veterinary College, having been started in 1886, completed sixty years of momentous existence as the premier Veterinary educational institute in India in 1946. A Diamond Jubilee Celebrations Committee was formed for the due celebrations of the event and proceeded with its work. Due to several unforeseen circumstances and conditions beyond the control of the College and the veterinary profession in the State the work was unduly hampered, resulting in the non-celebration of the event up to date. The matter took an unfortunate turn last year when the Government of Bombay decided not to permit the celebration and dispose of the collected funds, at the discretion of the Director of Animal Husbandry and Veterinary Science, with the permission of the donors. The donors were also informed of the decision. The matter was, however, taken up by the profession and very strong representations were made to the Government urging the necessity of permitting the celebration. These representations bore fruit and Government have

permitted the B.V.M.A. to celebrate the Diamond Jubilee, as indeed they celebrated the Golden Jubilee of the college. Extract of letter from the Director of Animal Husbandry and Veterinary Science is "Government is pleased to permit the B.V.M.A. to celebrate the Diamond Jubilee of the Bombay Veterinary College. They are also pleased to hand over the balance of the amount collected for the purpose viz Rs. 2800/-. The Principal of the college is requested to hand over the amount to the Association. For the actual celebration the B.V.M.A. is to appoint a new committee to organise the holding of the celebrations."

A Diamond Jubilee Celebration Committee to actually celebrate the occasion has been formed and is constituted as follows.

President of the B.V.M.A.

Two secretaries of the B.V.M.A.

One past secretary of the B.V.M.A.

Two secretaries of the Golden Jubilee Celebration Committee.

Director of Animal Husbandry and Veterinary Science.

Principal B.V.C.

Two senior officers of the B.V.C.

Three officers of the B.V.C. who are past secretaries of the B.V.M.A.

A student representative.

Representatives one each from the Bombay Corporation and the A.I.V.A. and five medical and scientific institutes in the City, with powers to co-opt more members as this committee thinks fit.

It is hoped that the composition of this committee will assure the utmost efficiency in the discharge of the onerous duties involved. The Jubilee is due to be celebrated this Xmas and no further postponements can at all be contemplated.

There is no time available to conduct the celebration on a grand scale as was originally planned in 1946. Circumstances did not permit the collection of any considerable amount. We will now have to collect whatever amount we can with the utmost urgency within the few months we have before us. The D.J.C.C. will be meeting at frequent intervals and their activities and communications will be published in these pages regularly. All are requested to take a keen interest in the celebration and help and support the committee in all possible ways. Those who have not already contributed to the D.J.C. fund are earnestly requested to kindly send in their contribution with the least delay. It was adopted as a convention within the profession that ten percent of the monthly income would be a suitable contribution. As funds have not been

collected in sufficient amount a generous contribution is earnestly solicited from all members of the profession and the public. Any efforts by any individual for collecting funds will be greatly appreciated and all are requested to make the contribution direct to the Treasurer D.J.C.C.C. Bombay Veterinary College, Parel, Bombay 12, so that an official acknowledgment for the amount may be made to the donor with the least possible delay. Any information regarding past students of this college including their present addresses will be gratefully accepted, as this will enable the committee to personally contact them as and when necessary.

It is proposed to utilise the funds collected mainly for the institution of a few medals to be awarded annually to outstanding students and members of the profession, in commemoration of the Diamond Jubilee of the College. The terms of such awards, and the constitution of the body that will make these awards, will be decided by the D.J.C.C. Suggestions in this regard will be welcome.

It is also proposed to hold a session of the A.I.V.A. and the B.V.M.A. at the time of these celebrations to enable members of the profession to attend all the three functions at a single opportunity. The actual dates will be duly announced but it will very greatly help the committee, if persons intending to attend the function, kindly inform the secretaries at an early date about it. This will help the secretaries to make provisional arrangements about accommodation, travel concessions and rations etc. Final arrangements in this connection would be made sometime in November.

It is also proposed to publish a D. J. commemoration volume. This volume is expected to be in the hands of the profession at the time of the function. Contributions suitable for this publication are solicited from all interested persons. They may kindly be made in the form of reminiscences by past students and eminent persons connected with the institution; general articles regarding policy governing major veterinary matters; articles on technical subjects of public interest by persons specialising in them and general articles on subjects of interest to veterinary surgeons and the public.

Any suggestions regarding the nature, scope, and details about the Jubilee celebrations are welcome and will be duly considered for adoption. Suggestions may kindly be made quite clear and explicit, practical and in full detail, so as to enable the committee to adopt as much of it as possible without serious waste of time, that would otherwise be entailed in correspondence for clarification and explanation of the views in question. Suggestions are also requested to be sent in immediately so as to give plenty of time to the committee to find ways and means of carrying them

out. The B.V.M.A. very earnestly requests all people concerned to come forward with a strong and immediate response so that the D.J.C.C. may succeed in conducting the celebrations to the entire satisfaction of all concerned.

Yours faithfully,

V. R. PHADKE,

President,

Bombay Veterinary Medical Association.

23rd March, 1951. }
Poona 4.

PUNJAB SUBORDINATE VETERINARY SERVICE ASSOCIATION

The 13th Annual General Meeting of the Punjab Subordinate Veterinary Services Association was held at Hissar on 4th March 1951 at 9 A.M. in the Punjab Veterinary College Hall, Hissar.

The following members attended :

1. Shri Jaswant Rai, Kapoor, 2. Amar Singh, Ahluwalia, 3. Atma Singh, 4. S. D. Sharma, 5. Karnail Singh, 6. Kapal Raj, Suri, 7. Sarup Singh, 8. Tara Singh, 9. Autar Singh, 10. Bhag Singh, 11. Mangat Singh Datt, 12. Som Nath Bhatia, 13. Sita Ram, 14. Sardari Lal, 15. Kanwal Kishore, 16. Sardar Singh, 17. D. L. Datt, 18. Gopi Chand, 19. Prem Raj, Gor, 20. Raj Paul, 21. Kewal Ram, 22. Ram Dass, 23. Beant Singh, 24. Manohar Lal, 25. Bashambar Dass Behal, 26. J. G. Singh, Mohindar, 27. A. S. Garewal, 28. Kehar Singh, 29. Autar Singh, Daroli Bhai, 30. Kirpal Singh, 31. Lekh Raj, Chawla, 32. Rajinder Singh, 33. Mohan Lal, 34. P. C. Taneja, 35. M. C. Tugnait, 36. Sobhan Chandar, 37. Ranjit Singh, 38. Vidya Sagar, Thapar, 39. Hira Lal, Kapoor, 40. Sadhu Singh, 41. M. L. Bhandari, 42. Kehar Singh, 43. Inder Singh, Kolhi, 44. Satwant Singh, 45. Shivdhan Singh, 46. Raj Kishan, Mehta, 47. Madan Mohan Chawala, 48. Om Prakash Malhotra, 49. Kehri Singh, 50. Jagdish Chander, 51. Ragunath Singh, 52. Ram Singh, 53. J.S. Chatwal, 54. R. L. Ghulauti, 55. Jarnail Singh, 56. Chander Parkash, 57. Sadhu Ram, 58. Prem Datt, 59. H. S. Bawa, 60. Ram Chand, 61. Ajit Singh, 62. Balbir Singh, 63. Harbhajan Singh, 64. Jagat Singh, 65. Surjan Singh, Batra, 66. Farja Ram, 67. Gurbakhsh Singh, 68. Gurbhagwant Singh.

Guests who responded to the invitation by the President were :—

1. Shri Gurdial Saran, Mehta, Superintendent, D.V.S. Office, Simla.
2. Shri Dial Saran, Professor, Punjab Vety. College, Hissar.
3. Shri Kundan Lal, P.V.S. Dy. Supdt; C. V. D. Ludhiana.

Shri Herdev Sahai of Hissar on an invitation from Shri Bishamber Dass Behl, President of the association occupied the Presidential chair amidst applause. Sh. Bishamber Dass Behl then welcomed the gathering in the following words :—

Shri Herdev Sahai, gentlemen and professional brothers,

On behalf of the Punjab Subordinate Veterinary Services Association, I deem it a great pleasure to extend you all a cordial and hearty welcome

to this meeting. Today we are singularly fortunate in having Shri Herdev Sahai to preside over the deliberations. Shri Herdev Sahai is not new to the Veterinarians of this Province, as he is an enlightened breeder, who realises the vital role of the Veterinarian in relation to his livestock. He has been all along in constant touch with the members of our profession and especially with the Hissar Cattle Farm. All went well with this association in the United Punjab, but, after partition, the association has been lying for some reason or other in a dormant state, and efforts to revive it after partition could not succeed till now due to a number of unforeseen difficulties. It is due to the extra-ordinary efforts of some of our colleagues that this association is being revived.

We must clearly understand that this association is a volunteer organisation: as such, it is not buttressed by the Physical might. It functions only through the willing loyalty of its members. Its authority is moral and not physical. The first condition, therefore, of the existence and effective functioning of such an association is unity. This unity cannot be superimposed by a dictator; it can only be achieved if the members learn discipline and mutual cooperation.

In the beginning, our profession was feared by the poor, ignorant and illiterate villagers, but now the times have changed and people have now begun to understand the real value of this profession, and they highly appreciate the work done by the Veterinarians. But, alas! our services are not yet fully appreciated by the Government and our plight remains much the same, as what it was before, because we have got no voice and no unity. We are greatly hard hit, our salaries are very meagre as compared to our sister medical department. Some revision of the scale of pay of the subordinate staff is essential and imperative, as the prices of the articles have gone 200 times more than what they were 25 years back, when the grades were made. "Discontent never breeds success". One of the important ingredients of an efficient and contented service is that there shall not be any financial difficulties to prevent individuals from playing their full part in the community to which they belong. In the ordinary civic life, the Veterinarians should have a place for himself in the district and local bodies and representative Assemblies too.

Shri Bishamber Dass Behl then dwelt on the service conditions and the ignominies to which the subordinates of the Department were subjected by their officers and said now that there is a popular Government with a popular Ministry, it is hoped that the Director of Veterinary Services will consider the matter and render justice to Veterinary Subordinates who are now subjected to much humiliation at the hands of their officers. It is my firm conviction that immense advances are possible in this department, if only the subordinates, who are the real backbone of this department, are called by the officers to explain the difficulties which they have to face in the efficient running of the hospitals as well as in the field work. Unfortunately, we are ignored most

cruelly in every respect. Our officers don't consult us, and never try to take us into confidence, rather they think it below their dignity to take any good thing from the seasoned veterinarians.

Tour Work.—Though some of my brethren will not agree with me, I dare to suggest, and thus echo the feelings of my colleagues, that the touring of veterinary assistant surgeons should be closed straight away to give place to rural veterinary dispensaries. It is really ridiculous that the veterinary assistant surgeons should leave 70 to 80 cases in the hands of veterinary compounders, and he himself run in search of a few cases in the villages for minor ailments, such as cough, indigestion etc. These veterinary surgeons should stay at the hospitals and thus be of help to the needy who go over to them for advice and help. By this I don't mean complete stopping of touring work; whenever contagious diseases break out the veterinary assistant surgeon will be at the spot to control the same. This proposal will only put an end to the unnecessary touring and unnecessary strain on the veterinary establishment. Thanks to the pioneers of our department, the need for propaganda is over, the rural public is now quite awake, and we are very popular with them. If the authorities feel hesitant to take this bold step, I request them to try this in at least a few districts of the province.

I do not wish to try your patience any longer. However, allow me a few minutes more for doing my duty of thanking all those who have rendered me help and cooperation in carrying out the work of the Association, especially, members of the managing committee for their whole-hearted support. I am also thankful to all the members and the guest for their presence at this meeting. My thanks are also due to Mr. B. N. Handa, the Principal, Punjab Veterinary College, Hissar, for kindly granting permission to hold the meeting in the College Hall. JAI HIND.

Shri Herdev Sahai then declared the meeting open and said,

Gentlemen, it was with great pleasure that I accepted the invitation extended over to me by Shri Bishamber Dass Behl to preside over the meeting, I thank you all for the honour you have done me and declare the conference open.

He stressed upon the importance of Veterinary Science and Animal Husbandary in an agricultural country like India and the role the veterinarian has to play in this respect. He exhorted the members to discharge their duties in a sportsman-like spirit, with great zeal and intelligence. He impressed the point that a veterinarian is the real back bone of the country and much depended upon him to strengthen the country.

After this Mr. S.D. Sharma read out the minutes of the last meeting written by the President in the absence of the Secretary who did not attend the meeting, for reasons not known.

Mr. President and Gentlemen,

The tenth annual general meeting of the Punjab Subordinate veterinary services association was held on the 31st of December 1946 at 10 A.M. in the Temperance Hall, Amritsar, under the presidentship of Sardar Swaran Singh, the Hon : Minister for Development. The following agenda was gone through.

1. An address of welcome was presented by the President of the association, Shri Bishamber Dass Behl.
2. Minutes of the last meeting were read by the Secretary and unanimously confirmed.
3. Annual report for the year 1946 was presented by the Secretary.
4. Shri Ram Lal, Ghulauti, Secretary Reception Committee extended welcome to the President and the members in a short address.
5. Professional papers were read by the members.

The Hon : Minister for Development in his presidential remarks appreciated the services rendered by the subordinate in the cause of the profession and exhorted them to take more interest in their work and improve their professional knowledge.

With a vote of thanks to the President, the morning session came to an end.

The afternoon session was started at 1-30 P.M. under the presidentship of Shri Bishamber Dass Behl. S.M.A. Shah Esq, M.R.C.V.S. delivered his illuminating speech on the achievements of the Civil Veterinary Department, Punjab, and advised the subordinates to keep on taking lively interest in its betterment.

Fifteen resolutions were then moved by different members of the association which were properly seconded, supported and then passed. These resolutions dealt with the different aspects of the improvement of the staff as well as the improvement of the profession.

The General Secretary of the Punjab Subordinate Services federation Shri S. K. Burkee, then gave the details of the working of the federation and requested the members to enlist themselves as members of the federation.

The necessity of starting an Indian Veterinary Medical association was greatly impressed upon by J. D. Sheeja Esq, M.R.C.V.S.

The election of the office bearers was then held and the following office bearers were elected for the year 1947.

<i>President</i>	...	Shri Bishamber Dass Behl.
<i>Secretary</i>	...	Shri J. S. Bhalla.
<i>Joint Secretary</i>	...	Shri Hamid Hussain.

Gentlemen, I very much regret to point out that inspite of my repeated requests to the elected Secretary of the association, Shri J. S. Bhalla, the records could not be availed. The facts mentioned above have only been reproduced from my memory and in consultation with certain members.

These minutes were confirmed unanimously by the house.

This was followed by the professional papers read by the following members of the association.

1. *Shri R.L. Ghulauti* :—A peep into the Biological products section of the Punjab Veterinary College, Hissar.
2. *Shri Jaswant Rai* :—A view of Poultry Industry in India with a few hints for its development.
3. *Shri S.D.Sharma* :—The sixth sense.
4. *S. Karnail Singh* :—A general paper on veterinary profession.

The next item on the agenda was resolutions from the members. The following resolutions were moved, seconded, discussed and passed unanimously.

Resolutions

- No. 1. Resolved that this annual general meeting of the Punjab Subordinate veterinary services association expresses immense delight on the appointment of Maj. A.C. Aggarwala, as Director Veterinary Services and Warden of Fisheries, Punjab. The association heartily congratulates him on this exalted position.
- No. 2. We the G.P.V.C. members of the subordinate services association humbly beg to approach the Government through this resolution that their present grade is quite meagre as compared with the work they perform in the hospitals and in the field. We therefore request the Government that their cases may be considered on merit and we may be placed at par with the L.V.P. and granted the scale of Rs. 100-10-200/10-300, instead of Rs. 60-50-90/5-130/5-160. We assure the benign Government that we will continue to discharge our duties more faithfully.
- No. 3. Resolved that this association requests the Director, Veterinary Services, Punjab, to kindly reconsider and cancel the order issued in the memorandum No. 112-116/c/33, I.G dated 10/8/1946 to the Circle Superintendent, and that gazetted and local holidays may kindly be granted to the veterinary staff as usual, as the veterinary hospitals are always required to remain open even when the staff is granted leave or is on tour.
- No. 4. Resolved that this association requests the Director, Veterinary Services, Punjab, to kindly permit the subordinate veterinary staff to engage in private practice subject to the conditions imposed on the Deputy Superintendents, in the 5th paragraph of the veterinary circular No. 5.
- No. 5. Resolved to move the D. V. S. Punjab to sanction the closing of veterinary hospitals on Sundays for outdoor work, as the case in every other department. Indoor cases and emergent cases shall, however, be treated.
- No. 6. Resolved to request the D.V.S. Punjab to provide the following accomodation in Residential quarters :—
 1. V.A.S. Quarter :—3 rooms, 1 store, Kitchen, bath, Latrine, and a cattle shed.
 2. V. C. Quarter :—2 rooms, Kitchen bath and Latrine.

All previous quarters should be remodelled and all new ones constructed on the above scale.

- No. 7. Resolved that the D.V.S. Punjab be requested to open all new hospitals in proper standard buildings and all dispensaries at present without proper buildings should be provided with that.
- No. 8. Resolved that this association requests the D.V.S. Punjab to move the Punjab Government, to provide a peon to each of the veterinary assistant surgeons in the state as is being practiced in the Uttar Pradesh with a view to increase the efficiency in their work. It may be mentioned here that all the touring subordinate officers of our status have been provided with peons.
- No. 9. Resolved that Punjab Government be requested to improve the grades of veterinary assistant surgeons to the grade of Rs. 160—10—330/15—450 which is prevalent in case of I.C.A.R. employees, as the present grade of 100—10—300 was sanctioned in 1924 when the economic conditions and cost of living were very easy as compared with present day hard conditions, when the prices of necessities of life have been enhanced by 700%.
- No. 10. Resolved that Punjab Government be requested to declare all veterinary assistant surgeons as milk and Meat Inspectors under the pure food act and also further instruct the local bodies to avail of their services in this matter, because all veterinary assistant surgeons are fully qualified in these subjects.
- No. 11. Resolved that in order to make the running of the department more efficient and effective, the D.V.S. Punjab may be requested to appoint a committee of nominated members of the Punjab Subordinate services association and a few of the departmental officers to consider difficulties arising out in the discharge of the routine duties of the subordinate staff and find out means to solve them.
- No. 12. Resolved that the S.P.C.A. Act be extended to all over Punjab and the powers thereunder conferred on the veterinary assistant surgeons, where such S.P.C.A. exists or where such societies are started hereafter.
- No. 13. Resolved that the Punjab Government be requested to sanction suitable house rent allowance or other compensatory allowance for all the veterinary assistant surgeons who are selected to work as Research Assistants, Demonstrators in the college, Dairy Bacteriologist, Dairy Assistant and the farm V.A.S. in the office, R.V.A.S., or in any other special post in the subordinate service as this concession is being enjoyed by their colleagues who are working in the field or as research Assistant at the Government Livestock Farm, Hissar and Poultry Farms in the department. This would encourage them to stick to the posts for which they have been considered particularly suitable and will avoid unnecessary discontentment and heart-burning.
- No. 14. Resolved that the Punjab Government be requested to grant 2nd class railway fare to all veterinary assistant surgeons while on tour or transfer, irrespective of their pay, which concession they were enjoying previously, so that they have not to lower their status and prestige.
- No. 15. Resolved that the Punjab Government be requested to make arrangements for the subsistence and education of the only surviving daughter of S. Gurdial Singh Bhatia, late V.A.S. Dinga, (Pakistan) who was mercilessly killed in Pakistan where he was serving the Department.

The house then adjourned to meet again in the afternoon.

The Afternoon Session

The afternoon session commenced at 1 P.M. under the Presidentship of Shri Bishamber Dass Behl on the same day. The election of the office bearers and members of the executive committee for the year 1951 took place. The following office bearers were elected.

1. Shri Bishamber Dass Behl: *President.*
2. S. Amer Singh, Ahluwalia: *General Secretary.*
3. Shri. Lekh Raj, Chawala: *Joint Secretary.*

Executive Committee members.

- | | |
|-------------------------|-------------------------|
| 1. Shri Sarup Singh. | 4. Shri S. D. Sharma. |
| 2. Shri Karnail Singh. | 5. Shri Mahish Chandar. |
| 3. Shri Ragunath Singh. | |

The house was then declared adjourned.

Dehlon,
District Ludhiana,
10-4-51.

AMAR SINGH AHLUWALIA, L.V.P.,
General Secretary,
Punjab Subordinate Veterinary Services Association.

INDIAN DAIRY SCIENCE ASSOCIATION

The Fourth Annual General Body Meeting of the Indian Dairy Science Association was held on the 30th March 1951 at the premises of the Indian Dairy Research Institute, Bangalore. Dr. Zal R. Kothavalla, Director of Dairy Research and Vice-President of the Association presided over the meeting. A large number of members of the Association from the Dairy Institute, Indian Institute of Science and other local centres were present. Amongst the distinguished visitors were Nusserwanji Dinshaw, a benefactor of the Association, Rajasevasaktha A. K. Yegnanarayana Aiyer and Prof. K. V. Giri. After adopting the Annual Report of the Secretaries and the audited statement of accounts, the General Body elected new office bearers and also approved the budget grants for the year 1951.

The discussions held at the meeting and some of the resolutions passed focussed attention on the need for improving the resources of the Association, for increasing its activities particularly in regard to dairy extension work and for securing greater facilities in regard to dairy education and research in the country.

In the unavoidable absence of the President, Sir Datar Singh, his address was read out. The President referred to the vital importance of improving the cattle wealth and dairy industry in the present economic as well as food crisis in the country. He referred to the valuable role that the Association has been playing in this connection and the scope for further increasing its useful activities. He also drew attention to the formation of a Council of Gosamwar-dhana by the Government of India, the key village schemes sponsored by the Indian Council of Agricultural Research for conserving and developing the valuable cattle breeds in the country and the pioneering work being done at Bombay, Madras and other centres for improving the position of urban milk supply.

Mr. Nusserwanji Dinshaw offered a generous donation of Rs. 1,000/- to the Association as a mark of his admiration for its useful work. After the meeting, the members were entertained to a cinema show of dairy films.

College News

BIHAR VETERINARY COLLEGE, PATNA

List of successful candidates in Diploma Examination of 1950-51 with their position and particulars of stipend.

Sl. No.	Name	Position	Name of Government or District Board etc.
1.	Hariraj Mishra	1st	Bihar Private
2.	Saroj Kent Jha	2nd	do.
3.	Ram Das Sinha	3rd	do.
4.	Baidya Nath Sinha	4th	do.
5.	Sreenath Tarenia	4th	Orissa
6.	Bhupendranath Kakati	5th	Assam
7.	Hardeo Singh	6th	Bihar Private
8.	Roop Raj Kalla	7th	Jodhpur
9.	Shiva Kumar Upadhya	8th	Bihar Private
10.	Judgeshwar Sharma	9th	do.
11.	Raj Murat Singh	10th	U.P.
12.	Qutubuddin Ahmad	11th	Bihar Private
13.	Lal Mohan Patra	11th	Orissa
14.	Bishambhar	12th	do.
15.	Sheo Nandan Singh	13th	Bihar Private
16.	Sankar Prasad Mishra	14th	Orissa
17.	Maheshwar Prasad	15th	Bihar Private
18.	Rasudeo Narain Sinha	15th	do.
19.	G. S. Nagaraju	16th	Mysore
20.	Suresh Singh	17th	Bihar Private
21.	Bal Govind Singh	18th	do.
22.	Ataur Rahman Hashmi	19th	do.
23.	Girish Narayan Tewari	20th	do.
24.	Bhagwat Prasad	21st	do.
25.	Md. Masihuzzaman	22nd	do.
26.	Najmuddin Ahmad	23rd	U. P.
27.	Chakradhar Pd. Singh	24th	Bihar Private
28.	Lillion Bakhla	25th	Bihar Government
29.	Shree Krishna Vyas	26th	Jodhpur
30.	Satya Murti	26th	Bihar Private
31.	Ram Lakhan Prasad Singh	26th	do.
32.	Ajodhya Prasad	27th	do.
33.	Man Mohan Singh	28th	do.
34.	Bar Kuwar Ho	29th	Bihar Government
35.	Maheshwar Prasad Srivastav	29th	Bihar Private
36.	Brundaban Chandra Panda	30th	Orissa
37.	C. N. Sankaranarayanan	30th	Mysore
38.	Shayam Sundar Jha	31st	Bihar Private
39.	Basudeo Tewary	31st	do.
40.	Lalit Chandra Bora	32nd	Assam
41.	Md. Yunus Ansari	33rd	Bihar Private
42.	Deo Narain Jadav	34th	do.
43.	Pratap Chandra Pathak	35th	Assam
44.	Janardan Prasad Jedav	35th	Bihar Private

Patna }
4th May 1951 }

H. R. KAPUR, M.R.C.V.S.
Principal.

BENGAL VETERINARY COLLEGE

List of students who passed the Diploma (G.V.Sc.) Examination 1950-51 (in order of merit.)

1. Anupam Chattopadhyay.	18. Lourembon Bijoy Chandra Singh.
2. Shovan Lal Moitra.	19. Lokanath Das.
3. Xavier Anthony Vendargon.	Arcot Jaipal Rajiababdur.
4. M. Devakadacham Daniel.	20. Ajit Kumar Chatterjee.
5. Sadananda Panda.	21. Toma Abdul Ahad Shamany
6. Munivenkatappa Narayan Swamy.	Mutum Tomcha Singh.
7. P.M. Madhavan Nair.	22. Birendra Nath Saha.
8. Mukti Brata Chakravarty.	23. Anil Krishna Pal.
9. Paramsothy Kanapathi Pillai.	24. Dilip Kumar Chakravorty.
10. Basana Ranjan Halder.	25. Bikramjit Sanyal.
11. Tan Boon Eng.	26. Sankar Chandra Ghose.
12. Amulya Chandra Das.	27. M. Nagaraj.
13. H. Dasanna.	28. Arun Kumar Bose.
G. Chandra Sekhara Pillai.	29. Ajit Kumar Banerjee.
14. Ram Chandra Das.	30. Nima Tsering Lepcha.
Fakraddin Sheriff.	31. Mahendra Narayan Choudhury.
15. Sharifuddin Ahmed.	Tankeshwar Singh Parihar.
Ganesh Chandra Mukerjee.	32. Saral Kumar Hazra.
16. Sahab Singh.	33. Birendra Nath Guha Thakurta.
17. B.M. Kuppuswamy.	
V. Lakshmanan Pillai.	
Narayan Prasad Samal.	
Birendra Nath Ghosh.	

POST SCRIPT

Studies on Myiasis and its Treatment

By

C. M. SEN GUPTA, P. BALARAMA MENON AND B. C. DASH

[The Indian Veterinary Journal, Vol. 27, No. 5, March 1951, pp. 241-250.]

The attention of the writers has been drawn to certain points which has necessitated inclusion of this post script.

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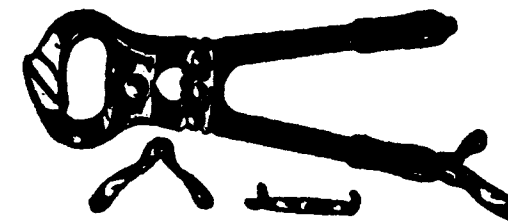
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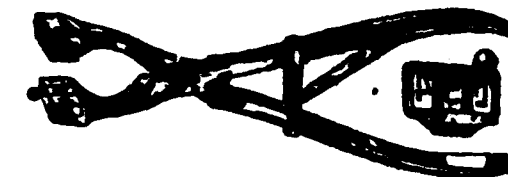
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