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(THE JOURNAL OF THE ALL-INDIA VETERINARY ASSOCIATION)

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

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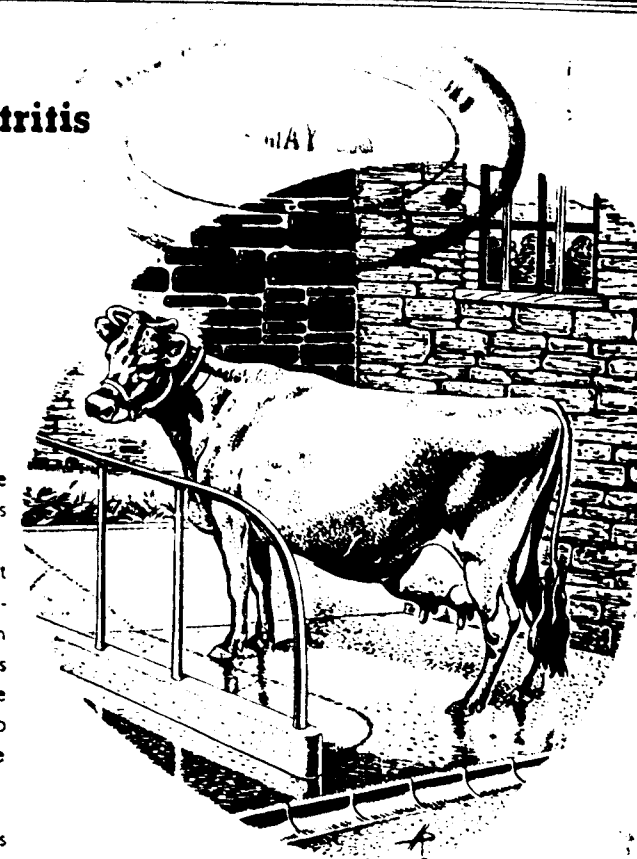
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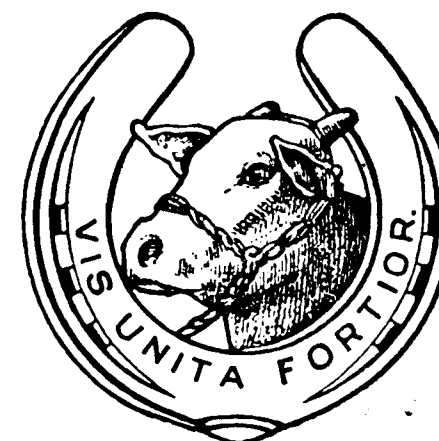
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THE INDIAN VETERINARY JOURNAL

[THE JOURNAL OF THE ALL-INDIA VETERINARY ASSOCIATION]

PUBLISHED ON ALTERNATE MONTHS

A BI-MONTHLY
RECORD OF
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DEVOTED TO THE
CAUSE OF THE
VETERINARY
PROFESSION

(ESTD. 1924)

EDITOR

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

Office:—26, Wallajah Road, Madras-2 (S. India)



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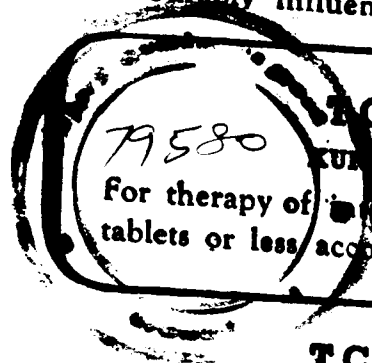
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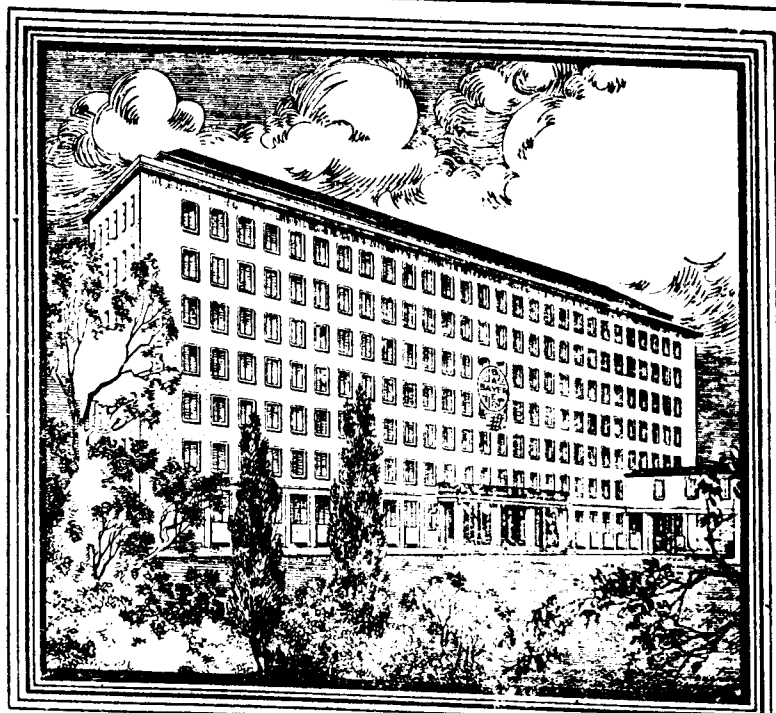
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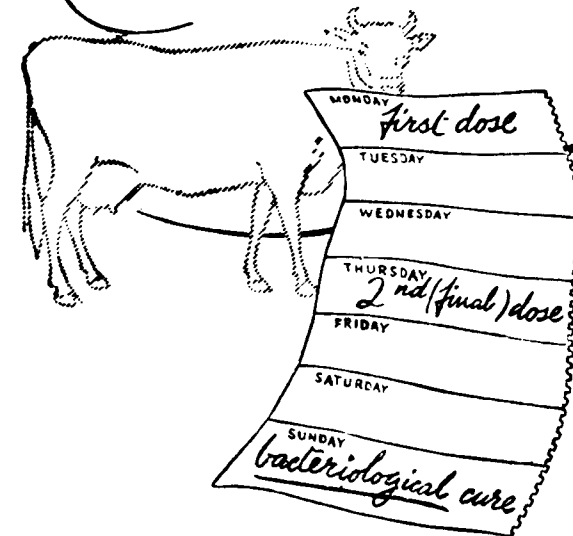
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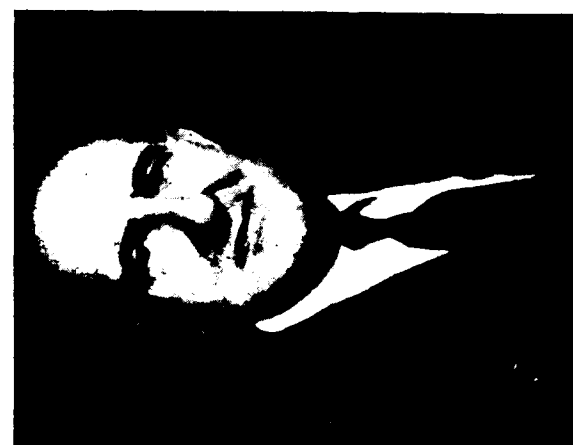
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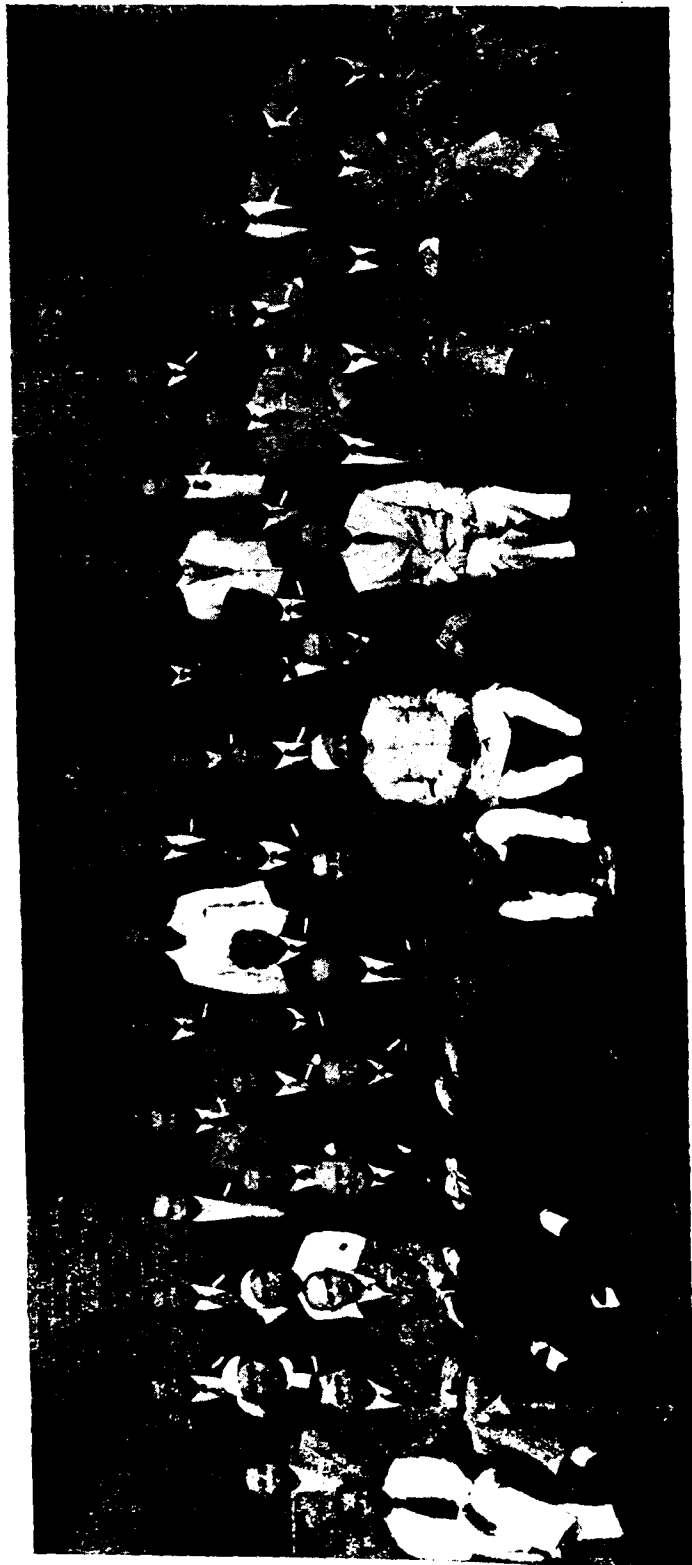


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A NEW ERA IN THE PROGRESS OF VETERINARY SCIENCE

A CO-ORDINATED PLAN BY THE FAO AND INDIA

International Training Centre on Manufacture of Veterinary Virus Vaccines

Inauguration at Izatnagar, U.P.

What may be described as a new era in the progress of Veterinary Science in the East took place on the 16th February 1953 when an International Training Centre on the manufacture of Rinderpest and other Virus Vaccines was opened at the Indian Veterinary Research Institute, Izatnagar, for a period of three weeks, under the Expanded Technical Assistance Programme of the Food and Agricultural Organisation of the UNO in conjunction with the Government of India. The inaugural ceremony of the Centre was performed by Dr. Punjabrao Deshmukh, Minister of Agriculture, Government of India, in the presence of a large and distinguished gathering of officials and non-officials. Sir Thomas Dalling, the Chief Representative of the FAO at Rome, had also come to participate in the function. Dr. S. Datta, Director, Indian Veterinary Research Institute, and Mr. R. Daubney, the FAO Expert at the Indian Veterinary Research Institute, acted as the Director and Associate Director respectively of the Training Centre. Dr. H. T. B. Hall from the head-quarters of the FAO at Rome worked as the Administrative Secretary. Besides the experts of the Indian Veterinary Research Institute, twelve foreign Instructors participated in conducting the course. About 33 Officers from Afghanistan, Burma, Ceylon, Japan, India, Pakistan and Thailand participated in this course.

The importance of this Centre and the necessity for it cannot be over-emphasised for a predominantly agricultural country like ours dependent upon the welfare of the livestock for its prosperity. Virus diseases like Rinderpest, Newcastle disease, Sheep-pox, and Fowl-pox claim millions of deaths annually from the cattle, fowl and sheep populations

in the Middle East and South East Asian countries. In India alone, the annual loss of these livestock is well over 20 crores of rupees. As agricultural production as well as the supply of food of animal origin is dependent to a great extent on the efficiency and welfare of the domestic livestock, a comprehensive programme for the eradication of these diseases for raising the standard of the people is of vital necessity. Isolated attempts in individual countries are often not successful, as these diseases seldom care for national boundaries and the good work done at one place may be vitiated, and even nullified, by the spread of these contagious diseases from neighbouring countries. It is for this reason that a concerted move is being made under the auspices of the FAO to combat these diseases simultaneously in India and all the countries around her. It is hoped that the trainees, who have been given training in the latest methods of manufacturing protective vaccines, will, on their return, initiate the work on larger scale in their home countries, so that with a concerted effort, these dread diseases may be eradicated from this part of the world as has been in other more advanced countries like U.S.A., U.K., etc. The Government of India has already taken a lead in this direction by modernising the vaccine manufacturing laboratories of the Indian Veterinary Research Institute. It may be recalled that the Institute was the pioneer in preparing the vaccines for these diseases and it is hoped that, with modern methods of manufacture, these biological products will be available for mass use at a cheap rate.

FAO has already interested itself in the supply of equipment and experts to the Asian and Far Eastern countries for the purpose of initiating to operate a co-ordinated eradication programme against these diseases. It is hoped that co-ordinated operations in the whole region will ultimately be the means of eradicating these diseases and thus help the Grow More Food campaigns which are now being carried out.

The inaugural function of this centre commenced with the following Welcome Address by Dr. S. Datta, Director of the Training Centre, well-known in the veterinary world for his high scientific achievements and great oratorical powers. He has done yeoman service to bring the Indian Veterinary Research Institute to its present predominant position.

Dr. Deshmukh, Ladies and Gentlemen,

On the occasion of the inauguration of the International Training Centre on the manufacture of Veterinary Virus Vaccines, sponsored jointly by the Food and Agricultural Organization of the United Nations and the Government of India, it is my proud privilege as the Director of the Indian Veterinary Research Institute and of this Training Centre to extend to you all a very hearty welcome.

It is indeed our good fortune to welcome in our midst the Hon'ble Minister for Agriculture who has kindly made time to preside over this function and inaugurate this Centre in spite of his many pressing engagements. Dr. Deshmukh's active interest in rural welfare and livestock development in India is well-known, and his mature advice and guidance will be of the greatest value to this Training Centre.

We offer our warmest welcome to the representatives of the many nations of the East and the West who have assembled here at some personal inconvenience and after tiring journeys. We welcome the scientists kindly lent by the FAO as instructors to the Centre. They are eminent in their special lines of work, and the joint deliberations and pooling of knowledge which are proposed at the Centre on the latest advances in the field of viruses will no doubt open up newer and more fruitful methods of serving vital needs of the different countries. As the Director of the Indian Veterinary Research Institute, it is a matter of great pleasure to me that among the trainees who have come from abroad there are some who had been at one time or another students or workers at this Institute and have come back like homing pigeons to their *Alma mater*.

This is a memorable occasion for us all as this happens to be the first International Training Centre on animal viruses that appears to have been called into being. It is a matter of great significance that this Centre has been located at this Institute as international co-operation and collaboration are not entirely new in the fairly long history of the Institute. We have received amply from the hands of world scientists and illustrious men like Pasteur, Koch, Pfeiffer, MacFadyean and Stockman have been of direct help to us giving personal guidance, and the Institute in its turn has also rendered not inconsiderable service by making its pioneering contributions from time to time. In fact, the above-mentioned German scientists held in 1897 at Mukteswar what may be called the first training centre on rinderpest immunisation methods for the veterinary workers of India of that time. Training courses which have been conducted at this Institute since 1901 have not only attracted students from the different States of India but also from Iraq, Palestine, Ceylon, Burma, Malaya, Thailand, China and even from distant countries. Many workers of this Institute have been similarly benefitted greatly by personal visits to great masters in Europe and America.

With the starting of this Training Centre, we are entering upon a new phase of our work in the control of virus disease of animals. The advances in engineering science has placed at our disposal the 'spin-freeze' drying equipment, and the advances in the biological technique of cultivating viruses in incubated egg may reorient the whole system of virus research and vaccine production.

One virus disease, the most dreaded rinderpest, causes staggering losses in livestock wealth every year. In India alone on a conservative estimate, at least 10 crores of Rupees is still being lost annually through the ravages of this scourge and this is in spite of the fact that we have at our disposal efficient vaccines for preventive measures against it. In addition the toll taken every year by other virus diseases like foot-and-mouth, rabies, Ranikhet, fowl-pox, etc., is also of considerable magnitude.

The uninitiated layman may pose the question that if protective measures are known why then these diseases have not been eradicated from the face of the earth. There are two reasons for it. Firstly, it is not enough that vaccines should be evolved. In order to be effective, these products should be cheap so that economic obstacles are not too great to stand in the way of any eradication programme and also that the products should be so stable that they can be transported to and used in the remotest hamlet without deterioration in their potencies. Moreover, the organisational set up and financial backing should be of sufficient magnitude in comparison with the vastness of the problem. In India there are 200 million cattle alone distributed over this vast territory and the veterinary organisation and the funds available for disease control are totally inadequate. Secondly, it is not possible to carry out eradication of any contagious disease in any one country which is connected through main land with other sister nations. Protective measures taken in one country may be nullified in a few year's time by a fresh import of the diseases from across the boundaries. In these days of rapid transport, there is always risk that these contagious diseases may be introduced with catastrophic results even in distant countries which have been freed of these diseases through great efforts.

It is for this reason that International Training Centre on the manufacture of virus vaccines can do everlasting good to India and all the neighbouring countries. Not only will the diversity, complexity and specialisation in the field of virus research be pooled and sorted out but also the needs of all the participating nations will be made manifest. A number of different vaccines for combating any one disease will be displayed and their efficacies under different conditions and in different breeds and species will be evaluated.

Moreover, the latest method of mass production and preservation of vaccines will be studied at first hand. The whole course is based upon the development of "freeze-drying" as a means of preparation and preservation of potent vaccines. This, which consists of drying attenuated forms of living virus at a low temperature, yields products which are not only very effective as prophylactics but which, unlike previous preparations, can also be preserved under adverse climatic conditions for long periods. Through this method, large quantities of vaccine can now be prepared at the central

station, whence it can be transported to remote corners to be used on the livestock there. As the bulk of these dried products is also small, the cost of transportation is proportionately decreased. This central production and cheap transportation will help greatly to make the eradication measures economic.

The simultaneous preparation and utilisation of all the vaccines by the neighbouring nations is of great importance to India at this stage. In 1949, I had the privilege of submitting to the Government a scheme for the eradication of rinderpest. This plan has been approved in principle by the Government of India and has been included in the current Five Years' Plan. In order to prepare the necessary vaccine, a central laboratory at Izatnagar has been opened and here again the FAO has come to our help in supplying men and materials. The services of Mr. Robert Daubney, the Associate Director of this Centre, who has had invaluable long experience in this type of work in other countries, have been placed at the disposal of this Institute. May I hope that the trainees, when they go back to their respective countries, will also be able to initiate similar programmes, so that with a well-coordinated effort, this dread disease may be eliminated from Asia.

In all agricultural countries, cattle and other livestock form the backbone of national economy. In India, through tractive power, manure and animal products, the annual contribution of livestock is roughly about 16% of the national income. In spite of this key position held by the livestock in Indian economy, and despite their large number, they are to-day to a large extent degenerate and unproductive in the world. This state of affairs has been brought about through lack of appropriate provision for disease control, balanced feeding and planned breeding. Needless to say that proper efforts to alleviate the condition of the livestock will be reflected in greater prosperity for the nation in the form of larger production of agricultural commodities as well as of valuable essential foods of animal origin like meat, milk and eggs.

Our Government is fully alive to this fact and it is encouraging to find that much greater attention is now being paid all round in the country for the betterment of the livestock. Through the improvement and expansion of sera and vaccine production, disease control measures, community projects, key village schemes, the establishment of the Central Council of "Gosamvardhan", the Government is trying to correlate the preservation and development of the livestock to the well-being and prosperity of the nation.

Ever since 1947 when I became the Director of this Institute it has been my earnest endeavour to develop the Institute and to improve its research and training facilities that it can also cater to the needs of such of

our sister countries as may be in need of them. It is therefore with great pleasure that I am witnessing to-day the inauguration of this International Training Centre, which bodes well for further collaboration in all aspects of Animal Health and Animal Industry. Those of you who are visiting the Institute for the first time will see that here, under one coordinated organization, every aspect of animal husbandry science is represented in its six divisions. I am sure that you will take full opportunity of visiting all these divisions and of discussing with the staff subjects of mutual interest.

I must say that I had considerable trepidations in inviting the Centre to Izatnagar. We are aware of our limitations and can only ask for your forbearance for any personal inconvenience that you may experience. I shall be failing in my duty if I take my seat before expressing my heartfelt thanks to the ladies and gentlemen who have graced this present occasion by their presence.

INAUGURAL ADDRESS

By

Dr. PUNJABRAO S. DESHMUKH,
Minister for Agriculture, India.

It is my pleasant duty to inaugurate this International Training Centre and extend a hearty welcome to all who are participating in it as trainees or instructors or are otherwise interested in its aims and objects. It was not long ago that I performed a similar duty at Cuttack on the occasion of the establishment of a training centre in rice breeding under the auspices of the FAO at the Central Rice Research Institute. As the means to larger ends the efforts made by the F.A.O. under the Expanded Technical Assistance Programme to promote international action in a vital field of human welfare for the common good of the countries in an important region of the world, through training centres such as these, will be recorded by history as landmarks in constructive international co-operation.

2. This International Training Centre on Veterinary Virus Vaccines is being held under the joint auspices of the Food and Agriculture Organization of the United Nations and the Government of India. The organizers are convinced that it will be of great advantage to the people of Asia that the latest techniques of production in this field should be more widely known.

3. To the discovery and development of such vaccines, India has already made several notable contributions. In fact, since the inception of organised veterinary research in this country through the establishment of the Indian Veterinary Research Institute in 1890, a foundation was laid

for conducting researches on immunology along the lines already being pursued by Pasteur and others in Europe. The illustrious German scientists Robert Koch and Pfeiffer visited the Institute in 1892 and helped Lingard in formulating the anti-serum method of immunisation for controlling rinderpest, the dread disease which has been responsible in the sixties of the last century for wholesale devastation of the cattle wealth of this country. Since this early beginning a galaxy of scientists working at the Indian Veterinary Research Institute have taken part in many advances in the control of animal diseases including those of viral origin. The epoch-making discovery at Mukteswar by Edwards and his colleagues in 1926-27 of the goat-adapted virus vaccine for rinderpest paved the way for a cheap yet lasting method of immunization of the cloven-footed livestock on a mass scale. These researches were soon successfully followed up in field test not only in India but also in countries like Nigeria, East Africa, and Egypt, and, I might add upto the present day it has been the most widely employed vaccine used as a prophylactic for rinderpest. Similarly the greatest dread of poultry industry, Ranikhet disease (Newcastle disease), has been brought under control in many countries by the use of the vaccine elaborated by Ganapati Iyer in collaboration with Dobson and by Haddow and Idnani.

4. I understand that recently several other vaccines have also been evolved for combating rinderpest. The lapinized vaccine, also pioneered by Edwards at Mukteswar but fully developed by Japanese workers, notably by Dr. Nakamura, has been found to be useful in several countries. Very recently field trials with this vaccine have been carried out on more than 20,000 cattle in different parts of India by workers from this Institute and very encouraging results have been obtained. An avianized rinderpest vaccine produced and developed by the efforts of the joint American and Canadian team under Richard Shope has been used successfully in field trials in China, Kenya, and Egypt by Cheng and Fishman, Hudson, Daubney and Zahan respectively. Each of these types of vaccines has its own particular sphere of usefulness in the control of the disease in cattle which show great variations in susceptibility to the virus. It may be emphasized that the attention of this training centre is concentrated primarily on the rinderpest vaccines and in doing so the recommendations of the 1949 Bangkok Conference on Rinderpest in Asia are being followed up. However, other living virus vaccines will also be handled at the centre and the trainees will see production of Newcastle disease, Fowl Plague, Fowl-pox and Sheep-pox vaccines. I also notice in the programme that special emphasis has been laid on question periods and discussions and am sure a free interchange of experience of the members from the different countries will result in considerable mutual benefit.

5. The original intention of the FAO was to convene a meeting of experts from countries in this region for coordinating programmes of rinderpest eradication. That meeting also was due to be held at this Institute in October 1952. Subsequently the FAO considered it advisable to postpone that meeting when it transpired that the countries in the region including India had not finalised their rinderpest eradication programmes. The Organization offered instead to establish a centre for training in the production of biologics, in particular rinderpest vaccine, and the use of freeze-drying equipment for the manufacture of a safer and cheaper vaccine of greater stability.

6. The postponement of the meeting was undoubtedly a happy second thought in so far as the acquisition of the requisite knowledge of the means of eradication is logically an essential pre-requisite for planning effective programmes of field work. I am sure that this centre will make a very definite and valuable contribution to our knowledge of production of biologics by the latest known methods and pave the way for a regional meeting of the type and for the purpose earlier contemplated by the FAO. Having pooled our knowledge of production methods, it will be logical to pool our ideas on the problems and mechanics of the eradication campaign. In this sense your work during the next three weeks will be regarded as preparatory to large scale action designed to promote human welfare through the preservation of cattle wealth which at all times and in all climes has been and will never cease to be an invaluable asset of mankind. It will be platitudinous on my part to elaborate this obvious truth. But it emphasizes the importance of translating expert knowledge into practical action. In under-developed countries the application of science into practice bristles with difficulties owing to wide differences in the mental outlook of the experts and the masses. Unless, therefore, experts are also men of action, I fear, science will remain a dormant force in countries where its application is most needed.

7. Our 5-year plan of economic development provides for a national campaign for rinderpest eradication as an important measure of animal husbandry. Here I must acknowledge the assistance rendered to us by the experts assigned to this country by the FAO in assessing our own eradication plan and giving a concrete shape to many of the measures which would require to be undertaken. I am glad to see that they are all here and the FAO expert in Pakistan is also here. At this Institute two of them, Dr. Daubney and Mr. Beaumont, have devoted their attention to the problems of the mass manufacture of a suitable vaccine by the freeze-drying process and on the field organization and legislative measures which will be necessary for the success of the plan. We propose to consider their findings and the views of our own experts at the next meeting of the Animal Husbandry Wing of the Indian Council of Agricultural Research next month

and hope to come to definite conclusions and make concrete recommendations to the State Governments on the nature and extent of their participation in the task.

8. The main feature of the training is the production of large quantities of vaccines relatively cheaply and the development of freeze-drying as a practical means of preserving them so that the products can be transported over great distances in tropical countries without appreciable deterioration. Delegates attending the course will have the opportunity to become familiar with the operation of the spin-freeze drying plant and it is hoped that they will be able to see a much larger plant which FAO is providing and which is in the process of being delivered to the Institute.

9. We hope that, as the result of this centre being held at Izatnagar, all the Asian countries which participated in the Bangkok Conference will have at their disposal first hand practical knowledge of production methods which will enable them to put their control or eradication plans into effect. A comprehensive programme for eradication of rinderpest has been drawn up and is under consideration by the Government of India. As disease knows no boundary, and because of the rapidity with which some of these virus diseases spread, close collaborative effort by all nations, particularly those situated in the immediate neighbourhood, is essential.

10. By pioneering researches in virology, and by many other notable achievements in the sphere of animal science, this Institute, has already found for itself, an important place in the international field. It is, therefore, in the fitness of things, that this Institute should have provided the venue for this International Training Centre.

11. I may add that the setting up of this Training Centre is not the only joint effort between the Government of India and the F.A.O. in the field of animal science. In this Institute alone, the F.A.O. have come forward with assistance in improving the manufacture of vaccines, as well as in investigations upon sterility and sub-fertility in Indian cattle, and in the setting up of a Climatological Laboratory at Izatnagar. The joint WHO-FAO project, for the production of rabies vaccine, and for starting Brucellosis centre, at this Institute, is also noteworthy. The U.S.A. Government under their Technical Assistance Programme is also helping us by providing the Biological Products Division of this Institute with technical advice and modern equipments. This assistance is being given to the Institute because here, under one unified organisation, researches on the diverse problems of livestock conservation, including studies on nutrition, genetics and disease prevention are being actively conducted. The Institute is running a number of advanced Courses which have been attended by students not only from different States of the Indian Union, but also from neighbouring countries like Iraq, Iran, Palestine, Malaya, Burma, Thailand;

etc. Mr. Norris-Dodd, Director-General of the Food and Agriculture Organization of the United Nations, during his last visit to the Institute, expressed the opinion, that this Institute is the best Training Centre for all neighbouring countries in the East, in advance research on animal science. With the newer developments of this Institute and with the assistance of the F.A.O., it is hoped, this Institute will be of greater service to the neighbouring countries in this direction.

12. I believe that, almost all the trainees undergoing this course, have experience of the administration of animal disease control measures in their respective countries. In the presence of so many experts, I feel a certain amount of diffidence in addressing you on matters of which I have no more than the most elementary understanding. But, in all humility, I venture to suggest that you may consider the problems of animal husbandry in the context of the social and economic environment of the region in which you may be called upon to perform your duty.

13. In under-developed countries new scientific measures do not readily appeal to the masses with whom, in matters of animal husbandry, scientists and administrators have to deal. This is a trying experience for both. It is nevertheless inescapable if the ultimate objective of your labours is to be attained. While during your sojourn here you are likely to exchange ideas on the various technical, administrative and legislative problems involved in the use of vaccines, the production of which by the most modern methods you are going to learn, I feel it will be useful for you to pay attention also to the methods of approach which should be adopted for ready acceptance of your measures by the masses. Faith is said to be an essential element of cure. How are you going to inspire that faith? Certainly not only by producing vaccines or by legislation or an army of vaccinators. I have a feeling that, as your tasks lie in widespread rural communities, the best assurance for success will be to create a psychology by which owners of cattle will consider it to be in their interest to voluntarily bring their animals for vaccination rather than to escape the vaccinator. I do not propose to dilate on this subject and will leave it to you to find the answer.

14. Though this training centre will be essentially concerned with the production of biologics you have opportunities also of watching the various activities of this Veterinary Research Institute in the fields of pathology, bacteriology, parasitology, animal genetics, poultry research and animal nutrition. I hope you will have time to visit the parent branch of this Institute at Mukteswar high up in the beautiful Kumaun hills. We have tried to modernise our Biologics Production Division. The latest addition to the equipment of this Division consists of some freeze-drying units which you will have occasion to see and use. These have been contributed by the F.A.O. The new equipment looks

impressive, complicated and delicate. Facilities for the maintenance and servicing of freeze-drying equipment, although they have not yet been established in this country or elsewhere in the region represented here, will no doubt spring up as necessity arises. In this respect, we may have for the time being to depend upon the manufacturers. The absence of such arrangements, I am confident, will not make progress precarious.

15. Let us hope that the closer collaboration in the scientific sphere of all the nations will develop more and more, and through many more training centres like this, the amenities of this Institute will be utilised by the neighbouring countries. On behalf of the Government of India, I renew the offer of the facilities existing in the Institute for collaborative studies in different spheres of animal husbandry and veterinary science for our mutual benefit.

16. It is my great privilege to welcome you scientists from different countries, and I have great pleasure in declaring this International Training Centre open. I hope during your three weeks' stay at this Centre, under the distinguished guidance of our Director, Dr. Datta, and our Associate Director, Dr. Daubney, you will have a very pleasant and profitable time.

I wish also to thank, very sincerely, all the International Agencies and their representatives individually and collectively, and all others who have enabled us to have this Training Centre here and those who are assisting us to make it a success.

JAI HIND.

Address by

SIR THOMAS DALLING, M.A., D.Sc., F.R.C.V.S., F.R.S.E.,
Representative of the F.A.O., Rome.

Mr. Minister, Ladies and Gentlemen,

As the representative from the Headquarters of the Food and Agriculture Organisation of the United Nations, Rome, my first duty is to express very warmly the appreciation of the Organisation of the efforts that have been put into the arrangements for this Training Centre. We do realize that it is no easy task to organise a Centre such as this. We also appreciate to the fullest extent the presence of you, Mr. Minister, for it shows us how great is your keenness in the health of livestock in your country and the interest which your Government is taking. Such action makes me, personally, rejoice for it is in keeping with the position which I am finding in many countries throughout the world. My view on animal health is quite definite: I am satisfied that, in any country in which agriculture is of economic importance, the health of the livestock is of paramount importance. To ensure this position, an active, well trained and well-equipped veterinary service is an essential condition. I say this not only because I

am a veterinarian, not only because others have told me, but because I have seen the position for myself. It is particularly pleasing to me to find that most countries which I visit realize clearly the importance of such a veterinary service and, where this is not present, are taking the necessary steps to initiate such a service. The causes of low animal production are many: they are mainly concerned with problems of breeding, nutrition and disease. All come under the scope of veterinary activities and are now receiving some attention in different countries. So far as actual diseases are concerned, one of the most important is the group of infections which are either endemic in a country or which, when they gain entrance to a country, sweep through the livestock and either cause heavy mortality or interfere markedly with the health of the affected animals and so lower animal production. Rinderpest and foot-and-mouth disease are examples. The effect of such diseases has also to be considered from international as well as a national point of view, because frontiers are no boundaries as far as infectious diseases are concerned and may easily spread to many countries from a focus in any country. Trade in livestock and livestock products between countries often depends upon the presence or absence of such diseases in the exporting country.

The Food and Agriculture Organisation realizes very clearly both the national and international aspects of these infections and is assisting in their control. At the present Training Centre some of these diseases are being considered, especially rinderpest and Newcastle disease of poultry; the latest techniques in the preparation of vaccines which have been proved of value in the control of the diseases will be demonstrated and trainees will have an opportunity of carrying out the techniques, so that they can carry them out more efficiently when they return to their own countries.

Foot-and-mouth disease is also to be the subject of international control, beginning with certain parts of the world. Already countries in Central America have agreed in principle on arrangements for mutual assistance in the event of any of the participating countries being invaded by the disease. In Europe, it is hoped that very soon a European Commission on Foot-and-mouth Disease will be set up for the control of the disease, on international lines, in that part of the world. Recent talks between representatives of South American countries indicate interest in the need for united effort in the control of foot-and-mouth disease. There is little doubt that if international action can be arranged and eventually extended throughout the world, some of the most serious infectious diseases of livestock will be brought under control and, we hope, entirely eliminated from, at least, some parts.

It has given me much pleasure today to see so many countries represented at this meeting. This means that governments are anxious that their veterinary services should be in a position to apply the latest

methods of control. It also pleases me to see so many veterinarians—some of them young men—who worked with me in Great Britain, some of whom are now occupying important posts in the veterinary services of their own countries.

I feel convinced that we will all derive much benefit from attendance at this Training Centre and I know that the Food and Agriculture Organisation will be pleased with the results.

May I close these few remarks with renewed thanks to you, Mr. Minister, for your presence here today and to all those, lead by Dr. Datta, who have taken such an active part in the preparations to make the Centre a success.

Address by

MR. ROBERT DAUBNEY, M.Sc., M.R.C.V.S.

Associate Director of the Training Centre and F.A.O. Consultant to the Government of India at the I.V.R.I.

Mr. Minister, Ladies and Gentlemen,

I am quite sure that I shall be expressing the sentiments of the F.A.O. staff of the Training Centre and those of the participants in the Centre when I say how much we appreciate the efforts that have been made by the Indian Government to make this Training Centre a success, and how grateful we are to you, Sir, for the personal interest which has led you to come here to-day to inaugurate the Centre and so to get it off to a good start.

For the last 250 years, science has been international, in every sense of the word, in its outlook, observing distinctions neither of nationality, race, colour or creed. Indeed that attitude was so well established in scientific circles that hardly any one even bothered to remark on it, until in the last 20 years the freedom of science was subjected in some countries to the pressure of totalitarian nationalist regimes. The freedom and integrity of science in countries where these pressures obtained were gravely threatened; but fortunately the free countries of the United Nations combined to establish the scientific and cultural agencies so that they might give practical expression to the human ideals that animated the founders of the United Nations. The Food and Agricultural Organisation or F.A.O., as it is popularly called in Rome, was one of the first of the agencies to be brought into operation. Its motto is '*Unus parvis*' and its avowed objective to increase the food supplies of the world to the point where there is freedom from want for all, and in its pursuit of that objective, its activities are many and diverse in their nature.

In holding this Training Centre on the Living Virus Vaccines at Izatnagar, the Organisation is following its main objective of increasing the food supplies of the people by carrying practical knowledge of

new techniques in the production of effective virus vaccines against certain diseases of livestock as rapidly as possible to workers in these countries of Asia. The emphasis will be mainly on vaccines to control the losses from rinderpest, to the manufacture of which Dr. Datta has already made reference, but the technique is already applicable to the improvement of other virus vaccines and we hope that the interchange of ideas will stimulate further independent developments in the countries to which the participants will return.

As you yourself have reminded us, India has already made large and most important contributions to the development of this type of vaccine through the works of Edwards and his colleagues at Mukteswar on the goat-adapted rinderpest virus, but it is of interest that Iyer of this Institute and Dobson of Weybidge in 1940 also produced the just living virus vaccine strain against Newcastle disease, probably the most widespread important disease of poultry in the world to-day.

By making it possible for F.A.O. to hold this International Training Centre at Izatnagar through the co-ready collaboration your Government has given in the Organisation of the Centre by offering us the hospitality of this Institute, you give us all a practical example of your continued readiness to help others and place us all in your debt.

May I in conclusion quote one sentence from a letter I received only this morning from Sir Herbert Broudley, Chief of the Experimental Technical Assistance Programme. In wishing us success with the Centre he says "The Programme of Technical Assistance for Economic Development is an undertaking on which we all set the highest hopes, not only for the improvement of the standard of living of rural people the world over, but also as one of the most hopeful projects yet to be undertaken in the interest of world peace.

After the inauguration ceremony was over, the following resolution was passed.

The International Training Centre on the Manufacture of Veterinary Virus Vaccines wishes to record its appreciation of the great contributions made to the development of virus vaccines by the late Dr. J. T. Edwards working at the Indian Veterinary Research Institute, Mukteswar. He, for the first time, introduced living goat-adapted virus as a practical method of immunising animals against rinderpest. His pioneer work in adapting this virus to rabbits paved the way for the introduction of the lapinised method of vaccination.

This meeting further records its deep sense of loss sustained by the veterinary profession by his premature demise which took place in November 1952.

Original Articles

TRANS-THORACIC PARTIAL OESOPHAGECTOMY

For removal of *Spirocercia lapi* nests on the oesophageal wall in dogs.

By

M. N. MENON, G.M.V.C., B.V.Sc., Assoc. I.D.R.I., M.R.C.V.S.

(Lecturer in Surgery, Madras Veterinary College)

This paper deals with an entirely new field of work and naturally there is not much of published work on which the writer could fall back for reference. To explore the chest cavity which holds some of the vital organs in the body is indeed a major-operative technique. It is so, mainly because of the need for controlled respiration under positive pressure, once the cavity is laid open. The earliest surgeons who attempted surgery of the chest kept their patients in an air tight chamber under pressure reduced to 7 m.m. of mercury below atmospheric level with the anaesthetist and the head of the patient outside the chamber. Later in 1910, insufflation of anaesthetic gases under positive pressure of 20 m.m. mercury was attempted. Still later, the idea of artificial respiration was conceived as a measure to counter atelectasis. More and more work has been done in this field and endo-tracheal anaesthesia associated with controlled respiration has now become an accepted routine for non-pulmonary intra-thoracic surgery. It has made thoracotomy possible without the fear of cardio-respiratory depression.

In veterinary surgery, the usual indications for thoracotomy or thoracoplasty have been mainly oesophagotomy in thoracic choking and repair of diaphragmatic hernia. Its application for the total removal of spirocercal nests perhaps has never been attempted. The main hurdle which prevented such an undertaking was probably the deeply inculcated teaching that such work would be inherently unsafe. Whether there is not the possibility of more than one parasitic nest being present and whether its surgical removal may not leave a stricture of the oesophagus are some of the questions that arise in addition. Above all is the consideration whether there was no effective medical treatment as an alternative. Hetrazan is now being tried for the so-called clinical cases of canine spirocercosis. The problem would have been much easier of solution if the actual pathogenesis was well understood. As it is, the complete details of the life history of this parasite are still under investigation and at present no further information beyond the one incriminating the coprophagus beetles as the intermediate hosts is available.

The writer in the course of his investigation has found the following system very satisfactory in the diagnosis and determination of the lesion.

(1) Examination of the faeces repeatedly for the ova. It is possible that in the earlier stages of the formation of nest and before the maturation of the female worm, communication with the lumen of oesophagus may not exist. Further, it is likely that all the worms in the nest are males. Obviously microscopical examination of faeces alone becomes quite unsatisfactory.

(2) Skiagraphic examination with or without shadow meal. The shadow meal will be useful only to delineate the course of the oesophagus and for this purpose the exposure should be so timed as to coincide with the actual swallowing of the meal; otherwise only two hazy lines limiting the lumen of the oesophagus will be visible. If there is communication between the nest and the lumen of the oesophagus, the meal helps to locate the ulcer on the mucous surface and in some instances even the outline of the swelling.

Clinical signs like frequent vomiting, not necessarily at fixed intervals nor related to the full or the empty state of the stomach and a resounding hacking cough are invariably present. In such cases exploratory thoracotomy as a diagnostic measure may be justifiable. In such an event the sixth intercostal space on the right side is the site of choice. This is based on the observation that in the majority of cases the location of the lesion was found to be post-cardiac. The oesophagus as it enters the chest is related to the left of the trachea up to the level of the third rib and then over the trachea to the fifth rib, moving over to the right half of the chest cavity up to the eighth rib and finally to the left till it passes through the *foramen sinistrum* to open into the cardia.

Details of procedure adopted in a demonstration operation of thoracoplasty and partial oesophagectomy in a two year old dog selected at random were as follows:—

Faeces examination revealed no ova of *spirocerca lupi*. Skiagram showed a rounded area of opacity bigger than a marble under the sixth rib about one and a half inches below the bodies of the dorsal vertebrae and immediately behind the bifurcation of the trachea caudal to the base of the heart (Picture reproduced).

The patient was kept on liquid diet for 24 hours prior to operation, the right side of chest wall was shaved and dressed with an alcoholic antiseptic dressing and covered over by sterilised bandages. An enema was given an hour prior to operation. The weight of the dog before the commencement of operation was 25 pounds. A dose of 5 grains of nembutal dissolved in 7½ c. c. of sterile distilled water was administered intravenously, the injection lasting for four minutes till 7 c. c. were given. The animal was in deep anaesthesia by the time the injection was completed as evinced by the absence of pedal,

Trans-thoracic partial oesophagectomy in a dog



Radiograph showing the lesion as marked.

[Vide Article by M. N. Menon]

Tran-thoracic partial oesophagectomy



Radiograph showing the resected rib.



Patient 10 days after operation.

[Vide article by M. N. Menon]

TRANS-THORACIC PARTIAL OESOPHAGECTOMY

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corneal and pupillary reflexes. Visual intubation with Magils' ora-tracheal tube No. 7 with cuff was carried out and the cuff was filled with 5 c. c. of air. The tube was then connected to a No. 4 Magils' connection and then attached to the respiration pump (Palmer's Ideal). The frequency of the pump was adjusted to 12 per minute and the stroke volume to 300 c. c. The bandage was then removed and the seat of operation painted with the same alcoholic dressing. The surface was draped exposing an area of 8 inches $\times$ 2½ inches centering the sixth rib. An incision 7 inches long commencing from a point 2½ inches below the spinous processes was made along the length of the rib through the skin followed by another going through the *Latissimus dorsi* above and the serrated costal origin of the *Obliquus abdominis externus* below to expose the rib and the *External intercostal* muscle of the sixth intercostal space. A longitudinal midline incision was then made over a length of 6 inches through the intercostals and parietal pleura taking care to avoid damage to the lung. Later a parallel incision 3½ inches long was made along the midline of the rib exposed commencing at the dorsal commissure so as to divide the periosteum. With the aid of the periosteum elevator a length of 3 inches of the rib was stripped of its covering and the part thus exposed was cut and removed with rib shears. The periosteal wound was dressed with sterilised Penicillin sulphamezathine powder and was sutured with plain catgut (Size 1/0). With the aid of a rib retractor the intercostal wound was dilated and the parasitic nest identified over the oesophageal wall. The overlying mediastinal pleura was then incised and the oesophagus elevated from its bed with tissue forceps to about 2 inches without endangering its delicate blood supply. The nest thus exposed was held by another tissue forceps and an elliptical incision was made over the length of the tumour-like swelling so as to include its width and by slow traction aided by blunt dissection the worm nodule was enucleated. The mucous membrane was left intact as there was no communication with the lumen. The muscular wound on the oesophageal wall was then sutured with three week chromic catgut (Size 1/0). The organ was then replaced in its bed and covered over by the mediastinum. The proximal and distal parts of the divided rib were tied to the seventh rib with catgut to relieve tension on the intercostal muscles and pleura when sutured. The pleura and the muscles were sutured with three week chromic catgut (Size 1). Negative pressure was restored before the last stitch was completed. The pleural surfaces were brought into apposition to avoid subsequent pneumonic adhesion. Then the divided muscles were sutured by plain catgut (Size 1) and the skin wound closed with silk, leaving the lower angle open to provide for drainage. Artificial respiration was continued for about 15 minutes till normal respiration reflex was evidenced. Recovery was facilitated by the administration of oxygen and carbondioxide at 500 and 200 c.c. per minute respectively from Boyles' apparatus.

The duration of operation from skin incision to skin closure was an hour and fifteen minutes.

Post-operative care: The line of suture was sealed with collodion resin leaving the lower angle. A chest bandage was then applied. The dog recovered completely from the effects of the anaesthetic in three hours' time. Twenty-four hours after the operation temperature was normal and the animal showed normal activity but for some tenderness on the operation site. The following day, there was a rise in temperature to 102.8 F. and consequently a dose of 4 lakh units of procaine penicillin was administered. Examination of blood smears revealed *Babesia canis* which was treated with Babesan. The temperature next day came down to normal. Diet for the first three days, post operative, was restricted to parenteral administration of glucose saline at intervals. Later, the dog was allowed access to meat juice and milk which it relished. The diet was restored to normal within a week. Sutures were removed on the 9th day. A photograph of the animal after the removal of the stitches as well as the 'X' ray graph showing the divided rib are reproduced. (Vide Plate No. 20).

Conclusion

It could be seen from the text that surgical removal of spirocerca nodules is an effective measure in the rational treatment of canine oesophageal spirocerosis provided facilities are available.

Acknowledgments

My thanks are due to Dr. I. M. Azizuddin, B.A., G.M.V.C., B.V.Sc., Ph. D. (Edin.), Principal, Madras Veterinary College, for his encouragement and to the staff of the departments of Medicine, Physiology and Parasitology but for whose willing co-operation this work could not have been possible.

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Hinshaw quotes H. Morris as having written that buzzards were a potential source of dissemination of anthrax. The beaks and feet of buzzards fed on anthrax animals yielded positive anthrax cultures for at least 48 hours. The buzzards had a habit of vomiting a few hours after eating carrion flesh and this vomit yielded pure cultures. So the buzzards were potential carriers of anthrax, though *B. anthracis* does not survive in the digestive tract.

Hinshaw, W. R. *Vet. Med.* June 1952, 253.

Simondsia paradoxa Cobbold, 1864



Fig. 1



Fig. 2



Fig. 3

[Vide article by G. Ramanujachari & V. S. Alwar]

ON *SIMONDSIA PARADOXA* COBBOLD, 1864

A parasitic helminth of pigs.

BY

G. RAMANUJACHARI B.Sc., B.V.Sc. and V. S. ALWAR, B.V.Sc.

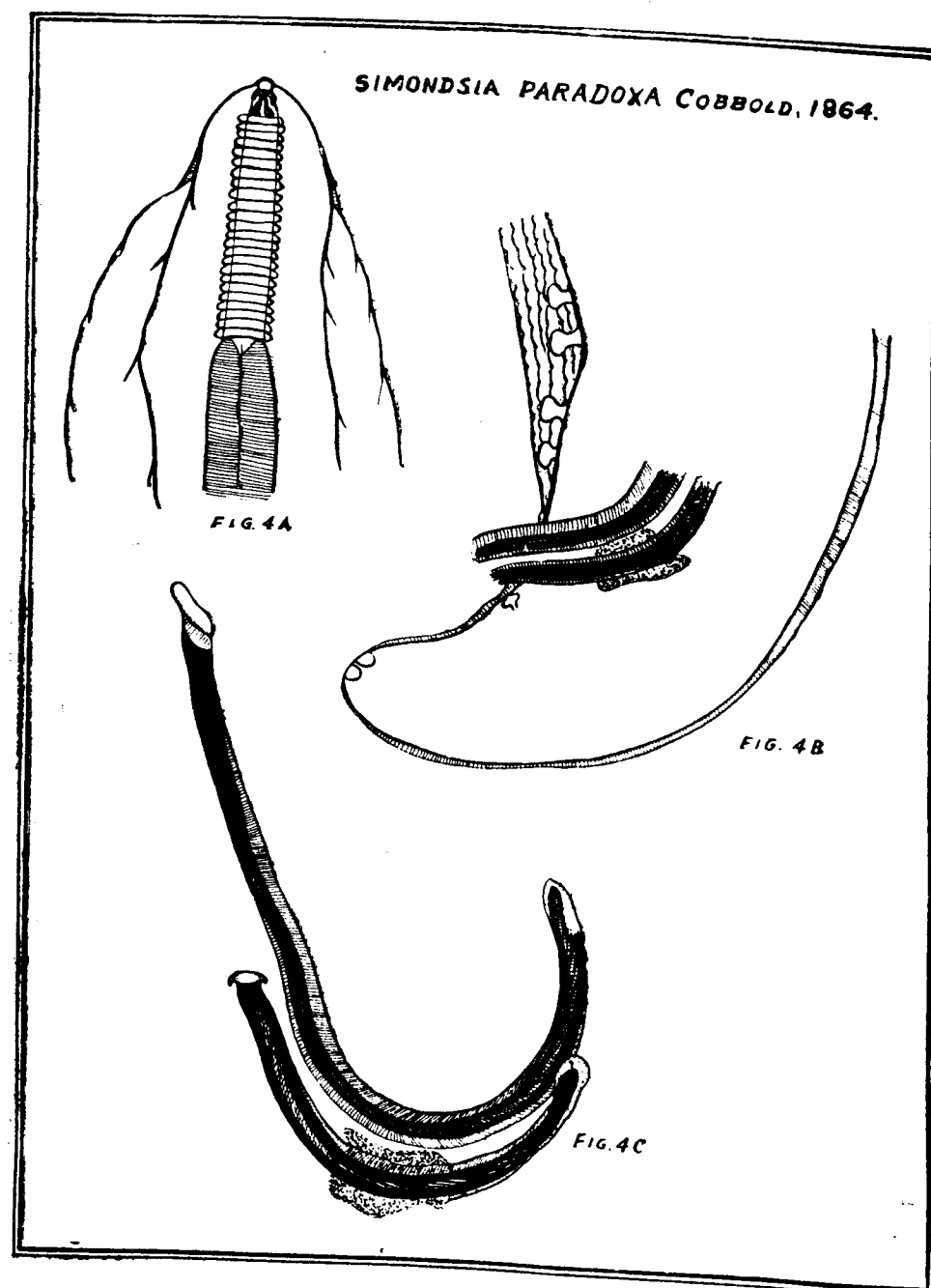
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It was Cobbold who first described this peculiar helminth from the stomach of pigs in Europe in 1864 and again in 1883. Subsequently, Colucci and Arnone (1897) and Piana (1897) redescribed the parasite. Its record has so far been confined to Europe only (Monnig, 1947) and domestic as well as wild pigs were found to be its hosts. But, during our systematic survey of the helminths in domestic pigs in Madras, this parasite was frequently met with in the stomach. Seven out of the twenty five pigs examined had this infection. This being the first record of its occurrence outside Europe, opportunity was therefore taken to study our collection in detail. Perusal of literature on this subject revealed a paucity of information regarding the morphological details of the parasite. Moreover, Cobbold's (1883) description lacks in a few important morphological details of the parasite and is in conflict with the description on some points by the subsequent workers like Colucci and Arnone (1897). Hence it is considered worthwhile to redescribe this helminth from our collection while recording its occurrence in India.

These are small, slender, and deep red (while fresh) worms. Males are deeply embedded in the gastric mucosa and the females enclosed within cysts formed underneath the mucosa. A majority of these are located just midway between the cardiac and the pyloric regions of the stomach, the mucous membrane over there being severely congested. The males are at times in deep tunnels. These are always found co-existing with either *Physocephalus sexalatus* or *Arduenna strongylina* or with both. Marked sexual dimorphism is seen, the posterior half of the body of the female being enlarged into a very large excrescence. Males measure about 10-12 m.m. long while the females are 10-15 m.m. The anterior end is bluntly pointed. Well developed lateral cervical alae are seen arising at about the level of the anterior third of the pharynx and extending upto nearly two thirds of the oesophagus. The anterior-most portion is devoid of any cervical alae or cuticular inflation. Cervical papillae are not seen. A pair of small trilobed lips, described as cephalic papillae by Cobbold (1883) guard the oral opening. A large dorsal and a ventral tooth are also found just down the mouth. The vestibule which follows is long and cylindrical, measuring 0.15 m.m., the wall of which is reinforced by ring like thickenings as found in *Physocephalus sexalatus* (Plate No. 21 Fig. 1 and Plate No. 22 Fig. 4 A). The oesophagus, which is very long and simple, measures about 3.5 m.m. In a few males the oesophagus is about half the length of the parasite. In the females the oesophagus is comparatively shorter.

Males:—The caudal end of the male is usually inrolled in the form of a hook. Only in a few, the caudal end is deeply coiled. Well developed caudal



[Vide article by G. Ramanujachari & V. S. Alwar]

alae symmetrical in nature and thrown into several wave like folds are present. The alae do not extend to the tip of the tail, which is also bluntly pointed. Four pairs of characteristic pedunculated preanal and one pair of postanal papillae are present. The papillae look like the pawn of a chess board. The tail is about 0.145 m.m. long and has at its tip 2-3 pairs of sessile papillae (Plate No. 22 Fig. 4 B). A pair of long, fairly thick unequal spicules are present. The left one is longer measuring 0.74 m.m. while the right is shorter measuring 0.34 m.m. They are of the same thickness and alate. The ala at the tip of the right spicule broadens into a spoon shaped structure while that of the left is simple. A well developed gubernaculum is present (Plate No. 22 Fig. 4c and Plate No. 21 Fig. 2). Cobbold (1883) described the two spicules as long, very delicate each measuring one thirtieth of an inch and the same was wrongly quoted by Baylis (1929) as unequal, long and slender. But Piana (1897) described the spicules as unequal while Colucci & Arnone (1897) recorded the occurrence of a single spicule only. Nobody makes mention of the presence of the gubernaculum.

Females:—As stated before, the posterior half is enlarged into a huge excrescence (Plate No. 23 Fig. 4 D and Plate No. 21 Fig. 3). Numerous crypts form the wall of the enlarged portion into which are lodged the coils of the uteri. The tail portion is not clearly seen. Vulvar opening is at the junction of the anterior and middle thirds of the body i.e., in the slender region. Eggs are oval or elliptical with a double contoured wall measuring 0.03 x 0.17 m.m. and contain fully developed embryo (Plate No. 23 Fig. 4 E).

Summary

The occurrence of *Simondsia paradoxa*, a stomach parasite of pigs, outside Europe is recorded for the first time.

A detailed description of the helminth is furnished.

Acknowledgments

Our thanks are due to Dr. I. M. Azizuddin, B.A., G.M.V.C., B.V.Sc., Ph.D. (Edin.), Principal, Madras Veterinary College for the facilities provided to undertake the survey of porcine helminths and for his encouragement in the work. We thank the Veterinary Staff of the Madras Corporation for their help in procuring the entrails of pigs from the city slaughter house. Our thanks are also due to Sri M.R. Jumbulingam, the College artist and photographer, for the figures and plates.

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Simondsia paradoxa Cobbold, 1864

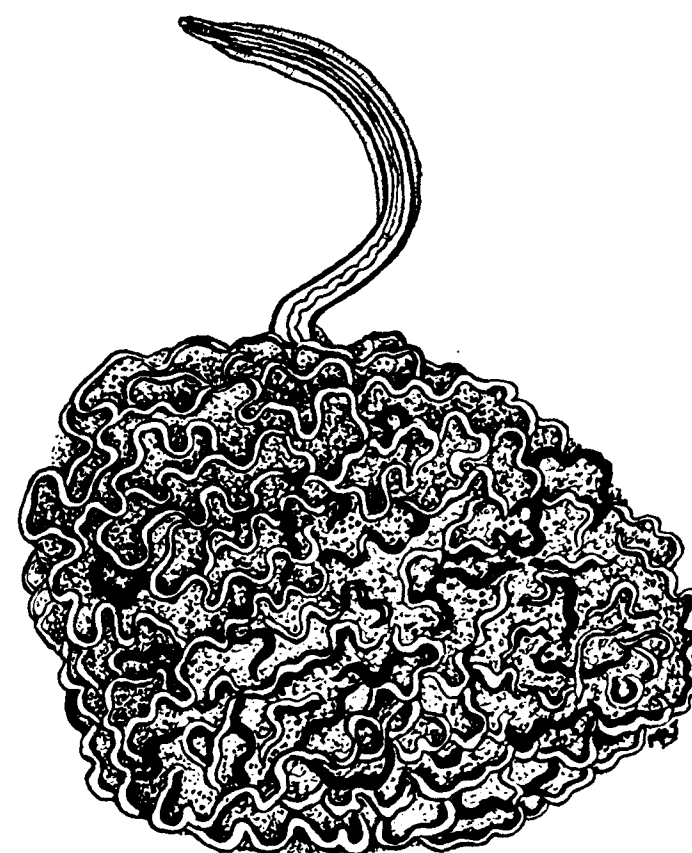


FIG. 4D



FIG. 4E

[Vide article by G. Ramanujachari & V. S. Alwa

Observations on *T. evansi*



A group of infected chicks.

[Vide article by V. S. Alwar & G. Ramanujachari]

OBSERVATIONS ON THE BEHAVIOUR AND TRANSMISSIBILITY
OF *TRYPANOSOMA EVANSI*
IN INFECTED HATCHED-OUT CHICKS

By

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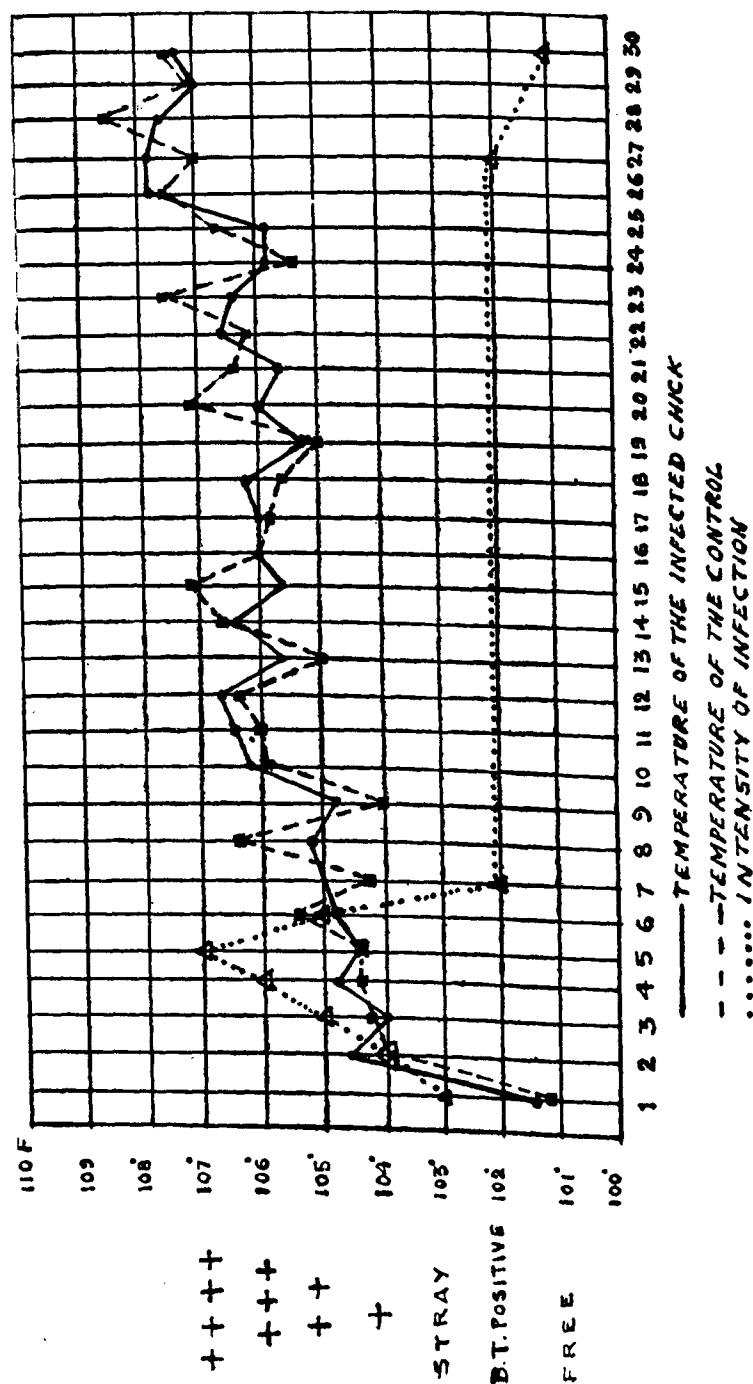
Literature on the behaviour of infected chicks inoculated during their embryonic development with the pathogenic mammalian trypanosomes is meagre. The available references are the works of Van Den Berghe (1943) and Alwar and Ramanujachari (1952) and both the experiments were with *Trypanosoma evansi*. The former successfully hatched out three infected chicks. These showed a heavy blood infection which persisted for 4 days and then gradually decreased in numbers, disappearing entirely in 6 to 9 days after hatching. Van Den Berghe's attempts to transmit the infection to other chicks and fowls were unsuccessful. Of the two chicks hatched by Alwar and Ramanujachari, one lived for 4 days only while the other died on the day of hatching itself. Both the chicks had to be helped out of the shells. Besides, they were weak and sickly and showed a sub-normal temperature ranging from 99° F. to 100° F. Further observations on infected chicks hatched out by the authors regarding the behaviour and transmissibility of the organisms differed significantly from those recorded so far by workers in this field of research.

Experimental details: One dozen eggs were inoculated with *T. evansi* on the 15th day of incubation. Fifteenth day was chosen with the idea of getting the chicks hatched out infected, as the well-developed embryos are more likely to withstand the infection. Besides, it was also felt that before the trypanosomes multiply to such an extent as to kill the embryos, the chicks can hatch out. The attempt proved successful resulting in the hatching of 5 chicks, all infected, while Van Den Berghe (1943) failed in similar attempts. Successful culturing was, so far, in embryos between 8 and 14 days of incubation only and the percentage of hatching of infected chicks was also very low. The same technique of inoculation and after care as described by the authors in their preliminary note (Alwar and Ramanujachari, 1952) was adopted. Unlike their previous two hatchings, these chicks came out of their shells in a normal manner. The chicks were apparently quite healthy.

Studies regarding the intensity of infection, thermal reaction, transmissibility and virulence of the strain made on a chick hatched out on 12-9-'52 are detailed hereunder.

The infection which was very light on the day of hatching showed a gradual increase till 16-9-'52 with a sudden fall on 17-9-'52. From 18-9-'52

Chart showing the daily record of temperature for 30 days of the infected and a control chick, both hatched on 12-9-52. The variation in intensity of infection is also plotted.



onwards, trypanosomes could not be seen during the daily repeated examination of wet films. Hence, biological test was resorted to on 3-10-'52 on a white mouse, which proved positive indicating the persistence of infection in the chick. A second biological test was undertaken on 8-10-'52 when wet film examinations were still negative. This also proved positive giving the information about the retention of infection till the 27th day after hatching. Further biological tests on 11-10-'52, 27-10-'52 and 12-11-'52 proved negative.

Statement showing the body temperature and intensity of infection of the chick.

Date	Temperature in Fahrenheit	Intensity of infection as noticed in wet film
12-9-'52	101.4	Stray
13-9-'52	104.6	+
14-9-'52	104.0	++
15-9-'52	104.8	+++
16-9-'52	104.4	++++
17-9-'52	104.8	++
18-9-'52	105.0	No trypanosome
19-9-'52	105.2	"
20-9-'52	104.8	"
21-9-'52	106.2	"
22-9-'52	106.4	"
23-9-'52	106.6	"
24-9-'52	105.6	"
25-9-'52	106.4	"
26-9-'52	105.6	"
27-9-'52	106.0	"
28-9-'52	106.0	"
29-9-'52	106.2	"
30-9-'52	105.2	"
1-10-'52	106.0	"
2-10-'52	105.6	"
3-10-'52	106.6	" —B. T. Positive
4-10-'52	106.4	"
5-10-'52	105.8	"
6-10-'52	105.8	"
7-10-'52	107.8	"
8-10-'52	107.8	" —B. T. Positive
9-10-'52	107.6	"
10-10-'52	107.0	"
11-10-'52	107.4	" —B. T. Negative

Stray — One to three trypanosomes in a drop
+ — One in three or four fields
++ — One in a field
+++ — Two to three in a field
++++ — More than three in a field
B. T. — Biological test

Throughout the period of infection, no abnormal variation in body temperature was noticed.

Two 2-day old chicks were inoculated subcutaneously with the blood of the chick at the height of infection, on 16-9-'52. One of them revealed

T. evansi in its blood on 20-9-'52, fifth day after inoculation, while the examination of the blood of the other by wet film method was consistently negative. The infection in the former showed a gradual increase in intensity till 23-9-'52 with a sudden disappearance of the parasites on 24-9-'52 and thereafter trypanosomes could not be detected in the daily examination of wet films. Biological tests carried out on 3-10-'52 established both the chicks as carriers of infection. This experiment has established the possibility of transmission of *T. evansi* from chick to chick. Biocca (1938) was able to detect the transmissibility of *T. brucei* from infected empyros to fowls by biological test only as he was not able to see the trypanosomes in the blood.

A white mouse was inoculated on 16-9-'52 to test the virulence of the strain cultivated in the chick, besides the two employed later for biological tests on 3-10-'52 and 8-10-'52. Trypanosomes were seen on 23-9-'52, 10-10-'52 and 15-10-'52 respectively and the three mice died on 26-9-'52, 13-10-'52 and 18-10-'52 thus indicating no change in the virulence of the strain.

Discussion: Healthy appearance of the infected birds, negative findings in wet film examinations, infectivity from chick to chick and the unaltered virulence of the strain to mammals are thought-provoking findings which may give a clue to the sudden onset of surra epidemics in rural areas where poultry is invariably maintained by the farmers as an adjunct to their other livestock. Just as wild games act as reservoirs for the pathogenic trypanosomes in Africa, the possibility of fowls acting as reservoirs for *T. evansi* requires thorough investigation.

Summary: A greater percentage of infected chicks were hatched out by inoculating *T. evansi* into the chorio-allantoic membrane on the fifteenth day of incubation.

The infection as noticed by the examination of wet films progressed gradually till the fifth day, with a sudden drop on the sixth day to completely disappearance from the seventh day. But biological tests gave evidence of retention of infection till twenty-seventh day after hatching.

Chick to chick transmission was successfully effected in both the attempted trials and wet film examinations revealed trypanosomes for some time in one, while the other showed the evidence of taking up the infection on biological test only.

The virulence of the strain remained unaltered.

No clinical manifestation of the infection was noticed.

The possibility of fowls acting as reservoirs for *T. evansi* is suggested.

Studies on the possibility of evolving an attenuated strain through serial passages in chicks is in progress.

Acknowledgments

Our thanks are due to Dr. S. V. Mudaliar, G.M.V.C., retired Principal and Lecturer in Parasitology, Madras Veterinary College, for his guidance in the work. The authors thank Dr. I. M. Azizuddin B.A., G.M.V.C., B.V.Sc., Ph.D. (Edin.), the present Principal for his encouragement and sustained interest. This work could not have been possible but for the technical help rendered by Drs. K. Govinda Sastry, G.M.V.C., and A. Lakshminarasimhan, B.V.Sc., of the Ranikhet Disease Vaccine section.

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General Articles

A NOTE ON THE CHICK EMBRYO VACCINE AGAINST FOWL-POX*

By

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Introduction

Immunization against fowl-pox is achieved by the vaccination of chickens with pigeon or fowl-pox virus material in suitable dilutions. In India, pigeon-pox scab virus is mostly used for this purpose, as preliminary trials with fowl-scab virus proved unsafe. Vaccination with pigeon pox virus in fowls causes a mild reaction without constitutional disturbance but its value is limited as the degree and duration of immunity conferred is of such a low order as to offset the advantage. On the other hand, vaccination with unmodified fowl-pox scab virus is full of risk as occasionally generalisation and flare-up of the disease occurs. (Annual report I.V.R.I. 1948, Glover 1939, Beaudette 1941). Further, although the skin-virus scabs gathered at the optimum time of 10-12 days after infection remain viable for a long time under refrigeration, the manufacture on a commercial scale requires constant attention as loss of potency occurs in the powdered vaccine very rapidly while processing, preserving and handling, particularly, under summer conditions. In addition, virus contents vary from brew to brew as quantitative analysis and standardisation are not practicable. To overcome these vexing difficulties, the egg-propagated vaccine was developed and given a trial.

* Paper read at the 40th Indian Science Congress, Lucknow, Jan. 1953.

Literature

The successful cultivation of fowl-pox virus on the chorio-allantoic membrane of the embryonated egg by Woodruff and Goodpasture (1931) is the first land mark in virus research. Burnet (1936a), Brandly (1935, 1936, 1937 and 1941), and Beaudette and Hudson (1939) conducted series of experiments on the cultivation of fowl-pox and pigeon-pox viruses for immunological studies. Brandly and Dunlap (1939) demonstrated the superiority of the egg-grown virus over the skin-lesion variety for immunising chickens. The former was bacteria free and richer in active virus than the latter of similar age and method of handling. Thorning, Graham, and Levine (1943b) after elaborate experiments with whole embryo vaccine concluded that the virus content as well as the immunogenic activity are related exclusively to the virus content of the chorio-allantoic membrane. Glover (1939) considered that fowl-pox egg grown virus showed slight attenuation but little tendency to spread from the site of inoculation. Brandly (1937), Beaudette (1941), Piercy (1952) and several others reported solid immunity up to 18 months in vaccinated chicks in the laboratory and the field, and consider a durable immunity over two years possible under natural conditions. No generalisation of the disease was observed and the incontact-susceptible birds remained healthy (Piercy *loc cit*).

Titration tests.—Titration in chicks and eggs is the generally accepted method for the quantitative determination of the virus contents of a preparation of fowl-pox vaccine. The end tenfold dilution capable of producing 'takes' is the index for such an assessment of the antigenic value. An end dilution of 10^{-8} is considered an average egg embryo infection, which might go up to 10^{-9} under favourable circumstances. Similarly an end dilution of 10^{-3} causing an infection in chickens followed by immunity is correspondingly recorded (Beaudette and Hudson 1938).

Neutralisation tests.—The presence of antibodies in an immune serum was demonstrated by serum neutralisation tests in embryonated eggs (Burnet 1936 b). Serum with high neutralisation and virucidal properties was produced by hyperimmunising chickens (Burdet and Lush 1936).

Isolation of virus from pox-scab material.—As large amounts of viruses are absorbed by filters, workers over two decades have used different methods to obtain bacteria-free seed virus to initiate infection in eggs. The difficulties encountered in filtering viruses is now explained by a study of the virus morphology by Cunah *et al* (1947). Woodruff and Goodpasture (*loc cit*) have described several methods including the digestion of 7 to 10 day old scab-material in trypsin to liberate the virus bodies and subsequent washing in normal saline and treatment for 24 hours with potassium hydroxide solution to overcome contamination. Piercy (*loc cit*) has used Meurer's 1939 filter strip

method to achieve final purification. Pencillin, 5000 units per c.c., failed to eliminate bacteria from scab suspensions. Filtrates through gradocal membranes failed to infect pigeons or eggs. Repeated freezing and thawing of virus suspensions prior to filtering through gradocal membrane gave finally a filtrate sufficiently active to initiate infection in eggs (Haig 1951). Pencillin and/or streptomycin was used successfully to isolate viruses of influenza (McKee *et al* 1947), Infectious bronchitis, (Delaplane 1947) and Newcastle disease (Thompson *et al* 1948).

Experimental

Materials and Methods.—Comb-scab material collected on the tenth day of infection from a virulent outbreak (Plate No. 25 Fig. I) was dried *in vacuo*, powdered, and a 10 per cent dilution was prepared in broth. The suspension was centrifuged for 20 minutes at 3000 revolutions per minute to settle down particles and 0.5 c.c. of a 200 mg. cc. solution of streptomycin was added to a 1.5 c.c. of the supernatant fluid in a sterile test tube along with 10000 units of penicillin per c.c. The mixture was allowed to stand at the room temperature (90°F) for 30 minutes and six vigorous embryos of eleven days old were inoculated with 0.15 c.c. each of the inoculum by a slight modification of Burnet's technique (1936a) so that the shell membranes were lightly pierced but not cut open and the inoculum, treated with antibiotics, was used to separate the membranes as well as sow the virus on the C.A.M. The opening in the shell was sealed with paraffin. The eggs were returned to the bacteriological incubator for a further incubation of 5 days at 37°C . The membranes were harvested and washed several times in normal saline and stored at 40°F in nutrient broth of pH 7.4. Cultural tests revealed no bacterial contamination of living embryos. After 5 passages, the virus was observed to be readily adapting itself to the growth on C.A.M. Oedematous white plaques appeared at the site of inoculation and spread throughout the entire oval field below the artificial air-space. After ten passages discrete plaques were visible in the lower portions of the C.A.M. as well. In most of the eggs, gross thickening and oedema of the C.A.M. was noticed but, when the virus was inoculated in high dilutions, fine pocks were observed scattered throughout the membranes. (Plate No. 25 Figs. II and III). After 10 passages, a nearly 33 per cent embryo mortality was a constant feature. Such dead embryos revealed gross as well as multiple pock lesions in the membranes and were sterile when cultured. The embryos mortality, however, ceased on doubling the dilution of the inoculum.

Titration tests with the entire C.A.M. in broth pH 7.4, were conducted on 11 day old eggs and 8 weeks chicks. The dilutions employed were from 10^{-1} to 10^{-10} . The dose for each egg was 0.2 c.c. and eggs were re-incubated for 5 days with 3 eggs for each group. The tests were carried out at the 15th, 20th and 25th passages. The titre varied between 10^{-6} and 10^{-7} (Table I.)

Chick embryo vaccine against fowl-pox

TABLE I
Titration of egg-adapted virus in eggs.

Passage	No.	Dilutions					
		10 ⁻²	10 ⁻³	10 ⁻⁴	10 ⁻⁵	10 ⁻⁶	10 ⁻⁷
15	1.	+++	+++	+++	+++	++	+
	2.	+++	+++	+++	++	++	+
	3.	+++	+++	+++	++	+	—
20	1.	+++	+++	++	++	+	+
	2.	+++	+++	++	++	+	—
	3.	+++	+++	+++	++	++	+
25	1.	+++	+++	++	++	+	+
	2.	+++	+++	+++	++	+	—
	3.	+++	+++	+++	+++	++	+

The above dilutions were simultaneously vaccinated by the stick method into the web of the wing in groups of 3 White Leghorn chicks of 8 weeks of age and reactions were checked on 7th, 14th and 21st day. One month after vaccination, they were challenged by a 10 per cent dilution of the vaccine by the stick method on the comb. The virus titre was judged by a 'take' reaction followed by protection. The end titres in chicks which were immune to the challenge test was 10⁻² (Table II).

TABLE II
Titration of egg-adapted virus in 10-12 weeks old White Leghorn chickens.

		Dilutions				
		10 ⁻¹	10 ⁻²	10 ⁻³	10 ⁻⁴	10 ⁻⁵
Response to vaccination.	1.	+++	+++	+++	+	—
	2.	+++	+++	++	—	—
	3.	+++	+++	++	+(?)	—
Response to challenge after 45 days.	1.	—	—	+	++	++
	2.	—	—	—	+	++
	3.	—	—	+	+	++



Fig. 1.
Donors of Fowl-pox virus
for egg propagated vaccine.

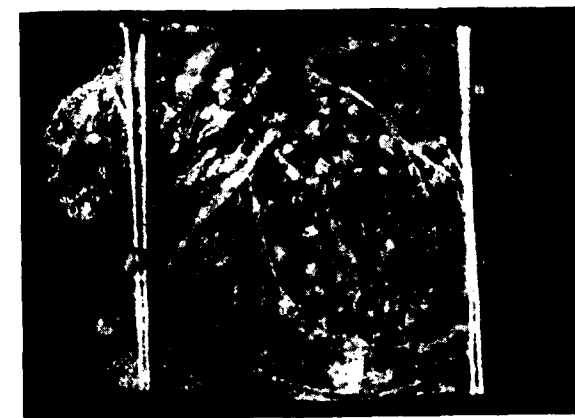


Fig. 2.
Metastatic Fowl-pox lesions of
Fowl-pox virus on c.a.m.

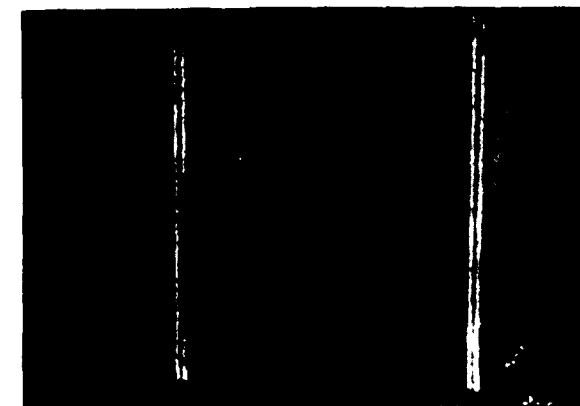


Fig. 3
Discrete lesions of Fowl-pox
on c.a.m. inoculated with virus
in high dilution.

[Vide article by S. P. V. Rao, *et al.*]

Chick embryo vaccine against fowl-pox



Fig. 4
Normal Chorio-allantoic membrane.
(Microphoto x 320)



Ectodermal changes in the infected
Chorio-allantoic membrane.
(Micro-photograph x 192)

[Vide article by S. R. V. Rao, *et. al.*]

A few serum neutralisation tests were done by collecting samples from protected birds after 45 days of vaccination. The virus was placed in sterile sugar tubes in 10 fold dilutions along with undiluted immune serum in equal quantity. The sets were incubated for three hours and 3 embryos were inoculated in each group. In the control tubes healthy serum was substituted for immune serum. The virus and titre was 10^{-6} while the serum neutralisation titre was 10^{-4} . The criterion for judging as positive was at least two 'takes' in each group. Four to five pock marks in the field was the picture of the virus end titre in eggs (Table III).

TABLE III
Serum neutralisation test with egg-adapted virus and homologous immune serum.

		Dilutions						
		10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}
Virus and healthy serum.	1.	+++	+++	+++	+++	+++	++	+
	2.	+++	+++	+++	+++	++	++	—
	3.	+++	+++	+++	+++	++	+	—
Virus and immune serum.	1.	+++	+++	—	—	—	—	—
	2.	+++	+++	++	—	—	—	—
	3.	+++	+++	+	—	—	—	—

Histopathological changes of the chorio-allantoic membrane were not different from that described by Woodruff and Goodpasture, (*loc cit*). (Plate No. 26 Figs. IV and V). The constant findings were the hyperplasia and proliferations of the ectoderm with eosin stained cytoplasmic inclusion bodies in the enlarged epithelial cells, while the cell nucleus itself was pushed to the periphery or disappeared. Neither the meso-derm nor the endo-derm was affected. Borrel bodies in numbers could be seen liberated from the inclusion bodies in the suspension of chorio-allantoic membrane material in stained preparation.

Preparation of the vaccine.—Infected embryos were candled daily and dead ones discarded, while membranes showing gross microscopic lesions like oedema and thickening were selected for vaccine preparation. Infected membranes, after they were wrung through sterile muslin cloth, weighed from 2.3 to 2.6 gms. Vaccine was prepared in 10 per cent, 8 per cent and 4 per cent strengths, using, as diluents, buffered nutrient broth of pH 7.4 and 50 per cent chemically pure and sterilized glycerine. At a time, 4 whole membranes in glycerine broth were subjected to the action of the waring

blender with blades revolving at full speed for one-half minute, disintegrating the membranes into a fine suspension. The prepared vaccine was ampouled and placed under refrigeration in general cold store at 40°F. for future use.

Technique of vaccination and results.—4340 chickens, between 8-10 weeks of age, were vaccinated by a pair of sharp miniature forceps by the stab method. The wing was kept stretched so that the vaccine was deposited to a great extent in the non-vascular layer of the skin on the under surface of the web of the wing. Reactions were checked on the 7th, 10th, 14th and 21st days.

Vaccinations were followed by 95 per cent 'takes' between 6 and 10 days. The lesions were very pronounced up to 15 days and the scabs fell off about the 21st day. There was no secondary lesions or generalised pox in any of the vaccinated lots. Groups of four vaccinated chickens from the field along with controls were challenged at monthly intervals with a concentrated homologous 10 per cent chorio-allantoic membrane vaccine by the follicular method. Till the time of writing this paper, the vaccinated chickens withstood 12 monthly tests. (Table IV.).

TABLE IV

Duration of immunity in chickens inoculated with egg-adapted vaccine and challenged with virulent homologous strain of the virus.

Interval between immunisation and challenge test.	No. of birds.	Results.
One month.	4	No reaction.
Two months.	4	No reaction.
Three "	4	One doubtful and three negative.
Four "	4	No reaction.
Five "	4	One mild and three negative.
Six "	4	No reaction.
Seven "	4	Two mild. Two negative.
Eight "	4	One mild and three negative.
Nine "	3	No reaction.
Ten "	4	Two mild and two negative.
Eleven "	4	One mild, two negative and one doubtful.
Twelve "	4	One mild and three negative.

In one of the experimental pens fowl-pox in a virulent form had affected 18 out of 44 birds. With vaccination, all further attacks ceased. Such instances have been reported by earlier workers and also by Priestly (1952).

Viability under storage conditions.—Fifty grossly infected membranes were dried over calcium-chloride in open petri dishes in a desiccator (Room temperature 105°F. summer) for 72 hours. The membranes were powdered and a moiety was stored at room temperature and the other moiety at 40°F. The material from the cold store was tested and found to be non-infective to chicks after 60 days; the other moiety was innocuous after 7 days. Six membranes were frozen at 4°C for 24 hours and then desiccated *in vacuo* over calcium-chloride for two days, ampouled and preserved in the refrigerator. In the four monthly tests so far, they have proved infective in dilutions of 10⁻² in chickens of 12 weeks of age. Liquid vaccine in broth/glycerine remained viable for one month at 40°F and gradually lost its potency in 45 days as could be observed by decrease in number of 'takes' and poor 'takes'.

Discussion

The method of isolation of fowl-pox virus from scab material with penicillin and streptomycin described in our work is based on the efforts of the workers who isolated Newcastle disease virus from field material by the use of antibiotics. The method proved a great success when applied to fowl-pox virus isolation and commends itself for its simplicity.

The virus recovered from a field outbreak readily adapted itself to the chorio-allantoic membrane within a few passages, and further passages through embryonated eggs had no influence on its virulence for eggs or chickens as shown by titration tests. Vaccination with fresh chorio-allantoic membrane in 10 and 8 per cent concentrations in 8-10 weeks old chickens produced neither metastatic nor generalised lesions. The vaccine contains no doubt a very high concentration of virus as compared to a 2 per cent level of membranes incorporated in a vaccine, suggested by Beaudette (*loc. cit.*), but a higher concentration up to 17 per cent has been used by Haig (*loc. cit.*) and Piercy (*loc. cit.*) with good results. The use of the virus in such high concentration with impunity is significant of the modifications of the virus through passage, which induces a durable immunity in keeping with safety. The end titres of 10⁻³ and 10⁻⁶ in chicks and eggs respectively have been recorded by Brandly and Dunlop (*loc. cit.*), and Piercy (*loc. cit.*). There is some interesting evidence of serum neutralisation in the few tests that were done by the consistent stepping down of the virus titre from 10⁻⁶ to 10⁻³. The immunity tests are not yet complete but it appears, from the solid resistance evinced by the vaccinated chicks against severe challenge tests for 12 months, that it might last longer. Potency tests under storage conditions show that drying of chorio-allantoic membranes at room temperature and ordinary atmospheric

pressure in summer decreases the viability of the virus very rapidly. Amongst the few attempts that were made to preserve the virus, the successful method so far was to quickly freeze the membranes, and dry over calcium-chloride *in vacuo* and ampoule the whole membrane, to be held under refrigeration at as low a temperature as possible. It can also be concluded from the tests that liquid vaccine can stand transport to any part of India during winter or in the cooler parts of the year for use on distant farms in the Union.

The average weight of an infected membrane is 2.5 gms. and by using 25 c.c. of the diluent to make a 10 per cent vaccine, a quantity enough to vaccinate 500 chickens could be prepared at a comparatively cheaper cost than skin-scab vaccine where live fowls are used.

Summary

Egg-propagated fowl-pox vaccine has been prepared and used for the first time in this country by adapting a virulent field strain to the developing chick embryo and modified satisfactorily after 15 passages. An easy and practicable method of isolation of fowl-pox virus from infected scab material by the use of streptomycin and penicillin in combination in a 10 per cent suspension of the F.P. scabs is described. The technique of the passage of the fowl-pox virus in embryos is delineated, with details of histopathological changes in the chorio-allantoic membrane, the virus titre and the serum neutralisation tests. The chorio-allantoic membrane vaccine was prepared in a 16 per cent suspension in buffered broth of pH 7.4 and 50 per cent glycerine saline. Vaccination was carried out in 4340 birds between the ages of 10-12 weeks with no untoward sequelae. The immunity developed has withstood solidly 12 monthly challenge tests so far. Vaccine held at 40°F was potent for a month, while the infected membranes were viable for four months when quickly frozen and dried *in vacuo* at a low temperature, and stored at 40°F in sealed ampoules. The egg propagated vaccine could be produced very economically as compared with the fowl or pigeon-scab skin lesion product.

Acknowledgment

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STUDIES ON THE BLOOD OF MULES*

I. Haematological

By

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It is an accepted fact that examination of blood is a *sine qua non* procedure in the elucidation and intelligent interpretation of various changes in the pathologic and metabolic disorders. But, unfortunately, normal data in respect of blood constituents of various species of animals under different geographical and climatic conditions are very meagre. In India, a beginning has been made by Keher, Singh and Rao, (1940); Sankaranarayan (1937); Mallick and Pal (1943); Keher and Murthy (1945); Pal, Momin and Muklick (1945); Nayar, Nambiar and Sastry (1949); and Keher and Murthy (1951) to establish the 'normals' among different types of animals under Indian conditions, but their studies are far from complete.

Though mules have been used extensively as beasts of burden both in peace time and war, yet only a solitary worker, Morris (1942), seems to have studied the blood of these animals and even his studies were restricted to a few aspects. These ungulates are heir to almost all the diseases affecting horses and hence a detailed study of normal blood is essential for a correct appraisal of its changes in such diseases. A knowledge of the changes in the blood in such diseases helps at once in the diagnosis and prognosis of the same.

(*) Read at the 40th Indian Science Congress, Lucknow, Jan. '53.

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This Institute maintains a few mules for transport purposes and advantage was taken of this in the study of the blood of these animals.

Methods.—The animals were bled from the left jugular vein in the standing position. Oxalated blood using Heller and Paul's (1933.34) oxalate mixture at the rate of two mgm. per ml. of blood was used for the following estimations: Total cell counts, reticulocyte counts, Packed cell volume Haemoglobin content, fragility test and differential counts.

For the Weltman coagulation test, Icterus Index and Bilirubin estimations, blood was collected in wide test tubes, 6" × 1", from which serum was collected after it had separated. After collection, the serum was centrifuged for 10 min. @ 3,000 rpm., before being used for the above tests.

Red cells counts were made in a counting chamber with double Neubauer ruling. Pipettes certified by the American Bureau of Standards were used. Vallarino's fluid (1941) with the modification introduced by one of us (G.A.S.) was used. An average of two counts was recorded. If two counts differed by more than 50,000 the counts were repeated with a fresh dilution.

White cell counts were made using Thoma's fluid as a diluent and the number per 1. c.mm. was calculated by multiplying the number in 5 sq. mms. by 40.

Packed cell volume was estimated by using Wintrobe's (1930) haematocrit tubes. These tubes were centrifuged in an International Clinica-centrifuge type II for 45 min. @ 3,000 rpm., that time having been found to be sufficient for complete packing (vide Table I.)

TABLE I
Showing the packed cell volume (%) at different lengths of time of centrifugation.

No. of Mule.	P.C.V. in % after		
	30 min. of Centrifugation.	45 min. of Centrifugation.	60 min. of Centrifugation.
8	37.0	36.5	36.5
11	33.5	33.0	33.0
15	41.5	41.0	41.0
17	37.5	37.0	37.0
19	39.5	39.0	39.0
21	40.5	40.0	40.0
16	46.5	46.0	46.0
20	42.5	42.0	42.0
25	39.3	39.0	39.0
24	37.0	36.5	36.5

Using Hellige make Sahli haemoglobinometer, the haemoglobin content was estimated. One hour (Robscheit, 1920) was allowed for the development of maximum colour.

Fragility of the erythrocyts in hypotonic saline solutions was determined by adding a drop of the oxalated blood to 2 ml. of different strengths of saline solution in test tubes, 4" × 1/2". These solutions had a range of 0.28% to 0.78% differing by 0.09% between two successive strengths. These working solutions were prepared from stock solution of 1% NaCl solution and kept in air tight bottles. It was found for the mules, that the range of 0.5% to 0.6% was sufficient to cover the strength to determine the commencement of laking and the range 0.3% to 0.4% to cover the completion of laking. After one hour, reading was taken. To determine the highest strength at which laking was complete, these test tubes in the lower range showing no turbidity were centrifuged for 10 min. @ 3,000 rpm and inverted. Tee bottoms of the test tubes were examined by a hand lens (× 10) to see in which tube containing the highest strength of NaCl solution no deposit of red cells was present and this denoted the highest strength in which laking was complete. Commencement of laking was denoted by colouration of the supernatant fluid in the first six tubes and begining occurred in that tube containing the highest strength of NaCl solution in which the faintest reddish hue was present.

For differential count, thin smears were made by Beacom's (1927-28) method from the oxalated method. These were stained by Leishman—Giemsa method. Counting was made using Klotz's (1939-40) random method. A total of 300 cells were counted and the percentage of different leucocytes was calculated out of this total.

Osgood and Wilhelm's (1934) method of staining the reticulum was adopted by adding one drop of oxalated blood to one drop of a one percent Brillinat cresyl blue in normal saline. A thin smear was made after 10 min. which was stained by Leishman-Giemsa method. At least one thousand redcells were counted.

Westergren's (1936) method of measuring the sedimentation rate was followed in which blood was mixed with 3.8% sodium citrate solution so that a concentration of 1 in 5 of the latter was obtained. Westergren's pipettes were used and readings were taken every 15 min. up to 1 hour.

Quick's (1938) procedure of prothrombin—time estimation was followed using Rabbit brain as a source of thromboplastin.

McGowen's (1907) capillary tube method was used for determining the clotting time, as this method was found to be the simplest and easiest to perform.

Aggler, Lucia and Hammlin's (1942) method of measuring clot retraction in terms of Extra-corpuscular volume (E.C.V. for short) was made use of, in which, blood that had clotted in a graduated centrifuge tube fitted with a looped copper wire, was kept in a water bath at 37.5°C for one hour. The E.C.V. was calculated by subtracting the Packed cell volume (P.C.V. for short) from the clot volume % of the specimen in the centrifuge tube. For eg. if the total volume of the specimen (clot plus serum) were X ml. and the serum Y ml., clot volume % would be $\frac{(X-Y) 100}{X}$. If Z were the PCV %, then the ECV would be $\frac{100 (X-Y)}{X}$ minus Z.

Weltman (1930) coagulation test was performed using anhydrous calcium chloride in the place of $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$, which was originally used by Weltman. Working solutions of 0.1% to 0.09%, differing by 0.01% were made from a stock solution of 2% CaCl_2 . The pH of the final solution obtained by adding 0.1 ml. of serum (with pH. 7.6) to 5 ml. of the working solution was 6.8 to 7.0. No efforts were made to correct the pH of the working solution to 7.4 (Szanto and Oxman, 1941) as even with the pH of 6.8 the coagulation band was found to be less than 5 or 6. If corrected to 7.4. the band shifted to less than 1. The pH of the sera and the solutions was estimated by using BDH Capillary standards.

Icterus Index was estimated by comparing in a Klett colorimeter the sera against a one in 10,000 Pot. dichromate solution (Meulengracht's method) and expressed in units.

Bilirubin content was estimated as per White's (1932) method using a Cobalt sulphate standard.

Mean corpuscular volume and Mean corpuscular haemoglobin concentration were calculated as per Wintrobe's formulae (1932).

Red cell diameters were measured by a filar ocular micrometer which was calibrated by a stage micrometer. Blood smears were made from the blood remaining in the needle used for bleeding from the jugular. The smears were stained by Leishman's method. One hundred cells from each animal were measured and means calculated. Price-jones curve (1910) was made from 1000 cells (from all the ten animals) Mean corpuscular thickness was calculated as per Price Jones, Vaughan and Goddard (1935) formula :

The findings from ten mules are embodied in tables II, III and VI.

Discussion.—There does not seem to be much difference between the sexes as regards haematological data. Though perceptible sedimentation was observed even by the 15th minute (table VII) this period cannot be advocated as the settling of the red cells is very hazy in most of the animals

TABLE II
Normal data Mules.

No. of Animal.	Sex.	Age in years.	Red cells in millions per c.m.m.	Packed cell volume %	Haemoglobin content in gms %	Mean corpuscular volume c.u.	Mean corpuscular haemoglobin concentration %	Laking beginning % of NaCl soln.	Laking complete % of NaCl soln.	Fragility of erythrocytes.	Clotting time in min.	Prothrombin time in seconds.	Extra corpuscular volume %	Weltman coagulation band.	Icterus index in units.	Bilirubin content in mgms. %	Sedimentation rate in m.m. per 1 hour.
8	G	16	6.545	36.5	13.05	55.77	35.75	.54	.34		16.5	21.9	18.0	3	6.45	0.69	69
11	M	21	6.285	33.0	11.60	52.5	35.15	.54	.34		17.0	21.2	15.0	5	8	0.80	133
15	G	12	7.065	41.0	14.79	58.03	36.07	.54	.34		15.0	21.8	19.0	3	8	0.95	70
17	G	13	6.90	37.0	13.21	53.62	35.7	.54	.36		21.0	18.8	22.7	4	9.7	0.51	133
19	G	15	7.29	39.0	14.5	53.5	37.18	.56	.36		23.0	19.2	17.0	4	10	0.79	107
21	G	12	7.60	40.0	15.63	52.63	39.0	.52	.34		18.5	23.1	23.3	3	16	0.84	43
16	G	12	8.64	46.0	17.4	53.25	37.83	.56	.36		17.5	19.8	15.4	3	16.6	0.91	54
20	M	13	8.075	43.0	15.66	53.25	36.42	.54	.34		16.5	18.8	15.9	3	6.25	0.74	109
25	M	12	7.18	39.0	14.05	54.31	36.0	.58	.36		15.0	19.2	22.7	3	9.52	0.68	133
24	M	13	6.65	36.5	13.34	54.88	36.54	.58	.36		17.2	21.0	20.0	4	6.4	0.64	130

TABLE III

Normal data Mules.

No. of Mule.	Sex.	Age.	White blood cells in thousands per c. m.m.	Polymorphs %	Lymphocytes %	Monocytes %	Eosinophils %	Basophils %	Unsegmented forms (young forms) %	Nuclear Index.	Neutrophil Lymphocyte ratio.
8	G	16	9.92	49.7	42.7	1.0	6.6	0.0	0.3	149	1.16
11	M	21	10.08	46.7	45.0	4.7	3.6	0.0	1.4	30	1.04
15	G	12	9.52	48.0	41.0	2.0	9.0	0.0	0.0	100	1.17
17	G	13	13.28	62.3	30.3	2.4	5.0	0.0	1.3	47	2.05
19	G	15	15.40	67.0	25.7	1.7	5.6	0.0	1.7	40	2.65
21	G	12	8.40	35.0	54.3	3.0	6.7	1.0	0.3	100	0.64
16	G	12	13.72	50.3	38.3	4.0	7.0	0.4	1.3	35	1.31
20	M	13	10.04	51.7	38.3	2.7	7.0	0.3	0.0	150	1.35
25	M	12	14.44	49.7	41.0	3.3	6.0	0.0	1.0	50	1.21
24	M	13	12.24	54.3	35.3	2.0	8.0	0.4	0.7	80	1.54

TABLE V

Normal data Horses.

No. of Horse.	Sex.	Age.	White blood cells in thousands per c. m.m.	Polymorphs %	Lymphocytes %	Monocytes %	Eosinophils %	Basophils %	Unsegmented forms %	Nuclear Index.	Neutrophil Lymphocyte ratio.
464	G	16	6.44	58.0	37.7	4.0	0.0	0.3	1.3	60	1.54
555	G	12	8.76	71.0	22.7	1.0	4.3	0.3	3.0	25	3.13
584	M	5	7.72	47.7	49.7	0.6	2.0	0.0	0.3	above 100	0.96
575	G	14	10.8	51.7	38.7	2.0	7.0	0.6	1.0	50	1.33
579	G	17	10.0	50.0	43.3	0.7	4.7	1.3	0.7	75	1.15
416	G	20	9.0	43.4	52.0	2.3	2.3	0.0	0.0	above 100	0.83
573	G	14	11.68	46.7	38.7	5.0	9.0	0.6	0.3	do.	1.2
574	G	14	9.06	47.0	47.0	2.7	2.7	9.0	0.7	70	1.0
488	G	18	10.72	40.0	46.0	4.0	9.3	0.4	0.0	above 100	0.88
571	G	13	9.40	45.7	43.7	3.0	7.3	0.3	0.0	do.	1.05

TABLE IV
Normal data, Horses.

No. of Horse.	Sex.	Age in years.	Red cells in million per c. m.m.	Packed cell volume %	Haemoglobin content in gms. %	Mean corpuscular volume c. u.	Mean corpuscular haemoglobin concentration %	Fragility of erythrocyts. Laking at commencing Laking complete	Prothrombin time in seconds.	Extra corpuscular volume %	Wellman coagulation band.	Icterus Index in units.	Bilirubin content in mgms. %	Sedimentation rate, in mm. per 1 hour.
464	G	16	5.785	29.5	11.02	50.99	37.35	.54	17.2	26.7	3	32	0.90	141
555	G	12	7.315	36.0	13.34	48.81	37.06	.58	16.8	24.0	5	42	1.3	101
584	M	5	8.02	37.0	14.5	46.13	39.1	.56	18.8	20.0	3	36.4	1.2	98
575	G	14	8.79	37.5	15.88	46.07	39.29	.60	17.6	18.5	5	26.5	1.2	113
579	G	17	7.665	36.0	13.63	46.98	37.86	.56	16.3	15.0	5	24.0	0.9	133
416	G	20	6.91	35.0	13.63	50.65	38.94	.52	17.3	19.0	4	50.0	1.3	131
573	G	14	7.085	35.0	13.92	49.4	39.8	.56	18.4	20.8	5	28.0	1.2	134
574	G	14	7.75	36.5	14.11	47.09	38.66	.56	17.0	17.2	5	40.0	1.5	78
488	G	18	8.27	38.5	15.37	46.58	39.92	.54	17.4	25.8	3	25.0	0.9	120
571	G	13	8.00	37.0	13.92	48.9	37.6	.52	16.0	27.0	5	28.0	0.85	118

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NS3-29.5

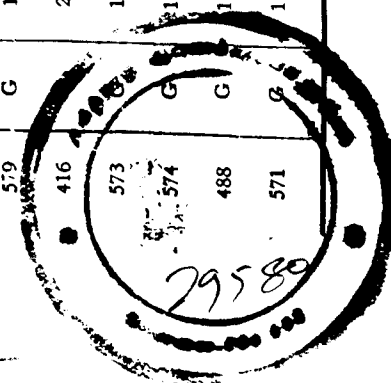


TABLE VII
Showing sedimentation rate at different periods of time.

Animal.	Sedimentation in millimeters at :			
	15 min.	30 min.	45 min.	60 min.
Mules.				
8	12	38	68	89
11	35	82	114	133
15	16	37	56	70
17	40	110	127	133
19	16	55	88	107
21	6	19	33	43
16	5	16	35	54
20	11	45	87	109
25	40	110	130	133
24	30	88	119	130
Horses.				
464	58	114	135	141
555	19	51	80	101
584	17	49	75	98
575	19	75	101	113
579	40	112	128	133
416	35	108	127	131
573	50	117	129	134
574	10	35	60	78
488	34	82	112	120
571	20	70	96	118

TABLE VI
Statistical analysis of haematological data. Mules & Horses.

	Red cells in millions per c.m.m.		Packed cell volume %		Haemoglobin content gms. %		Mean corp. volume %		Mean corp. Hb. conc. %		White cells in thousands per cmm.		Polymorphs %		Lymphocytes %		Monocytes %		Eosinophils %		Basophils		Mean corp. diameter in μ		Mean corp. thickness, μ	
	Mules	Horses	Mules	Horses	Mules	Horses	Mules	Horses	Mules	Horses	Mules	Horses	Mules	Horses	Mules	Horses	Mules	Horses	Mules	Horses	Mules	Horses	Mules	Horses	Mules	Horses
Mean	7.225	7.567	39.10	35.9	14.323	13.932	54.174	48.07	36.564	38.558	11.704	9.358	51.47	50.12	39.19	41.98	2.68	2.6	6.45	4.86	0.21	0.44	6.826	6.272	1.49	1.55
Standard error of mean.	0.228	0.264	1.166	0.862	0.522	0.411	0.533	0.574	0.364	0.325	0.762	0.489	2.749	2.778	4.291	2.625	0.351	0.456	0.48	1.004	0.104	0.118	0.17	0.17	—	—
Standard deviation.	0.72	0.835	3.688	2.727	1.651	1.301	1.686	1.815	1.15	1.027	2.41	1.546	8.69	8.787	7.879	8.301	1.111	1.442	0.518	3.175	0.328	0.374	0.548	0.531	—	—
Coefficient of variation.	9.965	11.035	9.432	7.96	11.527	9.338	3.112	3.776	3.145	2.664	20.591	16.521	16.891	17.532	20.105	19.774	41.455	55.462	23.535	65.329	156.19	85.0	8.028	8.466	—	—
Range	6.285 to 8.64	5.785 to 8.79	33.0 to 46.0	29.5 to 40.5	11.60 to 17.4	11.02 to 15.88	52.5 to 58.03	46.07 to 50.99	35.15 to 39.0	37.06 to 39.92	8.40 to 15.40	6.44 to 11.68	35.0 to 67.0	40.0 to 71.0	25.7 to 45.0	22.7 to 52.0	1.0 to 4.7	0.6 to 5.0	3.6 to 9.0	0.0 to 9.3	0.0 to 1.0	0.0 to 1.3	5.3 to 9.2	5.0 to 7.8	—	—

TABLE VIII
Showing comparison between authors' and
Morris' data.

	Sastry and Dhandra (1953)	Morris (1942)
Red blood. Cells in million per c.m.m.	6.285 to 8.64	4.6 to 9.933
white blood. Cells in thousands per c.m.m.	8.4 to 15.4	6.3 to 10.75
Haemoglobin. Gms %	11.6 to 17.4	13.22 to 18.928
Polymorphs %	35.0 to 67.0	20.33 to 49.0
Lymphocytes %	25.7 to 45	33.5 to 60.0
Monocytes %	1.0 to 4.7	1.66 to 7.33
Eosinophils %	3.6 to 9.0	1.83 to 11.0
Basophils %	0.0 to 1.0	0.0 to 1.33

at this time and so no clear reading could be taken. The hazy nature disappears by the 45th minute. For uniformity, one hour reading is suggested. It should be noted that even in the apparently healthy animals, the normal range is up to 133 mm.

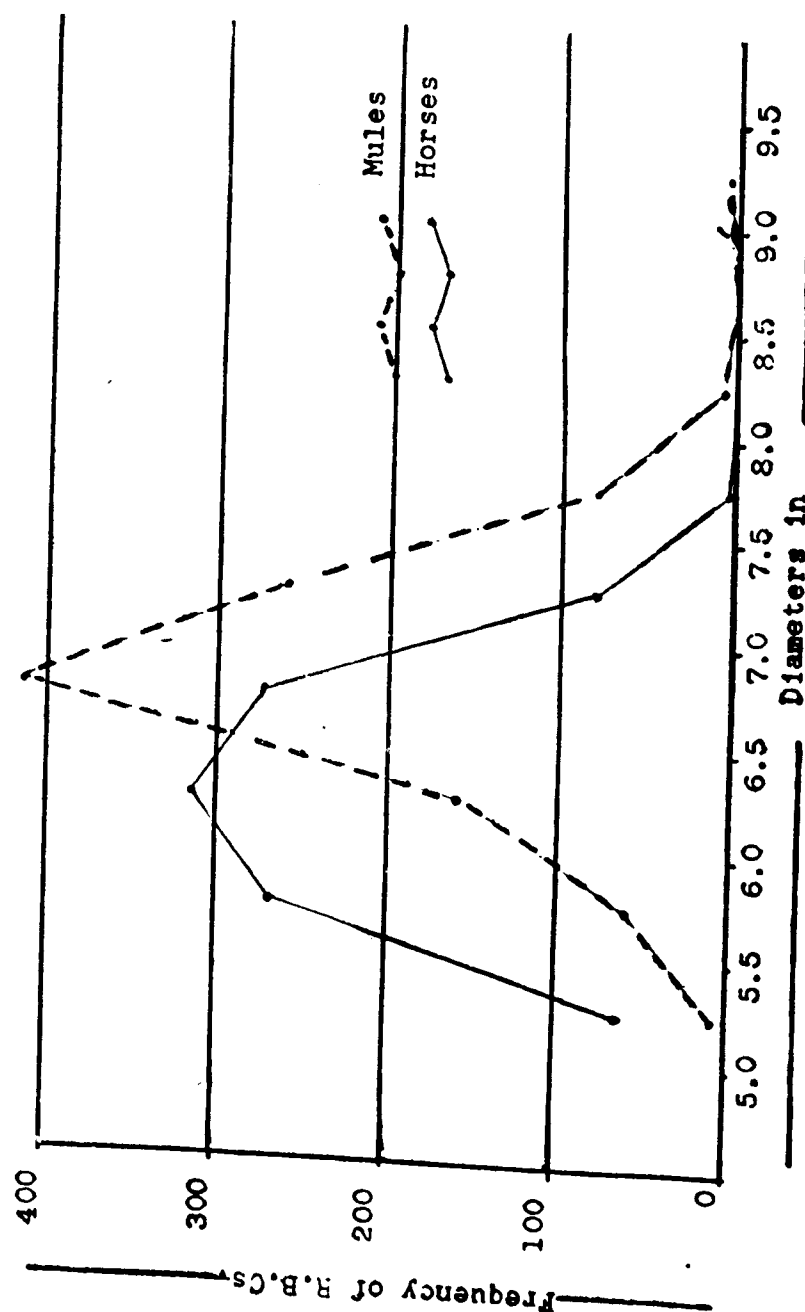
To have a comparative idea, the haematological data for ten horses were compiled and are incorporated in tables IV, V and VI. On a perusal of these tables, it would be apparent that the mules differ from the horses in the following:

The redcells being slightly larger and the erythrocyte count being equal, the P.C.V. Haemoglobin content, and the M.C.V. are slightly higher in these animals. A slight increase in the white cells is also observed. Comparatively fewer basophils were encountered in the mules. The prothrombin time is longer, icterus index is lower and the bilirubin content lesser in these animals.

No difference was noted in: the erythrocyte count, sedimentation rate, differential count, N: L ratio, E.C.V., Weltman reaction, nuclear index and reticulocyte counts.

The above findings agree with those of Morris (1942) table VIII) but the redcell counts in our animals are slightly higher due to the higher

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altitude of this station. Our conclusion that bilirubin content of the sera of mules is lower than that of horses is in agreement with Grap's (1926) findings. The values obtained by us for bilirubin in horses are lower than those of Wirth (1934) who reported 1.7 mgms. %.

Our observations support that of Martino (1933) and Coffin (1947) that there is complete absence of reticulocytes in the horse.

To have a complete blood picture of the mules, these estimations must be made on animals kept under plains conditions also.

Summary.—The haematological findings from ten mules are reported. The significant differences between mules and horses are detailed.

Acknowledgments.—We are thankful to the staff of the Veterinary section of this Institute for their immense help in the collection of blood. Our thanks are due to Mr. S. Sen for the statistical analysis of the data.

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SHARK LIVER OIL IN POULTRY FEEDING

BY

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The high cost of feeding, amounting to sixty percent of the total cost of production, is the major problem in poultry industry. During the summer months, in most of the states there is a scarcity of green fodder for the livestock. Poultry are mostly kept by poor peasants who normally have about ten birds in each household, and the incidence of disease conditions due to malnutrition in birds is not insignificant. In commercial farms also the situation is no better for during the summer months there is not only scarcity of green but also of yellow maize which is one of the rich sources of vitamin A supplement. Experiments were therefore conducted to determine the value of shark liveroil in poultry rations in providing vitamins A and B, which fortify the stock against losses due to certain disease conditions.

Chickens from pedigreed strains of white Leghorns and Rhode Island Reds were used in the experiments. Hatching and brooding were done artificially. Cleaning of the litter was done thrice a week to keep the birds free from coccidiosis. The birds were fed grain (*cheena*) and balanced mash supplemented with available greens, limestone grit and separated milk or meat offals.

Experiments

1. In December 1948, a total of 163 day-old chicks were reared for eight weeks under confinement and the mortality during the period was as follows.

Week No.	No. of deaths.
1	6
2	8
3	1
4	3
5	3
6	5
7	5
8	4
9	2

Laboratory examination of materials from the dead chicks revealed the incidence of coryza and fowl pox with lesions of vitamin A deficiency.

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Shark liver oil, supplied by the Government Oil Factory, Kozhikode, was incorporated in the dry mash (0.5 per cent) and fed to the chicks for a period of seven days from the sixth week onwards. The general appearance of the chicks showed considerable improvement within 72 hours after the feeding of oil, while the mortality stopped soon after the ninth week. The rate of growth and feathering appeared to be normal.

A total of 137 chicks of similar breeds and age maintained in an adjoining room were not fed with the sharkliveroil and served as control. The mortality among the control birds was as follows:—

Week No.	No. of deaths
1	2
2	2
3	5
4	3
5	19
6	28
7	15
8	2

The incidence of fowl pox, coryza and Vitamin 'A' deficiency was also recorded amongst these chicks. The growth rate was relatively poor and several of the chicks both males and females, appeared naked due to slow-feathering.

2. In December 1948, another lot of 126 chicks all day-old were transferred to a brooder house and the mortality among them was as follows:—

Week No.	No. of deaths
1	4
2	5
3	1
4	1
5	1
6	1
7	12
8	7
9	1
10	1

Cases of acute and chronic coryza were diagnosed in the dead and ailing chicks. Shark liver oil (0.5 per cent) was fed with the dry mash for three days during the eighth week with the result that the mortality stopped.

In another brood consisting of 195 day-old chicks to which no shark liver oil was fed, the mortality due to coryza and Vitamin 'A' deficiency was as follows:—

Week No.	No. of deaths.
1	4
2	5
3	—
4	3
5	1
6	3
7	4
8	18
9	14
10	2
11	7
12	3

As in experiment No. 1 the general condition of the chicks in the treated lot after recovery seemed better than in the control lot.

3. In the rearing pens cases of puffed up eyes due to Vitamin 'A' deficiency were observed during the hot summer months of 1949. Out of about one thousand chickens, fifty birds had to be killed. Vitamin 'A' assay of the livers of half a dozen of these cases revealed the main trouble is due to Avitaminosis 'A'. Shark liver oil in dry mash (0.5 per cent) was fed for seven days to the chickens in the pens after removal of the clinical cases. The trouble abated in severity within seven days of the administration of the oil. Prior to the occurrence of the symptoms of Avitaminosis 'A' there was paucity of yellow maize and green supplements in the ration, and the feeding of shark liver oil as a supplement in the poultry ration definitely helped to tide over a period when it was difficult to provide balanced rations.

4. *Greens Versus Shark Liver Oil.*—A total of sixty White Leghorn female chickens sixteen weeks of age were selected at random from the rearing stock and divided into two comparable groups. They were reared in confinement under similar conditions and maintained for sixteen weeks. During this period the body weight, sexual maturity and egg production for a fortnight in the beginning of laying were recorded.

Group 1 was fed balanced ration supplemented with available green at 2 oz per bird per day whereas the birds of group II received no greens and in its place shark liver oil was incorporated in the mash at one per cent, otherwise the feeding in both the groups was identical. The results were as follows:—

TABLE I
Control Group (with greens)

Age in weeks.	Average body weight per bird in oz.	No. of eggs per bird per week.	Average egg weight in oz.	Average food consumption per bird per day in oz.
16	28.23	—	—	2.17
20	38.17	—	—	2.63
24	46.65	—	—	3.51
28	59.03	—	—	4.01
30	59.91	2.18	1.69	3.83
31	62.55	1.59	1.79	3.22

TABLE II
Experimental Group (with shark liver oil)

Age in weeks.	Average body weight per bird per week.	No. of eggs per bird per week.	Average egg weight in oz.	Average food consumption per bird per day in oz.
16	28.10	—	—	2.17
20	35.98	—	—	2.75
24	44.16	—	—	3.11
28	57.92	—	—	4.08
30	64.50	1.50	1.77	3.83
31	65.20	1.46	1.77	3.17

The average body weight and food consumption data for the two groups were nearly identical. The birds in both the groups started laying at about the same time. As regards the laying performance during the period of fourteen days the average number of eggs laid by a bird in group 1 was 3.77 as against 2.96 in the case of group II. The birds had to be sold and therefore the experiment was discontinued. The colour of the shank was relatively pale in the shark liver oil group but as soon as the birds of either group were transferred to outside pens the yellow colour was restored in all the birds.

Egg quality studies were also made and the observations are given below in Table III.

TABLE III
Egg Quality studies.

	Group I (with greens)	Group II (with shark liver oil)
1. Average egg weigh.	29.18 Drams.	28.44 Drams
2. Yolk index.	0.4253	0.4224
3. Albumen index.	0.0838	0.0826
4. % Thin White.	27.81	29.16
5. Average shell thickness in mm.	0.3343	0.3183
6. Condition of Yolk.	Light yellow	Light yellow
7. Quality of albumen.	Clear	Clear
8. Total score.	Good	Good
9. Palatability test.	Good	Good
10. No. of eggs tested.	8	9

It will be seen from Table III that the percentage of thin white was slightly lower in Group I, while the average shall thickness of the eggs were slightly lower in the shark liver oil group, the rest of the factors, however, showed no significant differences.

Conclusion.—In view of these results, it is suggested that during the summer months shark liver oil may be incorporated in the poultry ration as a routine especially in all the large forms where losses due to coryzos, pox and other allied conditions amongst the rearing stock are quite common.

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PHENOTHIAZINE AND IRON THERAPY IN RELATION TO
HAEMATOLOGY OF THE SHEEP

By

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Introduction.—Ordinary Indian-bred sheep, aged between 2-4 years, have been used in this depot as vaccinifers for the manufacture of vaccine lymph. The sheep were supplied by a contractor from the districts of Bareilly and the neighbouring areas. In spite of a minute and careful selection of the sheep, post-mortem revealed a high percentage among them to be infested with helminths which markedly reduced their general vitality and haematologically produced a marked degree of anaemia resulting in a heavy post-scraping mortality. Helminths commonly found in sheep are *Haemonchus contortus*, *Paramphistomes*, *Oesophagostomum columbianum*, *Nematodirus* species, *Bunostomum trigonocephalum* and *Dictyocaulus filaria*. Of these *Haemonchus contortus* produces a marked degree of anaemia with no outward symptoms. An infestation rate of a thousand to fifteen hundred *Haemonchus contortus* was common among the sheep causing on an average a daily loss of 50 to 60 c.c. of blood which ultimately results in debility and death. Phenothiazine has been reported to be a valuable anthelmintic for eradicating most of the different intestinal helminths of sheep. Its action consists in killing the adult worms and making the ova non-viable. With a view to prevent infestation of the depot area with the helminths and to improve the general health of the sheep before vaccination it was decided to do mass scale de-worming with phenothiazine followed by iron therapy on subsequent days.

Method.—All sheep on arrival at the depot were given a single de-worming dose of 15 grammes phenothiazine which was followed by a daily dose of 10 grains of Ferrous Sulphate once daily during their stay in the depot. For the purpose of control, 10 sheep were not given any treatment.

Haematological studies.—Haematological examination provides an important aid in clinical diagnosis of anaemias. For the purpose of evaluation of the results the following tests were conducted:—

- Enumeration of cellular elements.
- Determination of haemoglobin percentage.
- Mean corpuscular haemoglobin.
- Erythrocyte volume per cent.
- Mean corpuscular volume in cubic microns.

All the above tests were at first carried out before starting the treatment and then after 12 to 15 days of administration of Phenothiazine.

Technique.—Venous blood was used for all the tests. The bleeding apparatus consisted of a needle fitted with a rubber tubing leading to a graduated test-tube. 10 per cent solution containing four parts of potassium oxalate and 6 parts of ammonium oxalate was used as anti-coagulant. 0.3 c.c. of this solution was used for every 10 c.c. of the blood. The anti-coagulant was placed in the graduated test-tube and then evaporated to dryness in hot air sterilizer.

Usually 15 c.c. of blood was collected from the jugular vein by venepuncture. The jugular vein was occluded by digital pressure immediately before inserting the needle to prevent any possibility of haemo-concentration. Immediately after collection of blood the test-tubes were shaken gently to mix the anti-coagulant and the blood.

Erythrocytic counts and haemoglobin determinations were done within an hour after the withdrawal of the sample. Each sample was thoroughly mixed by gentle uniform shaking before filling the red pipettes of the haemocytometer. Sahli's haemoglobinometer was used to determine the haemoglobin percentage. Red cell volume was determined by centrifuging 10 c.c. of blood in graduated centrifuge tubes for 40 minutes at 3,000 r.p.m.

Haematological values.—The results of all the tests carried out are tabulated in Table I. The figures for normal averages have been obtained from the Manual of Veterinary Clinical Pathology by David L. Coffin V.M.D.

Food and living conditions of all sheep under experiment and in control were similar throughout.

Discussion.—It will be seen from the table that the average erythrocyte count of the sheep under test was 7.04 millions per c.m.m. as compared to 7.425 millions per c.m.m. in the control group. The individual variation ranged from 6.1 to 8.3 million erythrocytes. The average haemoglobin in grammes per 100 c.c. of blood in the experimental group was 7.48 and 8.12 in the control group with individual variation of 5.6 to 10.5. Erythrocyte volume was 25 percent in the experimental group as compared with 28.1 in the control group with individual variation of 20 to 33 percent. Averages for the mean corpuscular haemoglobin and mean corpuscular volume were 10.53×10^{-12} and 35.5 in the experimental group as compared to 9.976×10^{-12} and 37.95 in the control group. It will be seen that the average figures of both the experimental and control group were almost identical indicating thereby that the haematological state of both the group were nearly the same.

TABLE I

	No. of sheep under test.	Erythrocytes in millions per c.m.m.	Haemoglobin (gms per 100 c.c.)	Erythrocytes volume %	Mean corpuscular haemoglobin M. C. Hb, gms 10^{-12}	Mean corpuscular volume in cubic microns.
Before treatment on arrival.	15	7.04	7.48	25.0	10.53	35.5
12 to 15 days after giving Phenothiazine.	15	8.56	10.09	32.8	11.7	38.3
Control on arrival.	10	7.425	8.12	28.1	9.976	37.95
12 to 15 days after their stay in the depot.	10	6.975	7.84	24.3	11.079	35.23
Normal averages.*	—	9.0-14.6	9.0-14.5	33-46	9-12	33-43

* Figures obtained from the Manual of Veterinary Clinical Pathology by David L. Coffin V.M.D. Page 118.

If there was any difference it was more in favour of the control group which showed a comparatively lesser degree of anaemia as compared with the experimental group. When the above averages are compared with normal averages given at the bottom of the table it will be seen that the animals were definitely in an anaemic state on their arrival as a result of parasitic infection as evidenced by positive finding on faeces examination.

It will be seen further that, after 12 to 15 days treatment with phenothiazine and subsequent iron therapy, the experimental group showed an average increase of 1.52 millions erythrocytes, 2.61 grammes per 100 c.c. of blood in haemoglobin content, 7.8 percent in erythrocyte volume, 1.17×10^{-12} in mean corpuscular haemoglobin and 208 cubic microns in mean corpuscular volume as compared with a decrease of 0.450 million erythrocytes, 0.28 gramme per 100 c.c. of haemoglobin, 3.8 percent in erythrocyte volume and 2.72 cubic microns in mean corpuscular volume in the control group in which no treatment was given after the same interval. The increase in the experimental group as a result of phenothiazine and iron therapy was definitely significant and the decrease in the control group was as a result of continued loss of blood.

from parasitic infestation inspite of the high altitude where, ordinarily, lower oxygen tension acts as a physiological factor to increase the red cells and the haemoglobin percentage.

It may be mentioned here that two sheep in the experimental group did not show any improvement as a result of the therapy because they were subsequently found to be suffering from parasitic bronchitis. Phenothiazine has no effect on *Dictyocaulus filaria* and *Amphistomes*. Among the treated sheep that died, post-mortem revealed massive infestation with paramphistomes.

F. H. S. Roberts and R. F. Rick have observed that in parasitic gastro-enteritis of cattle, animals manifesting severe symptoms of helminthiasis gave only low egg counts and some animals maintained a healthy appearance despite very high egg counts (Australian Veterinary Journal, Vol. 27 No. 1 Jan. 51). The present author has also found that egg counts in sheep were not very reliable indication of the degree of infestation in helminthiasis. Average total egg count in the untreated sheep was 800 eggs per gram which was reduced to an average of 300 eggs per gram in the treated lot.

Summary

(1) It has been revealed that there is a heavy helminthic infestation among a high percentage of Indian bred sheep as a result of which their general vitality is much lowered and they suffer from varying degrees of anaemia.

(2) Single dose de-worming with phenothiazine followed by subsequent iron therapy has a significant beneficial effect in the improvement of the anaemic condition and thereby general health of the sheep.

(3) Phenothiazine definitely reduces the egg count.

(4) Phenothiazine has no effect on the *Dictyocaulus filaria* and *Paramphistomes*.

(5) Egg count in the faeces is not a true index of helminthic infestation in the sheep.

Unfortunately further studies on the haematological values could not be continued as the animals were vaccinated for the production of vaccine lymph. It is presumed that further therapy would definitely improve the blood picture.

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CARCINOMA OF THE HORN IN BOVINES OF THE OLD BARODA STATE

BY

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Introduction.—The object of this paper is to place on record the observations made so far about the incidence of the so-called Cancer of the horn in bovines with special reference to its causal factor in the old State of Baroda which is now merged with the Bombay State.

Breed.—The disease has been found to be more common in the Kankrej breed of animals than in the Gir and other non-descript breeds of cattle of the Gujraht. The incidence is much less in cows and practically nil in the buffaloes. Either of the two horns may be affected, though, on rare occasions, both the horns may become involved.

Colour.—The colour does not play any significant part as the disease has been met with in animals of all colours.

Age.—Ordinarily, the disease is seen in animals over five years of age.

Seasonal incidence.—There is no seasonal incidence of this affection as cases are admitted for treatment throughout the year. More number of cases have been recorded in the winter and summer seasons than in the rainy seasons, probably due to the inability of the owners to bring their affected animals owing to their pre-occupation with agricultural operations during the rains.

Areas affected.—The disease has been observed in all the four districts of the State, but the Mehsana, Baroda and Amreli districts appear to be affected to a greater extent as could be seen from the following table showing the incidence of the disease in the year 1949,

No.	Name of the district.	Bovine population.	No. of dispensaries.	No. of cases of cancer of horn in bovines.		
				Treated.	Cured.	Discontinued or died.
1.	Navsari.	2,35,452	8	123	53	70
2.	Baroda.	3,03,831	10	432	123	309
3.	Mehsana.	7,01,830	12	680	220	460
4.	Amreli.	1,25,237	4	179	119	60
	Total.	13,66,350	34	1414	515 (36%)	899

Out of 1,414 animals admitted and treated at 34 dispensaries of the State, during the year 1949, 515 animals (36%) were cured; the rest of the animals either died or were sent to Panjarapoles. The percentage of cure has been mainly observed in animals that were brought for treatment in the early stages of the disease, i.e., when the base of the horn was not seriously affected. Of the total number of cases treated, about 95% was recorded in bullocks and about 5% in cows.

Shape of the horns.—The horns of the Kankrej breed of cattle are very symmetrical, big and massive, long and round, turning upwards with the tips pointing little backwards. In the case of the Gir breed, the horns are short and curved backwards sharply and then inclined forwards. The average thickness of the horn in the case of the Kankrej breed of animals is about 1/3 inch at the centre with a little increase at the base, whereas in the case of the Gir breed of animals, it is about 1/4" at the centre and a little more at the base.

Etiology.—There are strong grounds to suspect that this disease is of a traumatic origin. The common habit of trimming the horns appears to be a predisposing factor. With a view to get big and long horns of beautiful and uniform shape, the professional cattle breeders of Gujraht and Saurashtra such as Rabaris and Bharwads are in the habit of removing the external layer of the horns of bull calves when they are about 12 months old. This is done once, twice or even three times at an interval of about 12 months. Heifers are also sometimes subjected to this treatment up to their first progeny. This mal-practice weakens the natural resisting power of the horns and exposes them more to the ill-effects of injuries of a direct and indirect nature.

Injuries to the horn may be caused by fighting, rubbing and striking against any hard object such as walls, mangers, yokes, central poles, companion animals' horns, etc. While in yoke, either for road, plough or other purposes, the middle portion of the horn is liable to get

more knocks than the base or the tip of the horn. During action, the yoke rises up and down and the yoke and sometimes the central pole strikes against the base of the horn. Careless driving during acute turnings may also lead to frequent knocks against the horns, more frequently at the base and the middle portion of the horns. These repeated knocks or strikes may lead to inflammation and inflammatory changes terminating ultimately in the production of neoplastic growths inside. The horn itself remains apparently intact outside very often and the injury to the inside core is not suspected until the animal is noticed bleeding from the nostril of the same side as the injured horn. The horny core may have been injured or cracked or fractured and, as a result of it, the blood and inflammatory exudates collect in the hollow cavities of the horn and the sinuses of the head, gaining exit through the nasal passage of the same side.

It has often been suggested that this condition of the horn may be associated with deficiency of calcium salts and vitamins in the body. And, therefore, samples of blood serum collected from 23 affected bullocks of the Kankrej breed were sent to the I.V.R.I., Mukteswar, for determining calcium and phosphorous contents. The samples revealed that the inorganic phosphorous per 100 c.c. of blood was found to be practically normal (4.36 mgs.) whereas the calcium was much below normal (6.42 mgs.).

For comparative study, on a second occasion, samples of blood sera collected from 11 affected adult bullocks of the Kankrej breed as well as from 11 healthy adult bullocks of the same breed were forwarded to the I.V.R.I., Mukteswar, for determining calcium and phosphorus contents. These samples revealed that in each case—affected and non-affected—the inorganic phosphours and calcium per 100 c.c. of blood was found to be practically normal.

Symptoms.—31 cases (23 bullocks, 4 cows and one buffalo) of the so-called cancer of horn in different stages were studied in detail and the following observations were made. These cases have been classified according to their external appearances and internal findings.

External appearances:—First stage.—Frequent shaking of the head, rubbing the horn on some hard objects and/or striking it with the legs, slight bloody or slimy discharge from the nostril of the same side as the affected horn, lachrymation of the eye and slight bending of the horn—these are the early symptoms but, unfortunately, only rarely taken notice of by the owners.

Second stage.—The head is kept a little lowered or inclined towards the side of the affected horn, which is indicative of pain. There is a thick slimy discharge from the nostril of the same side as the

affected horn with dullness on percussion. The base of the horn is found hot and painful. The animal continues to feed as usual and no constitutional disorders are observed.

Third stage.—The above mentioned symptoms of the second stage are aggravated. In addition, the affected horn is clearly seen to be bent down. The head is further kept lowered on the side of the affected horn. There is profuse thick whitish discharge, sometimes tinged with blood, from the nostril of the same side as the affected horn. The base of the horn is found soft and yielding, hot and very painful. The animal loses appetite, becomes restless and emaciated. In more advanced cases, or in the later part of this stage, adjacent lymphatic glands are found inflamed. There is also inflammation of the temporal and parotid regions of the affected side and, many a time, one half of the head is found swollen. As the affection progresses, the horn becomes completely bent down and the base of the horn becomes more pulpy and flabby with or without a necrotic wound. The head is now kept lowered practically to the ground. The animal becomes very uneasy, loses condition rapidly day by day and gets weak and exhausted. In certain cases, corneal opacity and opthalmia have been noticed. In the worst cases, attacks of giddiness, circular movements, and leaning against walls of the byres with head low down, are generally observed. Finally, the horn-covering gets detached at the base and falls off, exposing the internal horn core full of granulomatous growths. The coronary band of the horn also is affected. Foetid material with debris oozes out of the exposed wound and gets easily fly-blown. Death occurs either from toxæmia, brain affection or other complications. Such cases are generally seen in Panjarapoles where they ultimately die.

These cases of cancer of horn are brought to the dispensaries very rarely in the first stage, commonly in the second stage, and occasionally in the third stage of the disease.

Internal findings: First stage.—As mentioned already, few cases are noticed in this stage by the owners and brought for treatment. When, however, a case is met with and the affected horn is cut across the root, no significant changes are found except severe congestion of the soft tissues covering the cavity. But when cut across the middle of the affected horn, soft cheesy-looking masses—degenerating horn tissues—are found in the centre of the horn core, although the sensitive portion of the horn appears intact and healthy. In the lower half of the horn and more towards the base, jelly-like milky fluid is noticed with a number of small globular bodies of whitish and yellowish colour, attached by their necks to the membrane of the bony meshes of the horn.

Second stage.—When amputated at this stage at the root of the horn, a good deal of haemorrhage takes place. The horn core is covered with growths of a cancerous nature and they are found firmly attached to the bony meshes. Above these growths and towards the centre of the horn, well-formed, ovoid and cyst-like lymphoid bodies of yellowish or whitish colour, in different sizes, often unattached, are found in large numbers; but when amputated at the centre of the horn, soft dust-like necrotic horny tissues evidently resulting from disorganisation of horny core, are found both in the centre and sensitive portion of the horn. How the so-called lymphoid bodies are formed is not exactly known, but probably they are the results of the injuries sustained by the horn directly or indirectly.

Third Stage.—When the horn is amputated in this stage at its base, profuse haemorrhage takes place and numerous cauliflower-like growths loosely attached to the bony meshes and soft vascular tissues are found. The proliferation of tissues is abundant at this stage. Just above these tumour masses and towards the centre of the horn, the bladder-like lymphoid bodies, bigger in size and larger in numbers, usually unattached and in torn condition, are noticed. The coronary band is often found separated and heavily damaged. When cut across the middle portion of the horn, deterioration of the horny tissues, in the form of extensive necrotic areas are found both in the centre and in the sensitive portion of the horn. In very much advanced cases the bony meshes are found in a disintegrated and degenerating condition due to constant pressure of necrotic and other effete materials. Blocking of natural passage results in inflammation of the surrounding regions. The irritant or toxic materials do not get proper drainage due to the obstructions in the lumen of the horn core as a result of which the toxic substances, effete materials and foreign bodies get lodged. Disorganisation of the original horn core takes place and cancerous growths appear which gradually increase in size and extent. They invade the sinuses, the bones of the head and also the cranial cavity and, by metastasis, even the internal organs such as liver, lungs, etc. The disease shows an obstinate tendency to recur and, after two or three attempts at excision of the growth, mortification of the bones of the head, takes place and the case becomes incurable.

Microscopical examination.—Materials such as nasal discharge, impression, contact and scraped smears made from tumour masses in their different stages from several cases of cancer of horn, on microscopical examination, did not reveal the presence of any parasitic, bacterial and helminthic infection. A few specimens of the above materials sent to the I.V.R.I., did not reveal anything significant.

Histo-pathological examination.—31 cases (26 bullocks, 4 cows and one buffalo) of cancer of horn in different stages were studied in detail and 48 specimens, including those collected from these animals, were forwarded to the I.V.R.I., for histo-pathological examination. The majority of the specimens were found to be "A squamous celled carcinoma with the presence of cell-nest bodies". The saw-dust-like necrotic tissue was found to be degenerating horn tissue (decalcified osseous tissue). The sections were examined for Rhinosporidia with negative results.

Cultural examination.—Swabs from cauliflower-like growths prepared from two cases of cancer of horn, when forwarded to the I.V.R.I., revealed Coryne-bacteria, pyogenous and micro-cocci, which may have no pathological significance.

Post-mortem examination.—Post-mortem examination was conducted on five bullocks and a cow that had died of cancer of horn. Out of these six cases, post-mortem findings in two cases—one in a cow and the other in a bullock—were important and interesting.

Bullock.—A few cauliflower-like growths were detected at two places in one of the lungs and these were sent to the I.V.R.I., for examination. They revealed the features of "a squamous-celled carcinoma with typical cell-nest bodies". This appears to be a genuine case of metastasis from the horn to the lungs.

Cow.—In this animal, the air sinuses, outer layers of bones of the cranial cavity of the affected side, liver and lymphatic glands were found affected. Materials found (1) in the liver and (2) sinuses (3) pieces of affected brain and (4) a few affected pieces of bones of the cranial cavity sent to the I.V.R.I. revealed the following.—

(1) Degenerated echinococcus hydatid cyst (2) Advanced squamous-celled carcinoma with presence of excellent cell-nest bodies (3) evidence of meningitis and (4) congestion and rarification respectively.

Additional observations.—(1) As a result of enquiries made at several places, it has been found that, in the majority of cases, the owners do not know that there was injury to the horn due to external violence. The only history available from the owners is that there was a slight bleeding from the nose and that the horn had started bending downwards by itself. (2) In regard to the period between the injury and the appearance of the cancer, it is difficult to say; but a period varying from 3 to 12 months, depending upon the nature of injury appears to be necessary for the appearance of the growth. (3) It has been observed that in cases that had been admitted in the advanced

second and third stages of the disease, the appearance of the cancer was almost certain in the majority of them whereas, in cases in the first stage or in the beginning of the second stage, amputation and treatment with usual antiseptic dressings, prevented cancer formation and the animals got cured. (4) In certain cases recurrence of cancerous growths was noticed in spite of their surgical removals at several times. (5) In rare cases both the horns were found to be affected simultaneously.

Summary.—31 cases (26 bullocks, 4 cows and one buffalo) of cancer of horn in different stages were studied and 48 specimens including a majority collected from those animals were forwarded to the I.V.R.I., for histopathological examination. The histopathological examination has revealed the growths, in a majority of specimens, to be "a squamous celled carcinoma with the presence of cell-nest bodies".

Cultural examination of the materials collected from these cases did not reveal the presence of organisms of pathological significance. Post-mortem examination conducted on one bullock and cow revealed metastatic growth in the lungs and sinuses.

Microscopical examination of materials did not reveal anything significant.

From the investigation so far conducted, it has been found that injury to the horns, direct, or indirect, is responsible for the production of the growths though, in the majority of the cases, history of an injury is not available.

The practice of removing the external layer of the horns of bull-calves, when they are about 12 months old, weakens the natural resisting power of the horns and exposes them more to the ill effects of the injury. The period between the injury and the appearance of the cancer, it appears, varies between 3 to 12 months depending upon the nature of injury.

The inorganic P. and Ca. contents per 100 c.c. of blood of affected and non-affected animals were found practically normal.

As regards causation of this condition, nothing could be said definitely at this stage. The condition as it is seen to-day appears to be due to irritation set up as a result of injury to the horns directly or indirectly.

Prevention.—Dehorning of cattle while they are young is the best way to avoid this condition. Horns should be protected by a leather case or cover thick enough to offer less chances to the effects of injuries to the horns. More important than this is that the practice of removing the external layer or paring of the horns should totally cease.

A NOTE ON THE PREVALENCE OF CONTAGIOUS ABORTION IN RAJASTHAN

By

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Polding (1948) in his report after a wide survey of the country about the incidence of Brucellosis in India has mentioned that random tests made in villages in Rajputana States showed a few doubtful or weakly positive reactors and he attributes the absence of the disease to the arid nature of the country. Hashmi (1945) carried out agglutination tests in the Military Dairy Farm, Nasirabad, and found 3 out of 4 cows tested giving positive reaction. He traced the incidence to a village in Ajmer, where, a similar test revealed the disease in 10 out of 14 animals. These cows were reported to be of Gir breed and it is not known whether this particular herd of cattle was brought from their home tract of Saurashtra or bred locally. Shankarnarayan (1949) carried out agglutination tests with serum samples received from cases of sporadic abortion in Ajmer State and only once he recorded a positive case. Besides these minor records, no other records of incidence of Brucellosis in any part of the wide area comprising the present United States of Rajasthan has ever been reported; hence, according to Polding's report, Rajasthan was being considered as free from Brucellosis.

I consider these remarks require modification in the light of subsequent information. No doubt the conclusions arrived at by Polding that the disease is absent in arid dry regions may be a fact but, in the present set up of the State, Rajasthan is comprised of not only arid regions, but wet regions and irrigated fields also. Udaipur Division, major portion of Kotah Division and a fair portion of Jaipur are wet lands, hence not coming under the description 'arid north west', so much so, according to Polding himself, that part of Rajasthan which is wet should have conditions present as in other parts of the country where this disease is prevalent.

I am of opinion that it is only due to the absence of organised Veterinary Department in the previous States and the natural conservatism of the villagers towards any organization which is new to them that cases of abortions were not reported and hence not known. Kotah Division with its numerous rivers and rivulets, jungles and marshy places and with a rain-fall on an average never below 30" and with extremes of climate exactly fits in the description given by Polding of a suitable region for the dissemination of Brucellosis and it is in that Division that the disease is now reported in the form of an outbreak.

Early in 1951, the District Veterinary Officer, Kotah, reported cases of spontaneous abortions among cows in a herd owned by the Thakur of Thungani, a village adjoining the Kotah-Bina Railway line. The history as reported by the Thakur Sahib was as follows:

In his herd consisting of 200 animals, abortions continued for the last 4 years and he got very few calves from the herd; these too were from old cows. All his cows had aborted twice or thrice and in most cases the foetus, as he estimated, was about 4-5 months old. According to him a female calf was added to his herd about 4 or 5 years before this occurrence and this calf aborted first in 1948, followed by abortions in other animals. Curiously enough the dam of this particular calf had no history of abortion and actually belonged to one of the villagers of the same village; but her earlier history is not known.

The village is situated on a river bank; the river, although not flowing in summer, is always having wide water logged areas in its bed, many of which are as large as 'Talab' or ponds with weed-grown banks offering an excellent breeding ground to molluscs and Tabanids. This rivulet like many other rivulets in Kotah has its source in the Aravali hills in Udaipur Division which fact should not be lost sight of in arriving at the source of infection. Another fact which is no less important in tracing the source is that, as Rajasthan is a surplus area for livestock, animals seldom enter Rajasthan from other states at least to this particular area. Hence the only possible conclusion is that Brucellosis is present in both Kotah and Udaipur Divisions and a detailed survey of these places is necessary before Rajasthan is declared free from this disease.

In Thungani village I carried out quick agglutination tests on 15 animals selected at random and all the serum samples gave positive results beyond doubt. The test was repeated with the same results. With a view to study the extent of infection I visited some of the surrounding villages viz. Banda, Dharampura and Jeswan, wherefrom villagers reported cases of abortions. Agglutination test carried out in one case gave a positive reaction.

The prevalence of Brucellosis was reported to the Veterinary Investigation Officer, Rajasthan and I visited Thungani again with him. The agglutination test was again carried out on 12 animals selected at random and the Veterinary Investigation Officer confirmed all the 12 as positive for contagious abortion. The reaction was controlled by an agglutination test carried out at Jaipur with the serum of a healthy cow, one of the cases attending the hospital, and it was negative.

One interesting fact should be mentioned before finishing this record. The herd consists of, besides cows and bulls, a few she-buffaloes also which are in close contact with the infected cows, graze with them, paddocked with them and fed with them; but the buffaloes were regularly calving and no case of abortion has been noticed in them. Since the owner was not willing to spare his buffaloes for testing, it is very much regretted that it was not possible to carry out agglutination test on them.

I have great pleasure in thanking Sri Kishore Singh, District Veterinary Officer, Kotah, for reporting the incidence to me and for giving valuable help during the course of this enquiry. I am indebted to Sri Shankarnarayan, Disease (Veterinary) Investigation Officer, Rajasthan, for the confirmation of the disease and help given in the preparation of this report. My thanks are also due to Sri G. S. Rathore, Deputy Director of Agriculture (Veterinary Section) Rajasthan, for the encouragement and help in this enquiry.

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THE USE OF ANTIBIOTICS IN VETERINARY PRACTICE

By

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Acute Peritonitis is nearly always secondary and is invariably due to bacterial infection by pyococci, coliform organisms etc., by perforation of appendix, of peptic ulcers, or ulcers of small or large intestines or penetrating wounds of the abdomen or by foreign bodies penetrating through the stomach or intestines or it may be post-operative, due to sepsis through a surgical wound e.g. Castration (in horses), Laparotomy, Hysterectomy, Ovariectomy etc. According to Wallis Hoare and Russell Greig, it is generally a fatal affection in horses and dogs.

Since the discovery of many of the chemotherapeutic drugs and antibiotics such as Sulphonamides, Penicillin, Streptomycin, Aureomycin, Chloromycetin, Terramycin etc., the mortality rate in man has considerably decreased.

The knowledge of the relative value of the newly invented antibiotics e.g. Penicillin, Aureomycin, Chloromycetin and Terramycin and their effect on cases of acute peritonitis in dogs is of great importance in veterinary practice.

With this object in view, the effects of these antibiotics were observed experimentally on dogs by the author.

Procedure.—Dogs and bitches supplied by the Mandi Municipal Committee were used for experimental observations. The weights of these animals varied from 20 to 40 lbs. No special pre-operative preparations were made for these dogs, except that morphia, 1/3 grain, was given subcutaneously about half an hour before the operation, chiefly to control these animals. The hair on the abdomen was shaved and the site of operation was disinfected by the application of Tincture of Iodine. All the dogs were anaesthetised with open aether method.

Taking strict aseptic precautions, the abdomens were opened, right or left, parallel to the linea alba and 2 to 2½" long incisions were given by one carefully drawn stroke over the skin. Then the underlying muscles were divided carefully up to the peritonium, which was carefully punctured and divided by holding up the peritonium on either side with fixation forceps. The intestines were then pulled out and the caecum caught hold of, was kept outside and the intestines were pushed back into the abdominal cavity. The base of the appendix was ligated tightly with silk sutures after tying the blood vessels below the base. Thereafter the lumen of the appendix was opened by giving longitudinal incision from the tip of its base downwards up to the site of ligature. Generally there was quite a large amount of faeces in the opened lumen of the appendix. The tip of this opened and evascularised appendix was then held with a pair of artery forceps and after it had been taken into the abdominal viscera, the faecal matter was thoroughly smeared around inside.

Following this, the abdomen was closed layer after layer with silk sutures, applying continuous sutures to the peritonium, the muscles and interrupted sutures to the skin layer. No drainage tubes were applied. Finally the sutured wound was covered with a pad of cotton wool soaked in Tincture Benzoin Co. and bandaged in the usual way. Every dog in the series was given 50 c.c. of castor oil through a large catheter immediately after the operation in order that the acute diffuse peritonitis created by the operation might become much more diffuse and fatal as emphasised by Zintal *et al.*

The conditions thus produced are ideal for the development of a wide spread multi-bacterial acute peritonitis.

Usually all the dogs regained their consciousness within an hour or so, some having regained it just after operation. They were given milk and water for about five days which they took voluntarily, except in a few cases where tube feeding had to be restored to. Thereafter,

they were given their regular diet. In some cases, which did not pass faeces, light warm soap-water enema was given to relieve constipation in some cases glycerine was used in place of soap-water.

About 6 to 8 hours after operation, the patients showed the typical signs and symptoms of acute peritonitis viz pain evidenced by cries, tense abdomen painful on palpation, arched back (crouching attitude), vomitions, short accelerated respiration, fever, loss of appetite etc.; in the case of controls, tympanic condition of the abdomen. During the course of the treatment no other medicines by way of supportive therapy were given, except the antibiotics already mentioned viz Pencillin, Aureomycin, Chloromycetin and Terramycin to the individual groups of animals in the series, keeping 5 controls.

Postmortem was performed in the case of those animals which died in the hospital. The lesions found in those cases were typical of acute peritonitis—the intestines bloated with gas, offensive in odour; highly thickened and congested condition of the peritoneum, intestines and other abdominal organs. The appearance of the peritoneum was dull and lustreless and the opened end of the appendix necrosed. In some cases, adhesions of intestines were found. A sero-sanguinous exudate of foetid odour in the abdominal cavity was also found.

Sixteen dogs were operated upon and diffuse peritonitis was produced in the way mentioned above. The distribution for treatment with one particular antibiotic was arranged as under:—

- (a) Five dogs were kept as controls.
- (b) The first group of 4 was treated with Aureomycin.
The second group of three dogs was treated with Chloromycetin.
The third group of one dog was treated with Penicillin.
The fourth group of three dogs was treated with Terramycin.

Doses:—

- (1) Aureomycin 25 mg. per kilogram body weight in 24 hours by mouth i.e. one capsule after every six hours for 8 days.
- (2) Chloromycetin: 50 mg. per kilogram body weight by mouth i.e. 2 capsules 6 hourly for 10 days.
- (3) Penicillin G: dissolved in sterile distilled water 50,000 units 4 hourly for 8 days.
- (4) Terramycin: the same as Aureomycin for 6 days except in one case in which it was given for 12 days.

Results.—Vide table appended.

Table showing results of experimental procedure.

S. No.	Body weight.	Procedure adopted.	Treatment given.	Result.	Postmortem report.	Remarks.
1. Male.	32 lbs.	Peritoneal cavity contaminated with opened and evascularised appendix (see text).	Nil.	Died on 2nd day.	All lesions of acute diffuse peritonitis found.	Control group.
2. Female.	36 lbs.	do.	Nil.	do.	do.	do.
3. do.	30 lbs.	do.	Nil.	do.	do.	do.
4. Male.	28 lbs.	do.	Nil.	Died on 5th day.	All lesions of acute diffuse peritonitis with gangrene of the appendix found.	do.
5. Female.	30 lbs.	do.	Nil.	Died 10 hrs. after operation.	All lesions of acute diffuse peritonitis found.	do.
6. Male.	24 lbs.	do.	Penicillin G Aqueous 50,000 units 4 hourly.	Recovered after 12 days.	No autopsy.	Had a very stormy course.
7. Female.	30 lbs.	do.	Chloromycetin 50 Mg. per Kilogram body weight orally.	Recovered after 10 days.	No autopsy.	Course fairly stormy.
8. Male.	32 lbs.	do.	do.	do.	do.	do.
9. Male.	28 lbs.	do.	do.	Died on the 3rd day.	All lesions of acute diffuse peritonitis.	—
10. Male.	34 lbs.	do.	Aureomycin 25 Mg. per k.g. body weight orally.	Recovered after 8 days.	—	Fairly smooth course.
11. Male.	28 lbs.	do.	do.	do.	—	do.
12. Male.	32 lbs.	do.	do.	do.	—	Had vomitions on first 2 days.
13. Female.	30 lbs.	do.	do.	Recovered on 6th day.	—	Had smooth course.
14. Female.	28 lbs.	do.	Terramycin 25 Mg. per K.G. body weight orally.	Recovered in 6 days.	—	Smooth course.
15. Male.	34 lbs.	do.	do.	do.	—	Fairly smooth course.
16. Male.	34 lbs.	do.	do.	Recovered in 12 days.	—	The course was somewhat stormy.

Control Group.—As would be seen from the table all the control dogs died from within 1 to 5 days. Three died within 24 hours. On postmortem, lesions already described were found (See Temp. chart Fig. 1)

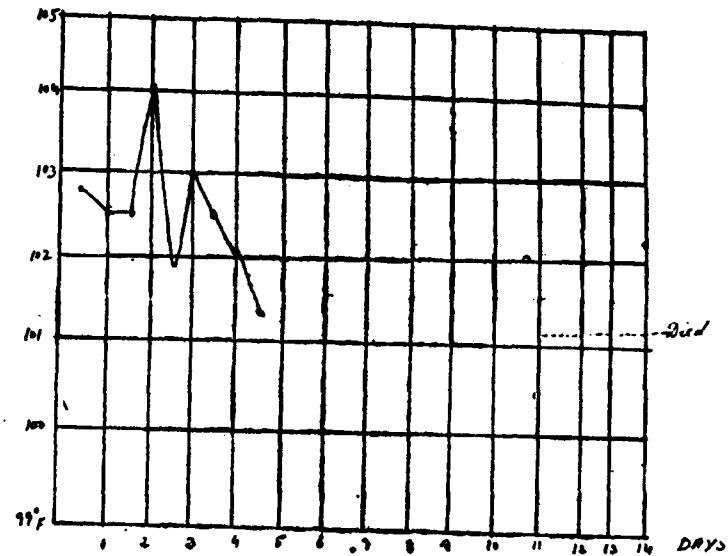


Fig. 1

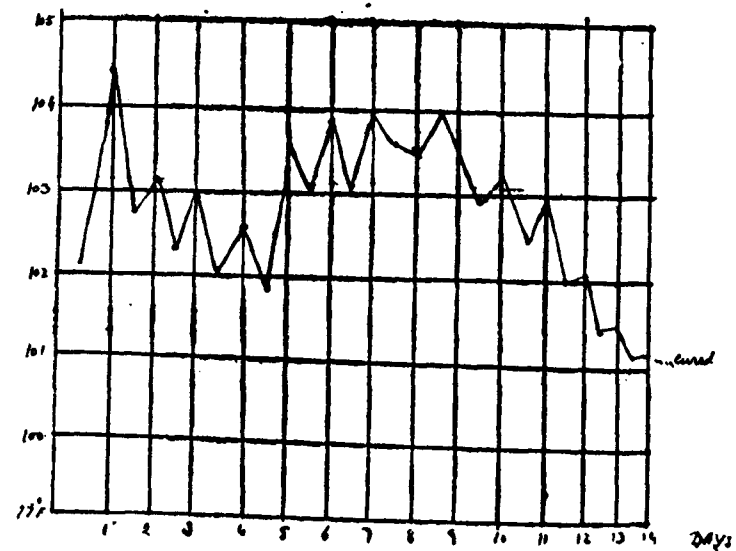


Fig. 2

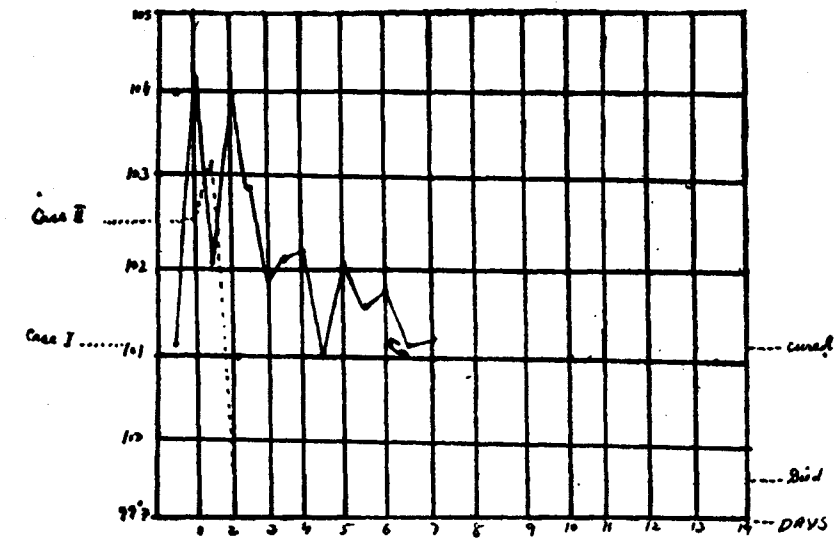


Fig. 3

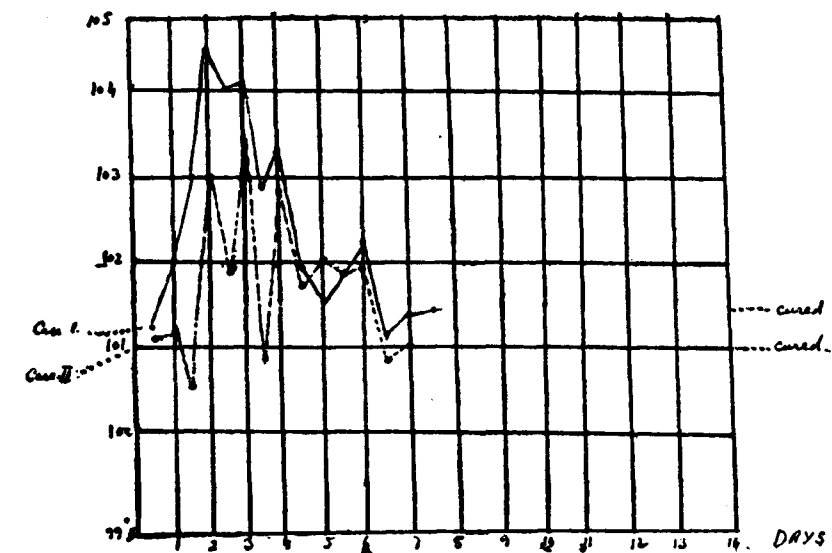


Fig. 4

Penicillin Group.—Only one dog was used for treatment with Penicillin because of its efficacy having been established already and also being a matter of routine practice.

From the temperature chart Fig. 2 it is clear that the case was prolonged and remained acutely ill, because of acute diffuse peritonitis for about 12 days, although finally it survived.

Chloromycetin Group.—Three dogs were used. Two survived and one died on the third day of operation. Its postmortem showed peritoneal cavity full with foul gas and serosanguinous fluid. Peritonium was thickened and oedematous, thus showing that the dog had died of acute diffuse peritonitis.

The surviving dogs had a fairly stormy course after operation although they recovered completely on the 10th day. Temperature record of one is given in chart Fig. 3

Aureomycin Group.—This antibiotic was tried on four dogs all of which recovered completely within 8 days without any special complications except a few vomitions in the case of one patient.

They were active and showed bright appearance from within 3 to 4 days and they had much less of distension or the tenderness of the abdomen. The temperature record of one is given in the chart Fig. 4 for comparison.

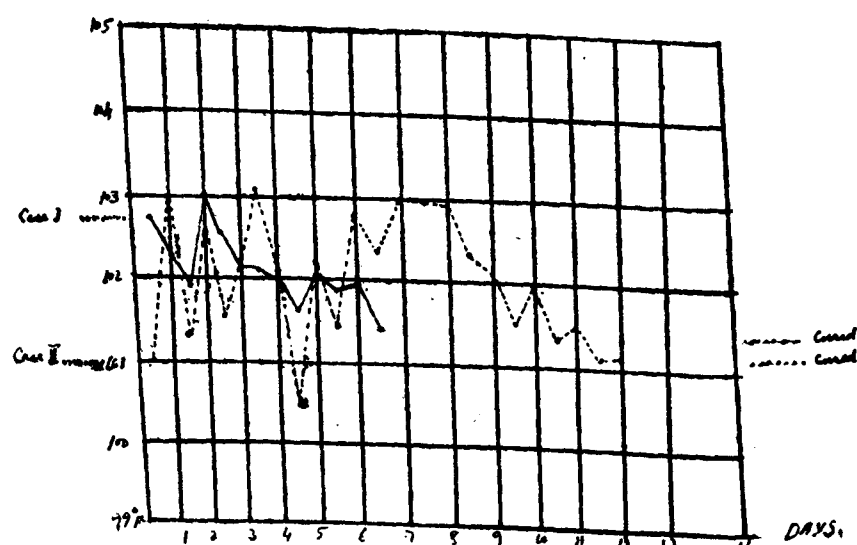


FIG 5

Terramycin.—Three dogs were treated with this antibiotic. The 4th i.e. the control with this group died within 10 hours after operation although, immediately after operation, it looked bright and in good active condition. The postmortem lesions confirmed the acute peritonitis. Two out of the three other dogs treated with Terramycin completely recovered within 5 to 6 days. The third had some stormy course, but finally recovered in 12 days. For comparison the temperature record of one of them is given in chart Fig. 5.

Summary

Experimentally acute peritonitis was produced in 16 dogs. Out of these, 5 were used as controls, all of which died within 1 to 5 days. Three were used for Chloromycetin out of which two survived. One treated with Penicillin survived after a prolonged course of treatment. Out of the four used for Aureomycin all recovered within 8 days. Three were used for Terramycin. Out of these two recovered within five days and one in 12 days.

It is, therefore, concluded that Aureomycin and Terramycin are equally the best antibiotics for the treatment of acute peritonitis in veterinary practice. Also they can be used to produce maximum abdominal antisepsis before or after an operation demanding opening of the abdominal cavity.

Acknowledgments

My thanks are due to Dr. K. N. Udupa, M. S.; F.R.C.S. (C) Civil Surgeon, Mandi, for the initial impulse given by him in conducting these experiments for the study and observation of the effects of antibiotics supplied by him free of charge. My thanks are also due to the staff of the Civil Medical Hospital, Mandi, for the help rendered by them.

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SPLEEN-WEIGHT IN RELATION TO BODY-WEIGHT IN GOATS

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While working on the production of Rinderpest Goat Tissue Virus Vaccine (Goatis), it was found that the weight of spleen of Indian goats was much less than that recorded by foreign authors. Ostertag and Wilcox (1907) mentioned that the weight of spleen of sheep and goats was about 60 gms. Martin (1947) reported the weight of spleen of goats at one year of age to be 2 ounces. Furthermore it was found difficult to estimate approximately the number of doses of vaccine that a reacting goat would yield on destruction. The goats at the time of purchase were selected on consideration of their age. Such physical examination did not give dependable results. It was thought that the body weight of the goats might give some reliable indication of their spleen weight. Thus data was collected from 134 such goats and analysed statistically to draw inferences on the following points:

- (1) Average weight of spleen in Indian goats.
- (2) Correlation between body-weight and spleen-weight.
- (3) Regression of body-weight on spleen-weight with a view to evolve a formula on the relationship between body-weight and spleen-weight in goats.

Methods and Material

The goats used for the manufacture of Goat Tissue Vaccine at the Vaccine Institute, Dagshai (Simla Hills) were examined for the purpose of this study. All the goats included in this experiment belonged to the same age-group, viz., 9 months to 1 year. These goats before being destroyed were weighed by a spring balance and their body-weight recorded in pounds. The weight of spleen from each goat was determined in grammes.

Two-way frequency table was constructed and co-efficient of correlation between body-weight and spleen-weight was calculated.

Observations

- (1) *Average weight of spleen.*—Observations recorded on 134 goats showed a wide variation in their spleen-weights. The minimum weight

SPLEEN WEIGHT IN RELATION TO BODY WEIGHT IN GOATS

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TABLE I
Showing correlation between body-weight and spleen-weight.

Showing correlation between body weight and spleen weight.																	
Assumed classes.	-4	-3	-2	-1	0	1	2	3	4	5	6	7	Frequency.				
													(X)	(Y)	(Z)	(W)	(V)
Body weight in lbs.																	
Actual classes spleen wt. in gms.	22-24	25-27	28-30	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57					
-6 15-17				1											1		
-5 18-20			2	1	1										4		
-4 21-23	1	1	2	1	1										6		
-3 24-26		2	3	-	2	1									8		
-2 27-29			7	6	6										20		
-1 30-32	1		6	9	5	2									22		
0 33-35			7	4	3		4						1		19		
1 36-38			1	3	4		1								9		
2 39-41			2	1	7										10		
3 42-44			2	3	4	1	2								12		
4 45-47			1	1	2	1	1	1							7		
5 48-50				1	2	1	1								5		
6 51-53			2	2											4		
7 54-56				1	1		1								3		
8 57-59			1	1	1		1								3		
9 60-62															1		
Frequency (x)	2	3	36	35	39	6	11	1	-	-	-	1			134		

Y (Spleen weight in gms.)

recorded was 16.7 gms. and the maximum was 59.9 gms. A majority of these goats had spleen-weight ranging between 25 to 45 gms. The average weight of spleen of this age-group of goats worked out to 35.26 gms.

(2) *Correlation between body-weight and spleen-weight.*—For this purpose, table I was prepared:

From the above table, the coefficient of correlation (r) between body-weight and spleen-weight worked out to 0.29. The significance of (r) (0.29) was calculated by the calculation of $t_{(132)}=3.38$, which had a very small probability. The coefficient was, therefore, found to be very significant. This result indicates that body-weight is a good indication of the spleen-weight.

(3) *Regression of body-weight on spleen-weight.*—From no: 2 above, it is concluded that the weight of spleen is dependent upon the body-weight. Taking body-weight (X) as the independent variate and spleen weight (Y) the dependent variate, coefficient of regression (of Y upon X) was worked out. Regression coefficient by X calculated as 0.64 was found to be highly significant by analysis of variance.

In order to find out the nature of relationship between these two factors a test of linearity of regression was made by means of analysis of variance given in Table II below:

TABLE II
Analysis of variances.

Source.	Sum of squares (S.S.)	Degree of freedom D.F.	Mean square (M.S.)	Fisher's Ratio. (F. Ratio).
Total.	1337.135	133		
Within Y arrays.	1149.336	122	7.6133	
Between Y arrays.	187.799	11		
Linear regression.	118.336	1	118.336	15.54**
Deviation from linear regression.	69.463	10	6.9463	0.912

**stands for highly significant.

Since the calculated value of F. Ratio for the "Deviation from linear regression" in the above table is not significant, it is inferred that regression does not depart significantly from linearity (Fig. 1). This indicates that spleen-weight invariably varies with body-weight.

With a view to express the linear relationship between the body-weight and spleen weight, equation of regression was calculated. The relationship is given by the formula:

$$Y = 14.17 + 0.64 X$$

Where Y = expected value of spleen-weight in grams and X = observed body-weight of the animal.

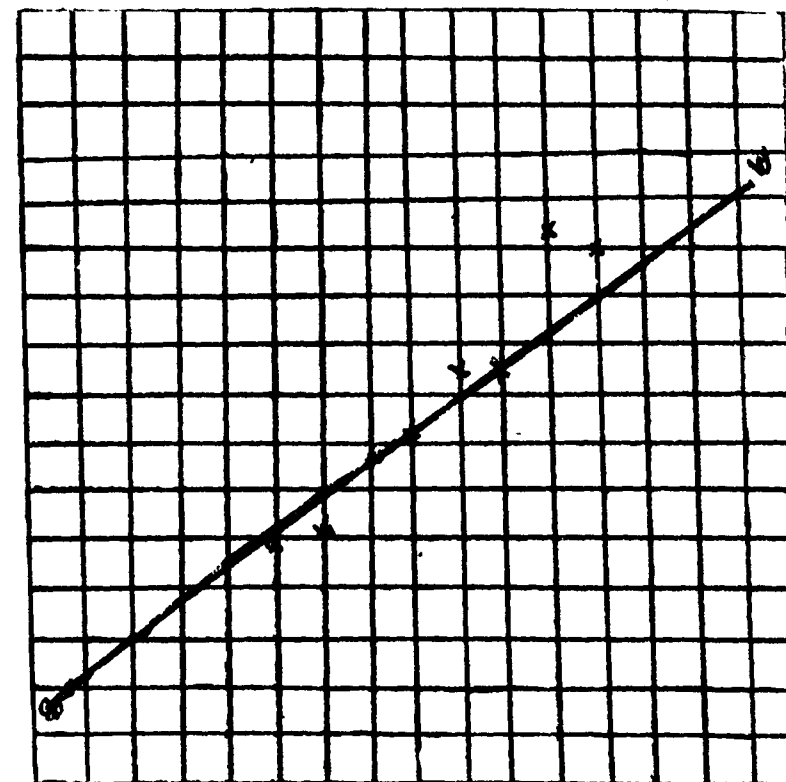


Fig. 1.

Discussion

Goats intended for the preparation of Goat Tissue Virus Vaccine "Goatis" are usually purchased on consideration of their age only irrespective of their body-weight. The above work is indicative of the fact that the weight of spleen depends on the body-weight of the goat. Thus if the animals of required age group are purchased on consideration of their body-weight and their price paid accordingly, an appreciable saving is likely to accrue in the production cost of the vaccine. The above formula would also help workers engaged in the production of "Goatis", meet demands of this vaccine by the field staff more accurately and would ensure fresh supplies of the vaccine.

Summary

A study of the spleen-weight in relation to body-weight in goats has been made with the following conclusion:

- (1) The average weight of spleen in Indian Goats is 35.26 gms.
- (2) The body-weight in goats is a good indication of spleen-weight.
- (3) The formula $Y = 14.17 + 0.64 X$ is recommended for determining the spleen-weight of Indian goats.
where Y = expected value of spleen-weight in grams.
and X = observed body weight of the animal.

Acknowledgments

The authors are thankful to Shri K. N. Vali, M.A., St.C., Statistician Directorate of Land Records, Pepsu, Patiala (formerly Statistical Assistant at the Govt. Livestock Farm, Hissar) for statistical analysis of the data presented in this article.

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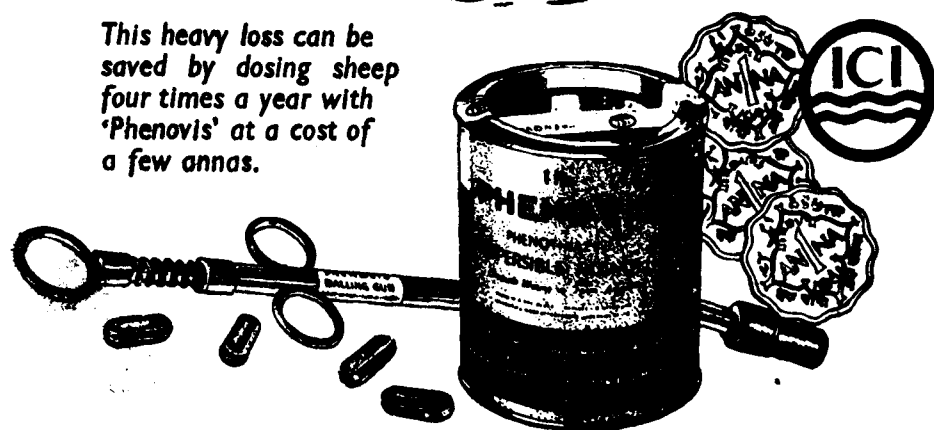
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THE
Indian Veterinary Journal

(The Journal of the All-India Veterinary Association)

Vol. XXIX

MARCH, 1953

No. 5

Editorial

A GREAT CO-OPERATIVE EFFORT

For the first time in the history of the veterinary profession in the East, a big forward step has been taken in the combating of contagious diseases of animals on a wide and extensive basis when an International Training Centre was opened at Izatnagar, Uttar Pradesh, on the 16th of February 1953 under the joint efforts of the F.A.O., and the Government of India. At this Centre trainees from the Eastern and Far-Eastern countries assembled together for a short course of intensive practical training on the latest methods of the manufacture of Veterinary Virus Vaccines as would be evident from the inaugural proceedings published in this issue. The training was given by the scientists attached to the F.A.O. and the Indian Veterinary Research Institute. This is a logical sequence to the efforts of the U.N.O., and its organisations like the F.A.O., which have been vigorously and enthusiastically evolving plans for the development of undeveloped countries all the world over. In these countries, the mainstay of the people has been agriculture which in itself is dependent upon an efficient Animal Husbandry. All the same, the health of the livestock has not been receiving in the past that amount of attention which it needed and the ravages from what obviously were preventable diseases were very great and the losses to the agriculturists enormous. This, in turn, made agriculture a precarious industry and it was even considered in many places as being uneconomic. This was all due to the neglect of animal health, Sir Thomas Dalling, the representative of F.A.O., at

Rome, who was also present at the inauguration at the International Training Centre, put his views on animal health very precisely and clearly in the following apt sentences.—“I am satisfied that, in any country in which agriculture is of economic importance, the health of the livestock is of paramount importance. To ensure this position, an active, well trained and well-equipped Veterinary service is an essential condition. I say this not only because I am a veterinarian, not only because others have told me, but because I have seen the position for myself”. It is this absence of an efficient veterinary organisation that has been responsible for the poor quality of livestock in undeveloped countries and this point cannot be stressed too much. Fortunately, this aspect, or rather this neglect of the animal health, is being sought to be rectified from a more realistic appreciation of the potentiality of the livestock wealth of the country. Almost the first thing in this regard is to eradicate contagious diseases. These have played havoc in the past with the animal population. Dr. Datta explained this point very briefly but very forcefully in his welcome address at the inauguration of the Training Centre in the following words: “One virus disease, the most dreaded rinderpest, causes staggering losses in livestock wealth every year. In India alone on a conservative estimate, at least 10 crores of Rupees is still being lost annually through the ravages of this scourge and this is in spite of the fact that we have at our disposal efficient vaccines for preventive measures against it. In addition the toll taken every year by other virus diseases like foot-and-mouth, rabies, Ranikhet, fowl-pox, etc., is also of considerable magnitude.” Efforts to combat these diseases on an individualistic basis by the affected countries have not been generally successful as these diseases never cared for the boundaries of countries and spread out with ease from one country to another. It is therefore very fortunate that veterinarians from adjacent countries met together in a great co-operative effort to eradicate diseases; we congratulate the sponsors who arranged for this Centre and we wish them all success.

Notes and News

Personal

Shri A. K. Verma, who went to the United Kingdom in February 1951, has now returned home after completing his studies in London. He has taken the degree of Ph.D., from the University of London, the subject of his thesis being ‘Medical and Veterinary Helminthology’. He has rejoined the Bihar Veterinary College.

Sri Harihar Saroop, B.V.Sc., I.D.D., in charge Civil Veterinary Hospital, Bassi, Pepsu, has been awarded by the Government of New Zealand a Fellowship for higher studies in livestock improvement under the Technical Co-operation Scheme for South East Asia. During his stay in New Zealand, which is for one year, he will get administrative and supervisory training in livestock improvement at Messay Agricultural College. He left for New Zealand early in February, 1953.

* * *

Animal Nutrition Committee.—The Animal Nutrition Committee of the Indian Council of Agricultural Research has been re-constituted, we learn, for a further period of three years from 1st of April 1953 with the following personnel:—Members by name: Dr. K. C. Sen, Director, Indian Dairy Research Institute, Bangalore; Dr. N. D. Kehar, Head of the Division of Animal Nutrition, I. V. R. I., Izatnagar; Shri V. Mahadevan, Lecturer in Animal Nutrition, Madras Veterinary College; Dr. H. S. Lakke Gowda, Nutrition Chemist, Mysore; Dr. Lal Chand Dharmani, Agricultural Chemist, Agricultural Department, Punjab, Jullunder City; Dr. S. K. Talpatra, Prof. of Animal Nutrition, College of Veterinary Science and Animal Husbandry, Mathura, U.P.; Shri P. M. Dabodghao, Asst. Agrostologist, Indian Agricultural Research Institute, New Delhi; Dr. V. N. Patwardhan, Director, Nutrition Research Laboratory, Coonoor; Shri H. R. Saini, Director of Agriculture, Punjab, Simla. Members by designation:—The Central Silviculturist, Forest Research Institute, Dehra Dun; The Officer-in-charge, Regional Nutrition Centre; The Livestock Expert, Bombay State, Poona; Director, I.V.R.I., Izatnagar, and Officers of the Council.

* * *

Hannover Veterinary College.—The Veterinary College of Hannover which is one of the oldest in Europe and certainly one of the largest Schools of Veterinary Science will have been in existence for 175 years in the year 1953. To mark this jubilee the Rector and the Senate of the College have decided to celebrate the historic occasion from July 29th to July 31st, 1953. The staff of the Hannover School wishes to deepen and reaffirm the scientific relationship and friendship that exist between the Veterinary Schools and the veterinary surgeons of all nations, and they therefore extend an invitation for this

jubilee, and to take this opportunity of meeting as many people as possible. As the XVth International Veterinary Congress is to be held in Stockholm (Sweden) in August 1953—it is supposed that many Veterinary surgeons will be coming to Europe, and therefore they could attend this celebration from July 29th to July 31st in Germany before proceeding to the International Congress.

Hannover is situated in the British Zone of the Federal Republic of Germany, and the city is easily accessible by car, rail or aeroplane from the large ports of Bremen and Hamburg; visitors from England travel via Hoek of Holland. (From a note issued by the Hannover School).

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Obituary

We regret to record the sudden premature death of Sri V. Subramanian on 1—3—53. He was Veterinary Assistant Surgeon in charge of the Veterinary institution at Singanallur in Coimbatore District. He was a very promising young man with a high sense of duty. It is unfortunate that his career is cut short at a young age.

THE MADRAS VETERINARY ASSOCIATION

Proceedings of the Tenth Provincial Veterinary Conference held under the auspices of the Madras Veterinary Association at the Madras Veterinary College on the 20th and 21st February 1953.

20th February 1953.

The Conference commenced at 10-45 A.M., in the 'Swarajya Hall' of the Madras Veterinary College which was tastefully decorated and presented a festive appearance.

The chief guest Shri Sri Prakasa, Governor of Madras, on arrival at the Madras Veterinary College at 10-30 A.M., was garlanded and introduced to the Members of the Reception Committee by Dr. I. M. Azizuddin, Chairman, Reception Committee. A group photo of the Reception Committee members with the chief guest was taken.

The following members were present:—

- | | |
|---|---------------------------------|
| 1. Swaminathan, R. (President of the Association) | 9. Balasubramanian, G. |
| 2. Rajagopalan, V. R. (President of the Conference) | 10. Balasubramanian, N. |
| 3. Azizuddin, I. M. (Chairman, Reception Committee) | 11. Balasubramanian, R. K. R. |
| 4. Alwar, V. S. | 12. Bharadwajan, C. |
| 5. Ananthapadmanabhan, T. | 13. Chandrasekharan Nair, K. P. |
| 6. Babu, E. V. | 14. Chalapathi Rao, M. V. |
| 7. Balakrishnan, S. K. | 15. Dandapani, M. N. |
| 8. Balaprakasam, R. A. | 16. De Souza, Bertie, A. |
| | 17. Ebenezer, George. |
| | 18. Ganapathi, M. S. |
| | 19. Gopalakrishnan, V. |

TENTH PROVINCIAL VETERINARY CONFERENCE, MADRAS, 1953.
RECEPTION COMMITTEE MEMBERS



FRONT ROW :
(L. to R.) K. S. Krishnaswamy, C. V. Padmanabhan, K. P. Chandrasekharan (Secretary), Bertie A. D'Souza, Dr. I. M. Azizuddin (Chairman, R.C.), R. Swaminatha Iyer. (President, M.V.A.), Shri Sri Prakasa (Governor of Madras), Hon'ble Sri V. C. Palaniyandy Gounder, (Minister for Prohibition), V. R. Rajagopalan (President), D. Pattabhiraman, G. Osman Khan, P. Srinivasa Rao, G. Krishnaswamy Mudaliar.

2ND ROW : G. Ramanulachari, C. T. V. Tiliak, A. Kalleppan, D. A. Victor, C. Bharadwajan, S. Sourirejan, G. A. Sastry, R. V. Hegde, F. D. Wilson, G. Balasubramanian, G. Venkatraman, M. S. Jayaraman, V. Venkatarayanan, O. Hanumantha Rao, M. K. Sreenivasan, C. K. Subbu Singh, K. Govinda Sastry, N. Kalyani.

3RD ROW : M. N. Dandapani, P. Satyendra Rao, K. S. Krishnaswamy, C. Krishna Rao, C. I. John (Jt. Secretary), I. D. Mantramurti, D. Sasibhushana Naidu, C. K. Velayudhan Nair, B. N. Rai, A. R. Vedanayagam, V. S. Alwar, (Treasurer), A. Kerim Khan, M. S. Ganapathi (Secretary, M.V.A.)

4TH ROW : G. Ebenezer, M. Muthugopal, V. D. Ratnam, C. V. Narasimham, T. Ananthapadmanabhan, M. V. Chalapathi Rao, M. Govindaraghavan, K. Thiruvankalaswami Pillai, M. N. Menon (Secretary, Show Committee), S. N. Thengaveilu Nadar.



Harihar Saroop, B.V.Sc., I.D.D.,
who was gone abroad from Pepsu,
for higher studies.



Dr. A. K. Verma, G.B.V.C., Ph.D. (Lond.),
Bihar Veterinary College, Patna,
who has returned from abroad after
higher studies.

- | | |
|-------------------------------|----------------------------------|
| 20. Govindan Nair, K. N. | 48. Rai, B. N. |
| 21. Govinda Sastry, K. | 49. Rama Rao, P. |
| 22. Govindaraghavan, M. | 50. Rangamannar, R. |
| 23. Hanumantha Rao, O. | 51. Ramanujachari, G. |
| 24. Ho. de, V. R. | 52. Ranganathan, R. |
| 25. Jayaraman, M. S. | 53. Sankaranarayanan, M. V. |
| 26. John, C. I. | 54. Sasibushanam Naidu, C. |
| 27. Kalyani, N. | 55. Sastry, G. A. |
| 28. Khan, Osman, G. | 56. Satyendra Rao, P. |
| 29. Khader, Abdul, S. G. | 57. Satyanarayanan, K. |
| 30. Kelappan, A. | 58. Sreenivasan, M. K. |
| 31. Krishnappa, K. S. | 59. Sreenivasa Rao, P. |
| 32. Krishnaswamy, K. S. | 60. Subbu Singh, C. K. |
| 33. Krishnaswamy, A. | 61. Sourirajan, C. |
| 34. Krishnaswamy Mudaliar, G. | 62. Sundaram, R. H. |
| 35. Krishna Rao, C. | 63. Thurley, |
| 36. Mariappa, D. | 64. Thiruvengadaswamy Pillai, K. |
| 37. Mantramurti, I. D. | 65. Thangavelu Nadar, S. N. |
| 38. Menon, M. N. | 66. Tilak, C. T. V. |
| 39. Michael, R. D. | 67. Tulasi Ram Singh, K. |
| 40. Nair, K. B. | 68. Umamaheswaran, V. |
| 41. Nagarajan, E. R. | 69. Vasant, K. |
| 42. Narasimhan, C. V. | 70. Vedanayagam, A. R. |
| 43. Natarajan, T. A. | 71. Velayudhan Nair, C. K. |
| 44. Padmanabhan, C. V. | 72. Venkatanarayanan, V. |
| 45. Panduranga Rao, V. | 73. Venkataratnam, G. |
| 46. Pattabhiraman, D. | 74. Victor, D. A. |
| 47. Ratnam, V. D. | 75. Wilson, F. D. |

Among the Visitors were Sri C. Palanisamy Goundar, Minister for Prohibition, T. Chengalvaroyan, Mayor of Madras, K. N. Anantaraman, I.C.S., Director of Fisheries, Dr. T. S. Tirumurti, V. R. Ramanatha Iyer, Mr. P. E. Penfold, Mrs. K. G. Menon, Dr. M. K. K. Menon, Asst. Director, King Institute, Guindy, Dr. V. Mahadevan, Dr. M. Dharmarajan, M. Anantaraman, Dr. V. Samuel, Sri B. Naganna, Mrs. A. Harris, Dr. Rajamanikkam, R. Venkataraman, Retd. R.O., R.D.V., R. Natesa Iyer, Retd. D. V. O., and P. A. Parthasarathy Naidu, Retd., D. V. O.

The proceedings commenced with a prayer by Sri R. K. R. Balasubramanian. Dr. I. M. Azizuddin, Chairman, Reception Committee, then delivered the following Welcome address :—

The Governor of Madras, Ladies and Gentlemen,

On behalf of the Reception Committee of the 10th Provincial Veterinary Conference, I have great pleasure in welcoming you to this assembly. I further take this opportunity of thanking you for the interest and support you have manifested in the Madras Veterinary Association by accepting our invitation. I would also like to express my own thanks as Chairman to those who had worked and are working for the Association, because, although I myself have done very little, a great deal has been done. Sri. A. Ramalinga Mudaliar, M. S. Sastry, T. Vinayaka Mudaliar, Pangal Sreenivasa Rao, R. Swaminathan and many others had worked nobly for the same cause.

We are very fortunate, indeed, in having Shri Sri Prakasa, the Governor of Madras, to inaugurate this Session. His presence is a source of great strength and encouragement to the Association. I might mention here, Sir, that there has been a very close link between your home Province of Uttar Pradesh and Madras from early times in matters pertaining to Veterinary profession for the Veterinary Associations of these two States were mainly responsible for the foundation of the All-India Veterinary Association in 1922 at Moradabad. To guide us wisely in our deliberations, we have Sri V. R. Rajagopalan, the Director of Animal Husbandry. To Sri T. Chengalvaroyan, Mayor of Madras and Sri A. B. Shetty, Minister for Public Health, who have kindly accepted to open the cattle and poultry shows and distribute the prizes respectively, our thanks are due for their great interest in our Association.

We are here this morning because we are of the opinion that the importance of Veterinary Science and the profession had never been put before the public in this country in any way comparable to that of Human Medicine. In spite of the fact that we pride ourselves as being a nation of animal lovers, the great majority of our people do not realise the absolute necessity which exists for urgent action to raise the level of health of our farm animals. The requirements of Animal Medicine and Animal Husbandry had never attracted the same public attention as those of Human Medicine. This in effect has been the cause of lack of benefactions for the development of the educational and research Institutes in the field of Veterinary Science.

I do not wish to trespass upon your time by recounting all that had been done by this Association in the advancement of Veterinary Science in this country, except to say that the Madras Veterinary Association has been doing excellent service to the Veterinary profession and its contribution to Veterinary journalism is invaluable since the day it undertook the great responsibility of bringing into existence the *Indian Veterinary Journal* and run it as the official organ of the All-India Veterinary Association. It has been running this *Journal* successfully for over a quarter of a century now.

Now let us consider for a moment the real meaning of Veterinary Science and its application to world problems. The most authentic definition is that "Veterinary Science is the branch of knowledge that deals with the Anatomy of the domesticated animals, their physiology and racial characteristics, their breeding, feeding and hygienic management, the pathology and treatment of their diseases and injuries, the improvement of stock, their relation to man with regard to inter-communicable maladies and to his use of their flesh and products".

It is not generally understood that the Veterinary profession all over the world has made important and substantial contribution to the world's requirements of food, viz., milk, meat, poultry and eggs. The Food and Agricultural Organisations' statistical surveys show the attempts of most countries to increase the present supplies of milk, meat, eggs, poultry, wool, etc. Veterinarians have played an important part in combating highly fatal livestock diseases which inhibit dairy farming. Better feeding, management, selective breeding, clean production and distribution techniques have increased the quality and quantity of milk yield.

Animal Diseases:—Among the outstanding livestock diseases which cause serious economic loss in India are Rinderpest, Haemorrhagic septicaemia, Black-quarter, Foot and mouth and Mastitis. But quite a few countries in the West have either eradicated or effectively controlled these diseases. Reports from Denmark show that abolition of Tuberculosis, Brucellosis and Foot and Mouth and control of Mastitis and better feeding of cattle have produced milk yields higher than pre-war levels. But what is the position in India? Well, all these diseases exist in all their aspects. No definite and reliable estimates are available of their economic importance and no concentrated and adequate steps have been taken to eradicate these diseases. In more advanced countries like United States of America and United Kingdom, fairly accurate estimates of what some of the important major diseases of farm livestock were costing the nation are available. In these estimates the Veterinary Associations of the countries concerned have played a very significant role. Efforts have, however, been made to roughly assess the loss owing to animal diseases on presumptive basis. The total annual loss due to mortality from infectious diseases alone has been estimated at Three Crores of Rupees. There are many other diseased conditions which though do not end in the death of animals, reduce their vitality and usefulness to a large extent. Thus it is clear that the problems facing the country are very many. But it is gratifying to note that the Five Year Plan includes a scheme for the eradication of Rinderpest.

Milk:—Efficient dairying and breeding demands that a cow shall give birth to a healthy calf every fifteen months and be in Milk for atleast 300 days in the year. If on the other hand the dairyman is obliged to keep a dry cow or one in low lactation he suffers an economic loss in direct proportion to the cost of maintenance before she again becomes pregnant. In addition he loses the potential profits of dairying over the same period of time.

At present diseases and their treatment impose heavy responsibilities on the Veterinarians in India. But the future demands research and field work in Nutrition, Hygiene and Breeding to step up the quantity and quality of our milk supply. The prerequisite to high milk yield is high fertility. Sterility in cattle in our country is a problem that requires to be studied in all its aspects. For its control, proper diagnosis, treatment, adequate balanced ration including trace elements and good management are essential.

The special significance of milk as a nutritive and protective food for children and adults is well realised. It has been estimated that the per capita consumption of milk in India is about five ounces only while the optimum as per nutritional standards is 16 ounces daily per person.

Smaller countries with a much smaller cattle population depend for their prosperity on their livestock. New Zealand and Australia, not only produce sufficient milk for home consumption, but also export large quantities of dairy products. If that were so, there is no reason why India with more than one-fourth of the world's total cattle population cannot do even better.

Development of pastures and growing of fodders for animals are of paramount importance in our efforts for increasing milk yield. These should not be lost sight of in our efforts to grow more cereals for human beings. Adequate supply of clean wholesome milk is essential for the maintenance of public health. The place of Milk Marketing Boards to achieve these cannot be over-estimated. These Boards besides organising the milk industry will ensure the quality of milk from the time it leaves the udder of the cow until it reaches the consumer. The Veterinary profession must pay adequate attention to these problems.

Meat:—In the production of meat, breeding and nutrition play an important role. Mineral deficiencies in diet of animals have been responsible for poor breeding results. Recent researches in South Africa, Australia, New Zealand and United States of America have shown that deficiencies of cobalt, copper, phosphorus and calcium have prevented breeding and growth of livestock in large tracts of land. One of the greatest contributions of Veterinary research to the world food production is the knowledge that deficiency of minerals causes sterility and impaired growth in livestock. Addition of cobalt and copper on otherwise sound land have produced amazing results.

While no definite information is available, there is reason to believe that there must be great areas in India which are deficient and which will respond to top dressings of various minerals. But it is a matter of urgency to note that this aspect of the question has not been

investigated in this vast sub-continent. We as a profession, believe that there is great need to take up special research programmes to investigate these nutritional deficiency diseases.

Now let me turn for a while to slaughter houses. Not only the quality of meat is poor but also the meat is often unsound due to lack of proper organisation of meat inspection. At present the majority of by-products viz., blood, bones, intestines, fats, glands, etc., are allowed to go as mere waste products. By the application of scientific knowledge there is much profit to be made by the technical handling of different by-products in the slaughter houses following slaughter. There is a great future in this way for the export of finished by-products in the meat industry. The glands and other organs should be utilised for the manufacture of pharmaceutical preparations, large quantities of which are at present imported. Blood can be converted into much needed and valuable protein supplement for animals.

The consumer has a right not only to demand food of good quality but food free from disease and infection. The prevailing insanitary conditions in our slaughter houses are appalling and a visit to such slaughter houses would induce many a visitor to become a vegetarian.

The solution to these drawbacks lies in the construction of modern abattoirs in every town and in the creation of a Veterinary Public Health Service, whose duty it will be to carry out proper ante-mortem and post-mortem examination of animals and their carcasses to ensure good and sound meat supply. To ensure proper inspection of meat and the utilisation of all products of animal origin, there appears to be a great need to have a separate section, viz., Bureau of Animal Industry, under the Animal Husbandry Department. The Veterinarians by virtue of their professional knowledge are eminently suited for this type of work. It is so in all the modern countries. They should also be entrusted with the task of inspecting fish and all preserved foods especially those of animal origin.

The efforts of the Veterinarians in the field of eradication and control of poultry diseases have borne excellent fruits and ensured conservation of the world's poultry and egg supplies. In India, though we have an efficient vaccine for Ranikhet disease control, we still have many other problems which await a satisfactory solution.

Animal breeding:—The role of the Veterinarian in the breeding and rearing of domestic animals is an important and arduous one. Sterility among cattle has been of late engaging our attention. But in order to correctly assess its incidence and elucidate its etiology, a large volume of material should be at our disposal. Until and unless

the owners call in the Veterinarians for pregnancy diagnosis and treatment for sterility, it is not possible to assemble and analyse the information. The Madras Veterinary College Hospital is paying increasing attention to this question. It is over a decade now since artificial insemination of cows was started in the Madras Veterinary College and today this method is very popular in the City of Madras and a few other large towns and key village centres. I must at this stage sound a note of warning, *viz.*, that artificial insemination of animals is at once an instrument for perfection or deterioration of breeding. Those entrusted with it should exercise the utmost care in using semen carrying the factors we require for production, *viz.*, milk, butter, wool or meat and ensure that it is free from infection. The advent of artificial insemination has created a real need for an efficient Veterinary-Gynaecological service. With the expansion of breeding programmes, the need for Veterinarians with sound knowledge and practical experience of reproduction becomes inevitable. This subject is now taught in most Veterinary Colleges as a part of Surgery. The extent of the subject is so vast that it is not possible for the teacher in Surgery or Medicine to do justice to his role as Gynaecologist. Therefore it is very essential that independent professorial chairs of Obstetrics and Gynaecology should be instituted in all the Veterinary Colleges.

Veterinary Education & Research:—Thus it is clear that the modern Veterinarian should be both “the physician of the farm and the guarantor of the nation's food supply”. Is the B.V.Sc. Graduate equipped to meet these factors? For my part, the answer is quite definitely “Yes”. The student entering the Veterinary course has had a good knowledge of the basic sciences of Chemistry, Biology and Physics. During his professional course of nearly five years, he acquires a sound knowledge of the structure, functions, diseases including treatment and prevention, management and feeding, breeding and rearing, etc. of many domestic animals. Thus his study covers an extremely wide field of Animal Medicine and Animal Husbandry. It is gratifying to note that attempts are afoot to standardise Veterinary Education in this country on the model of the Madras Veterinary College.

The Madras Veterinary College has had very good traditions and high standards. Many a distinguished alumnus has passed through its portals. The highly trained personnel on the teaching staff should be afforded greater facilities for research by sanctioning adequate funds. Since the College is the fountain head of learning, all her requirements should be met to enable her to open post-graduate courses leading to specialisation.

There is a real need for opening more research centres in the country. But the crux of the problem is the money necessary for such projects. While the Government should do its best, there is a great need for benefactions from the public. In Western countries there are many examples of private benefactors for Veterinary education and research. In the United Kingdom a few philanthropists formed themselves into a Trust called the Animal Health Trust, which today endows large amounts of money for scholarships and runs its own research institutes for cattle, horses, poultry and other livestock.

Before I conclude, Ladies and Gentlemen, permit me to emphasize that the prosperity of our country depends upon the prosperity of her livestock and in this the Veterinarian and the public have a full part to play. The untiring efforts of the Madras Veterinary Association to bring into existence the Indian Veterinary Council are well known to the profession. I hope and trust that by the time we meet next the Indian Veterinary Council will be a *fait accompli*.

As will be seen from the agenda of this Conference, the professional discussions will be devoted chiefly to those conditions which most seriously limit production of food for man and animals. By pooling our experiences and crystallising our plan of work, we shall contribute towards the prosperity of livestock industry.

I offer a most cordial welcome to those who have come from the mofussil. We shall do all we can to make your visit interesting and useful.

I have now great pleasure in requesting the Governor of Madras to inaugurate the Conference.

Shri Sri Prakasa inaugurated the Conference and addressed the gathering extempore as follows:—He said that he was happy to find that his home State of Uttar Pradesh and Madras had a close link in matters pertaining to Veterinary profession, in that they were mainly responsible for the foundation of the All-India Veterinary Association in 1922 at Moradabad. They were also alike in the poor quality of the cattle they possessed. It was good that representatives of the two States should come together from time to time in order to devise means of improving the matter. Like many other institutions in Madras, the Veterinary College was also a fairly old one. Looking into its history he found it had had to face several difficulties. He hoped that they would not be having many difficulties in the future.

Shri Sri Prakasa said, “Animals are our companions and are utilised by us in various ways. They are used for irrigation, agriculture, locomotion, etc., and as such they deserve our respect and services to

them in return." Most human beings, he said, would continue to use animals also for food. Dr. Azizuddin had said that the conditions in slaughter houses were appalling and visitors to them might well turn vegetarian. "Personally", Shri Sri Prakasa said, "I would welcome it, a vegetarian myself (*laughter*). I would like most human beings to be vegetarians. I shall, however, recommend it on this condition, namely, that there is more supply of food in this country." It was a curious thing that non-vegetarians ate vegetarian animals. They did not go in for lions and tigers (*laughter*). He wished they did. Goats had a rough time of it, every way. Because they ate up practically anything in the vegetable world, both the U. P. and Madras Governments were up in arms against them. Shri Sri Prakasa pointed out that animals quite often, formed the subject matter of good paintings. They were used as pets and were kept in Zoological Gardens for the children to see and enjoy, Shri Sri Prakasa mentioned that the Governor of Assam had promised a rhinoceros for the Madras Zoo.

Stressing that animals should be kindly treated, Shri Sri Prakasa said that they found that Europeans who were meat-eaters, generally, were far more kind to animals than vegetarians in India whose so-called kindness was a hypocrisy. In the towns the cow was milked to the last drop, and then when it became dry, was sold for being slaughtered. And yet they were the people who cried from platforms that our animals should be protected. The cattle wealth of the country would prosper only if they milked the cow within its capacity, fed it well and took care of it. Milk was an important food for children; that was why, from the earliest times; it had been included in vegetarian food even by the orthodox.

Need for pasture lands :—Stressing the need for enough pasture lands for the cattle to graze on freely, Shri Sri Prakasa said that the ancients left large tracts of Zamindari properties for cattle to graze on. In these days hunger and thirst for money had induced people to rent out pasture lands to tenants for the raising of crops which could get them money. Shri Sri Prakasa emphasised that sufficient pasture lands should be made available for cattle.

In South India, he said, they were having three outstanding breeds of cattle—Ongole, Kangayam and Hallikar. There was demand from outside countries for the Ongole breed. These good breeds should be preserved. It could be done only if they inculcated in the hearts of the people a true love for the animal kingdom.

Shri Sri Prakasa said that during his tour of the scarcity-affected areas of the State, one of the insistent demands he had heard

was for fodder. Veterinarians should devote their attention to the question of how to increase the fodder output.

Thereafter, Dr. R. Swaminatha Iyar, President of the Association, proposed Dr. V. R. Rajagopalan, Director of Animal Husbandry, to preside over the Conference and conduct its deliberations. In doing so, Dr. Swaminatha Iyer spoke of him as a worthy and eminent old boy of the Madras Veterinary College and mentioned in appreciative terms the services rendered by him to the profession. Dr. V. R. Rajagopalan rose amidst applause and delivered the following presidential address :—

Shri Sri Prakasa, Governor of Madras, Ladies and Gentlemen,

I thank the Madras Veterinary Association, for the honour it has done me in inviting me to preside over their Annual Conference. I consider it not only an honour but a privilege and duty for I realise, as the Head of the Animal Husbandry Department, that a meeting with the profession for the discussion of the diverse problems that confront us is bound to streamline and galvanise our common efforts towards the attainment of our goal. In initiating the proceedings of the Conference, I cannot, therefore, do better than give a brief account of some of the more important plans for the realisation of Animal Husbandry Development in the State.

A virile and cultured nation has attained its independence and is free to develop according to its genius and is striving to find its place among the comity of nations. We are, therefore, planning and working hard for all-round development. The only impediment is lack of funds and resources. But these cannot impede the progress of a nation which is determined to advance. The country has to advance in several directions but the success will ultimately be measured by the standard of life attained by the common man. As about 80 per cent of our people are agriculturists, in the ultimate analysis, it is agricultural prosperity that will mark the progress of National advancement.

Agriculture and Animal Husbandry are indissolubly linked and there could be no lop-sided development of either. Any deficiency in one is bound to produce corresponding retardation in the other. This is universally accepted for reasons that are so obvious and it is not necessary for me to take time over it here. Animal husbandry men have, therefore, got a very great responsibility in shaping the destiny of the Nation. Animals contribute to human food directly through their produce and indirectly through efficient agriculture.

The paucity of food grains in the country during the post-war period necessitated an all out drive to produce more foodgrains. The

phenomenal effort put into the campaign in this country has very few parallels. But it should be admitted that animal husbandry development has not received adequate and equitable attention during this initial phase. Judging from current thoughts, it is evident this was not due to apathy, neglect or want of appreciation of the importance of the role of animals in the grow more food campaign. The deficiency in food grains was so acute that an all-out drive to bridge the gap became a "produce or perish" struggle. As animal husbandry development work could not yield quick and immediate results, it is understandable why this aspect of development did not receive the same immediate treatment. But everybody is aware that any fillip given to agricultural development, could not be sustained unless animal efficiency is secured. Modest beginnings have already been made for animal development as a long-range plan. It will be our responsibility to build on them on sound lines.

I propose to confine my remarks this morning for a brief discussion of the scope of some of the more important developmental schemes that we are called upon to undertake under the Five Year and related plans.

The Five Year Plan:—The strain of the World War II taxed the livestock resources of the State to the utmost and brought home to Government the necessity to develop the livestock of the State. The Post-War Reconstruction Programme envisaged the strengthening of the administrative set up of the department by the appointment of two Deputy Directors and a District Veterinary Officer for each district. In order to provide better Veterinary aid, both preventive and curative, it was programmed to have atleast one Veterinary Institution and a Touring Billet with a Stockman Compounder for each taluk. This was far short of the requirements but more could not be thought of on financial grounds. In order to stabilise the manufacture of biological products, a permanent habitation for the Serum Institute was found by taking over the Meat Dehydration Factory, Ranipet, situated on an extensive estate of 56 acres. The investigation of diseases of poultry and sheep and goats was provided for by the appointment of two Special Officers. On the developmental side, a cattle farm for a group of two districts was contemplated. Five officers of the department were also deputed for training abroad in special subjects.

Most of the above schemes were later on absorbed in the Five Year Plan and new schemes have also been included. The administrative staff of two Deputy Directors and the Supervisory staff of the District Veterinary Officers have been appointed and also the Disease Investigation Officers. The Serum Institute has since been

designated as Veterinary Biological and Research Institute with provision for research and production of additional biologicals. Six new Veterinary Institutions and seven Touring Billets have been opened. Five Cattle farms namely the Dairy cum Bull Farm at Visakhapatnam; the Combined Sheep and Cattle Farm in Bellary; a farm in each of the districts of Malabar, South Kanara and Trichy (Pudukottah) were opened. Opening of additional Farms has been held up due to paucity of finance.

Artificial Insemination of cattle which began on a small scale in the City has been extended and additional Centres have been opened at Coimbatore, Guntur, Annamalais and Ooty. The value of this technique as a measure to relieve the paucity of good bulls has been amply demonstrated especially at Madras and Coimbatore. Within a short period, these Centres have become very popular. Additional centres are to be opened at the rate of four per year.

The Ten Year Programme of land transformation:—The Ten Year Programme of land transformation initiated by the Government of India envisages the production of adequate superior male breeding stock through what is known as the Key Village Plan and the eradication of Rinderpest by intensive mass inoculation of all cattle.

The Key Village Plan:—The grading up of cattle in the field was first attempted by the issue of bulls to the ryots. On account of paucity of bulls, the result was inappreciable and there was no continuity in breeding work. It was, therefore, realised that unless the available bulls were concentrated in limited areas, there would be no appreciable improvement and the Key Village Plan was evolved by the Indian Council of Agricultural Research. A village or group of contiguous villages in breeding tracts having a cow population of about 500 would form a unit. Adequate number of bulls will be stationed in the area for the service of the cows either by natural service or by Artificial Insemination technique. The ten year programme provides for this State the establishment of 96 Key Villages with 24 Artificial Insemination Centres in the course of four years. During the current year 20 Key Villages with 7 Artificial Insemination Centres have been opened. Of these, two Artificial Insemination Centres are established in each of the breeding tracts of Kangayam and Ongole, two on the Annamalais for Sindhis and the other at Hosur for Hallikar. During the remaining years, more Key Village Centres will be opened along the periphery of the existing Centres to produce breeding tracts from which pedigreed bulls could be drawn for further development elsewhere.

The local Government, on their own account are running similar scheme in seven centres in Firka Development areas in order to augment the results. Each year five such centres are to be opened.

The other programme under the ten year plan is the eradication of Rinderpest. Rinderpest was a dreaded disease because it accounted for 50 per cent of the total annual losses in the State. The discovery of safe and cheap vaccines in recent years and development in technique permitting preservation of vaccine over a long period has opened up the prospect of complete eradication of the disease. That Rinderpest can be successfully controlled has been adequately demonstrated in this State. By systematic, timely and intensive vaccination, we have been able to eradicate the disease from fifteen contiguous districts in the Southern peninsula covering an area of about 70,000 sq. miles and containing over 16 million cattle. For the last five or six years, we have had no outbreak of Rinderpest in this area. The personnel of the Veterinary Department have to be congratulated for this outstanding achievement.

The prevalence of outbreak of Rinderpest in the other districts is brought about by the proximity of those districts to other States. The ingress of cattle through the numerous cattle routes on the land frontiers could not be checked. Common grazing grounds at the State border is another source by which the infection is kept up. A pilot scheme for the eradication of Rinderpest in these areas is under consideration. The Government of India have secured the services of two Food and Agricultural Organisation Experts, one for laboratory work and the other for field organisation in connection with the eradication plan. We, in this State, have also a Food and Agricultural Organisation Expert on the staff of the Veterinary Biological and Research Institute, Ranipet for the installation of equipment for the preservation of vaccines in freeze dried State. In the meantime, routine immunisation of animals in these areas has been intensified.

Control of other contagious diseases :—Attempts are being made to control other infectious diseases also besides Rinderpest.

Work of a fundamental nature has been made with reference to the control of Anthrax. Anthrax is a disease which appears in an endemic form year after year in the same locality and it has now been found that if animals in an area are vaccinated yearly for a few years, the area could be cleansed entirely of Anthrax. In this way, 20 villages which suffered visitations of this disease year after year have now been completely cleansed of the disease by the adoption of yearly vaccination.

If we have sufficient vaccine to go round and given the staff, Anthrax will be another disease which could be completely eradicated from the State. The department has already taken preliminary step for the production of Anthrax vaccine at the Veterinary Biological and Research Institute, Ranipet on a mass scale for use in the campaign.

Vaccinations against Haemorrhagic Septicaemia, Black-quarter and Brucellosis have also been intensified. Ranikhet disease of poultry which was at one time a serious menace to poultry has been brought under effective control through large scale vaccination.

It is proposed to establish a Clinical Laboratory in all the districts either at the Headquarters Veterinary Hospitals or at the Livestock Farms to facilitate quick diagnosis and prompt control of diseases under the Five Year Plan.

Community Project :—The villages numbering more than 5 lakhs form the backbone of this country though crippled at present by years of neglect. In order to rehabilitate the villages and restore them to the position they once held in the body politic, the community project has been conceived and launched. The idea is not a novel one but is only the Sarvodaya plan on which Gandhiji set his heart and soul. Under the project, there is to be an all-round development by the people's own effort with the minimum of external guidance and finance. Those of you, who are drafted to work the Veterinary aid and breeding centres in the protect area share a great responsibility. What was hitherto exclusively Government work has to be transformed into peoples endeavour and you will need all the faculties of head and heart to achieve the objective.

Better feeding and better cattle :—Gentlemen, I have enumerated briefly the more important developmental plans that have been formulated for animal husbandry development. If the breeding plans are faithfully executed, we should have quality cattle established in the land, provided they are fed adequately to enable them to express their inherited qualities. For the realisation of the proviso regarding feeding mixed farming practices are essential. It has been calculated that animals kept on land could yield as such return per acre—if not more—as crops could. The only condition, but a very essential one at that, is that the cattle should be really worthy. And in this rotational allotment, there is bound to be increased output both from animals and crops. India has been an agricultural and pastoral country from time immemorial and has a rich heritage of agricultural practices. Her people have realised the value of cattle to the extent of deifying it. Such a country should be an exporter of food and milk products instead of being an importer. Unfortunately owing to the increase of human

population and the encroachment on pasture lands and also owing to the importance attached to cash crops, the agricultural economy has been upset and mixed farming has not been adopted to the extent it should. It should be our earnest endeavour to correct this disturbed state in our agricultural plan and induce our farmers, shrewd observers as they are—to take to mixed farming more extensively and enrich both the land and the livestock.

In addition, we must utilise more fully our forest resources. At present, there is plethora of grass during monsoons and great scarcity during the summer. It should be our endeavour to preserve this grass during the glut season for use during the lean period. Conversion of the grass into hay and transporting it to scarcity areas has been found to be a very costly affair and consequently could not be tried on an extensive scale. But there is now a chance that this surplus grass can be utilised on the spot itself by a new scheme for cattle preservation about which mention will be made later. Rotational grazing and improving the water resources are other ways of utilisation of the forest grazing areas and these are constantly under the consideration of the Madras Forest and Grazing Committee.

Superfluity of cattle:—It has often been said that there is a superfluity of cattle in our country. This is true to a certain extent. In the past, it was necessary for the ryots to keep some extra cattle as an insurance against the ravages of contagious diseases which were periodically levying a heavy toll. This created other defects like under feeding and indiscriminate breeding both leading to lowered efficiency in performance. But now with our better control of epizootics, there is no need for the ryots to keep any cattle more than what is absolutely essential. The productive cattle will then have more adequate feed and fodder. With this object in view, a scheme sponsored by the Government of India known as the Gosamvardhan scheme has been launched. Liberal grants have been placed at the disposal of the Central Council of Gosamvardhan. Camps will be established in forest areas wherein the unproductive cattle will be stationed. By this process, practically all the useless animals are removed from the rural and urban areas. The result of this scheme will be shown in the better feeding of the remaining cattle and in their improved efficiency. As far as the State of Madras is concerned, a small beginning has been made and 2000 acres of forest land in the Perumalmalai Hills in the Kodaikanal Range have been selected for the location of a Gosamvardhan there.

For the implementation of these plans, it is essential that we should have properly trained personnel in sufficient numbers. We are fortunate in having a Veterinary College in the State from which we have been getting fairly adequate number of graduates if not the full

complement. The Veterinary College which was opened in the year 1903 was probably the first institution in India to institute the B. V. Sc. degree course. As elaborated in the welcome address of the Chairman of the Reception Committee, the College has been expanding steadily in all directions. It has been possible all along to absorb all the graduates of this College into the Animal Husbandry Department. But latterly, owing to financial limitations, there has been a check on our plans of expansion. It is my earnest hope that our finances will improve ere long and that we will be able to work out to our objective of having one Veterinarian for every 25,000 cattle.

Before I conclude, I must say a few words to the members of the profession. Most of you are graduates of the Madras Veterinary College and it follows that you have a degree of professional attainments rarely excelled elsewhere in the country. You are eminently fitted for all the varieties of tasks that may be expected of men employed in a progressive livestock department. There is full scope for the display of your talent. We have, fortunately, the *Indian Veterinary Journal* amidst us which has been functioning excellently well all along catering to our requirements and keeping the members of the profession up-to-date. It is the only *Journal* of its kind in the whole of India and it must be our earnest endeavour to record our findings and experiences in its pages and enrich our profession. I gratefully acknowledge the unstinted co-operation that has been extended to me by members of the profession both in and outside the department. I have need for continued support in increasing measure. At a time when the field extension plans are contemplated on a scale never before envisaged, the State is in the grip of acute financial stringency. There should be no set-back on this account. It is our duty to work up to a degree of efficiency so that maximum returns are secured with minimum expenditure. You have, therefore, to work with missionary zeal and expend every ounce of your energy for the fulfilment of the task that is entrusted to you. In this way, we shall demonstrate that, in the ultimate analysis, it is the human element and not money that makes all the differences between success or failure in any enterprise.

I thank you all, ladies and gentlemen, for your patient hearing.

After the Presidential address was over, Sri T. Chengalvaroyan, Mayor of Madras, declared open the Cattle and Poultry Show and said that, as part of national planning, there was need for a plan to rehabilitate animals. There should be extensive pasture lands, he said, and they must evolve a synthesis between the requirements of the people and the animal kingdom in this regard. The Mayor referred to the Tallathi Scheme now under the consideration of the Corporation for

utilising the sewage to grow what was called 'Gunica' grass. He added that the Corporation had been keeping the slaughter house in the City very neat.

After a vote of thanks proposed by Dr. I. M. Azizuddin, the gathering adjourned to the Show grounds. They went round the Show evincing keen interest in the exhibits,

The Delegates reassembled at 12 noon and elected the following members, proposed by Dr. K. B. Nair, to the subjects Committee :—

- | | | |
|-------------------------|----------------------------|---------------|
| 1. R. Swaminatha Iyer, | 10. D. Pattabiraman, | |
| 2. Dr. I. M. Azizuddin, | 11. O. Hanumantha Rao, | |
| 3. C. I. John, | 12. A. Kelappan, | |
| 4. M. N. Menon, | 13. Bertie A. D' Souza, | |
| 5. V. S. Alwar, | 14. G. Osman Khan, | |
| 6. I. D. Mantramurthi, | 15. G. Ebenezer, | |
| 7. G. Venkatratnam, | 16. M. S. Ganapathy, | |
| 8. P. Srinivasa Rao, | 17. K. P. Chandrasekharan, | } ex-officio. |
| 9. K. S. Krishnaswamy, | Nair. | |

The meeting then adjourned for lunch.

Stalls put up by the Imperial Chemical Industries (India) Ltd., and Larson & Toubro Ltd., invited the attention of the members of the profession and many members took keen interest in going through the exhibits.

Judging of animals of the Cattle and Poultry Show began at 2 P. M. Messrs. Bertie D'Souza, D. Pattabiraman, I. D. Mantramurthi, C. Krishna Rao and G. O. Khan judged the various categories of cattle, while Mrs. Fathima Basheer Ahmad, Sri H. Narahari Rao, Messrs. F. D. Wilson and V. D. Ratnam judged the poultry. For the Show the public contributed generously and the Government gave a grant of Rs. 200/-. There were 180 entries in cattle, majority of which were cross-bred and 150 fowls, consisting of a large number of Rhode Island Reds and White Leghorns. Silver cups costing Rs. 656-2-5 were given away as prizes.

At 5-45 P. M., the prize distribution function began. After prayer, Sri M. N. Menon, Secretary, Show Committee, presented a short report about the Show and requested Sri A. B. Shetty, Minister for Public Health, to distribute the prizes. The Minister spoke as follows before handing over the prizes to the winners :—

"The improvement of livestock is vital for the economy of the country. The organisers of the Show and the prize-winners deserve congratulations. Shows like this are valuable in encouraging owners of cattle to breed and rear cattle in a better way. They have a large

cattle population, but a large percentage of it is old and useless. How to manage these unservicable and unproductive cattle is a problem. Segregation has been suggested as one of the methods.

Regarding useful cattle the question is how to improve this. Better feeding and care are very essential. They have to raise fodder crops and improve pasture lands and grow various varieties of grasses.

There is next the question of scientific breeding. In the Key Village Centre, they have planned to provide for the production of breeding of pedigree bulls to improve the quality of cattle. They have a number of Key Village Centres in the State, but they are far below the requirements. They have also a few artificial insemination centres. This technique would be useful to India because of shortage of breeding bulls.

Next to feeding and breeding is the question of the control of epidemics. The Union Government have under consideration, a big scheme for eradication of Rinderpest. They have also a large quantity of vaccine for preventive inoculation. It is the duty of the Veterinarians to educate the public and persuade them to adopt methods of cattle improvement and I am sure, they are quite alive to this".

The prizes and certificates were then distributed to the owners of the prize winners along with a free gift of mineral bricks kindly given by the Imperial Chemical Industries (India) Ltd., to every prize winner. As the prize distribution was in progress, Shri Sri Prakasa, Governor of Madras, arrived and was seen to evince keen interest in the animals that had won prizes.

PRIZE WINNERS

Cattle :

1. Sindhi bull.	Con. Prize.	Hindu Office (4)	
2. Sindhi cow.	do.	R. Kuppuswami (37)	by Mrs. T. S. Manickam.
3. Ongole cow.	I Prize.	Chittibabu (39)	by Pasumarthy Cunniah Chetty
4. do.	II Prize.	Kuppuswami Naidu (163)	
5. do.	III Prize.	Shanmugham (172)	
6. do.	IV Prize.	Doraiswamy Naidu (138)	
7. Cross bred bull.	I Prize.	Balakrishna Pillai (226)	by V. R. Ramana Iyer
8. do.	II Prize.	Mangali Pillai (141)	by Season Sales & Services
9. do.	III Prize.	Kuppuswami Naidu (165)	
10. Cross bred cow	I Prize.	Mangali Pillai (143)	by Mrs. I. H. Chambers.

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11. do.	II Prize.	Shanmugam (126)	by A. R. Narasimha Chetty
12. do.	III Prize.	Mati Raghu Menon (64)	
13. do.	IV Prize.	Sriram Naidu (48)	
14. Local breed cow.	I Prize.	B. T. Sundarraj (117)	by Raghava Pillai
15. do.	II Prize.	Ramaswamy Pillai (55)	
16. do.	III Prize.	K. P. Manickam	
17. Calves. above 1 yr.	I Prize.	Joseph (12)	by Dhanraj Sowcar
18. do.	II Prize.	Mrs. Masilamani (51)	
19. do.	III Prize.	Srinivasan (119)	
20. do. below 1 yr.	I Prize.	K. Ubbaiah (179)	
21. do.	II Prize.	Dr. Sankaran (221)	
22. Art. Insemination calves.	I Prize.	Venu Naicker (88)	by V. Shanmugam
23. do.	II Prize.	Govindaswamy Naicker (20)	by M/s Larsen & Toubro, Ltd.
24. do.	III Prize.	Jaganadha Naidu (135)	
25. do.	IV Prize.	Vijayaranga Pillai (114)	
26. Grand Champion.	Ongole cow	Chittibabu (39)	by M/s Larsen & Toubro Ltd.

Poultry :

1. W. L. cock.	I Prize.	Balasubramanian (222)	by I. H. Chambers.
2. do.	II Prize.	do, (102)	
3. W. L. Hen.	I Prize.	P. Ramachandran (223)	
4. do.	II Prize.	Devarajan (161)	
5. do.	III Prize.	P. Mari (141)	
6. B. Minorca.	Con. Prize.	Gunasekaran.	
7. R. I. R. cock.	I Prize.	S. A. P. Prasad.	
8. do.	II Prize.	Mother Superior (201)	
9. do.	III Prize.	A. C. Manuel (219)	
10. R.I.R. Hen.	I Prize.	S. A. P. Prasad of Nandigama.	
11. do.	II Prize.	A. Raju.	
12. do.	III Prize.	Supt. Madras Zoo.	
13. L. Sussex cock.	I Prize.	S. A. P. Prasad.	
14. do.	II Prize.	Supt. Madras Zoo.	
15. L. Sussex hen.	I Prize.	Dorairaj.	
16. do.	II Prize.	Supt. Madras Zoo.	
17. Local breed cock	I Prize.	Ekambara Chetty (194)	by Appi Reddi
18. do.	II Prize.	Vajjiravelu (140)	
19. Local breed hen.	I Prize.	Kanniappan.	
20. do.	II Prize.	Jambulingam.	
21. do.	III Prize.	Miss. E. Dare.	
22. Champion bird	Light Sussex	S. A. P. Prasad	by M.V.A.S. Association.

The meeting terminated with a vote of thanks by the Show Secretary.

At 7-30 P.M., the Subjects Committee met and considered the resolutions received and drafted those that were to be placed before the General Body.

Saturday, 21st February, 1953.

The Proceedings began at 9 A.M., with Dr. V. R. Rajagopalan in the Chair.

Messages wishing success to the Conference that had been received from the following gentlemen, were read to the members, Sri M. S. Sastry, President, The All-India Veterinary Association, Bangalore, K. Venkataswamy Naidu, Minister for Religious Endowments, Madras, N. N. N. Manradia, Pattagar of Palayakottai, H. B. Shahi, Animal Husbandry Commissioner, U.P., Dr. P. M. N. Naidu, Director of Animal Husbandry, Mysore, Sri V. R. Phadke, Retd. Principal, Bombay Veterinary College, Poona, K. S. Nair, Professor, College of Veterinary Science and Animal Husbandry, Hyderabad-Dn., Rao Sahib M. Anant Narayan Rao, Retd. Lecturer and P. A., to the Principal, Madras Veterinary College, D. S. Laud, Retd. Superintendent of Markets, Bombay, Milat Chand Dadha, Madras, G. Sitaramamurty D.V.O., Kakinada, R. N. Govindaswamy, Retd., D.V.O., P. L. Narayana Rao, V.A.S., Elluru, M. Hanumantha Rao, V.A.S., Peddapuram, P. Subramanyam, V.A.S., Orathanad, V. Subbarama Rao, V.A.S., Narsapur, Aga Muhammad Shirazi, V.A.S., Yerragondapalem.

Thereafter, Dr. I. M. Azizuddin spoke on 'Sterility in Cattle', with the aid of a large number of lantern slides. He was followed by Dr. M. N. Menon and others.

The meeting adjourned at 1 P.M., for lunch which had been arranged by the Association.

At 2-30 P.M., the members reassembled and Sri V. S. Alwar, moved the following resolution:—

"Resolved to consider the business meeting of the General Body cancelling the programme on 23-2-53, in view of the arrival at Madras of the President of the Indian Union on that date and consequent engagements of some of the members of the Association therein."

The resolution was adopted unanimously.

Sri M. S. Ganapathi, Secretary of the Madras Veterinary Association, presented the following report of the Managing Committee of the Association for the period from 16-12-51 to 19-2-53.

This report relates to the period from 16-12-51 to 31-12-52.

Membership: Number on rolls on 15-12-51—108 (73 ordinary and 35 life). Number enrolled for the year 1952-46. 24 Ceased to be members and the number on rolls for 1952 is 130. (95 ordinary and 35 life).

Rao Bahadur Dr. R. Swaminathan was elected as President of the Association on 16-12-1951 at the Annual General Body meeting. The Managing Committee elected Sri M. S. Ganapathi as Secretary and Sri K. P. Chandrasekharan as Treasurer.

Activities

1. The Managing Committee met 7 times during the year.
2. Resolutions pertaining to the formation of the Madras Veterinary Council, the registration of Veterinary practitioners in this State, gazetting of all the Veterinary Surgeons in the Service of the State, and utilisation of the services of the Veterinary Surgeons by all the municipal authorities for the inspection of meat, slaughter houses, hackney horses and ponies which were passed at the Annual General Body meeting were sent to the authorities with suitable explanatory notes and it is a matter for regret that so far the Association has not been favoured with any replies for these representations.

3. Dr. I. M. Azizuddin and Sri M. S. Ganapathy were elected to represent the Association in the All-India Veterinary Association.

4. A condolence resolution was passed on the death of Sri M. R. Subramania Sastry, a former Secretary of the Association and the same was communicated to the members of the bereaved family.

5. It was resolved to extend all possible help to the proposed Golden Jubilee celebration of the Madras Veterinary College in 1953.

6. Steps were taken to conduct the Conference and an animal show during 1953.

7. A sum of Rs. 105/- was collected during year towards Panikkar Memorial Fund.

The accounts of the Association were audited by Sri I. D. Mantramurti and Sri M. Muthugopal. Consolidated statement of receipts and expenditure from 13-11-51 to 8-1-53 is appended.

Statement of Receipts & Charges from 13-11-1951 to 8-1-1953

RECEIPTS.		CHARGES.	
By	To		
Opening balance	191 6 11	Postage	23 11 3
Interest on Savings for 1951-52.	3 3 0	Remuneration to typist	22 13 0
Panikkar Memorial Fund	105 0 0	Stationery	3 8 0
Subscriptions	181 0 0	All-India Vety. Association affiliation fee	11 5 0
		Cooly charges	1 0 0
		Conveyance	0 8 0
		Coffee and tiffin for General Body and Managing Committee meeting	5 12 0
		Printing charges for circular appeal	11 0 0
		Printing charges for three letter heads	7 2 0
		Imprest with Secretary	7 11 6
		Bank balance	383 1 0
		On hand	3 2 6
	480 9 11		480 9 11

Audited by

M. MUTHUGOPAL,
J. D. MANTRAMURTHI.

M. S. GANAPATHY,
Secretary.

K. P. CHANDRASEKHARAN,
Treasurer.

The Managing Committee wishes to place on record its appreciation of the co-operation and facilities afforded by the Principal, Madras Veterinary College, for the working of the Association and the Editor, *Indian Veterinary Journal*, for his helpful attitude.

Sri V. S. Alwar moved the adoption of the report and Sri K. G. Sastry seconded it carried unanimously.

Thereafter, the following resolutions were moved and passed.

1. Resolved to place on record the deep sense of sorrow at the sad demise of Messrs. M. R. Subramania Sastry, V. Krishnaswamy, A. A. Subramaniam and Prakasa Rao. Moved from the chair and passed, all members stand.
2. Resolved to reiterate the following resolutions passed at the last general body meeting held on 16-12-51.
 - (a) Resolved to appeal to the profession for generous contribution towards Panikkar Memorial Fund as well as the Kailasamier Memorial Fund to enable the Association to institute Medals to be awarded by the University of Madras.
 - (b) Resolved to request the Government to expedite the formation of the Madras Veterinary Council and the registration of Veterinary practitioners in this State.
 - (c) Resolved to request the Government to gazette all the Veterinary Assistant Surgeons in the service of this State as has been done in the Medical and Public Health Departments.
 - (d) Resolved to request the Government to make it obligatory on the authorities concerned to utilise the services of the Veterinary Assistant Surgeons for the inspection of meat, slaughter houses, hackney horses and ponies as they are the most competent persons.
3. Resolved to approach the Government of India for the reintroduction of the Indian Veterinary Service along with the other proposed All India services.
4. This Conference notes with concern that in spite of the availability of veterinarians, the expansion of the Animal Husbandry department has been held up on the plea of financial stringency and submits to the Government that in the general interest of the country and for effectively implementing the Five Year Plan, it is absolutely essential to expand the Department until the objective of having one Veterinarian for every 25,000 head of cattle is achieved.
5. Resolved to request the Military authorities to select Veterinary graduates only as Commissioned Officers for their Remount and Farm sections as the Veterinarian is the fittest person in view of his intensive training in all the branches of Veterinary and Animal Husbandry sciences.
6. Resolved to request the Government to institute post-graduate courses leading to specialisation in various branches of Veterinary Science in the Madras Veterinary College.
7. Resolved to request the Government to institute a Professorial chair for Obstetrics and Gynaecology in the Madras Veterinary College.

The election of office-bearers of the Association for the year 1953 then took place.

Sri R. Swaminatha Iyer was re-elected as *President*.

The following members were elected to the *Managing Committee*:

- | | |
|---------------------------|---------------------------|
| 1. C. Bharadwajan, | 8. P. Srinivasa Rao, |
| 2. M. N. Menon, | 9. G. Venkataratnam, |
| 3. Dr. I. M. Azizuddin, | 10. K. S. Krishnappa, |
| 4. Bertie A. D'Souza, | 11. K. S. Krishnaswamy, |
| 5. K. P. Chandrasekharan, | 12. G. Osman Khan, |
| 6. A. R. Vedanayagam, | 13. D. Pattabhiraman, and |
| 7. V. S. Alwar, | 14. M. Muthugopal, |

Sri K. P. Chandrasekharan was elected *Secretary* from among the members of the Managing Committee.

The following were elected to represent the Association in the All-India Veterinary Association:—

1. Mr. Bertie A. D'Souza,
2. Dr. I. M. Azizuddin,
3. Secretary of the Association.

At the end of the General Body meeting, the members adjourned for tea.

At 4.30 P.M., the meeting was resumed and Sri D. Pattabhiraman, spoke on 'Key Village Schemes'. He was followed by C. K. Subbu Singh and others.

The President then delivered his concluding address and the Conference ended with a vote of thanks by Sri M. S. Ganapathy.

Reviews

Banham's The Veterinary Surgeons' Vade Mecum. Eighth Edition. W. A. GREIG, B.Sc., M.R.C.V.S. Publishers:—Messrs. Bailliere, Tindall & Cox, Ltd., London. Price 17s. 6d.

This well-known book which first appeared in 1887 under the name of 'Veterinary Posology and other information' has undergone considerable change in its present edition, which is the Eighth one, and has been given the present title of *Veterinary Surgeons' Vade Mecum*. That this new title is appropriate is evident from the fund of information available in its ten chapters. The first chapter on *Materia Medica* and *Pharmacology* is a brief one but detailed enough for a practitioner. It would have been better if some more information is

given in this chapter about the latest anti-biotics now in use. As it is, only penicillin is mentioned. The second chapter on Bacteriology and Parasitology is followed by chapters on Nutrition and Foodstuffs, Milk, Animals in Health, Notifiable diseases, Allergic tests, blood, urine and faeces and miscellaneous tables constants and formulae. On the whole, the publication is a very handy one, not only for the practitioner but also for the students and will be welcomed.

Introduction to Veterinary Therapeutics. By GEO. F. BODDIE, B.Sc., (Edin) M.R.C.V.S., F.R.S.E., Professor of Medicine, Royal (Dick) Veterinary College, Edinburgh. Publishers:—Messrs. Oliver and Boyd, Edinburgh. Price 15s.

The title of this book aptly describes what is contained in it. The author says in his preface that his object in preparing this book has been to present in a compact form the essential principles of Veterinary Therapeutics—a very laudable attempt indeed. The book is divided into two parts. The first part contains the elements of Materia Medica, just enough for the understanding or rather for the appreciation of the subject. The second part deals with the Principles of Therapeutics and, in this, the author discusses the actions and uses of drugs on the various systems of the body. There are also chapters in this part on hormones, vitamins, anti-biotics, anthelmintics, chemotherapy, physio-therapy, etc. There is thus quite a good deal of detailed information on Therapeutics in a very condensed form and we are sure the book will be welcomed by the profession.

ERRATA

Vol. XXIX, No. 4.

In the article on 'Guinea-pig husbandry' published in January 1953 issue of this *Journal* it is stated on page 338 that "Sulphamerazine 16% solution in drinking water helped in limiting the outbreak". The author says this should read "Sulphamezathine Sodium 16% solution".



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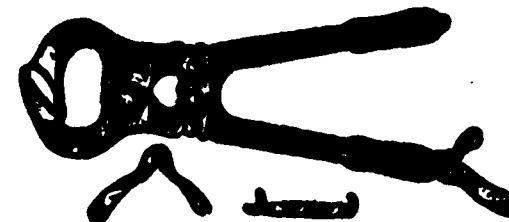
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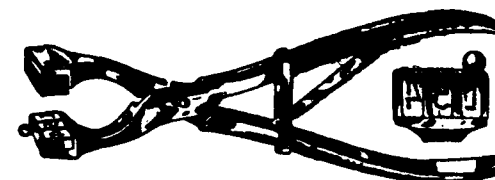
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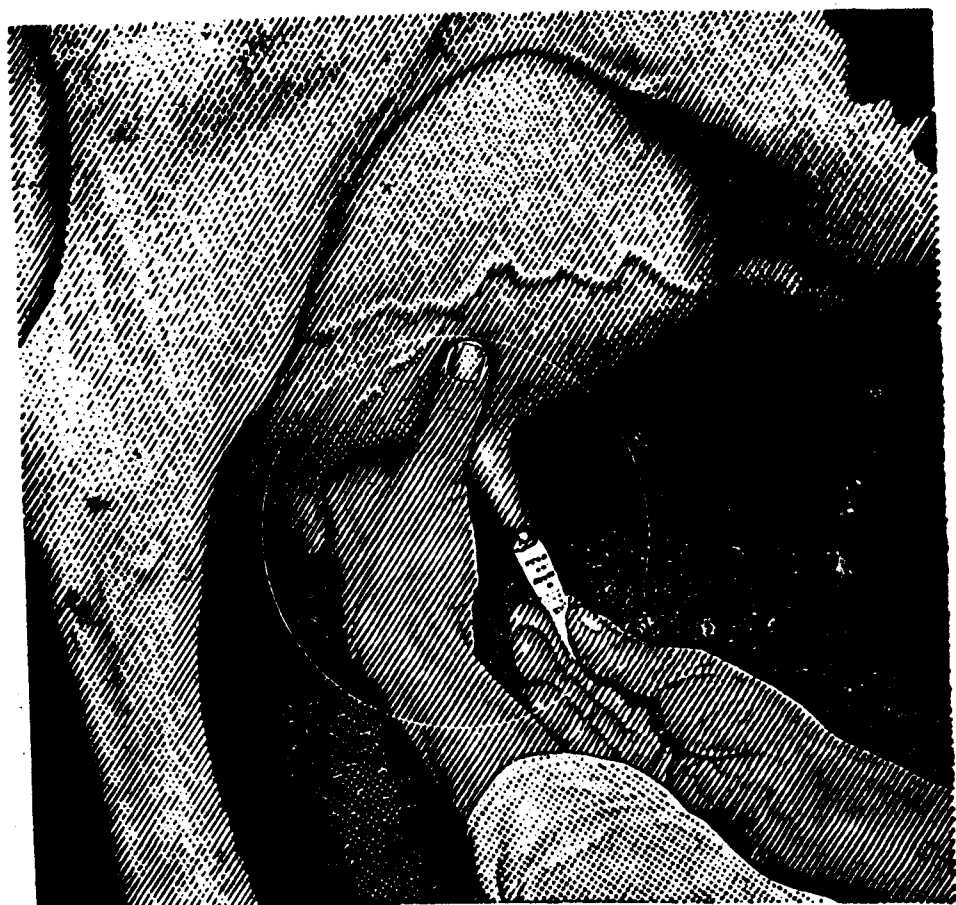
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