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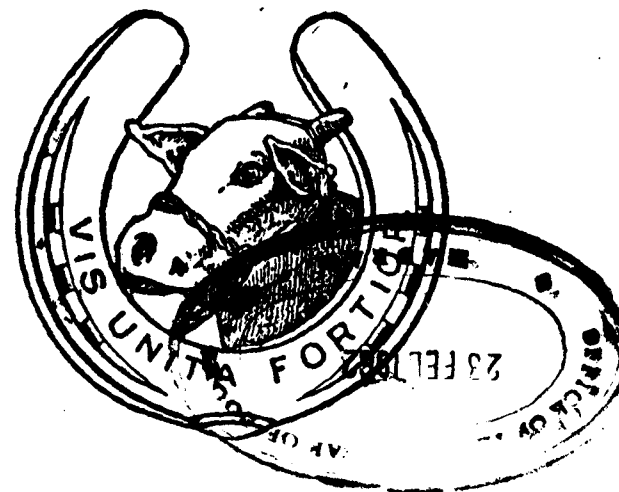
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THE INDIAN VETERINARY JOURNAL

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(The Journal of the Indian Veterinary Association)

*A Monthly Record of
Veterinary Science*



(ESTD. 1924)

OFFICE:

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Vol. 39

January, 1962

No. 1

THE INDIAN VETERINARY JOURNAL

[THE JOURNAL OF THE INDIAN VETERINARY ASSOCIATION]

PUBLISHED MONTHLY



A Monthly Record of Veterinary Science
Devoted to the cause of the
Veterinary Profession



EDITOR

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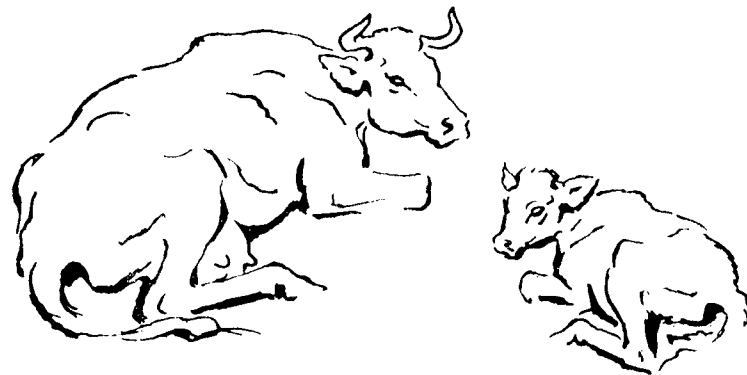
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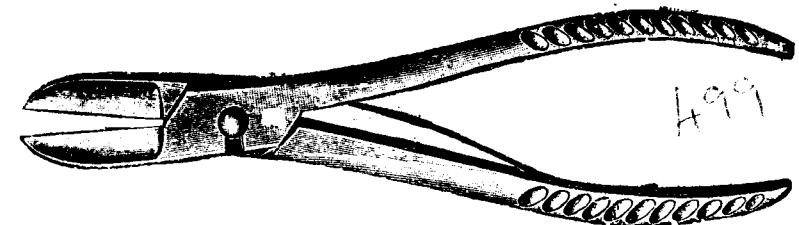
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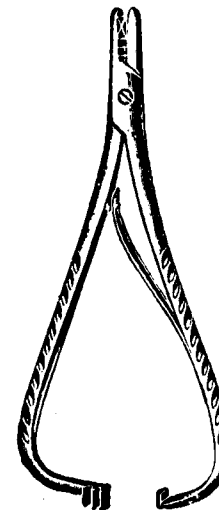
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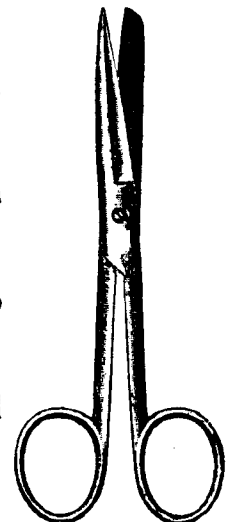


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The Indian Veterinary Journal

(The Journal of the Indian Veterinary Association)

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THE Indian Veterinary Journal

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Vol. 39

JANUARY, 1962

No. 1

We Wish Our Readers
A Happy and Prosperous
New Year!

Editorial

CROSS-BREEDING FOR MILK

We know we are rushing into a field where angels fear to tread. Such a spate of literature has grown up both for and against cross-breeding in animal husbandry work! But yet it is a subject which is fascinating in the extreme, alluring, intriguing and even rewarding those who pursue it with determination and courage. But more is talked about this subject than actual work done. It is not a case of sinning so much, as it is sinned against. One has to merely mention the word cross-breeding, we see at once people raising their eye brows, shrugging their shoulders, pursing their lips and indicating in every possible manner that it is a prohibited subject, not worth talking about. We have no objection if they have arrived at such a definite conclusion, after having tried cross-breeding experiments under our environmental conditions *on a scale and pattern* that this highly involved work demands. But it is a case of giving a bad name to a dog and hanging it.

Leaving the scientific experts severely alone, it would be correct to say, that cross-breeding has been trying hard to establish itself in this land. We see it practised in Cities and Towns, in Estates and Plantations and is slowly spreading to rural areas as well. When it comes to a question of their going in for a cow to meet the growing

demands of their expanding families, the very oppositionists to cross-breeding, think only of a cross-bred cow. What has the profession done to regularise what is already happening in a haphazard manner and place these cross-breeding efforts on a scientific basis? It is a poser which the profession has to face sooner or later.

We concede that the present grading up work that has been in vogue for over 30 years now in most of the States, is the quickest and best possible method of bringing about the general herd improvement in a village. The selective breeding within well-established breeds, practised on some of the Government Livestock Farms, is the key stone of all livestock improvement work in any country. None outside a bedlam will ever say that these two items of work are unnecessary and should be given up or even exchanged for cross-breeding. Each one is great in its own place and has a definite place in any scheme of livestock improvement.

But such items of work can take us only up to a certain limit and not beyond, if we are to compete with world markets or even to raise the nutritional standard of our people. It is not that people do not understand the value of milk or of the egg. It is a slander if anybody says so. But where are these precious articles of diet available in India in enough quantities and at reasonable price? On the face of such a scarcity, is it not a little unrealistic of us when we preach to people, 'Drink more milk' or 'Eat an egg a day'. Let us confine ourselves to milk. What have we done to increase the output of milk in our land? Is it possible to reach even the required minimum standard in living, with our present low grade cows. Of course, there are certain breeds of cattle more particularly in northern India, whose performance at the pail 'compares favourably' and nothing more with some of the best breeds in the world. True it is again, that we can increase our present output by another 50 to 60 per cent through improved feeding. Let the Statisticians work out how far it is going to take us. We have even started to advertise that we propose establishing baby food factories and the like. Are we not starting at the wrong end? What then is the best means of solving our milk problem? It can be achieved only through cross-breeding, evolving a new breed or type, best suited for us and our environments, let us not be afraid to admit, through several trial and error methods, fix that type and make it breed true and present it to independent India. Only then and not until then, can we ever hope to reach international standards in our

dairy industry. This is a basic piece of research work, which the profession in India to-day, could ill-afford to delay any further, with the amount of talent and money available. We fully well realise the extent of risk involved, the perils to be faced, the time-consuming nature of such a piece of research work and a fairly heavy budget provision needed. But all these appear to us to be trivial where a Nation's health is involved and where a Nation's progress is desired.

Sometimes we hear the bogey, where have we got the animals to build upon. They need not necessarily be pure-bred stock of an already well established milch breed of cattle. If we get them in enough numbers, well and good. It must be possible to get them with a little effort. Otherwise we may even think of several 'grades' of such breeds that are available to-day. Perhaps stock from animals yielding 2000 pounds or 2500 pounds in a lactation of any breed that is available locally may even be considered. These are matters which a high-powered scientific committee of geneticists, nutritionists, livestock men, dairy men etc., can iron out and plan. In any case we feel that every State should shoulder a scheme of this nature under the Third Five Year Plan. If we miss these Plan periods, we may miss the bus for ever. It is far better to make a start and fail than not to start at all. There is a Chinese proverb which says "Many a man who failed actually never tried". We remind the profession of the inspiring words of the poet.

" Some work of noble note, may yet be done,
Not unbecoming men that strove with Gods "

Hullo!

Have you read our New Year Resolve?

Won't you be proud to house this National Veterinary Journal in a building of its own? What have you done individually to help the Journal which had helped you in some form or other?

Delay not to send in your contribution to the Reserve Fund.

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THE MATHURA CONFERENCE

Mathura, that hallowed City of Lord Krishna, is becoming us. History and mythology have embellished not only Mathura but the twin City of 'Brindavan'. What memories come crowding from the pages of history of that great personality, Lord Krishna, the best of kings, the best of diplomats and the best of men!

The profession meets there for the first time, on an all-India basis, after one of the foremost of Veterinary Institutions in the world came into existence there. Uttar Pradesh has the honour of being in the vanguard of progress from the dawn of history of our profession in India. It was in March 1924, that the Second All-India Veterinary Conference was held at Lucknow under the presidency of Col. H. T. Pease, C.I.E., M.R.C.V.S., F.Z.S., F.R.C.V.S. Nearly thirty-eight years have rolled away and Uttar Pradesh has now come forward once again to give us a shake-up from our lethargy. The momentous decision to run a Journal of our own was taken only at the last U. P. session. The Bennett Hall of the Canning College, Lucknow, rang with tumultuous cheering of the profession when that decision was taken. It was the good fortune of the present Editor of this journal to have served on the sub-committee specially constituted to consider the question of starting a Veterinary Journal and giving it a definite shape. We invite the attention of our readers to an article on "Then and Now" in the Silver Jubilee Number of this Journal (July 1949) which describes in detail the enthusiasm U. P. had shown at the adoption of the resolution on the starting of the I. V. J. Apart from all these, the first General Secretary of the All-India Veterinary Association, Khan Sahib S. M. Raza Hussain of revered memory, came from U. P. as well as the first elected President of the A. I. V. A. Khan Bahadur Sheik Niaz Mohamed. These were pioneers who along with others had laid the solid foundations of our Association. We owe a debt of gratitude to U. P. Let us muster strong and make the session, as historic as the one in 1924, held in that garden city of King Wajid Ali Shah. U. P. saw to the birth of this Journal in 1924 and we only hope she would see to the housing of this Journal in a permanent abode in 1962.

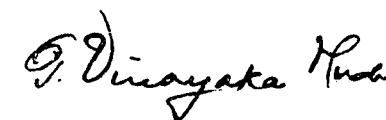
Mathura Challo!

THE INDIAN VETERINARY JOURNAL

A New Year Resolve

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

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



President, Indian Veterinary Association
and
Editor, Indian Veterinary Journal.

MADRAS, }
10-11-61. }

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1. The award shall be called "Dr. R. Swaminatha Iyer Memorial Medal".
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4. Only those with a basic Veterinary qualification shall be eligible for the award.
5. Publications of clinical value, preferably of original nature, shall be eligible for consideration of the award.
6. In the case of joint authorship, the award shall be made by dividing the amount equally amongst the authors.
7. In the event of the award not materialising in any year for any reason the value of the award shall be added to the corpus of the fund.
8. The Managing Council of the Indian Veterinary Association shall appoint a Committee of three Judges - a Chairman and two Members - in December each year to determine the award. The General Secretary of the Association will act as Secretary to the Committee but he will have no voting power.
9. The majority decision of the Committee shall be final. In case all the three Judges differ, the final verdict will lie with the President of the Indian Veterinary Association.
10. The award will be announced in the April issue of the Indian Veterinary Journal each year.

T. Vinayaka Mudaliar,
President, I. V. A.

General Articles

*A PRELIMINARY NOTE ON FIELD OBSERVATIONS IN AN EPIDEMIC OF "AJANTHA DISEASE" COMMONLY KNOWN AS 'MUCOSAL DISEASE'

By

S. N. SAPRE, M.Sc., G.B.V.O.,

Dy. Director Animal Husbandry,

i/c Disease Investigation Section, Maharashtra State, Poona.

Introduction

During the past few years a disease affecting cattle and buffaloes has been investigated. The condition described here falls in the category of 'MUCOSAL DISEASES', a term used to designate a recently recognised disease complex of cattle characterised by diarrhoea and ulcerations of the mucosal lining of various systems of the body. Pande and Krishnamurthy in 1956, reported for the first time in India the occurrence of three such entities in cattle and buffaloes in the State of Uttar Pradesh, under the names (1) Parotido-Stomatitis, (2) Mucosal Disease, and (3) Muco-Epithelitis, conditions which clinically simulate Rinderpest and Foot and Mouth Disease. Jarrett (1958) summarised the knowledge on Mucosal-type diseases and came to a conclusion that the term 'Mucosal Disease' is a misnomer, because the condition was not limited to mucous membranes only. He discussed the following diseases similar to it and compared them with reference to the morbidity and mortality rates.

American Mucosal Disease: Low morbidity and high mortality.

Virus Diarrhoea (New York): High morbidity.

Virus Diarrhoea (Indiana): Low mortality.

British Mucosal Disease: High morbidity and Low mortality.

Reinders (1959) described 8 outbreaks of Mucosal Disease in Holland, where small number of animals, usually yearling was involved. Johnston (1959) first observed Mucosal Disease in Australia.

This group of diseases is assuming importance in many countries like America, Great Britain, Sweden, Holland, New Zealand and Australia. This disease complex occurs in this country also and it may be of more importance than has generally been recognised hitherto.

* Read and discussed at the Meeting of the Bombay Veterinary Club, Bombay, on 4th November, 1961.

Other diseases known in India which may be confused with the above condition are Ephemeral Fever, Foot and Mouth Disease, Rinderpest, Surra, Coccidiosis and Rabies.

In the beginning of 1958, an outbreak of disease in buffaloes vaccinated against Rinderpest, was located in a village near 'Ashti Chimur' in Chanda District. But only in November, 1960, work on this disease was taken up. Blood samples from buffaloes showing Mucosal Disease like syndrome, were taken from the villages of Shavge-Bahal and Nagar Deola (Jalgaon Dist.), and were sent to the Veterinary Research Institute, Izatnagar. They reported that the material proved infective and when given 10 ml. volume (intravenous) induced a fatal condition simulating the naturally occurring disease. The Indian Veterinary Research Institute, further reported that 3 out of 4 buffalo-calves inoculated with the material had succumbed. From the pattern of temperature reaction and distribution and structure of gross lesions, it was felt that the disease might be a distinct entity. The material did not infect hill bulls and so it was felt that there might be a restricted host spectrum of infectivity.

History

A disease very much similar to cattle plague in cattle and buffaloes vaccinated against Rinderpest has been in existence in Maharashtra and other States. The existence of such disease was often wrongly mistaken for Rinderpest. Inter-current infection of 'Tryps' was thought to be responsible for encephalitic symptoms exhibited in a few cases. Violent symptoms were invariably attributed to Rabies and were confirmed as such because of the fact that, inclusion bodies similar to those observed in positive Rabies cases were seen in brain smears stained with 'Sallor's Stain' (Schipper *et. al*, 1955). Lesions similar to those observed in Foot and Mouth Disease have been noticed infrequently and it is likely that these outbreaks were mistaken for this disease also. In this connection it would be worthwhile to note that in Aurangabad Region, during (1959-60), out of 518 reported attacks of Foot and Mouth Disease, 485 were fatal.

Mass immunisation of cattle against Rinderpest was carried out in entire Maharashtra State during 1956 to January 1961. Freeze dried goat tissue vaccine obtained from the Indian Veterinary Research Institute, was used for mass immunisation. The first outbreak from village Shavage Bhal, north of Ajantha (Dist. Jalgaon) was reported as recrudescence of Rinderpest, despite recent mass immunisation. The special feature in the early outbreaks was that buffaloes suffered most, and four out of six affected succumbed. Cattle from this village were reported to have had a very mild attack and recovered.

At Chopda, 10 to 12 buffaloes died within four days, while cattle were not affected except one calf (9 months old) which eventually recovered. Subsequently ten more buffaloes were also reported dead. In 1961 a report from Jogalkheda, (Dist. Jalgaon) was attended. Here seven cattle and 1 buffalo were found affected. Another buffalo was reported to have died the previous day.

Earlier outbreaks from south of Ajantha, were from Aurangabad side and cattle were affected in all the four villages. Hardly ten to twelve animals from each village were affected, the death rate being 2 to 3 i.e., 20%.

During the first quarter of 1961, Aurangabad area reported similar outbreaks from Bhatepuri, Panegaon, Sevargaon, Hatwan, Wadi-Wadi, Pachan-Wadgaon, Hivare, and Dahiphal.

The outbreaks still simmered on in spite of repeated (four times) vaccinations against Rinderpest within a period of two months.

At Wadi-Wadi, the first attack was on 5th March, 1961. There were about 200 attacks and 200 deaths. In spite of vaccinations against Rinderpest the disease simmered on till August, 1961. At Pachan-Wadgaon the first attack was on 3rd January, 1961 and 35 attacks and equal number of deaths were recorded. Vaccinations were undertaken against Rinderpest, during earlier part of February 1961 and yet the disease continued until August 1961.

During April and May 1961 attacks and deaths were reported from Aarey Colony, where Rinderpest vaccinations with follow-up programmes are carried out regularly, and from surrounding areas, due to a disease with similar symptoms.

Further reports from Poona, Ahmednagar and Dhulia Districts were reported during second quarter of 1961.

Thus in all 36 outbreaks were attended and necropsy and other examinations were carried out wherever possible. The details of findings are as follows:—

NATURAL DISEASE

Epidemiology and symptoms

Out of 52 outbreaks in the field, which occurred between November, '60 to date, it was possible to investigate 36 only. Cattle and buffaloes of both sexes, young as well as old were affected. In the earlier outbreaks, there was transient pyrexia, the survival time was longer ranging from 4 to 6 weeks and the percentage of morbidity ranged from 2 to 18%. The mortality among the morbid animals was low (2 to 10%); later on this rose to 97% to 100%. It was gathered that out 1,100

animals affected 1,027 died, indicating a high percentage of mortality among the morbid animals.

At Aarey Colony the attacks were more in buffaloes than in cattle and mortality among the morbid buffaloes was cent percent in young calves, and 30% only in adults. Out of 8 affected cattle only one death was recorded.

Symptoms

It has been observed that in buffaloes, the disease primarily affects brain. The animal shows high temperature, lachrymation, in-coordination of movements, dazed appearance and at times violent symptoms. The conjunctivae become intensely congested. Occasionally opacity leading to partial or complete loss of sight depending upon the severity of the infection may occur. Ulcers on buccal mucous membrane may rarely be present.

Secondary affection is either in the lungs or heart. When the lung is affected, breathing is abdominal and there may be discharge from nostrils and cough. On auscultation pneumonic rales can be heard. Temperature ranges from 104° to 106° F. for four successive days. When the heart is involved there are no apparent symptoms exhibited except increase in pulse, which is weak. Occasionally diarrhoea occurs with watery green colour but without mucous or blood. In spite of the high pyrexia, the animals ruminate without any difficulty.

In cattle the primary predilection seat for the aetiological agent is the alimentary canal. Invariably there will be rise of temperature with straining, shooting diarrhoea with blood and mucous. Secondary affection takes place in the same way as in buffaloes involving the lungs or heart. When lung is involved there will be dripping of saliva and nasal discharge tinged with blood. Occasionally the brain is involved and violent symptoms are exhibited in such cases. Rarely ulcerative lesions in inter-digital space are exhibited.

Field observations indicate that mouth lesions may be exhibited in numerous mild cases where the disease first makes its appearance in a clean area. Similarly, at the end of the outbreak mouth lesions along with those in the inter-digital space, and occasional skin eruptions are seen.

Post-mortem lesions

Buffaloes:—There was mild gastro-enteritis. In some cases ulcerations on the abomasum restricted to pyloric region were observed. In all cases, congestion of pharynx was present. The degree of congestion varied, depending upon whether the disease was a lung form or heart form. In lung form the congestion was intense with ulcerations

A preliminary note on field observations in an Epidemic of "Ajantha Disease" commonly known as 'Mucosal Disease'

By S. N. SAPRE.



Fig. 1
Nasal discharge and Lachrymation.



Fig. 2
Pronounced Ocular discharge.



Fig. 3
Mouth lesions.



Fig. 4
Tongue lesions



Fig. 5
Profuse diarrhoea.

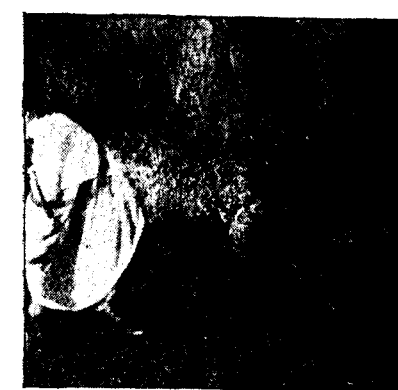


Fig. 6
Skin lesions.

A preliminary note on field observations in an Epidemic of
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Fig. 7
Foot and Skin lesions.

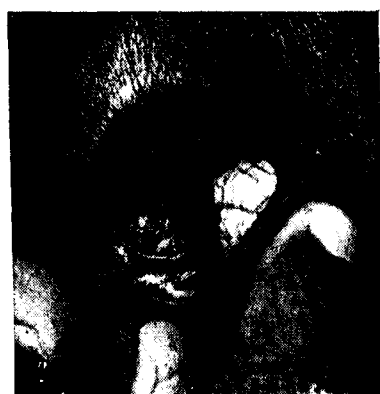


Fig. 8
Congestion of eyes.



Fig. 9
Brain lesions.



Fig. 10
Endocardium lesions.



Fig. 11
Intestinal lesions.

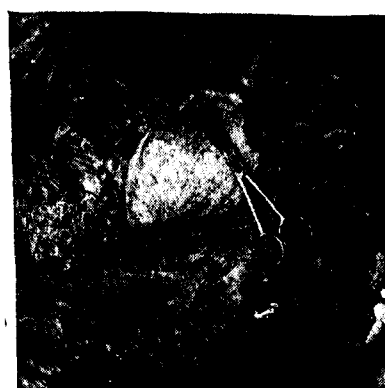


Fig. 12
Enlarged mesenteric lymph glands.

extending from nares to the pharynx. The tongue at the basal part showed ulcers. Occasionally there was congestion near the illeocaecal valve and in the rectum. Payer's patches were congested and the mesenteric lymph nodes were enlarged 4 to 20 times and oedematous. Brain showed intense congestion. In the majority of cases there was severe haemorrhage with rupture of superficial blood vessels. On opening the brain cavity the meninges showed meningeal fluid tinged with blood. When lung was involved the anterior portion inclusive of the apical and the cardiac lobes appeared pneumonic. When heart was involved there were severe haemorrhages on the endocardium, occasionally under the epicardium too. At times ulcers were seen on the inner surface of the gall-bladder, and the urinary bladder. Cultures and impression smears of tissues did not indicate any bacterial infection.

Cattle:—The lesions invariably indicated severe catarrhal gastro-enteritis, circumscribed ulcers, erosions and haemorrhages observed in the abomasum, near the illeo-caecal valve and rectum. Hyperaemic condition was seen in rest of the alimentary tract. The pharynx and larynx showed acute congestion. Ulcers were invariably present on the base of the tongue.

Transmission experiments

The condition was transmitted to buffalo calves by inoculating intravenously and intermuscularly emulsions of merthiolate treated materials like mesenteric lymph glands, tongue scrapings, brain and spleen obtained from two sick animals. Suspensions were prepared by grinding the merthiolate treated tissues with sterile sand, filtering through gauze and centrifuging at 2,000 R. P. M., for 30 minutes. The supernatant fluid was used for inoculation. The filtrates of mesenteric lymph glands, tongue scrapings and spleen were infective. Brain material produced a fatal shock (vide Table I). Two calves withstood the first infective dose till 42 days after the inoculation. When these were given a second massive dose, both of them died. All the calves (six in number) which were not protected against Rinderpest previously, died within a period of 7 to 10 days, showing a typical syndrome of the disease.

Similar experiment to produce the disease in seven buffalo calves was undertaken at Bombay. Five of these animals showed typical temperature reaction, and they were destroyed in extremis for the collection of material for vaccine preparation. The temperature and other reactions are noted in Table II. Two of the seven calves, resisted the infection and showed no febrile or other reactions even after the booster dose which was given on the 7th day. Probably they were naturally immune.

TABLE I

(Artificial inoculation of Buffalo calves bred at the Buffalo Breeding Farm, Aurangabad, with Karla Strain)

Type of inoculum	Number of Calf	Reaction after first inoculation	Reaction after Second inoculation	Remarks.
1	2	3	4	5
Brain Tissue	X	Shock	—	Died instantaneously
do	56	do	—	Died 10 hours after inoculation
Lymph Gland	45	Showed typical syndrome of disease	Not given	Death after 7 days
do	46	do	do	Death after 9 days
Spleen tissue	53	No reaction	Typical syndrome was seen	Death after 60 days
do	51	do	do	Death after 21 days
Spleen & lymph gland mixed	49	do	do	Death after 8 days
do	234	do	do	Death after 53 days
Spleen, lymph gland & tongue scrapings	47	Typical syndrome was seen	Not given	Death after 7 days
Spleen & lymph gland mixed	54	do	do	Death after 7 days
do	55	do	do	Death after 12 days
(Incontact calf)	57	Not given	Not given	No development of the disease

Majority of the calves taken for this experiment were protected against Rinderpest.

TABLE II

Transmission Experiment conducted at Bombay.

No. of Calf	Type of inoculum	Reaction after 1st injection	Reaction after 2nd injection, given on the 7th day	Remarks
1	2	3	4	5
1	Spleen & Mesenteric lymph gland (Karla Strain)	Pyrexia from 3rd day lasted for 48 hours, followed by downward trend of temperature	Not given	Destroyed on the 7th day in extremis
2	do	Slight rise in temperature on 3rd day and lasted for 24 hours	Rise in temperature from 3rd day after 2nd injection and lasted for 48 hours	Destroyed on 15th day
3	do	Slight rise in temperature	Slight rise in temperature	No reaction
4	do	Pyrexia on 3rd day, and lasted for 48 hours, with conjunctivitis	Not given	Destroyed on 6th day, after fall in temperature
5	do	Pyrexia on 4th day and lasted for 48 hours with conjunctivitis	Pyrexia on 3rd day after 2nd injection and lasted for 24 hours	Destroyed on 12th day
6	do	Slight rise in temperature on 3rd day, and lasted for 48 hours	Nil	No reaction
7	Spleen and lymph gland from Aarey Colony, Bombay	No febrile reaction	2nd injection after 3rd day; yet no febrile reaction although conjunctivitis was seen.	Destroyed on the 7th day, when temperature had gone sub-normal & prostate condition

All the animals taken for this experiment were protected against Rinderpest.

Clinical Symptoms

The experimental disease did not differ a great deal, from cases seen in the natural outbreaks except that no violent symptoms could be produced by artificial inoculation of even massive doses of the inoculum. The incubation period, as a rule, in all the cases observed was 3 days. From the 4th day onwards the animal showed pyrexia lasting for 96 hours. Simultaneously, the eyes showed conjunctivitis with muco-purulent discharge. Lachrymation and nasal discharge of thin mucoid nature were present. A few hours prior to

death the temperature came down to normal and became subnormal prior to death.

Intermittent anorexia was seen in all the cases. Four out of eight cases showed thin watery greenish diarrhoea. These calves first passed semi-solid faeces on the 5th day, then liquid diarrhoea till death. There was no mucous or blood in stools. No enlargement of the superficial lymph glands was observed; neither was there any ulceration of the mucous membrane of the oral cavity.

Those that showed lung lesions, exhibited frequent cough, and on auscultation, pneumonic rales were heard. Those that had secondary heart lesions showed nothing except weakness of the pulse and increase in the number of heart beat.

Post Mortem Findings

Aurangabad Experiment:—Ten animals that died were necropsied immediately after death. All of them showed intense congestion of brain. The meninges were tense with pinkish meningeal fluid. Haemorrhages with rupture of superficial vessel were seen. The gray matter was pinkish in appearance, due to the rupture of blood vessels. Four out of ten, showed heart lesions, and in these the lung lesions were absent. Those that had lung lesions showed pneumonic appearance extending over two thirds of the apical portion. One calf showed both lesions in heart as well as in lungs. In those that showed diarrhoea, enteritis was present. Lesions were particularly evident in pyloric, ileo-caecal and rectal areas. In all cases, ulcerations and erosions were present on the tongue and haemorrhages in the region of the pharynx. Petichaeal haemorrhages in one case were noted in the frontal sinus. The mesenteric lymph glands were enlarged nearly 2 to 10 times.

Bombay Experiment:—All the five buffalo calves destroyed, showed acute congestion of brain and meninges. Two showed petichae on heart. One showed typical ulcerative erosions on duodenum.

Transmission by contact

Two healthy animals, without testing for susceptibility, were kept in close contact with the artificially infected animals; but they showed only muco-purulent discharge from eyes for few days, and recovered. The mode of infection requires further elaborate experimentations and it is proposed to undertake the same in the near future. One of these two incontact animals, was subsequently taken up for artificial inoculation and it reacted (vide Table II).

Susceptibility to the infection among other species of domestic animals

One sheep, one goat and four rabbits were inoculated with the infective agent, but they did not evince any reaction whatsoever.

Differential Diagnosis

The condition described above is proposed to be called as "*Ajantha Disease*". It is similar to Rinderpest. Little is known about its etiology, mode of transmission etc. It has been often mistaken, for Rinderpest, Surra, Rabies, Coccidiosis or Foot and Mouth Disease.

For differential diagnosis it is emphasised that dependance will have to be placed on laboratory methods such as Gel-Diffusion, Passive Haemagglutination, Serum Neutralisation and Cross Immunity tests. Gel-Diffusion test is being tried in this laboratory for differential diagnosis of Ajantha Disease from Rinderpest, and some success has already been achieved.

Discussion

The natural disease described here has features in common with Rinderpest, and some other diseases. For differential diagnosis, gel-diffusion, passive haemoagglutination, serum neutralisation and cross immunity tests will have to be tried.

During recent years there have been several accounts of Mucosal Diseases affecting the alimentary tracts of cattle in North America. The clinical accounts and post-mortem findings closely resemble those seen in England. Virus Diarrhoea (New York), first described by Olafson, MacCallum and Fox (1946) differs from the disease encountered here, in that it principally affects adult animals and has a low mortality. Virus Diarrhoea (New York) was at one stage suspected to be Rinderpest, but Olafson (1947) showed by cross protection tests that the two conditions were unrelated.

In view of the similarities of the disease described in foreign countries and unlikely possibility that the entity described in this article is a new disease, it would appear desirable to attempt to establish the relationship between the conditions found there and Ajantha Disease. Until such time, that similarity between these entities is established, the author prefers to designate it as '*Ajantha Disease*' after the name of the place where the condition was first encountered.

Summary

A mucosal type of disease designated as '*Ajantha Disease*' is described here. It occurs in cattle and buffaloes in all age groups

irrespective of sex. Low morbidity with high mortality in affected animals is noticed.

Clinically there is high temperature, lachrymation, nasal discharge and blood stained faeces particularly in cattle.

Postmortem examination reveals lesions among cattle, varying from mild enteritis with marked haemorrhages in the abomasum. Ulceration of oral mucosa infrequently and mucopurulent discharge from eyes invariably are present.

Encephalitic cases were more common in buffaloes than in cattle. Whenever they occur, violent symptoms like in-coordination of gait, partial loss of vision and dazed appearance were seen.

The condition experimentally produced in buffaloes was similar in nature, characterised by an incubation period of three days. High temperature lasting for about 96 to 100 hours, with cough, increased pulse rate and diarrhoea are characteristic. Post-mortem examinations invariably reveal acute congestion of brain accompanied by lesions in the heart or lungs.

Acknowledgments

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SALMONELLA TYPHI INFECTION IN FOWLS

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Since the reporting of Salmonella cases in fowls in the Kumaon hills by Cooper *et al* (1931), occasional reports of the occurrence of Salmonella in birds have come out in various Indian publications. Unfortunately the mass of information in this field, pertaining to this sub-continent, is far too small even to-day.

After Cooper's report on the incidence of Salmonella in a fowl in 1931, Rao (1946) reported Salmonellosis in ducks in an Army Development Farm. Thereafter, Iyer *et al* (1950) also reported an outbreak of Salmonellosis caused by *S. aertrycke*. Dixit (1951-1952) isolated *S. anatum* and *S. typhimurium* from outbreaks in poultry in Poona. Rao *et al* (1952) reported incidences of Salmonellosis in birds in different parts of India due to *S. gallinarum* and paratyphoid organisms. Das *et al* (1955) reported isolation of a new sero-type of Salmonella namely, *S. alachua* from an outbreak of poultry disease in farms in Bombay. Rao (1955) reported about a variant strain of *S. pullorum* in chicken. Das *et al* (1959) reported about avian Salmonellosis caused by *S. gallinarum*, *S. pullorum* and *S. aertrycke*. Ghosh and Chatterjee (1960) reported isolation of *S. dublin*, *S. typhimurium* var *copenhagen*, and *S. typhimurium* in guinea-pigs, pigeons, and rabbits respectively.

The organism *S. typhi* was first observed in infected human tissues by Eberth in 1880, and subsequently it was isolated and described by Guffky in 1884. Since then a large number of references have accumulated as to its notorious ability to produce diseases in human beings; but the occurrence of this sero-type in fowls is interesting and thus merits reporting.

History of the outbreak

On 9-1-60 a sporadic outbreak flared up amongst a group of fowls numbering about 20 that were reared as back-yard poultry in Calcutta. Five birds died following a period of illness from 3 to 4 days. The ailing birds were off-fed, dull, drowsy and also having yellowish white diarrhoea. Enquiry into the possible source of infection to these five birds, revealed that these affected birds were fed with the viscera of an apparently healthy hen purchased for table-purpose from the local market. These five only out of the flock of twenty fell sick and died. The other fowls which did not receive the feed of the stated viscera remained unaffected. Two out of the five birds that died were sent by the owner for necessary examination.

Necropsy findings

The author did have the opportunity to undertake postmortem examination of these two birds. The postmortem changes in both these birds were almost similar. In general the changes revealed were, congestion of the lungs, kidney and intestines, effusion in the pericardial sac, unusual enlargement of Spleen with necrotic changes and enlargement and mottling of liver. Considerable subcutaneous congestion was also present. The postmortem changes presented a picture of septicaemia.

Bacteriology

Heart blood smear and impression smear from liver stained by Gram's method revealed a large number of gram negative rods which were found arranged singly and also in pairs with end to end arrangement.

Culturally gram negative bacillus in pure culture was isolated from heart blood and liver of both the cases subjected to postmortem examination. The organisms, morphologically similar to the above ones, were isolated on bovine blood agar, Nutrient agar and MacConkey's bile salt media. In primary culture the colonies, after 24 hours incubation at 37°C, were very small, pin-point in size and were barely visible with the naked eye. The colonies, however, on increased incubation after 48 hours were slightly enlarged. They were low convex, entire to undulate margins, grayish, opaque and emulsifiable.

A study of certain biochemical reactions was also carried out with the sugars. The sugars included were Glucose, Maltose, Lactose, Mannite, Sucrose, Dulcitol, Xylose, Arabinose, Sorbitol, Raffinose and Galactose. The organism fermented Glucose, Mannite, Arabinose and Maltose with the production of acid only. The rest of the sugars were not attacked. It did not produce indol, H₂S, nor it could split urea.

Pathogenicity

Tests to determine the pathogenicity of the organisms were carried out on chicks and guinea-pigs with the results as indicated below :

Experimental subject	Material employed	Method of administration	Results
Chick—I	18 hour broth culture	Inoculated s/c 0.5 ml.	No illness
Chicks—II	do	Inoculated s/c 0.1 ml.	Died on the 14th day
Chick—III	do	By oral route 1 ml.	Died on the 5th day
Chick—IV	do	By oral route 0.5 ml.	Died on the 12th day
Guinea pig—I	do	Intra-muscularly 1 ml.	Died after 48 hours
Guinea pig—II	do	Intra-peritoneally 0.5 ml.	Died after 36 hours

From the above experimental birds and guinea pigs organisms in pure culture were isolated from heart blood, bone-marrow and pericardial fluid. The lesions noticed in these cases were almost identical to those in the birds that died of the disease. In chick — IV the organism could be isolated in pure culture from the blood of the wing vein on the 10th day of infection when the bird was in a moribund stage.

Serology of the organism

The cultures were sent to National Salmonella and Escherichia Centre, Central Research Institute, Kasuali (Punjab) for the purpose of determining the sero-type of the organisms and it was identified as Salmonella typhi of Group D (Kauffmann white scheme) with the antigenic formula 0 = 9, 12, Vi, H = d. With the object to get the results cross-checked, the strain was also tested by Dr. E. S. Anderson, Public Health Laboratory, Colindale, England and it was confirmed as Salmonella typhi with the same antigenic structure as stated above.

Discussion

The incidences of Salmonella infection in birds and animals have been showing a noticeable increase in recent years in this country. It is safe to presume that actual incidences far out number those that have been detected and reported. This group of organisms with its wide range of susceptible hosts has been accepted as a great offender in the causation of various diseased conditions in man, mammals, birds, reptiles etc. Apart from this, the existence of this group amongst susceptible hosts in a carrier state, has also been seriously considered. While, however, other species of this group have been reported to have been associated with food-poisoning, and gastro-intestinal disorders in different hosts, Salmonella typhi belonging to Group D (Kauffmann white scheme) has so far been held responsible for diseases in man only. This report would indicate that this sero-type not only may exist in carrier form amongst poultry, but also may actually be pathogenic to them. Further more, the healthy fowls contracting the infection through ingestion of infected viscera of apparently healthy birds open up a wide field of investigation of public health importance.

Summary

Salmonella typhi infection in fowls both in carrier and pathogenic state has been recorded. The viscera of an apparently healthy hen has been found to be infective to other healthy fowls.

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SUSCEPTIBILITY TESTS ON HILL CATTLE TO FREEZE DRIED GOAT TISSUE VACCINE IN INDIA

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When the plans for eradication of rinderpest were formulated, it was considered that goat-adapted virus vaccine was too strong a product for adoption, for the purpose of prophylactic vaccination of animals on a mass scale. During that time two new vaccines viz. Lapinised and Avianised Vaccines had just come into the field. Although their suitability for large scale use under Indian conditions had not been determined, it was considered that one of these products would be suitable for use in the eradication campaign. At that time more importance was laid on the lapinised vaccine and it was considered necessary to get full information on this new vaccine in regard to its antigenicity as an immunising agent for the various breeds of cattle, buffaloes, sheep and goats met within India as well as to determine the nature and duration of immunity conferred by this product under conditions met with in different parts of this country.

Consequently the Indian Council of Agricultural Research sanctioned a scheme to ascertain the above information as regards the use of lapinised vaccine on a large scale. The extensive field trials carried out under the Scheme showed clearly that the vaccine was absolutely safe for all breeds of cattle, buffaloes, sheep and goats including European and European cross-bred animals. The immunity tests have shown that this vaccine conferred a solid immunity lasting for a period of 5 years, the longest period for which the tests have been carried out so far. In spite of all these highly desirable qualities, it was found that it would not be possible to produce, economically sufficient quantities of lapinised vaccine to cope with the large demand for the mass vaccination in connection with the rinderpest eradication scheme in India.

In the meantime it was found that majority of plains cattle which possess certain degree of resistance to rinderpest could be safely vaccinated with goat-adapted virus vaccine which had undergone a change in its virulence due to certain modification having been introduced in the method of maintenance of the strain at Mukteswar. However, there still existed quite a large number of animals in this country, especially cattle of hill areas for which goat-adapted virus was considered too strong, but it was still thought necessary to carry out susceptibility test on hill cattle of different hilly tracts of India with M.A.G. virus (Mukteswar goat-adapted virus) before any other mild vaccine could be recommended to be used in hill cattle on a mass scale in connection with the rinderpest eradication campaign.

The Present Study

Therefore, the following hilly areas were selected with a minimum number of 10 typical hill cattle representing the majority of animals in each area for test :—

	Animals.
1. Kashmir :—Ladak Valley, where animals are believed to be highly susceptible ...	10
2. Punjab hills :—(a) Kulu Valley ...	10
(b) Kangra hills ...	10
3. Himachal Pradesh :—(a) Sundarnagar ...	10
(b) Kotagarh ...	10
4. Bengal hills :—Darjeeling area ...	10
5. Assam hills :—(a) Khasi and Jaintia hills ...	10
(b) Garo hills ...	10
(c) Lushai hills ...	10
6. N. E. F. A. :—Along ...	10
7. Uttar Pradesh :—Garhwal ...	10
Almora ...	10

Animals from U P. hills were not tested for the reason that we had a good deal of experience regarding the susceptibility of hill bulls from Almora and Garhwal districts as most of the hill bulls that are obtained for research work at the Indian Veterinary Research Institute are drawn from the above districts. It was found that majority of them do not show any reaction as a result of vaccination with freeze dried goat tissue vaccine.

The details of the test

1. The requisite number *i.e.*, 10 animals representing the type commonly met with in the locality were selected with the help of the officers from the respective Veterinary Departments. These animals were obtained on loan from the villagers on condition that adequate compensation would be paid in case any animal died during the course of the experiment as a result of vaccination with freeze dried G.T.V.
2. The experimental animals were housed in special and separate cattle sheds.
3. Their feeding expenses were met from funds under the research scheme.
4. The experimental animals were kept under observation for a period of 15 days.
5. The animal attendants were provided by the respective departments to look after them during the course of the experiments.

Kashmir Ladak Valley

Ladak Valley is situated in north of Kashmir State at an altitude of about 11,500 ft. The cattle of that place are of hill type with long hairy coat and somewhat bushy tail. Most of them are crosses between the Yak and Nubra Valley cattle. It appears when some of these animals were vaccinated with goat tissue vaccine in 1953 many of them, nearly 80% died due to very high reaction following vaccination and the Kashmir Govt. had to pay a heavy compensation to the owners. Since then they have been on the look out for a milder vaccine for protecting Ladak cattle against rinderpest. As lapinised and lapinised-avianised vaccine have proved to be quite suitable for vaccinating highly susceptible livestock against rinderpest, an experiment was undertaken to test the susceptibility of Ladak cattle to these two strains of viruses. The public of Ladak were not keen to get their animals vaccinated with any vaccine against rinderpest due to their previous experience with goat tissue vaccine when they had lost many animals following very severe reactions. But after a good deal of persuasion by the veterinary authorities they agreed and 20 cattle ranging in age

from 3 to 6 years were purchased and housed in a shed in the veterinary hospital compound.

After keeping these animals under observation for a couple of days they were divided into two groups of 10 each. Animals in group No. I were inoculated subcutaneously with 1 ml. of 1 : 40 dilution made with one gramme of lapinised freeze dried vaccine so that each had 10 minimum infective doses of the virus. All the cattle in group No. II were inoculated with 1 ml. each subcutaneously containing 20 m.i.d. of lapinised-avianised virus. These two groups were kept away from each other and looked after separately. Their body temperatures were recorded twice daily at 7 a.m. and 5 p.m. for a period of 15 days.

Observation

1. Of the cattle in group No. I, seven animals showed absolutely no signs of ill health or any untoward reaction. Of the remaining three, one bull showed a rise in body temperature upto 103.2°F on the 4th day after inoculation, another heifer had 103°F on the same day. The third one, a bull exhibited thermal rise on the 4th and 5th day upto 104°F. Besides the rise in body temperature no other untoward symptoms of any kind were noticed in these animals.

As there were no rabbits available at Leh (Ladak) the reconstituted lapinised vaccine used for the experiment was sent to Srinagar by air, where it was inoculated into two healthy rabbits, both of which died on the 4th and 5th day of inoculation thereby indicating that the virus was fully viable at the time of use at Leh.

2. None of the animals in group No. II inoculated with lapinised-avianised virus exhibited any rise in body temperature nor did they show any untoward symptoms as a result of vaccination. The viability of the reconstituted lapinised-avianised vaccine was ascertained on sending the material to Srinagar by air and it was found to be viable, as two rabbits that were inoculated typically reacted exhibiting the thermal rise and off feed etc. One rabbit out of these two was sacrificed on the 4th day and it showed the pathological changes, *i.e.*, enlargement of spleen, and mesenteric glands and white necrotic spots on round nodule in peyers patches, thereby confirming the viability of the virus at the time of inoculation.

Inference :—Lipinised rinderpest vaccine though very mild for all species of animals susceptible to rinderpest in India was found to be a little strong for Ladak cattle as 30% of them exhibited thermal rise as a result of vaccination with this product. Such a reaction shows the hyper-susceptibility of those animals. As such, if the vaccine is employed on a large scale it is very likely that a few percentage of animals from the inoculated lot may react and if, by chance, they are

suffering from any intercurrent infection, some mortality among the lot may also occur. It is, therefore, suggested that lapinised-avianised vaccine, which was found to be very safe for protecting the hyper-susceptible animals, may be employed on a mass scale as a prophylactic against rinderpest all over Ladak area including Nubra Valley and Tibet borders.

Susceptibility of Kashmir Valley Cattle to freeze dried Goat Tissue Vaccine

In order to study the susceptibility of Kashmir Valley cattle to freeze dried goat tissue vaccine under village conditions, extensive field trials were carried out in Kashmir state:

	Cattle
1. Handvara (Handwara Dt.)	175
2. Larikpore (Anantnag Dt.)	316
3. Laripore (Pehalgan)	160
4. Kichhma (Baramulla)	1,068
Total	1,719

Since Kashmir Valley is an extensive area and is about 5,000 ft. above sea level, it was presumed that susceptibility tests on this valley cattle would give an exact idea whether freeze dried goat tissue vaccine could be employed for mass vaccination as a protective measure against rinderpest in the rinderpest eradication campaign in the state. To get representative data, different districts were selected and animals were vaccinated as mentioned above.

Observation

1. At Handwara out of 175 cattle, 16 animals were kept under observation for a period of fourteen days after vaccination and their morning and evening body temperature recorded. Out of these, only 3 animals exhibited a mild rise of temperature for about two days starting from the 4th day of vaccination, and subsequently they became normal. All other vaccinated animals remained healthy during the course of the experiment.

2. At Larikpore:—24 animals from the vaccinated group were kept under observation for a fortnight. Only 4 animals showed a mild rise of temperature up to 103°F for a day or two, without any other signs of ill health.

3. At Laripore:—11 animals were kept under observation for a week and none of them showed any reaction.

4. At Kichhma:—8 animals were kept under observation for a week and only two animals showed a mild thermal reaction on the 4th day of vaccination and they subsequently became normal.

Inference:—Susceptibility tests in 1719 Kashmir Valley cattle to freeze dried goat tissue vaccine @ 1 ml. of 1:100 suspension in normal saline incorporating 40 M.I.D. in each vaccinating dose have shown that the vaccine does not provoke any untoward reaction. This experiment indicated that none of the vaccinated excepting two showed any signs of ill health. On the basis of the above results it would be quite safe to presume that freeze dried goat tissue vaccine can be used with impunity for vaccinating cattle in the Kashmir Valley.

Punjab Hills

1. Kulu Valley:—In the Kulu Valley Kulu proper is devoid of typical hill cattle. The cattle are of mixed breed with plains cattle viz. Hariane, Sindhi and Sahiwal. A few cross-bred European and plains cattle are also seen there. The altitude of Kulu Valley is less than 4,000 ft. and as such the susceptibility test was carried out at Manali which is about 26 mile from Kulu.

Manali:—Manali is about 6,000 ft. above sea level. The cattle are of pure hill type and they are mostly black in colour, stunted in growth with thick black hairy coat.

Test:—10 hill cattle varying in age from 3 to 6 years were procured on loan and they were tied in a shed in the hospital compound. They were inoculated with 1 ml. of 1:100 suspension of freeze dried goat tissue vaccine and kept under observation for a period of 15 days. They were all stall fed and watered, and their body temperatures were recorded in the morning and evening.

Reaction:—On the 4th day of vaccination all the ten animals exhibited a marked rise in their body temperature varying from 104°F to 105°F which persisted for two to three days. They were dull and fed slowly. None of the animals developed mouth lesions. One animal was very dull and had diarrhoea. But none of them died although all of them had reacted severely. All experimental animals recovered from the reaction within the course of 15 days and they were returned to their owners.

II. Dharamsala (Kangra District):—Dharamsala is the capital of Kangra district and is about 4,500 ft. above the sea level. The cattle of that area are of pure hill type as well as mixed breed with Hariana and cross bred cattle. Ten hill cattle representing the majority of the cattle found in that area were obtained on loan and they were housed in a shed in the veterinary hospital compound. These animals were inoculated

with freeze dried goat tissue vaccine as usual and they were kept under observation. This time a goat was also inoculated with the reconstituted vaccine and kept under observation along with the experimental animals. This goat was used as a control to make sure of the viability of the goat tissue vaccine.

Reaction:—Out of 10 animals, 5 exhibited thermal rise up to 104°F to 105°F on the 4th day of inoculation which persisted for 2 to 3 days. All the animals had dull look for about three to four days starting from the 4th day onwards. One animal had diarrhoea. In spite of all these high reactions no animal died. The control goat reacted typically with a thermal rise up to 106°F on the 4th and 5th day of inoculation thereby indicating that the vaccine was viable at the time of use.

Inference:—These experiments in the Punjab hills proved that goat tissue vaccine was too strong to be used in animals residing in areas above 4,500 ft. sea level and a milder vaccine than G. T. V. viz. lapnised or lapinised-avianised vaccine is the only solution to protect these animals from rinderpest.

Himachal Pradesh

1. *Sundarnagar*:—This place is situated about 17 miles from Mandi, at an altitude of about 4,000 ft. This is a beautiful valley surrounded by hills all round. The cattle of this area as well as the districts surrounding it up to Bilaspur from Mandi are of mixed type with Harians, Sindhi and Sahiwal blood. They are of small stature, with colours varying from grey, brown and dark brown. Most of the cattle were found to be emaciated and sickly probably for want of proper nutrition and care. The cattle owners are very orthodox and sentimental and as such were very hesitant for subjecting their animals for any sort of vaccination against any contagious disease more especially against rinderpest due to fear of high reaction and mortality as a result of vaccination with goat tissue vaccine. They keep their cattle only for manure and bulls for ploughing fields after breaking them as bullocks. The average milk yield from a hill cow is only about 8 to 12 ozs. which they generally give to the calves. Under such circumstances it was very difficult to get animals on loan for the experiment. However, 10 hill cattle of varying age groups were obtained through the help of the veterinary authorities of the state, and they were housed in the hospital compound. After observation for a couple of days to make sure that these animals were healthy, they were inoculated subcutaneously with 1 ml. of 1:100 suspension of freeze dried G. T. V. and kept under observation.

Reaction:—Out of 10 animals only one showed a mild rise of temperature up to 2°F more than the normal on the 4th and 5th day of

vaccination with no other untoward symptoms. All other animals in the vaccinated group were found to be normal. In order to get a more conclusive data, as well as to convince the cattle owners that freeze dried goat tissue vaccine did not produce any severe reaction in the vaccinated animals at Sundarnagar, a field trial was conducted in which 162 cattle were vaccinated with this product under field conditions. Ten animals out of this vaccinated lot were kept under observation for 10 days. It was very interesting to observe that out of these 10 animals only one showed a rise in body temperature up to 104°F on the 4th and 5th day and then it became normal. All others in the vaccinated lot were reported to be quite normal and no untoward reaction had occurred in any of them as a result of vaccination.

II. *Kotgarh*:—Kotgarh is a hilly area which lies about 54 miles from Simla, with an altitude of about 6,000 ft. At first it was decided to carry out the susceptibility test of hill cattle to goat tissue vaccine at Theog which is about 12 miles from Simla where typical hill cattle were available but unfortunately there was an outbreak of rinderpest a few months earlier and all the available cattle were protected against rinderpest with G.T.V. and serum (Serum simultaneous method) and as such it became very difficult to get animals which might be considered absolutely clean. Therefore, Kotgarh was selected for the reason that there had been no outbreak of rinderpest reported during the last two decades. Cattle of this area are of pure hill type i.e., short and stunted with black hairy coat.

Ten hill cattle of varying size and age groups between 3 to 6 years were obtained on loan from the villagers and they were tied in a closed shed in the hospital compound. As the weather was very cold these animals were protected from cold and inclement weather. All the animals were kept under observation for 3 days. They were inoculated subcutaneously with 1 ml. of 1:100 suspension of freeze dried goat tissue vaccine and kept under observation for a period of 15 days.

Reaction:—Out of 10 animals, 5 exhibited a sharp rise of temperature up to 104°F on the 3rd day evening. Out of these five, three animals became dull and remained so for two days. None of these animals showed any lesions in their mouth nor did any of them develop diarrhoea.

Inference:—The results obtained in the susceptibility tests of hill cattle to freeze dried goat tissue vaccine in the tracts of Himachal Pradesh have shown that cattle in the areas under 4,000 ft. altitude could be protected against rinderpest with freeze dried G.T.V. for the reason that the cattle are somewhat resistant like plains cattle. The majority of cattle in these areas are of mixed type with Hariana, Sindhi,

and Sahiwal blood. In the areas above 4,500 ft. altitude, the cattle are of pure hill type with high susceptibility to rinderpest and freeze dried goat tissue vaccine was found to be too strong for them, and as such either lapinised or lapinised-avianised vaccine is necessary to protect them against rinderpest. An observation that deserves special mention was that hill cattle found in the areas at heights less than 3,000 ft. in altitude at Himachal Pradesh also reacted severely to freeze dried goat tissue vaccine. In this connection it may be mentioned that hill cattle in the high altitude zones are practically starved during winter months as most of the tracts are covered with snow. Therefore, the cattle owners sell their cattle to the cultivators in the lower altitude on nominal prices. As has already been mentioned, the people keep those cattle only for manure purpose rather than for ploughing or carting. Hence these cattle are brought to lower altitudes for ploughing the fields for the cultivation of cereal crops and to use as beasts of burden. These cattle always remain highly susceptible to rinderpest and freeze dried G.T.V. will be too strong for them. However, this investigation has struck caution that indiscriminate use of freeze dried G.T.V. in hill cattle without studying their type and breed in hill areas will prove to be hazardous. It is, therefore, necessary that the type and breed of cattle and the altitude of the place must always be borne in mind before taking up the vaccination of cattle with any attenuated vaccine against rinderpest in order to get useful and valuable result.

Bengal Hill

Darjeeling area :—Bengal hills start right up from Siliguri and are continuous to the Nepal and Tibet borders. Darjeeling area represents the highest altitude (about 7,000 ft.) where hilly population is quite dense. Kalimpong though contiguous with Darjeeling area is separated by Tista river and its altitude is about 4,300 ft.

Most of the cattle in Darjeeling area are European crosses with plains and local hill cattle. Pure hill cattle, as can be found in other areas are not found in these hills. Probably in early period the tea planters in those areas imported a good many foreign cattle like Ayrshire, Holstein — Friesian, and Jersey and after a time indiscriminate breeding might have started with the result that pure hill cattle have become rare. Therefore, the susceptibility test was carried out at Ghoom area. Ghoom is about 4 miles from Darjeeling which is about 6,500 ft. above sea level. At Ghoom, 10 hill cattle were obtained on loan from a Nepali zamindar on the clear understanding that adequate compensation would be paid in the event of death of any animal during the course of the experiment. Those animals had not been vaccinated earlier against rinderpest nor had the disease been reported among them during the last 10 years or so. Hence, 10 healthy and clean cattle varying

from 3 to 6 years were obtained. All these animals were housed in a closed shed and kept under observation for a couple of days, and then they were vaccinated with 1 ml. of 1:100 suspension of freeze dried goat tissue vaccine and kept under observation for 15 days.

Reaction :—On the 4th day of vaccination 9 out of 10 animals exhibited a marked rise in their body temperature and in more than 40% of them the temperature touched 105°F to 106°F which persisted for 3 to 4 days. All the vaccinated animals excepting one, were dull and off-feed. Five animals had diarrhoea and mouth lesions. As a result of severe reaction one animal out of this group died of rinderpest on the 8th day of vaccination and another on the 10th day. The local people got frightened as they thought that the disease might get disseminated to other areas and a serious outbreak of rinderpest might occur spreading the whole Ghoom area as well as Darjeeling side. But, they were convinced that the G.T.V. does not disseminate the disease, and there was no cause for any alarm. Just to satisfy them the carcasses were dumped into deep pits from where they were opened to study the rinderpest lesions, and then covered. The other animals, although reacted severely had recovered and were discharged on the 15th day and returned to the owners. For two animals that died the cost was paid.

Inference :—The results of this experiment have conclusively proved that freeze dried goat tissue vaccine is too virulent a vaccine to be employed for protecting cattle against rinderpest in Bengal hills. A milder vaccine viz. lapinised or lapinised-avianised only can safely be used in these highly susceptible animals.

Assam Hills

I. Kasi and Jayantia hills :—This area starts from 'Bornihat' which is about 18 miles from Gauhati. Gradually this hill rises up 5,500 ft. up to Shillong which is one of the most beautiful spots in Kasi and Jayantia hills. From Shillong the hills maintain the same altitude up to a range of 100 miles. Cattle of that area especially at Shillong and near about are of mixed type mostly with foreign blood and plains cattle viz. Haryana, Tharparker and Sahiwal. This is probably due to the import of cattle from the plains by the European and Indian tea planters to that area. But this place has no typical indigenous breeds of its own. Since the susceptibility of foreign cross bred animals to rinderpest is well known, no animals from this locality were included in the test reported hereafter.

Jowai :—This is a hilly spot about 42 miles from Shillong, with an altitude of 5,000 ft. This is also a district headquarter of Kasi and Jayantia hills. In this area typical hill cattle are found. These cattle

are very small in stature with varying colours as dark, brown and dark-brown. Ten hill cattle bearing the above description and of different age groups were obtained on loan and kept under observation in a closed shed in the veterinary hospital compound at Jowai. All these animals were healthy. There was no incidence of rinderpest reported for the last 10 years or so in that area. All these animals were vaccinated with freeze dried goat tissue vaccine subcutaneously with 1 ml. of 1:100 suspension in normal saline and kept under observation.

Reaction:—On the 3rd day after vaccination four animals showed thermal rise, and on the 4th day six animals exhibited high thermal rise including the previous four. This high temperature persisted for 4 to 5 days. All these animals were dull and ate slowly. But no animal died as a result of high reaction. However, 60% of the animals severely reacted, and they came round only towards the end of a fortnight. It will be recalled that in a similar test carried out in Himachal Pradesh and Punjab hills, animals met within regions 4,500 ft. above sea level, had evinced a severe reaction to the freeze dried goat tissue vaccine.

II. Garo Hills-Tura:—In Garo hills, Tura is the highest place and capital of Garo hills. It is one of the district headquarters and is about 222 miles from Gauhati. This is a typical hill area with an altitude of nearly 3,000 ft. where civilization has entered, the rest of the locality being a dense forest with a scanty habitation of tribal people. The cattle population is very small when compared to other hill areas in Assam. Most of the cattle are like those met in the plains, such as Haryana, Sahiwal etc., and a few with foreign blood. Most of the animals are stunted in growth probably for want of nutritious food. There are vast areas of forest with good wild grass, but animals are not grazed for fear of wild animals. Ten cattle representing the major group of cattle found in the Garo hills were procured on loan and housed in a shed in the veterinary dispensary compound at Tura. These animals were of different age groups and of either sex and healthy in condition. Although there was rinderpest outbreak reported in some parts of Assam, this place was free from rinderpest and there was no previous history of vaccination done against this disease. Thus we were able to get 10 clean cattle between 3 to 6 years in age for the experiment. Vaccination of all these animals with freeze dried goat tissue vaccine was done in the same way as in the case of animals at Jowai reported earlier and their reactions were observed for 15 days. Only one animal showed a mild rise of temperature on the 4th and 5th day whereas the other animals did not exhibit any thermal reaction nor any other untoward symptoms as a result of vaccination. This test has also confirmed the previous finding that the hill cattle living in places at an altitude of less than 4,500 ft. can withstand the vaccination with freeze dried goat

tissue vaccine, of course with the exception of hill cattle that were brought down from very high altitude to lower regions.

III. Lushai Hill. Aijal:—Aijal is the capital of Mize district on Lushai hills (Assam). This is a hilly tract situated about 100 miles from Silchar. The altitude of the place is about 4,000 ft. The cattle are of mixed breed being crossed with plains cattle infiltrated from Burma borders and from Assam plains. Their colour varies from dark or pale red to dark brown, or white. They are very small in size but stumpy and strong. Mostly these animals are used for carrying load, and their milk yield is very poor. Ten healthy cattle representing the type most prevalent in this locality were obtained on loan from the villagers for this experiment and kept under observation for a couple of days before vaccination. The age of the animals varied from 3 to 6 years. Susceptibility test of these animals with freeze dried goat tissue vaccine was carried out in the same manner described above.

Reaction:—None of the animals receiving the virus exhibited any reaction thereby indicating a comparative resistance (similar to those observed in the plains of Assam and elsewhere) of these animals. This test has indicated that the cattle of Lushai hills can withstand freeze dried goat tissue vaccine without any untoward effect.

Inference:—In the Kasi and Jayantia hills of Assam, from 4,500 ft. and above, freeze dried goat tissue vaccine is too strong to be employed for mass vaccination. As 60% of the experimental animals had shown thermal rise up to 3 to 4°F which had persisted for 3 to 4 days, this vaccine is very risky to be used on a mass scale for the following reasons:

1. Most of the hill cattle are exposed, because all the cattle are let out for grazing in jungles in the morning till they come back late at night.
2. Due to the exposure, animals that are having high thermal reactions as a result of vaccination are likely to contract pneumonia and die.
3. Animals harbouring intercurrent infections viz. helminthic infections and protozoan parasites might develop the disease and succumb.
4. A few percentage of animals due to debility and weakness might die as a result of high reaction provoked by goat tissue vaccine. All these untoward happenings, therefore, can be avoided if a milder vaccine than goat tissue vaccine is employed for vaccinating the highly susceptible animals.

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In Garo hills and Lushai hills with a height of 4,500 ft. and below the animals could withstand freeze dried goat tissue vaccine quite well and as such cattle in these areas could be safely protected against rinderpest with this product.

North East Frontier Agency

*N. E. F. A. (Along) :—*Along is the central place in N. E. F. A. and is surrounded by hills. The place bears an appearance of a valley with a height of 1,000 ft. above sea level. The cattle population of Along is very thin and most of them are similar to those found in plains of Assam. Since the susceptibility of Assam plains cattle to freeze dried goat tissue vaccine is already known *i.e.* they can withstand this vaccine without any untoward effect, the plains cattle of Along were not tested for their susceptibility to the goat adapted strain. However, the test was carried out in "Mithunes" which is a semiwild bovine distinct in appearance from cattle as well as buffaloes. They have no humps and are very big in size weighing about 1200 to 1500 lbs. The face of the animals is short, broad and thick. Horns are short, situated sideways, thick at the base and tapering to a point. Forehead is broad and convex. Muzzle is broad, thick and strong. The body is short with deep girth. The tail is long with heavy tuft of hairs. Colour is black, dark red, and dark with white patches. The fore and hind legs are white at the pastern. The skin is hairy, thick and soft. These mithunes are found only in N. E. F. A., Tibet and Bhutan borders. In some places they are domesticated; otherwise they remain only in jungles. These animals are owned by tribal people and they put some marks in their ears for identification. These animals are used as a bartering system in the tribal areas. Hence they are the assets of the people and valued very high. Each animal costs about Rs. 800 to Rs. 1,500 but the people do not sell their animals even at higher values due to sentiment. Chiefly these animals are used for beef purposes. Government of N. E. F. A. purchased 10 mithunes within the range of 4 to 6 years in age, and they were kept under observation before vaccination in a compound under thatched shelter. Their body temperatures were recorded for about a week in the morning and evening and were found to be about 100°F, *i.e.* the same as the normal temperature of the plains cattle. Since it was the first time that the mithunes were subjected to an experiment with freeze dried goat tissue vaccine against rinderpest, the authorities wanted only the minimum number of mithunes to be used for G. T. V. experiment. Therefore, these 10 animals were made into two groups, A & B consisting of 5 mithunes each. Group A was vaccinated subcutaneously with 1 ml. of 1:100 suspension of freeze dried goat tissue vaccine and group B with freeze dried lapinised

rinderpest vaccine @ 1 ml. of 1:40 suspension in normal saline, and these two groups were kept under observation for a period of 15 days.

*Reaction :—*On the evening of 3rd day after vaccination all mithunes which received freeze dried goat tissue vaccine exhibited a marked rise in their body temperature. On the 5th day the temperature reaction was very high touching between 105°F to 106°F. They had vesicles on the gum and under the tongue. All the 5 mithunes were nearly off-feed with staring coat, lachrymation, nasal discharge and diarrhoea, thus indicating the pathogenicity of the freeze dried goat tissue rinderpest vaccine. It was reported that one mithune out of these five died as a result of severe reaction provoked by this vaccine and the other four severely suffered and ultimately recovered. But their condition became so weak and debilitated that the authorities found it very difficult to sell them back to the people. Out of the five mithunes in group No. B which received freeze dried lapinised vaccine, four animals exhibited a marked rise in their body temperature, on the 4th and 5th day after vaccination. There was slight dullness in them for two days. Their feeding and condition were quite normal, and there were no vesicles in their mouth, nor they had diarrhoea. Their temperature became normal during the period of the experiment.

*Inference :—*This experiment has conclusively proved that mithunes are hypersusceptible to rinderpest and freeze dried goat tissue vaccine is very virulent for them. Lapinised rinderpest vaccine although very mild for all species of animals susceptible to rinderpest in India, has been found to be strong for mithunes for the reason that this vaccine has provoked thermal reaction in them which in adverse circumstances may lead to some complications ending either in loss in condition or death. Therefore, lapinised-avianised vaccine which has been found to be very safe, effective, and economical for protecting hyper-susceptible animals is only the vaccine which can be safely used for protecting mithunes in the North East Frontier Agency and elsewhere.

Discussion

Susceptibility tests on hill cattle to freeze dried goat tissue vaccine were carried out in hill regions in India in connection with the plan for eradication of rinderpest from the country. At first it was decided to use lapinised vaccine on a mass scale for protecting all susceptible cattle, buffaloes, sheep and goats against rinderpest for the reason that this vaccine did not provoke any untoward reaction in vaccinated animals including animals in advanced pregnancy and milch cattle. But with all these good qualities of this vaccine, it was found very difficult to produce this vaccine in a large quantity economically due to the fact that rabbit breeding in this country was found to be a difficult problem.

Secondly the quantity of vaccine received from a rabbit is comparatively smaller than what can be got from other sources. In the meantime it was found that (M.A.G.) Mukteswar goat adapted virus had come down in its virulence due to certain modifications made during the passage level at Mukteswar and could be used safely for protecting all indigenous plains cattle against rinderpest. But its utility as an immunising agent in hill cattle was not studied. It was, therefore, considered essential to study the susceptibility of hill cattle in various hill areas in India before recommending the vaccine to be used in hill cattle.

Accordingly it was proposed to carry out susceptibility tests on hill cattle in Kashmir Valley, Ladak, Punjab hills, Himachal Pradesh, Bengal hills, Assam hills, Uttar Pradesh hills, and North East Frontier Agency. Tests were carried in 10 hill cattle representing the major group of animals found in each area on the various altitude levels. It was observed that cattle living on 4,500 ft. altitude and above were highly susceptible and goat tissue vaccine was too strong for them. Cattle found in areas lower than 4,500 ft. could withstand freeze dried goat tissue vaccine without any untoward effect excepting those cattle that had come down from high altitudes to lower levels for which a milder vaccine than G. T. V. is required. As regards the cattle at Ladak and North East Frontier Agency, they are hypersusceptible to rinderpest. The experiments have shown that freeze dried goat tissue vaccine is very virulent and pathogenic to these breeds, and lapinised vaccine is too strong to be used on a large scale. The lapinised vaccine although provokes only the thermal reaction, will not be suitable in these areas due to the fact that the animals are exposed to the cold and changing condition of weather, as they live in jungles under natural conditions, and this may be fatal to them. As a rule the tribal people are superstitious and sentimental, and any untoward reaction as a result of vaccination in their valuable cattle render them non-cooperative and thus may hinder any vaccination campaign in future. Therefore, it is very essential that the vaccine for these animals should be very mild and perfectly innocuous. Lapinised-avianised vaccine which has been found to be very effective and safe for protecting hypersusceptible animals to rinderpest is the only vaccine which can be used for immunising these species of cattle against rinderpest.

Summary

1. Lapinised rinderpest vaccine was considered suitable to be used for all species of cattle, buffaloes, sheep and goats against rinderpest in the rinderpest eradication plan in India, as goat tissue vaccine was found to be too strong a product to be used for highly susceptible animals.

2. Due to scarcity of rabbits in India and difficulty in breeding them in large number, vaccine production was found to be a difficult problem. Secondly the quantity of vaccine obtained from the rabbits is too small to produce it economically. The use of lapinised vaccine was, therefore, considered to be uneconomical.

3. In the meantime it was found that the majority of the plains cattle could be protected against rinderpest with freeze dried Mukteswar strain of goat-adapted virus (M. A. G.) as the strain got mutated during its serial passages and became less virulent and less pathogenic to plains cattle. However, there are certain types of animals viz. hill cattle for which this vaccine was reported to be too strong.

4. It was considered essential to conduct susceptibility tests on hill cattle to freeze dried goat tissue vaccine in various hilly tracts in India. Accordingly tests were carried out in cattle at various altitudes with freeze dried goat tissues vaccine and it was found that this vaccine is too strong for animals living on areas above 4,500 ft. high above the sea level and for animals in areas in lower altitudes i.e. less than 4,500 ft. this vaccine can be used safely.

5. This vaccine is not suitable for animals that migrate from high altitude to lower regions and for them lapinised avianised vaccine is the vaccine of choice.

6. For cattle in Ladak and North East Frontier Agency (N.E.F.A.) lapinised-avianised vaccine can be used. Lapinised vaccine, although good, provokes thermal rise in about 50% of vaccinated animals.

7. Before any vaccine is selected to be used in any particular hill area, it is necessary to consider the type of animals in which the vaccine is to be used as well as the sentiments of the people in the locality for enlisting their wholehearted and full-fledged co-operation.

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SOME OBSERVATIONS ON THE INCIDENCE OF BRUCELLA REACTORS AMONG BULLS

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On the basis of work carried out by Polding (1943, 1947), Brucellosis in cattle is known to be widespread in most organised farms as well as in villages of India. Though the incidence of Brucellosis in cows has drawn more attention in recent years, evidence on the incidence of *Brucella* reactors in bulls is very meagre in this country. In west Bengal, Mukerji (1960) tested sera from 70 bulls and found direct evidence of Brucellosis in one, while two more were incriminated as positive reactors. He found that 15 out of 45 negative bulls were in herds with history of *Brucella* infection. In the course of routine testing of farm animals against Brucellosis, the authors tested 119 bulls, 130 bull calves, 19 bullocks, 7 buffalo bulls and 13 buffalo bull calves, results of which are recorded in the present communication.

Materials and Methods

Except at Bhanjanagar Farm, where 4 bulls of the indigenous breed (Ghumsur) were tested, the bulls and bull calves were either purebred Red Sindhi, Hariana or Murrah, purchased from the Punjab or bred locally. Serum samples were subjected to plate agglutination test using conventional methods (Dhanda and Rajagopalan, 1949) and those showing one + reaction and above were subjected to tube agglutination test from 1:5 to 1:640 dilutions. The antigens used were obtained from the I. V. R. I. Animals reacting to one + in the plate test and showing titres of 1:20 or more (50% agglutination) were considered as positive for Brucellosis.

In two bulls, showing symptoms of orchitis, tube agglutination tests were performed on the semen plasma on the lines described by Bendixen and Blom (1947).

Results

In Table I, results of agglutination tests conducted on serum samples of bulls and bullocks stationed at different Farms of Orissa have been summarized.

1. Disease Investigation Officer, Cattle (Pathologist), Orissa, Bhubaneswar.
2. Assistant Professor of Bacteriology, Orissa College of Veterinary Science and Animal Husbandry, Bhubaneswar.
3. Director of Animal Husbandry and Veterinary Services, Orissa.

TABLE I

Results of *Brucella* agglutination tests on bull and bullock sera

Locality	No. of bulls tested & No. positive	No. of bull calves tested & No. positive	No. of bullocks tested & No. positive	No. of buff. bulls tested & No. positive	No. of buff. bull calves tested & No. positive
Regional A.I. Centre, Cuttack ...	56(0)	—	—	—	—
A.I. Centre, Balangir	4(1)	15(0)	—	1(0)	4(0)
S.L.B. Farm, Khapuria ...	1(0)	48(3)	—	1(0)	4(0)
D.L.B. Farm, Baudh	3(0)	15(3)	6(0)	—	—
D.L.B. Farm, Bhanjanagar ...	9 (4Indigenous, Ghumsur)	31(0)	—	—	—
D.L.B. Farm, Balangir ...	6(0)	8(0)	—	—	5(0)
D.L.B. Farm, Keonjhar ...	4(0)	13(0)	9(1)	5(0)	—
Patha ...	36(0)	—	4(1)	—	—
Total ...	119(5)	130(6)	19(2)	7(0)	13(0)

N.B.—Figures in the parenthesis show number of positive reactors.

It is evident from the above table that the incidence of *Brucella* reactors in bulls in this State is confined to only two breeding centres inspite of high incidence (20 to 40%) of *Brucella* reactors among cows in some of these farms. At the A. I. centre, Balangir the positive bull had a swollen knee joint, but all the 4 indigenous (Ghumsur) bulls of Bhanjanagar farm, which also reacted positively, showed no symptoms of Brucellosis. The position with regard to bull calves appears to be not very much different in as much as 6 out of 130 calves reacted positively and the incidence was limited to two farms.

In buffalo bulls, there were no positive reactors in any of the 7 bulls and 13 bull calves examined.

Two consecutive examinations of sera and semen plasma of two bulls showing symptoms of orchitis proved negative to *Brucella* tube agglutination test.

Discussion

In view of several authentic records of *Brucella* infection in bulls in Western countries (Thomsen, 1957), there is need for

systematic survey of this disease in bulls in India. According to Vandeplassche (1957), Brucellosis in bulls offers a less serious danger of spread inside the centre, but it has proved to be very dangerous in artificial insemination. The source of infection of a clean herd is usually the introduction of an infected female though it may be from an infected bull (Stableforth, 1959). As there is a growing need to increase the number of breeding centres and intensifying A. I. service all over India, it appears necessary to keep a watch on Brucellosis among bulls as well and regular examination of serum samples may have to be carried out at all stud centres. Fortunately, however, an important aspect of Brucellosis in bulls is, what appears to be their relative nonsusceptibility to natural infection. Stableforth (1959) quotes Priestley (1949), who found 0.9% bulls in Great Britain positive to Brucellosis as compared with 14% cows, and in a series of first tests of herds for eradication purposes he (Stableforth, *loc. cit.*) found 28% cows and 13.2% bulls reacting to the test. Our findings in this State are in general agreement with the above observations in as much as 5 out of 119 bulls (4.2%) reacted positively as compared to an overall incidence of 20 to 40% reactors among cows in some of the farms.

Most workers believe that even in badly infected herds bulls get infected chiefly through ingestion of contaminated food and water but not through coitus. The fact that one bull, which was positive to the test and showed clinical signs of Brucellosis, happened to be an A. I. bull shows that infection had taken place not by coitus but most probably through ingestion. This is further substantiated by the fact that 6 out of 130 bull calves never used for service and 2 out of 19 bullocks reacted positively. The incidence of Brucellosis in bullocks, however, appears to be of no consequence since they are incapable of spreading the infection in any known way.

Summary

The incidence of *Brucella* reactors in bulls in different farms and A. I. centres of Orissa was surveyed by plate and tube agglutination tests on sera samples. Out of 119 bulls tested, 5 (4.2%) reacted positively and 6 out of 130 bull calves and 2 out of 19 bullocks also showed positive serum titres. One positive bull showed clinical signs of the disease in the form of swollen knee joint. In two bulls suffering from orchitis *Brucella* agglutinins could not be demonstrated in the serum or semen plasma. All the 7 buffalo bulls and 13 buffalo bull calves tested were found to be negative. The role of the infected bull in disseminating the disease and the natural mode of infection have been discussed and the need for periodical screening of bulls against Brucellosis is stressed.

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FURTHER STUDIES ON INTENSIVE TREATMENT OF NASAL SCHISTOSOMIASIS IN CATTLE*

By

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A preliminary investigation was undertaken during 1957-58 at the Madras Veterinary College on the effectiveness of intensive treatment against Nasal Schistosomiasis (Alwar, 1959). For this study 14 ailing bullocks were experimented upon with different dosages of sodium antimony tartrate and the treatment was completed in 36 hours. Of the 7 animals which were given 6 injections each in doses of 1.5 mg/kg body weight 3 times a day, 5 were cured and 2 had relapse. Two bullocks were given the same regimen of treatment but with an average dose of 1.7 mg/kg body weight; of them one was cured while the other showed relapse. One of the two animals in both the groups which received 1.9 and 2.1 mg. respectively per kg body weight thrice a day died of antimony poisoning, and the remaining ones were cured of the affection. Of the two bullocks which were given 4 injections of 2.2 mg/kg body weight twice a day one was cured and the other showed relapse. Both the animals which received the drug in doses of 1.8 mg/kg body weight twice a day as the previous group were not cured at all. The above trials indicated that the intravenous administration of sodium antimony tartrate in doses of 1.5 - 1.7 mg/kg body weight 3 times a day or 2.2 mg/kg body weight twice a day on two consecutive days was safe and fairly effective. Moreover the use of 1.5 mg dose 3 times a day seemed to be more advantageous on account of the

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fever relapses and reduced intake of the drug at a time. But the number of experimental animals used for the investigation under each group was very few. Hence the intensive treatment trials were continued on a larger number of animals during 1959-61 and that further study forms the subject of this paper.

Experimental Work

Non descript, aged, medium sized bullocks suffering from Nasal Schistosomiasis with pronounced lesions and symptoms were secured and kept under observation for 3-4 weeks to make sure that they were not treated just before. Freshly prepared 2% solution of sodium antimony tartrate (SAT) in 10% glucose saline was used intravenously for the treatment. One method of treatment entailed the administration at the rate of 1.5 mg of the drug per kg body weight 3 times a day (7-30 A. M., 12-30 P. M., and 5-30 P. M.) on two consecutive days. The second schedule of therapy was the same as the previous one, but the dose rate was 1.8 mg/kg body weight. The third method was the administration of 2 mg of the drug per kg body weight twice a day (8 A. M., and 5 P. M.) on two consecutive days. The treated animals were maintained for a period of 6 months and the progress of cure was observed. Those in which the ova did not reappear after their initial disappearance till the end of the observation period were considered as cured of the affection. The animals before discharge were tested for their tolerance to the drug at the same dosage given to them before. Some of the animals declared as cured were subjected to postmortem for confirming the complete elimination of the causative parasite and the lesion in nostrils. Autopsy was also conducted on animals which showed relapse, to have an idea about the number of worms which escaped destruction.

Twelve bullocks were treated with 1.5 mg of the drug per kg body weight 3 times a day on 2 consecutive days. The only reaction noticed in 2 of them were, slight rise of temperature, staring coat, cough during or immediately after injection and dullness on the second day of treatment. But all the symptoms disappeared in a day or two. Dark, shrivelled and distorted ova were noticed in the nasal washings 1-2 days after treatment. The clinical symptoms abated remarkably in 2 weeks. There was a marked fall in the number of ova in 2-3 weeks during which period dead ones began to predominate. But live miracidia were seen till 16 days after treatment in 3 animals. It took generally 4-6 weeks for the complete disappearance of ova and lesions. In one the dead ova persisted in the discharge for 12 weeks. Only in one animal normal ova reappeared in the nasal washing after 9 weeks. Though the number of ova increased thereafter, no granulomatous growth did appear. The bullocks improved in condition during the

6 months and showed an increase of 20-40 kg in their body weight. All the 12 animals were again subjected to the same dosage schedule. There was no reaction except in two, which exhibited mild toxic symptoms as noted earlier. The absence of *Schistosoma nasalis* at autopsy in two of the cases declared as cured confirmed the complete elimination of the flukes. Hence in this schedule of treatment out of 12 bullocks, eleven were cured while one had relapse.

The second group of 12 bullocks received the drug at the rate of 1.8 mg/kg body weight three times a day on 2 consecutive days. Six animals showed slight toxic symptoms. In three there were severe reactions. They showed either steep rise (105°F) or fall (98°F) in temperature, dryness of muzzle, suspension of rumination, unsteady gait, diarrhoea, retention of urine and finally prostration. On the third day after the completion of treatment they died. Postmortem of the carcasses revealed the following features; severe congestion of the organs as liver, spleen, kidneys and brain with degenerative changes of parenchyma; extensive petechiae of subserosa of spleen, subepicardial space and lower half of trachea; extensive streaks of haemorrhages under the endocardium especially of the left ventricle; catarrh of the abomasum and small intestine. Only a few specimens of *S. nasalis* were available in the nasal veins, whereas a very large number of them was found in the liver and a small number in the chambers of the heart, and the lungs. The collection contained mostly males and none was alive. The flukes were found to have undergone disintegration and shrinkage. The testes, ovary and the vitellaria were not clearly identifiable as they had become a degenerated mass and reduced in size. The uterus contained either a few abnormal ova or no ova at all. The intestinal caeca were devoid of haematin pigments. In the animals which survived, the cure was apparently quicker than that in the first method. Eight animals were cured and one showed relapse after 13 weeks. When the same dosage was repeated in the nine animals left behind, before their discharge all of them showed severe reactions and 7 died. Deaths were found to occur even on the very next day of injection *i. e.*, in about 18-20 hours. A few dead males of *S. nasalis* were collected from the carcass of the bullock which showed relapse. In others which were considered as cured no schistosomes were present. In this trial it was found that the dosage of 1.8 mg of SAT per kg body weight 3 times a day on 2 consecutive days was fatal to the bullocks. Parenteral use of adrenalin and phenergan (M. & B.) did not alleviate the toxicity.

The third group of 12 bullocks was experimented upon with 2 mg of the drug per kg body weight, twice a day on two consecutive days. The reactions were comparatively least and complete elimination

of the ova and lesions was evident in 4-6 weeks. Reappearance of normal ova was noted in 2 animals, after 10 and 12 weeks respectively. All the 12 animals were subjected to the same dose of the drug before their discharge and they all withstood the dose very well. The cure in one of the bullocks was confirmed at autopsy. In these trials, out of 12 bullocks experimented upon, 10 were cured while 2 had relapse.

Discussion

Antimony has a specific action on schistosomes. The drug when present in the blood gets into the body of the parasite mainly through its alimentary canal while ingesting blood. The combination of antimony with the sulphhydryl groups in the receptor cells inactivates the enzyme phosphofructokinase and thereby interferes critically with glycolysis vitally needed for the survival and reproduction of the parasite (Bueding, 1959). The metal initially affects the reproductive organs. Live worms with damaged genitalia produce abnormal ova, and this fact explains the persistence of sterile ova in the nasal discharge in a few cases even up to 12 weeks. The degeneration of the genitalia will lead to sexual impotence and cessation of oviposition. In such of those worms which escape destruction, the reproductive organs regenerate after a few weeks and begin to produce normal ova. This explains the relapses which were found to occur in the trials in 10-14 weeks after treatment. Due to the lethal action of antimony, the adult worms in copula are separated, lose hold of the wall of blood vessels due to loss of muscle tone and are immobilised and ultimately killed. There is shrinkage of size and they are washed in circulation. Degeneration soon sets in. They are arrested mostly in the liver. The finding of a large percentage of *S. nasalis* in the liver and few in other situations as heart and lungs in animals died soon after treatment confirms the above facts. Some (Bang and Hairston, 1945; Standen, 1955) opine that antimony does not act on the eggs already deposited by the worms, while others (Faust and Meleney, 1924; Girges, 1934; Rao and Mudaliar, 1936) hold the opposite view. The appearance of dark eggs with a mass of granular contents in the place of miracidia in the nasal discharge even on the next day after treatment points to the action of antimony on the eggs in the tissues. But the continuous presence of normal eggs showing viable miracidia inside even up to 3 weeks after treatment indicates that the concentration of antimony in the tissues is not sufficient to affect all the ova. The action of the drug seems to be more quick on the female worms. This explains the recovery in the course of this study of a larger number of male worms in bullocks died after treatment and in animals which had relapse. This observation is in agreement with that noted by Vogel and Minning (1947) and Standen (1955). The number of worms escaping destruction after the therapeutic dose is

very few only and this small number with a preponderance of males is not able to cause marked pathogenesis and so lesions in the nostrils do not become manifest in cases of relapse. Antimony in the toxic dose acts as a protoplasmic poison and causes degeneration of the parenchyma especially of heart, adrenal and liver and cause toxic symptoms leading to the death of the animal. Such has been the result in the treatment with 1.8 mg/kgm body weight.

There is little information on the fate of antimony given to cattle intravenously, though literature is available on work done in laboratory animals, dogs, goats and men. The distribution and the amount of antimony in the body after the administration of SAT as in the intensive treatment trials, in rabbits and goats, were studied by Ozawa (1956). In the intensive treatment trials conducted here with the dose of 1.5 mg of the drug per kg body weight 3 times a day at 5 hourly intervals and with 2 mg/kg body weight twice a day at 9 hourly intervals on 2 consecutive days, the initial concentration of the drug in blood will be about 1 in 58,000 and 1 in 44,000 respectively. This concentration will be reduced to about 1/3 when the next injection is due. Thus the repeated administration of the drug at short intervals will not only keep up the high concentration of antimony but also will increase the strength. On the second day of treatment which begins after 14-15 hours after the last injection, a sufficiently high concentration of the drug will continue to be present in the blood. The concentration of antimony may even be twice the initial strength for some time during the course of the second day of treatment. Moreover, the drug will persist in the blood in an appreciable quantity till 2-3 days after the completion of the treatment. Alves and Blair (1946) were also of opinion that 70-80% of antimony remained in the body till 24 hours after 2 days intensive treatment. It will be of interest to know in this connection that Faust and Meleney (1924) noted in vitro the death of *S. japonicum* in half to one hour exposure to a solution of SAT ranging in strength from 1 in 12,000 to 1 in 42,000.

In this study bullocks which received a total dose of 9 mg of SAT/kg body weight tolerated the drug, while a majority of those which had a total intake of 10.8 mg/kg body weight succumbed. The fatalities due to an increase in each administration of only 0.3 mg/kg body weight clearly demonstrates the narrow margin of safety of SAT. But this lethal dose (10.8 mg) in cattle is smaller than the therapeutic dose (12 mg) used by Alves and Blair (1946) in human beings. Though Alves and Blair (*loc. cit.*) and Seitz (1946, 53) did not observe any untoward reactions, Talaat and Shoaib (1947), Girges and Aziz (1948), Rail (1949), Greany (1952), Barton (1952) and Halawani and Dawood (1950) found the dosage to result in severe toxicity, sometimes leading to mortality.

So it will be prudent not to exceed the dose rate of 1.5 mg/kg body weight in the 3 injections a day regimen. In the treatment with 2 mg of the drug per kg body weight twice a day on 2 days, the total intake was only 8 mg/kg body weight and the reactions were negligible. Talaat and Shoaib (1947) found this method more safe for use in human beings.

Though the strength of the solution of antimony tartrate for intravenous injection recommended by various workers ranges from 0.3% to 6%, a 2% solution was used throughout this study and the drug dissolved quickly. The preparation of the solution in 10% glucose saline was found to be advantageous. The reactions compared with those of the earlier investigation when the solution was made in distilled water were definitely milder. Most of the workers in Africa too dissolved the drug in 5% glucose saline in their intensive treatment trials in human Schistosomiasis.

Conclusion

Three modes of intensive treatment against Nasal Schistosomiasis in cattle with SAT were tried. One method resulted in fatalities and the dosage schedule adopted was the administration of 1.8 mg of the drug per kg body weight thrice a day on 2 days. In the group which was given 1.5 mg of the drug per kg body weight 3 times a day on 2 days there was no untoward reaction. Only one out of 12 showed relapse. In the group which received 2 mg/kg body weight twice a day on 2 days, 2 out of 12 animals had relapse, but the reactions were negligible. The increase in the number of relapses in the latter group might be due to the reduction in the total dose of the drug from 9 mg to 8 mg/kg body weight. But the administration of the drug twice a day will be more convenient for mass therapy. The reactions are also mild even though it involves the giving of a slightly increased dose at each injection. Any attempt to increase the dose further with a view to reduce relapses may result in the onset of severe reactions and even death. Certain percentage of patients were not cured in the intensive treatment of human Schistosomiasis also; but this figure (5-10%) is very small compared to that (27%) in the prolonged method of treatment. Even in the group which was given 1.8 mg/kg body weight one animal had relapse. In the preliminary trials (Alwar, 1959) a few *S. nasalis* were found alive in the carcass of a bullock died of antimony poisoning. Though we do not have figures to compare the efficiency of the intensive treatment with that of the present day therapy the observations made by us on the intensive treatment are encouraging; but the cure rates in these 2 safe methods do not significantly differ from each other. So it is intended to continue the trials on a larger number of animals with a view to assess their comparative efficiency.

Summary

The intensive treatment trials against Nasal Schistosomiasis in cattle were continued during 1959-61. Sodium antimony tartrate was the drug employed and 36 ailing bullocks were experimented upon. The drug was given intravenously as a 2% solution in 10% glucose saline. Twelve animals were treated with a dose of 1.5 mg of the drug per kg body weight 3 times a day on 2 consecutive days. Eleven were cured while one showed relapse. The second group of 12 bullocks were administered 1.8 mg of the drug per kg body weight 3 times a day on 2 consecutive days. Of these 3 died after the treatment and one had relapse. The third group of 12 animals received the drug at the rate of 2 mg/kg body weight twice a day on 2 consecutive days. Ten were cured and 2 showed relapse. The second schedule of treatment was found fatal to the animals while the first and the third methods were found to be fairly efficient and safe.

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**CLOSE SPECIES RELATIONSHIP DEMONSTRATED
BY THE PRECIPITATION TEST BETWEEN
THE COW AND BUFFALO**

By

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With the passing of the U. P. Prevention of Cow Slaughter Act 1956 by the Uttar Pradesh Government, the problem of differentiating cow flesh from buffalo flesh for medico-legal purposes came to the fore front.

In cases where large portions of carcasses were seized for proceedings under the Act with hooves and part of hide attached, the differentiation could be easily made. But in the majority of cases, only pieces of flesh with some bones attached were seized and in these cases considerable difficulty was experienced in identification of the species which would stand scrutiny in a court of law.

The usual test employed for medico-legal purposes for differentiating proteins of different species is the precipitation test. It was, therefore, decided to evaluate this test for the above mentioned purpose.

Literature

Kraus (1897) discovered bacterial precipitins and found them to be specific. Bordet (1899) produced precipitins for cow's milk. Later workers as Morgenroth (1900) confirmed that proteins could be differentiated by the precipitation test. Uhlenhuth and Weidanz (1909) are usually credited with the introduction of the test for medico-legal purposes, and they regarded the test as strictly specific. Nuttal (1904) was the first to recognise group reactions with the precipitation test which was confirmed by Uhlenhuth and others, who demonstrated cross reactions between related species such as human and anthropoid apes, cattle, sheep etc.

Materials and Methods

One dozen white rabbits were procured and divided into two groups of six each. One group was injected with cow plasma and the other with buffalo plasma. Strict precautions were observed in keeping the groups separately with separate sets of instruments and glass ware for each group.

At first i/p injections of 4 ml. of plasma were given every fifth day to the rabbits. The titre of precipitin was tested after the 6th injection and found to be only 1/100. So the injections were continued and the titre again tested after the 8th and 12th injections. The precipitin titre had gone upto 1/400 but was still considered to be too low for our purpose. It was therefore decided to resort to i/v injections.

The rabbits in each group were injected with 2 ml. of respective plasma intravenously. Severe anaphylactic reaction was observed in four of the rabbits and despite immediate treatment with Anthisan two rabbits succumbed. The injections however were persisted and after five i/v injections, the titre was found to be over 1/12000. In two rabbits titres of 1/15000 were obtained.

The precipitation tests were set up in the usual way using small precipitation tubes with antigen dilution of 1/500, 1/1000, 1/5000, 1/10,000 and two controls. Antiserum from three cow plasma injected rabbits and four buffalo plasma injected rabbits were used as these showed the maximum titre on previous testing. The antigen employed was buffalo and cow serum in the requisite dilutions.

Each antiserum was tested against cow antigen and buffalo antigen in the dilutions already mentioned.

Results and Conclusion

Clear precipitin rings developed in all the dilutions tested, with the difference that in the lower dilutions of 1/500 and 1/1000 the rings were formed within three to five minutes, while in the higher dilutions the rings took about 20 minutes to develop and were of somewhat lower density.

The precipitin reaction shown by cow antiserum with cow antigen and buffalo antigen could not be differentiated even at a titre of 1/10,000. When the buffalo antiserum was tested with buffalo antigen and cow antigen in similar dilutions similar results were obtained.

In medico-legal cases concerning differentiation of human blood from that of other animals, cross reactions are only noted with the blood from anthropoid apes and this also at a fairly low titre of about 1/100. The precipitation test is therefore only taken as positive at dilutions of 1/1000 or over for human blood.

The very close serological relationship between the cow and the buffalo is clearly shown by the fact that even at dilutions of 1/10,000 and over, it has not been possible to differentiate between the two

species by the precipitation test. The precipitation test, therefore, cannot be considered satisfactory for differentiating buffalo flesh from cow flesh for medico-legal purposes.

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Clinical Article

CAESAREAN OPERATION IN A CAMEL

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Petris reported two successful caesarean operations in camels in 1956. Both the cases had torsion of the uterus. The site of operation was the lower left flank and the animals were cast on right side after injecting 10% chloral hydras i/v. The first case got infected in the three lowermost sutures and was treated as an open wound later on. Further, Petris reported that the first case could not rise for three days but the second one had faster and safer recovery.

Caesarean Section in Camel

By

SOHAM SINGH RATHORE.



Fig. 1
One fore limb is protruding through the vagina.



Fig. 2
Calf and placenta being removed.



Fig. 3
Dead calf along with the placenta.



Fig. 4
Sutured incision line on the right flank

They Go Abroad



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History

History :—A she-camel was transported in a truck to the College clinic from a village. It was reported that 72 hours had passed since the water bag was ruptured and one forelimb was projecting out. Many local people tried to pull out the calf but in vain. The previous two parturitions were normal.

Symptoms

The patient was healthy looking and showed mild toxemic symptoms as the calf was already dead. Suppuration and putrefaction had started, giving a foetid odour. The temperature was 102°F. Dystokia was diagnosed and after manipulation it was decided to operate upon the animal.

Preparation

The animal was made to sit and secured with a rope, so that she may not get up during the operation. The right flank was clipped, washed and prepared for surgery. The area was washed with germicidal detergent lotion till snow white foams were obtained.

Anaesthesia

200 ml. of 10% chloral hydras was injected in the jugular vein to quieten down the animal. Locally 2% procain hydrochloride solution was infiltrated in a "T" shape fashion with an eight inches long needle deep in the muscles taking precaution not to perforate the peritoneum.

Procedure

An incision 14 inches long was made in the skin. Muscles and peritoneum were incised and the uterus was pulled out preventing damage to the intestines. A sterile towel was placed around the opening. The uterus was incised in the direction of muscle fibres and the dead calf was pulled out. As the putrefaction had already set in, it became difficult to keep the field sterile. Placenta came out with the calf. Three hibitane pessaries were placed in the uterus. The uterus was closed with "Vetafil" applying Cushing sutures. About 50 ml. sterile solution of 33½% sulphadimidine sodium was sprinkled in abdominal cavity. The peritoneum was sutured with simple continuous sutures, and interrupted sutures were applied in the muscles. The skin was closed with mattress stitches and carbolised vaseline was applied on the closed incision. Skin sutures were removed after 10 days.

Glucose saline 1000 ml. i/v was given during surgery.

Post-operative Care

1. Procaine Penicillin intramuscularly four million units with streptomycin two gms. were followed up for four days. This brought the temperature down to 98°F.

2. For the muco-purulent discharge from the vagina, 0.5% savlon lukewarm solution was employed for daily douching for ten days.

When the sutures were removed a watery foetid discharge was noticed from the three lower-most stitches. There was slight swelling which formed a pocket on the lower-most suture. It was decided to make a counter opening and pass a seton.

The Animal was tied up in sitting position and a four inches long incision was made on the swelling. Pus was drained out and a counter opening was made at the ventro-lateral aspect of the belly. Several small holes were made in a sixteen inches long $\frac{1}{2}$ " diameter polyethelene tube and was fixed in along with a seton to maintain the drainage. The part was irrigated with 1% copper sulphate solution twice a week. After a month the tube and the seton were removed. Dressing was done with BIPP.

Results

The animal was cured and discharged from the clinic after two months.

Discussion

The right flank was chosen in preference to the left flank, because in the left flank the position of the spleen and the kidney are such, that they might get injured during the manipulation. Complete general anaesthesia was not preferred as in that case the animal lies down and the abdominal contents prolapse through the incision line.

Summary

A she-camel had dystokia and the calf died. Caesarean operation was performed after three days since the first symptom of parturition was noticed. Seton and drainage tube were fixed for drainage. After two months of the operation, the animal was discharged from the clinic.

Acknowledgments

The Author is thankful to Dr. Mohan Singh, Principal for giving advice on the anatomical approach. He is grateful to Dr. Ratan Singh, his Prof. of Surgery for the guidance during surgery and thanks are also due to Drs. R. N. Kohli, I. S. Kohli, and P. D. Mathur, for their co-operation.

REFERENCE

Petris, M. A. (1956)

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Abstracts

The Stability of Brucella Agglutinin Serum.—BY S. SHIBATA, K. SUZUKI, Y. ISAYAMA and T. SHIMIZU. *National Institute of Animal Health, Quarterly. Vol. 1. No. 2, Summer, 1961.*

The sero-agglutination test of bovine brucellosis in compliance with the Weybridge method has been employed in Japan since 1957. The results showed that only 30% of the positive cattle had given positive isolation of *Brucella* organisms. This discrepancy between sero-agglutination and bacterial isolation might be due to the individuality of the cattle examined and environmental conditions under which they had been kept. As for the non-specific agglutinin, cross-agglutination reactions have been reported between *Brucella* and other species. On the otherhand, the inhibitory effect of incubation of serums at 56°C on cross tube-agglutination test was reported by earlier workers. The experiment described in the present paper was carried out in connection with the subject mentioned above. The authors came to the conclusion that when serums collected from many suspected and low-reacting cattle were incubated at 56 or 65°C for 15 minutes prior to *Brucella* agglutination test, they showed a decrease in titre. Such reduction of titre was also observed when some serums with high agglutinin titres had been incubated. The reduction of titre was parallel to an increase in temperature of incubation. There are evidences suggesting that serums of low-reacting cattle are affected more strongly by incubation at the temperatures mentioned above than serums of infected cattle with high titres. Besides incubation, repeated freezing and thawing, exposure to the sunlight, and shaking of serums seems to decrease the agglutinin titres of infected animals.

A. MUKERJI

Effect of Administration of Copper and Cobalt on the whole Blood Copper Level and Chronic Diarrhoea of Cattle.—BY T. HAYAKAWA, and T. TAKAYAMA. *National Institute of Animal Health, Quarterly. Vol. 1, No. 2, Summer, 1961.*

It has been known that copper is an essential element for animal nutrition on account of its special biological functions. Deficiency of copper causes licking sickness of cattle which develop symptoms of anaemia, loss of appetite, general debility, and sometimes diarrhoea. Cobalt is also essential for the ruminants. Its deficiency has been admitted as a cause of bush sickness of cattle and sheep. These sicknesses due to mineral deficiency can be prevented or cured by adequate

mineral administration. Chronic diarrhoea among milking cows was found in a district but its cause could not be established by the usual methods. On analysis it was found that the copper level in the whole blood of cattle and average mineral contents, specially of copper and cobalt, of pasture grasses in that district were low. In this paper, whole-blood copper levels before and after administration of copper and cobalt and the effect of administration of these elements on diarrhoea are presented. The chronic diarrhoea of cattle which was prevalent in a district seemed to have been caused by mineral deficiency. The whole-blood copper level was lower in affected cattle than in healthy ones. The diarrhoea and copper level in whole blood were improved by copper and cobalt administration. Therefore, it was considered that this disease was caused chiefly in copper deficient conditions.

A. MUKERJI

Studies on Colostrum-Acquired Immunity and Active Antibody Production in Baby Pigs.—BY HERBERT BROWN, V. C. SPEER, L. Y. QUINN, V. W. HAYS and D. V. CATRON. *Jour. of Animal Science*, Vol. 20, No. 2., May, 1961.

This study was designed to investigate the effect of weaning baby pigs at 2 weeks of age on persistence of colostrum-acquired immunity, the effect of colostrum-acquired immunity on antibody production and the effect of Zymosan (a polysaccharide type residue or Baker's yeast, after autolysis, trypsin digestion and alcohol precipitation) injections on persistence of colostrum-acquired immunity. 195 baby pigs were used in five experiments to study colostrum-acquired antibodies and active antibody production. Colostrum-acquired antibodies persisted in the blood stream of baby pigs for at least 6 weeks after birth with no difference between pigs weaned at 2 weeks of age and pigs nursing sows. Baby pigs produced antibodies actively in the presence of colostrum-acquired antibodies to the same bacterin between 4 and 5 weeks of age. Injections of Zymosan had no effect on the length of life of colostrum-acquired antibodies. Injections of Zymosan resulted in higher active antibody titres to *Serratia marcescens* and *Candida albicans* but not to *E. coli* when injected simultaneously with the immunizing bacterin. Pigs weaned at 2 weeks of age were capable of actively producing antibodies by 3 weeks of age. The response was quite low upto 4 or 5 weeks of age at which time the antibody response was great enough to be indicative of some protection for the pig. There was no appreciable difference in active antibody response between pigs weaned at 2 weeks of age and pigs allowed to nurse their dams longer than 2 weeks.

A. MUKERJI

The Continuous Feeding of an Antibiotic to Laying Hens.—BY F. A. RYAN, L. M. POTTER, E. P. SINGSEN and L. D. MATTERSON. *Poultry Science*, Vol. 40, No. 5, Sept. 1961.

Each of the fifty 26-bird groups in the 1955-56 Storrs Egg Laying Test was divided in two 13-bird entries to determine the effects of the continuous feeding of 100 grams chlortetracycline per ton in a high energy laying ration on egg production, feed efficiency and mortality. The average egg production for the birds receiving chlortetracycline over the 48-week experiment was 72.02 percent compared with 68.37 percent for the birds receiving the same diet without the antibiotic, a difference of 3.67 percent which was highly significant. The increase in egg production associated with feeding the antibiotic was greatest during the winter months and was significant during the first 36 weeks of the experiment. A significant decrease in pounds of feed required to produce a dozen eggs was obtained from feeding the diet with chlortetracycline, 5.216 compared with 5.407 for the hens fed the diet without the antibiotic. The reduction in feed consumed per dozen eggs is believed to be a reflection of the increased egg production rate rather than an increased feed utilization *per se*. Of the 650 birds fed with each diet, 78 of the those fed with no antibiotic and 65 of those fed with the antibiotic died; this difference fails to be statistically significant.

A. MUKERJI

Some aspects of the Mechanism of immunity to Helminths.—BY SOULSBY, E. J. L. (1961) *J. Am. Vet. Med. Assoc.*, 138, 355-362.

Important mechanisms by which immunity against helminths is induced have been discussed. Parasitic antibodies have been shown to be almost similar to any other type of humoral antibodies in their physicochemical properties. Nature of the local cellular response, which is often in the form of a marked eosinophilia is being investigated. Passive immunity has been demonstrated in several infections. Excretions at various stages of the development of the parasites within the host's body, e.g. the exsheathing fluid at moulting time, have been shown to be immunogenic in some cases. Protective immunity could not be produced by any single stage of parasitic infection and in order to be effective, antigenic materials must be derived from viable parasites. Histotrophic phases were shown to be important immunising stages. The resultant immunity caused the inhibition of the development of the invading parasites.

Acute infection, preferably with forms, attenuated by X-irradiation, is the only practical method of inducing immunity at present; but the development of 'in vitro' parasitic cultivation techniques may, before long, enable the preparation of non-viable parenteral vaccine against helminths.

B. N. G.

News and Views

Jersey Farm:—A press message reads, "A farm for breeding pure-bred Jerseys at Katwala, near Mandi, in Himachal Pradesh, is being established. Nearly 125 Jersey animals are expected as a gift from the Meifer Project, an un-official American organisation. The first batch of 54 animals has already been air-lifted to India by an Air-India Super-Constellation. The cost of transportation is being borne by the Union Government. Bulls from this farm will be used for extensive cross-breeding and development of hill-cattle in the region." Will not other States venture on the same lines? The road is long and the risks are many, but yet the brave despair not.

The London University had for the first time an Indian as examiner for its Ph. D. examination held in December 1961. He is Dr. A. M. D. Rozario, Minister of Science in the Indian High Commission in London.

(Hindu 11-12-61).

Horses for Cavalry:—The Defence Minister of India said recently that horses from Poland will be imported for the use of cavalry. This is again a matter where India could have made herself self-sufficient. Unless and until horse-racing is not threatened with extinction in India, this sad state of affairs of depending on other countries for our needs, will continue. Racing is the marketing end of any scheme of horse-breeding. If that end is frozen, how can the industry thrive?

Prostitution of Honorary Degrees:—Pandit Nehru suggested that Universities in India should be more sparing in the award of Honorary Degrees and cited an instance in a general way where a person was so honoured because he had given a large donation to an university, even though he lacked intellectual qualification. This he caustically remarked amounted to prostitution of such degrees. We agree. Some of universities have been racing with one another in conferring honorary degrees in recent times.

"Doctors":—Pandit Nehru also favoured a law limiting the use of the term 'Doctor' as he thought far too many people called themselves Doctors.

Research:—"The country should undertake research in a big way in different fields", said Pandit Nehru recently. It is a reminder that can stand repetition any number of times.

Conferences:—Pandit Nehru took a dig at the spate of Conferences that are usually held round about the Christmas season. He expressed doubt whether they yielded any fruitful results and opined that the world was becoming one of conferences, one conference succeeding another. He concluded by saying "I believe the international air lines are kept going by this".

Dr. A. L. Mudaliar, Vice-Chancellor of Madras University said recently that the time had come for Indian Scientists to make their presence felt and to secure for India a place in the scientific map of the world. He further added "All that we are supposed to have achieved in the political and other fields will not be worth anything unless we are in a position to produce men and women who will be comparable to the best in any other part of the world".

Ewe with a Denture:—A ten-year old ewe of Kerry Hill breed, belonging to a Veterinary Surgeon had all her remaining teeth pulled out under an anaesthetic and a denture was made to stay in place with a plate, says a press message. It adds, this experiment may have important implications, as in pedigree breeding of sheep, thousands of ewes with broken mouth are discarded yearly at the age of four or five due to poor digestion and consequent impaired breeding abilities.

Japan steps in where India is still lagging behind:—A Japanese academic team which is now in India will undertake studies on indigenous food habits, tropical diseases and their methods of treatment, particularly Ayurvedic methods and their efficacy and the usefulness of medicinal plants in the treatment of such diseases. This scheme is sponsored by the Tokyo Newspaper *Tokyo Shimbun* and by the *Hindu* of Madras. Hats off to these two newspapers!

Luck favours perseverance:—A 75-year-old American, Joseph Schubert, who "died" on arrival at a hospital in Philadelphia a few days ago, joined his wife on December 24 for the Christmas holidays in Florida, after Doctors brought him back to life by massaging his heart for six hours in a desperate last-minute bid to revive him. Schubert's heart had stopped beating and his pulse could no longer be felt when he reached the hospital in an ambulance.

Association News

THE XXI U. P. VETERINARY CONFERENCE and THE XV INDIAN VETERINARY CONFERENCE

NOTICE No. 3.

As already announced in the December 1961 issue of this *Journal*, the above Conferences will now be held from 29th to 31st January, 1962 at Mathura under the Presidentship of Sri L. Sahai, M.Sc., M.R.C.V.S., Animal Husbandry Commissioner with the Government of India.

Sri C. V. G. Choudary, B.Sc., M.R.C.V.S., Principal, U.P. College of Veterinary Science & Animal Husbandry, Mathura is the Chairman of the Reception Committee.

The session starts at 10-30 A.M. on 29th January, 1962 and attempts are being made to get the Conference inaugurated by some high dignitary.

A Technical Exhibition is being arranged which shall be declared open at 15.00 hours on the same day. The evenings shall be devoted to Cultural Programmes e.g. Ras-Lila and Folk music, the most famous dramatic performances of Brij in India.

Accommodation in both Western and Indian style has been arranged. Western style hotel charges are Rs. 4/- for single and Rs. 6/- for double-bed rooms, while Indian style hotel rates are Rs. 2/- to Rs. 6/-.

Mathura is connected both by Western and Central Railways as well as by N. E. (Meter-gauge) Railways. Delegates travelling by Meter-gauge should find it convenient to drop at Mathura Cantt. Railway Station while those coming in broad-gauge should detrain at Mathura Junction. Receptionists will be available at both the above Stations for all important trains. Conveyance and boarding charges shall be borne by the delegates themselves, while lodging is being arranged free for those who desire to avail it.

Arrangements for visits from Mathura to Vindraban, Nand-Gaon, Barsana and Gobardhan and the famous religious and historical places of the town have been made. The approximate charges per head would be Rs. 3.00 only for a trip to all these places. Arrangements for those interested to visit Agra shall be available and the charges for this also would be about Rs. 3.00 per head only.

The exact time of the State Conference shall be announced at the spot.

Arrangements for Technical Demonstrations, Shows and important discussions have already been made. Others interested in participating in this programme are welcome and should inform the undersigned at once.

Delegates are requested to intimate their requirements of accommodation to the undersigned immediately. With the present weather conditions Mathura is expected to be fairly chill. Delegates, therefore are requested to come with warm clothing. Prior intimation of the arrival of the delegates will be helpful. Delegates reaching Mathura should please report at the Reception Centre located in the campus of the Veterinary College on Mathura-Agra Road.

The Office of the Conference Secretary will close at Lucknow from 22nd January, 1962 and shall reopen at Mathura from 24th January, 1962. All correspondence thereafter may please be addressed to the undersigned by name C/o Veterinary College, Mathura. Telegraphic address is "KAPOOR CARE VETCOL, MATHURA" (Telephone No. 148).

Necessary Railway concession forms may be obtained from the General Secretary, Indian Veterinary Association, Madras or from the undersigned. The concession is available only for distances above 160 kilometers (100 miles) and only when the fare is not claimed from the Government or from the Local Body.

Mathura is calling you one and all. Here is an opportunity for us to meet together and discuss problems for the speedy progress of the Profession and our country. Let us march ahead.

Chak-Ganjaria,
P.O. Bakkas,
LUCKNOW.
4th January, 1962.

H. P. KAPOOR,
General Secretary,
Veterinary Conference.

The Indian Veterinary Association

THE RESERVE FUND

An event of great importance to the Veterinary profession in India, took place in August 1924. It was the birth of the *Indian Veterinary Journal*. Circumstances were positively hostile and yet the profession took that bold step and the lion-heartedness of the early pioneers cannot be too highly praised. Ever since then, the *I.V.J.* has toiled hard under very adverse circumstances. The *I.V.J.* lives to-day so that the profession could prosper and Science advance.

And now the hat is sent round so as to place this journalistic venture on a sounder and firmer basis. The *I.V.J.* is a priceless possession of our profession. It has placed the Indian Veterinary Surgeon, on the map of the scientific world. Just pause and ponder over, how much we owe to the *Journal* both individually and collectively. Is it too much then to expect the profession to respond to the appeal issued for a Reserve Fund? We hope not.

Some enquiries have come to us asking us to indicate the extent of help expected. We do not want to put the members of the profession to any undue financial strain in these hard days. At the same time, a certain amount of sacrifice is needed to make this fund a great success, so as to make it worthy of our profession. So we feel that the following scale of contribution will be quite reasonable. It could even be paid in two or three instalments.

Class I Officers	...	Rs. 100/- and above.
Class II Officers	...	Rs. 50/- and above.
All others	...	Rs. 25/- and above.

It is our ambition that no Veterinary Surgeon in this land should remain without contributing to this fund. Brick by brick, this great edifice of ours should begin to rise higher and higher. On the success or otherwise of this venture, the solidarity of our profession depends. "Pay and Prosper" is the slogan we pass on to the members of our profession.

Jai Hind!

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

THE I. V. J. RESERVE FUND

LIST OF CONTRIBUTORS

	Amount acknowledged (December 1961 issue)	Rs. nP.
Dr. Y. B. Rajah, Munirabad, Mysore	...	6,508.05
" T. H. Gudi Viramgam, 2nd instalment	...	101.00
" C. G. Bhasker, S. I. T. C., Madras, 6th instalment	...	13.00
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Cheques, money orders and all correspondence should be addressed to the Editor, *The Indian Veterinary Journal*, Madras-17.

THE BOMBAY VETERINARY MEDICAL ASSOCIATION

NOTICE

The 35th Annual Conference of the Bombay Veterinary Medical Association will be held at Poona in the 2nd week of February 1962. The exact date of the Conference will be communicated to the members.

Members of the profession are requested to attend the meeting in large numbers. Resolutions and papers to be placed before the General Body Meeting should be sent to the undersigned before 31-1-1962.

M. G. KALE,
Honorary Secretary,
Bombay Veterinary College,
Parel, Bombay-12.

Parel, BOMBAY, }
5th January '62. }

Reviews

The Philosophies of Extension. Part 1:—By V. SRINIVASAN, B.A., Dip. Econ., G.M.V.C., P.G., Professor of Extension, Bihar Veterinary College, Patna. 78 pp. Price Rs. 1.75.

This is an anthology of available literature on Rural Extension work, from vedic times to the present day, admirably brought out by the author. The author does not claim any originality for his work. "I have borrowed freely not only the ideas but often the very phraseology" says the author. But his originality and greatness are reflected in the manner the subject has been dealt with.

Within the compass of a small booklet of 78 pages, the subject matter breathes new life, new ardour and new enthusiasm. It has brought out in a remarkable manner the spirit behind all extension work. It induces love for dedicated service and holds out hopes of great reward for unremitting toil in this field.

The book will prove of great value not only to the students but to the field workers under the several community development schemes and to all public servants as well. Three more parts are due to appear in due course, but it would have been better if the subject had appeared as a single compact volume, using better paper and print and a more attractive get-up.

T. V. M.

Veterinary Dietetics:—A Manual of Nutrition in Relation to Diseases in Animals:—By J. O. KING, Ph.D., M.B.C.V.S., M.V.Sc., B.Sc.(Agric.), Senior Lecturer in Animal Husbandry, University of Liverpool. 230 pp. Price 30s/h. Publishers:—Bailliere, Tindall & Cox, Ltd., London, W.C. 2.

This new book is a good attempt at the subject of Animal Nutrition in relation to the various diseases in livestock and poultry. It

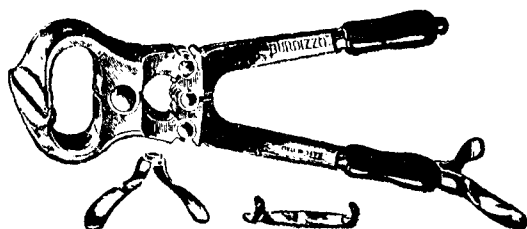
consists of 17 chapters covering almost all the pertinent topics in the subject concerned viz the various causes of disease due to nutritional factors; the use of antibiotics as feed supplements; the defective feeding of various classes of livestock and poultry; the effect of poisonous feeds; and the feeding of animals. It is simple in style and easy to understand. This will serve as a useful reference book.

G. V.

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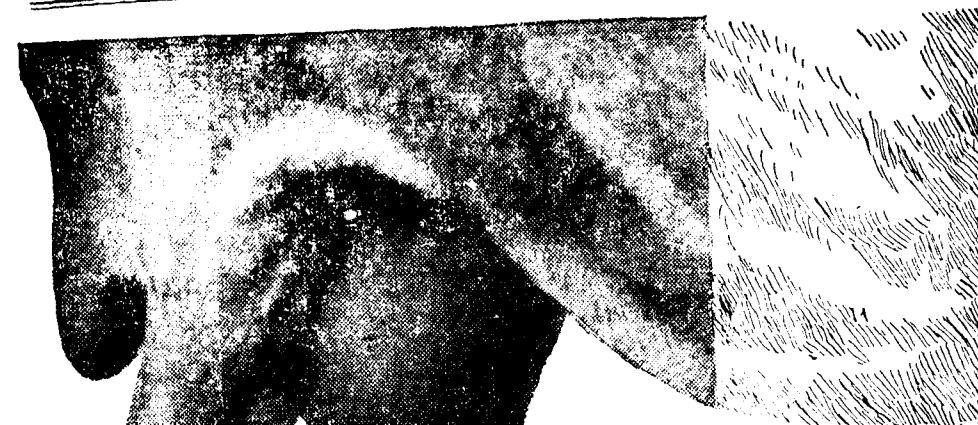
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29639
A Reminder!

Please note the supply of the Journal will be stopped from January 1962, if you are in arrears even for one year. Please therefore pay up your arrears within this current year. It will go a long way to help us.

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