

Vol. 8 & 9

1979/80

Regd. No. ZCBA 7/2025/26

**BULLETIN OF VETERINARY SCIENCE
AND
ANIMAL HUSBANDRY
NEPAL**

Dr. U. M. Singh.



Official organ of Nepal Veterinary Association

Published in August 1981

(Published in August 1981)

Bulletin of Veterinary Science

and

Animal Husbandry, Nepal

Editorial Board

Editor-in-Chief: Dr. S. Pyakural Ph. D.

Associate Editors Dr. D. D. Joshi, B. V. Sc. & A. H., M. P. V. M (calif)

Dr. P. K. Agrawal B. V. Sc & A. H.

Dr. C. M. Lamichhane B. V. Sc & A. H.

Annual Subscription of the bulletin Rs. 10/-
(Nepal, India, Bhutan, and Pakistan)

Other Countries \$ 2.00

Payment should be sent to the Nepal Veterinary Association by cheque or postal order or cash. For bussiness matters and other corespondence please write to General Secretary, G. P. O. Box 1885, Kathmandu.

Nepal Veterinary Assoiation wants to wish its gratitude to the National Conncil of Science and Technology (NCST) for their generous contribution of Rs. 2000/- for the publication of this Bulletin.

(NCST Regd. No - 01/00/05 - 034)

CONTENTS

Articles With Authors

Page

1. Rinderpest and its Control in Nepal
by S. Pyakural 1
2. Brucella Agglutinins in Human Serum in Nepal
by S. Pyakural 9
3. Fibrosarcoma in a Lioness
by B. K. P. Shaha and N. S. Parihar 15
4. Macrocanthorhynchus in Piglets
by N. B. Singh 19
5. Experiments with High Levels Soyabean Meal in Chicks Diets
by T. P. Shrestha 25
6. Role of Livestock in the Economic Development of Nepal
by D. D. Joshi 37
7. Incidence of Foot - and Mouth Disease in
Baglung and Parbat Districts
by P. Mainali 47

Rinderpest and its Control in Nepal

S. Pyakural

Veterinary Division Tripureswar, Kathmandu, Nepal

(Received for publication on 15 December 1980)

Until early 60s rinderpest (RP) was a disease of serious economic implication in Nepal. RP was at rampant in the whole perimeter of the country, the intensity being high in the Terai, the southern part of Nepal bordering India. Livestock, specially cattle and buffalo worth Rs. 600,000 was claimed due to this malady annually.

RP is a disease of wide disrepute among farmers of Asia and Africa. It has done tremendous havoc in the cattle wealth of this subcontinent in the past. Wherever this disease has occurred the stock owners are well aware of its symptoms and mode of control. The purpose of this paper is not to describe the disease in detail but to sum up the ways and means adapted in Nepal during the course of vaccination with a view to control it.

The disease

The symptoms attributed to this disease in Nepal were not different from those of classical RP described in any text-book of virology. Depending upon the severity of infection mild to fatal cases were observed which is not exception to the rule in natural outbreaks. To piece up together, the symptomatic manifestations of frank clinical cases of rinderpest were as follows - high fever, eruptions in the buccal cavity, watery, followed by purulent discharge from the eyes and nostrils, shooting foetid diarrhoea, sometimes mixed with mucus and blood, emaciation and high mortality.

During those days RP was prevalent in every part of the country. Factors like, infrequent mobility, difficult transpo-

rtation and the natural barriers created by the deep valleys and steep hills, outbreak was sporadic in the high and mid hills. Hardly any foci of infection was noticed in the northern frontier ie. the Tibet - Nepal border. This gives lot of evidence to speculate that probably the northern neighbour of Nepal was free from this pest.

Livestock movement between Nepal and the Tibetan territory of China was considerably high. Both before and after the Chinese occupation of Tibet these two neighbours have give and take of animals and animal products in significant amount the major group of animals being sheep and goat. A small proportion of RP susceptible animals like yak, and chauries were also crossing the border regularly. The animals of one territory were also crossing the frontiers on either side for grazing. However, livestock trade statistics indicated a decrease in such flow of animals after the Chinese occupation of Tibet.

Contrary to the above, the situation was all the way different in the Teri of Nepal. In the past, when RP was wild throughout the 500 miles long area bordering India this disease inflicted heavy mortality in cattle and buffalo population. The total loss of animal wealth measured in terms of cash in the area is estimated

to be nearly five million rupees. As no mass vaccination campaign came into practice, the disease was circulating all the year round. The intensity being high during summer. Factors like easy transport facility, conducive temperature for the survival of virus, availability of high density of susceptible population, frequent inter-village mobility of the local people, further enhanced the quick spread of the disease.

Strengthening of Veterinary Services:

Rinderpest as an animal disease has got a great role to play in the growth of veterinary profession in Nepal. This disease has set a noteworthy example, to show how veterinary medicine changed from almost a neglected piece of art to a recognised profession pertained to applied science.

Before the 1953 outbreak of RP of Pokhara valley, situated 200 KM west of Kathmandu, livestock diseases were dealt with by traditional methods of segregation, the propitiation of divinities, exorcism and medication by local herbal remedies. To control this outbreak wet goat tissue vaccine (GTV) was received from livestock Research Station, Patna (LRS). The miracle done by this vaccine to prevent the spread of this epizootic opened a new era in veterinary medicine to realise the intr-

roduction of alleopathic system to treat and control animal pests. Another after-effect of the control of the Pokhara outbreak was that his Majesty's Government of Nepal (HMGN) made a formal request to the Food and Agriculture Organisation of the United Nations (FAO/UN) to develop a programme for the expansion of veterinary services in general and the control of RP in particular for this country.

In 1958 FAO/UN gave this assignment to Dr. H. B. Shahi of India, who in his report stressed the need to establish the network of animal health services in the form of Veterinary Hospitals and Dispensaries in all the districts of Nepal to make veterinary service easily available to the farmers. For the control of RP he recommended the creation of 'Immune belt' of vaccinated cattle and buffalo in the 500 miles Terai. His report also suggested the establishment of checkposts in few important entry points from Terai to the mid and high hills. On the basis of his report Oxford Foundation for Famine Relief (OXFAM) and FAO/UN extended assistance in the form of field vaccination including transport and laboratory equipments.

During 50s and 60s RP was listed as a prime cattle killer in many South Asian countries including Nepal and India

Those days RP control work was undertaken with priority in India. Keeping in view the long arbitrary border and the uncontrollable livestock movement between the territory of India and Nepal, the Indian experts devoted in this arduous task realized that for effective control of this pest in this subcontinent unilateral investment of resources is not enough unless the adjoining country (Nepal) joins hand with equal enthusiasm.

Understanding this problem Government of India provided financial and technical assistance under Indian cooperation programme to HMG. This friendly aid was utilized to expand animal health services by setting up networks of veterinary hospitals and dispensaries in the districts of Nepal. This bilateral assistance also covered to create the training facility for the medium and low level technicians such as stock supervisors and stockmen. Colombo - plan fellowship was made available for undergraduate and post-graduate level training.

Rinderpest control Programme

Phase I. The Indian assistance was used to establish 22 veterinary hospitals 21 dispensaries and 4 check posts in different places of the country. These hospitals

were equipped with buildings including staff quarters. One moderate set of hospital equipments was also supplied. Besides, one Vaccine Production Laboratory was constructed under this scheme. However, major laboratory equipments fitted in this building were made available by OXFAM/FAO.

Rinderpest is a disease, which spreads rapidly within or across the frontier through the movement of cattle. Keeping this into consideration,¹ vaccination programme was designed to make the "immune belt" in the 500 miles long and 15 to 20 miles deep Terai belt. To fortify this belt vaccination posts were established in 14 different points in Nepal-India border, the function of such posts being to vaccinate all bovine animals passing through these posts but having no pre-vaccination identification with GTV. Each check post was staffed by 2 vaccinators. Additional 4 posts were established in the foot-hills to vaccinate the animals moving from the Terai to the hills or mountains, so that chances of penetrating the disease from plain to the hill could be minimised.

Vaccination work was carried out in the village by mobile team of vaccinators recruited temporarily for the campaign. Each team of vaccinator was attached

to a senior technician of the adjoining veterinary hospital, who could help them to make necessary preparation for vaccination, keep the record up to date and to provide the inputs necessary for the team. The team was comprised of 20 vaccinators, animal controllers and one driver. The team was equipped with a four-wheel drive land-rover, camping set, extension materials, and one kerosin refrigerator to preserve the vaccine. The activity of the team was supervised by a qualified veterinarian.

During the first phase of the campaign, that is, from November 1964 to June 1969, 3.65 million bovines, which is estimated to be nearly 70 percent of the Terai animals were vaccinated with freeze dried GTV. Initially this vaccine was imported from India. In 1966 when the Biological Products Laboratory started functioning the vaccine was produced locally. A total of 1.38 million doses were produced by the end of the campaign. Obviously rest of the vaccines came from India.

Phase II. At the close of the campaign it was suggested to undertake "Follow up" vaccination work to cover the underaged animals left unvaccinated in the previous year and the possible new entries of few or those animals which

were likely to be missed, to maintain the status quo of the "immune belt". But due to various technical and administrative shortcomings such "Follow up" action was discontinued in 1971. As a result of which wave of rinderpest erupted from the foci which otherwise remained dormant due to regular vaccination, and flared up in many areas in a localised manner. Frank clinical cases of the disease were recorded in Kailali and Kanchanpur districts in the west, Bara and Dhanusa in the central region, and Morang, Sunsari and Saptari in the East. Thanks to the prompt action of the Veterinary Division of HMG Nepal. These outbreaks could not produce that disaster which otherwise was inevitable in RP. The effective vaccination work executed by the field staff was equally significant to localise the spread of infection.

Assuming that cattle plague is under control, HMG Nepal was looking forward to provide inputs in the form of improved germ plasma to help develop the low productive stock of the country. During this time the reemergence of RP proved to be a stab in the back. However, realising the impact of adequate animal health measures, in the uplift of livestock development, RP control work got top priority (amongst all livestock development

programmes) in the financial year of 1973/74. Vaccination campaign was launched afresh once again. No bilateral or international assistance was available this time. The Government provided generous share for this must-to-do work from its own resources.

The vaccination work was designed more or less in the similar fashion as in the previous campaign. Nevertheless, the experience of the first phase contributed substantial help to deal with this outbreak. The veterinarians were experienced this time to handle situation, the veterinary network in the field was well spread and equipped to carry out such work. Above all, the production of freeze dried GTV locally helped to add additional muscle in the campaign.

The vaccination work was intensified in the terai belt as in the previous occasion. In the first year of the campaign that is, in 1973/74 nearly 6,00,000 cattle and buffalo received GTV. Then onwards inoculation of 1 million animals was targeted every year. By the end of 1976, 4.2 million bovines were vaccinated at least with one shot of GTV. This expects to cover 75 percent of the bovine animal of the terai. From 1977 onwards vaccination work is being done in the form of "follow

up" programme. And it is envisaged to continue such work, so far the whole subcontinent is not declared free from RP.

Conclusion :

Rinderpest is a disease of great economic threat and precipitates national disaster of livestock wealth wherever it exists. In spite of this it is a simple and most eradicable of the diseases. Considerable progress has been made in the past decades to suppress or eradicate this disease in many countries of Asia and Africa. India and Nepal also have become free from this malady after so many years sincere effort towards its control with a view to ultimate eradication, and at present RP has been reduced to a disease of little significance.

In Nepal last outbreak was recorded at the end of 1973 but enzootic foci may still exist in few areas which may predominate anytime in future when the innate resistance of the stock will be reduced or the percentage of animal population previously unexposed to rinderpest vaccine may increase. Nepal may still be included among RP high risk country group although the innate resistance of the local stock is expected to be high due to constant vaccination with caprinised

antigen. The youngs are protected passively through intake of colostral antibodies. The yearlings are somewhat resistant and even if they are affected because of their innate resistance the disease is mild or inapparent and the mortality is low. In addition, the strains of virus involved are often of low virulence in high risk areas. All these favourable circumstances may lead to take a milder course and subside even if RP appears in this country.

It is postulated that in high risk areas where rinderpest is suppressed, the disease persists in large or small wild ruminants and may flare up whenever some favourable condition arises. Further exotic stock, which are imported extensively in developing countries for cross-breeding from countries which are not previously exposed to RP are prone to suffer from severe infection when they come in contact with the disease in high risk area.

Low risk countries remote from enzootic country can ensure freedom from RP by complete restriction of imports of domestic animals and raw animal products from enzootic areas. It is very unlikely to create such iron curtain in the movement of domestic or wild animals between Nepal and India. The political border between these two countries are well passed

many times in a day by the animals or humans from either side. Further the socio-economic condition of the people in the frontiers is so closely built-up that the more it is tried to disturb the more it intricates. In such circumstance it is advisable for the veterinarians and also the farmers of either side of the frontier to remain vigilant so that any possible appearance of the disease can be nibbled at the bud.

In some instances in areas apparently free from RP the emergences of rinderpest-like disease which manifests symptoms simulating to cattle plague, may complicate the situaion. However' in high risk areas it is always advisable to take such diseases as rinderpest and adapt necessary measures before any untoward consiquence which might ensue.

Brucella Agglutinins in Human Serum in Nepal

S. Pyakural

Veterinary Laboratory, Tripureswar, Kathmandu, Nepal.

(Received for Publication on January 1981)

Malta fever is one of the many diseases known to be communicable from animal to man. Brucellosis in human beings is mainly an endemic disease of sporadic occurrence. Man generally comes in contact with the disease by consuming infected milk and meat or other dairy products derived from infected animals or by direct contact with the infected animals or their body tissue. Alternatively meat, milk, or such products from infected animals can also become the source of infection in man.

Brucellosis is basically a disease of animals, those of primary epidemiological importance are cattle, swine, goats and sheep. There are mainly three types of organisms involved to attribute the symp-

toms of brucellosis infection i.e. *Br. abortus*, *Br. suis* and *Br. melitensis*. Some new species have also been added in the list of these main types (Mayer 1957) which, however, are not of considerable significance from public health point of view. Whatever may be the type of organisms involved the symptoms attributable to brucellosis in man remains the same. The symptoms of brucellosis in man are described elsewhere.

Brucellosis has been incriminated in various species of animals in Nepal such as cattle, sheep, goat, waterbuffalo, yak, nak and chauri as well (Joshi, et al, 1974 a,b, Pyakural and Mishra 1977). Human brucellosis has been reported from various countries of the world including

India (McCullough 1978, Mathur 1972). No such investigations were so far, attempted in Nepal to trace out the incidence of brucellosis in man. We herein report the presence of brucella agglutinins in human serum collected from few geographical areas which could represent the varied topography of the country assuming that this will pave the way for further study of this zoonosis.

Materials and Methods

Human serum from selective geographical areas of mountains, plains and vallies were collected. In all 19 blood sera from Sulukhumbu, 56 from Langtang, 156 from Malunga, 134 from Pokhara, 31 from Biratnagar, 215 from Birgunj, 110 from Bhairhawa and 121 from Kathmandu were tested.

All these sera were subjected to tube and plate agglutination tests, using *B. abortus* colored and plain antigens procured from I. V. R. I. Izatnagar, India. Results were interpreted according to the standard procedures as laid down by FAO/WHO expert committee (1964).

Results and Discussions

The results presented in the table have revealed that human beings of all the regions surveyed in this experiment

were carrying *Brucella* antibodies in their serum. From this observation, it can also be assumed that similar situation might be prevailing in other parts of the country which, however, needs extensive investigation.

As in the case of animals (Pyakural and Mishra 1977) agglutinins against brucellosis were detected in highest percentage in the remote mountains such as Solukhumbu (5.26%) and Langtang (7.24) which clearly indicates that human being have reciprocated the infection from their animal counterpart such as yak, nak and chauris, which share the same roof with man in the altitudes of Nepal and Tibet.

On the other hand, unlike cattle (Pyakural and Mishra 1977) human of Kathmandu and Pokhara were the least reactors against brucellosis, the percentage of seropositives being 1.67 and 1.48 respectively. The low positive reaction in Kathmandu population is probably because in the capital the association between man and animal is not so close as in the interior. The possible cause of such low reactivity of Pokhara serum is not clear because of the absence of local address of the blood donors. Although, the percentage of confirmed reactors was not very high in Kathmandu, the percentage

of doubtful cases was fairly high which may turn into positive in subsequent tests provided further sera samples could be collected from these blood donors in future.

Previous works on this disease (Joshi et al a, b, Pyakural & Mishra 1977) have given some vivid picture about the brucellosis situation in various species of domestic animals belonging to different geographic areas of the country. Perhaps Nepal is one of the many developing countries where there is close association between livestock and man, such symbiosis being closer in the mountains than in the plains. The impact of such relationship can also be detected from the evidence of *Brucella* agglutinins in human subjects of such areas and their animal counterparts belonging to the same region (Pyakural and Mishra 1977).

Although animals are always considered to be the main source of protein component of human food, this efficiency of livestock is least exploited in Nepal. Paradoxically, Nepal stands on top as regards per capita holding of livestock, having 5.8, heads of animals per household, on the other hand the availability of per capita meat and milk is very poor, amounting to 4 kg of meat and 35 litres of milk per year. However, the role of animals

in the agriculture based economy of the country can not be underestimated. Even this traditional interrelationship between man and animal may be deranged if timely measures are not initiated towards the control of this disease in animals.

This has been fully realized that man gets brucellosis infection through animal which may either be due to direct contact with the infected animals or through milk and/or meat products of the diseased animals. So the first step towards the control of this zoonosis in human should be its control in livestock. So far no effective measures are taken towards the control of animal brucellosis in Nepal except the study of its surveillance in isolated cases. The situation is still precarious so far the knowledge of human brucellosis is concerned which is likely to deteriorate further if effective control measures are not introduced in time. It is obvious that the incidence of human infection can be reduced or controlled only by keeping their livestock free from this disease, which can be achieved only from a joint approach of medicos and vets of the country. In other words and effective veterinary public health division should immediately be framed which can look after the control of brucellosis and similar other diseases communicable from animal to man. If timely measures are not taken

the situation may be aggravated to such an extent that both man and animal may become vulnerable to a number of zoonosis which will be beyond our reach in future. Various methods for the control of animal brucellosis are described elsewhere (Thomson 1975, Renoux 1957, Cemeron 1957, FAO/WHO expert committee on brucellosis 1264, Pyakural and Mishra 1977). From this observation it can also be assumed that similar situation might be prevailing in other parts of the country which is yet to be investigated.

Summary

Human sera from 6 geographical positions of Nepal which cover, plain, valley, high hills and mountains were tested against *B. abortus* antigens. Percentage of definite seropositives ranged from 1.65 in Kathmandu and 1.49 in Pokhara to 5.2 in Sholukhumbu. However, the percentage of doubtfuls ranged from 6.04 in Biratnagar to 12.5 in Langtang. The importance of veterinary public health in the control of brucellosis is discussed.

Acknowledgement

The authors are grateful to Mr. U. B. Shaha for his technical assistance.

Table:- Prevalence of brucellosis in human beings

Location	Year	Agglutination test				
		Plate test		Tube test		Percent
		No, Positive No. tested	Percent	No. Positive No. tested	Percent	
Solukhumbu	1974	1/19	5.26	1/19	5.26	10.52
Laangtang	1973	3/56	5.36	4/56	7.14	12.5
Malunga	1973	4/156	2.56	6/156	3.84	8.97
Pokhara	1974	2/134	1.49	3/134	2.23	6.79
Biratnagar	1975	5/215	2.32	6/215	2.79	6.04
Bhairahwa	1976	4/110	3.63	5/110	4.54	7.29
Kathmandu	1977	2/121	1.65	3/121	2.47	9.91

REFERENCES

1. Cammeron, H. S. (1957): *Advances in Vet. Sc.* 3, 275.
 2. Joint FAO/WHO Expert Committee on Brucellosis. Fourth report (1964).
 3. Joshi, D. D., Pyakural, S. and Shukla, R. R. (1974 a); *J. communicable disease* 6, 325.
 4. Joshi, D. D., Shukla, R. R. and Pyakural, S. (1974 b). *Bull. vet. Sc. & A. H., Nepal* 3, 1
 5. McCullough, N. B. (1958); *Annals of the N.Y Accademy Sc.* 70, 541.
 6. Mathur, T. N. (1972); *Indian Vet. J.* 49, 963.
 7. Mayer, M. E. (1654): *Advances in Vet. Sc.* 18, 231
 8. Pyakural, S. and Mishra, U. (1977): *Bull. Vet. Sc. & A. H., Nepal* 6, 1
 9. Renoux, G. (1957); *Advances in Vet. Sc.* 3, 241.
 10. Thomsen, A. (1957): *Advances in Vet. Sc.* 3, 197.
- 

Fibrosarcoma in a Lioness (Panthera Leo)

B. K. P. Shaha and N. S. Parihar*

Veterinary Hospital, Mahendranagar, Nepal.

(Received for Publication on February 1981)

Not unlike human beings and domestic animals, the wildlife is affected with neoplastic and allied conditions. Nevertheless, the recorded cases in human beings and domesticated animals far exceed than those reported in wildlife. Social and economic backwardness and lack of appreciation of the role of comparative pathology in the advancement of knowledge about diseases constitute some of the reasons for the paucity of reporting and proper diagnosis of various maladies in wildlife. But the study of wildlife in its various facets is rewarding and called for in the interest of overall development of the society. The free-living wild animals which are kept under the artificial but

protected environments of zoological gardens, although subject to innumerable undefined stresses, are allowed to grow old and live their full span of life. These factors naturally increase the likelihood of their developing neoplasia. A similar case is reported herein about a lioness about 13 years old which developed fibrosarcomatous growths in the lungs.

Materials and Methods

A nodular growth was noted on the internal aspect of lower lip towards the right side about 6 months earlier and the same was extirpated twice but recurred. The growth spread to the right side of the lower jaw and the animal

* Pathology Division, Indian Veterinary Research Institute, Izanagar, U. P., 243122.

could not eat properly due to presence of growth and falling of molar teeth. Because of its fast deteriorating condition, the animal was subjected to Magnesium Sulphate euthanasia after sedation by Rompun and Flexedil.

The animal was necropsied after saving its head and skin for processing for exhibition. The pieces of lungs, liver, heart and kidneys were collected in 10 percent formalin for histopathological examination. Suitably trimmed pieces of these organs were washed, dehydrated in graded alcohols, cleared in benzene and embedded in paraffin. 4-6 M thick sections were stained with haematoxylin and eosin, van Gieson's and Masson's trichrome staining methods.

Results

Grossly both the lungs revealed nodular whitish/grey fleshy lesions varying in size from pin-head to about one cm. in diameter situated in the substance of the lungs and also visible under the pleura (Figs. 1.). The right kidney was larger than the left and the liver revealed small cysts in the parenchyma.

Histopathologically the lung tissue revealed mild emphysema and infiltrations at places in the alveolar tissue with neo-

plastic masses (Fig. 2). The growths consisted of small ill-formed bundles of usually spindle shaped elongated cells running in various directions and criss-crossing each other (Figs. 2). Their nuclei were usually plump, vesicular, slightly elongated with rounded ends and displayed one to two nucleoli. Mitotic figures were few and far in-between. The cytoplasm revealed its fibrous nature on staining with van Gieson's and Masson's trichrome stainings and was pale eosinophilic in haematoxylin - eosin stained sections. Well-formed blood vessels were noticeable in the neoplastic masses. Little mononuclear cell infiltrations were also noticed at places in the tumor masses.

Microscopic examination of the liver, heart and kidneys did not reveal any evidence of neoplasia in these organs.

Discussion

Sivadas et al. (1968) have recorded 4 cases of tumors in lions viz, carcinoma of the intestine, squamous cell carcinoma of the skin, epidermoid carcinoma of gingiva and adenoma of lungs. Except the above report, perusal of the available literature did not reveal any other report recording the occurrence of tumors in lions. The present case, therefore, adds to the list of recorded tumors in this species.

The primary site of the tumour is suspected to be the lower lip region which was subjected to surgery twice for the removal of the labial growth. But in the absence of the excised tissue and the whole head, nothing definitely can be said about the primary site. The pulmonary growths, however, were considered secondary in view of their multifocal distribution and wide variation in size. The failure of repeated surgery to check the labial growth and occurrence of multiple tumor nodules in the lungs correlate well with the known characteristics of malign-

ant tumors of connective tissue i.e penetrability beyond the apparent limits of tumor growth and usually prominent blood borne metastasis which occur first and most prominently in the lungs (Ritchie 1970).

Acknowledgements

The authors are grateful to Director of Veterinary Services, Nepal and Director, Indian Veterinary Research Institute, Izatnagar, U. P., India for the facilities and encouragement.

References

- Sivadas, C. G.; Rajan, A.; Nair, M. K.; Ramachandran, K. M. Malay Veterinary Journal (1968) 4, 173
- Ritchie, A. C. The Classification, Morphology and Behaviour of Tumors. In Florey H. W. (editor) General Pathology. London, Lloyd - Luke (Medical Books) Ltd. (1970) 4th edition, 668-719 pp.

Legends to figures

- Fig 1. Cut surface of lung of the lioness exposing whitishgray nodules of variable size in formalin fixed specimens.
- Fig. 2, A microscopic fibrosarcomatous focus in the lung substance in alveoli. H. and E. X 65.

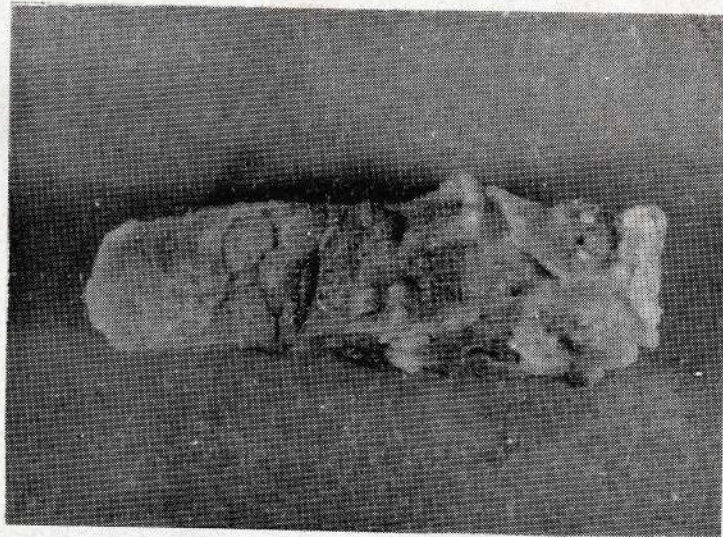


Fig. 1: Cut surface of lung of the lioness exposing whitishgray nodules of variable size in formalin fixed specimens.

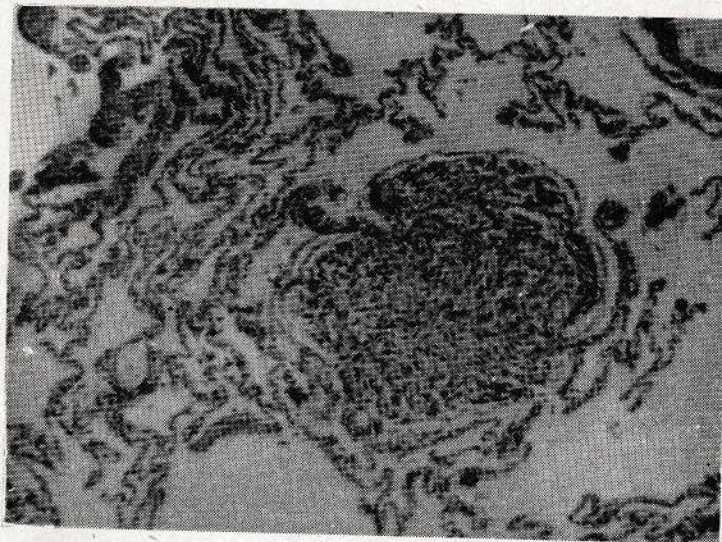


Fig. 2: A microscopic fibrosarcomatous focus in the lung substance in alveoli, H. and E. X. 65.

Macrocanthorhynchus in Piglets

M. B. Singh

Disease Investigation Laboratory, Tripureswar, Kathmandu, Nepal.

(Received for publication 6 January 1981)

Macrocanthorhynchus is the obligatory parasite of the small intestine of pigs. This helminth is world wide in distribution. The pathogenicity pathology and other characteristics of this worm including its enonomic implication in pig industry have been described elsewhere (1). This paper deals with the morphology of one laboratory isolate of this worm and the post-mortem lesions in pigs died of macrocanthus infestation.

Necropsy:-

After thorough external examination of the carcass the abdominal and thoracic cavities were opened and visceral organs were examined. Gastrointestinal tract was opened. The lesions were recorded. The worms were collected in petridishes. A piece of the small intestine with the worm attached to it was collected in petridishes. A

piece of the small intestine with the worm attached to it was collected in 10% formalin. A few worms were washed thoroughly with tipped P. B. S. for morphological study. The length, and the width of the worms were measured. A portion of the intestine with numerous worms attached to it and having old ulceratrd lesions was collected in 10% formaline to preserve as museum specimen. Formalin fixed issue with the worm attached in it was embided in paraffin and sections were cut and stained with routine HE method for histopathological study. About 10 grams of faeces were collected from the intestine of the dead piglet and also from 3 live piglets for the detection of parasitic ova.

Necropsy Findings:-

The external appearance of the cadaver showed emaciation, the visible

mucous membranes were pale indicating severe anaemia. The anus was soiled with foetid yellowish loose faeces. Subcutaneous fat was absent. Fibrino-purulent exudate was present in the peritoneal cavity. There was adhesion of the intestine in some places. Heart contained very little amount of blood. Nodular structures similar to pimply gut in the intestine were visible throughout the serosa in the duodenal and jejunal portions of the intestine. In few places the gut wall was completely perforated by the parasite. The stomach contained nothing but only frothy fluid. Small intestine was devoid of faecal material. A number of worms were found firmly attached to the intestinal wall. A number of ulcerated scars were clearly noticed. Complete worms could be separated only by careful dissection. The death was diagnosed to be due to peritonitis which resulted from the penetration of the intestinal wall by the worm followed by secondary bacterial infection. The formation of granulation tissue which looked nodular in the intestinal wall was probably the result of the tissue reaction between parasite and local tissue.

Microscopic lesions:-

The histopathology revealed the replacement of the intestinal epithelium with diphtheric membrane. The proboscis

of the worm lying in the diphtheric mass was incircled by granulation tissue with eosinophilic infiltration resulting necrotic enteritis.

Helminthological study:

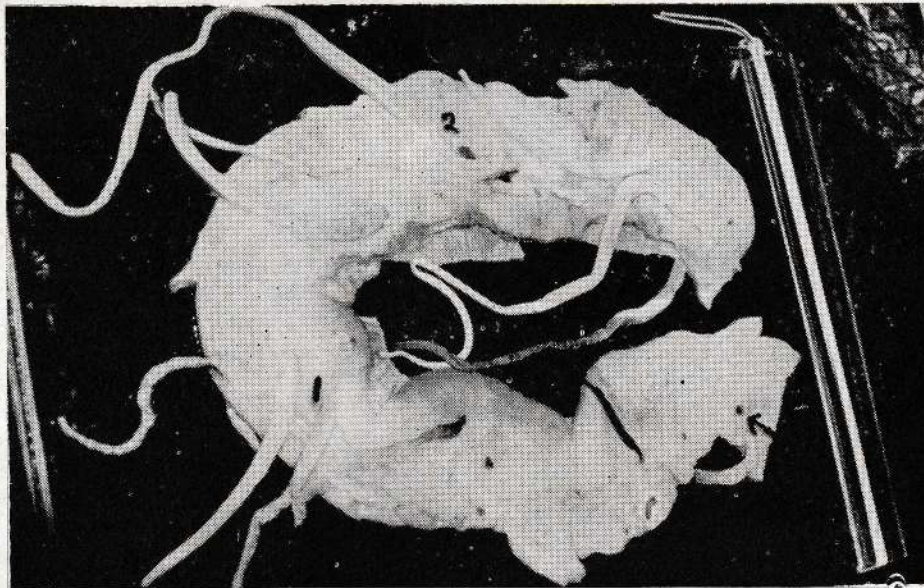
Study of Parasitic Ova:-

The stool samples of the carcass and the live piglets were examined directly under low magnification of the microscope. A number of elliptical brown coloured, dry, coarse looking ova was noticed. On thorough observation the ova were found to contain four coats. The outermost and the second coats looked rough whereas the inner coats were finer. When measured micrometrically the ova on average were 105 x 45 μ m.

Morphology of the worms:

The worms were dirty looking with dry, light brown, transversely wrinkled cuticle. The length of the male and female worms varied greatly: the smallest one was 9 cm and largest one measured 25 cm, the breadth varied from 4 to 11 mm. The head of the worms were deeply buried in the intestinal wall. The worms in natural state were found in curved state.

Short and stumpy ones were



Small intestine of macrocanthorhynchus with worms

→ Old healed Scar

1 Male

1 Female

found to be the males while the longer ones were the females. The natural appearance of the worm is presented in plate. The detail morphological structure is shown in sketches I and II. Several rows of hooks were seen on the retractile proboscis. A small neck and proboscis receptacle connected the proboscis to the trunk (body) of the worm. The epidermis was finer, thinner and was situated below the cuticle. The male genital organs were comprised of testes, genital sheath and the genital pore; whereas the female reproductive system included uterine belt, uterus and terminal vagina. The sex organs were suspended in pseudocoelom. The digestive tract is lacking in this worm.

Life Cycle:-

The available literatures suggest that the worm *Macrocanthorhynchus* needs two hosts to complete its life cycle, pig being the final while dung beetle serves as intermediate host. However, no detail study in this direction was carried out in the present observation.

Prevention and treatment:-

The infected piglets were treated with piperazine adipate orally with a dose of 100 mg per kg body weight. The following morning parasites were seen in

the faeces. Faecal examination one week later was still positive for the ova.

Mansonil with dose schedule of 150 mg per kg body weight orally was found more effective to remove the worms, as seen from subsequent faecal examinations.

Safe disposal of the faecal material was suggested for the control of further infestation. As stagnation may encourage dung beetle multiplication

Conclusion:-

The lesions noticed in this observation suggested that the male worm is likely to cause severe damage to the intestinal wall piercing its thorny head into the intestinal mucosa and making it completely unfit to adsorb required nutrients from the food. This may result in the debilitating condition of the animal.

For the first time this worm was recorded in this country. Some areas of USSR from where these piglets were imported and the Philippines were the usual habitat of this worm. In the Philippines 0.3% of the local country pigs were found to harbour this parasite. This disease is also considered to be of zoonotic significance. As seen from the life

cycle of the worm once the disease is established its epizootiology runs smoothly. The dung beetle which is very common to all countries acts as intermediate host of this worm.

i) The death due to peritonitis is the usual feature in *Acanthocephalus* infection. The numerous ulcerated and healed scars in intestinal surface were the result of penetration of the gut wall with the hooked proboscis leading to chronic inflammatory process.

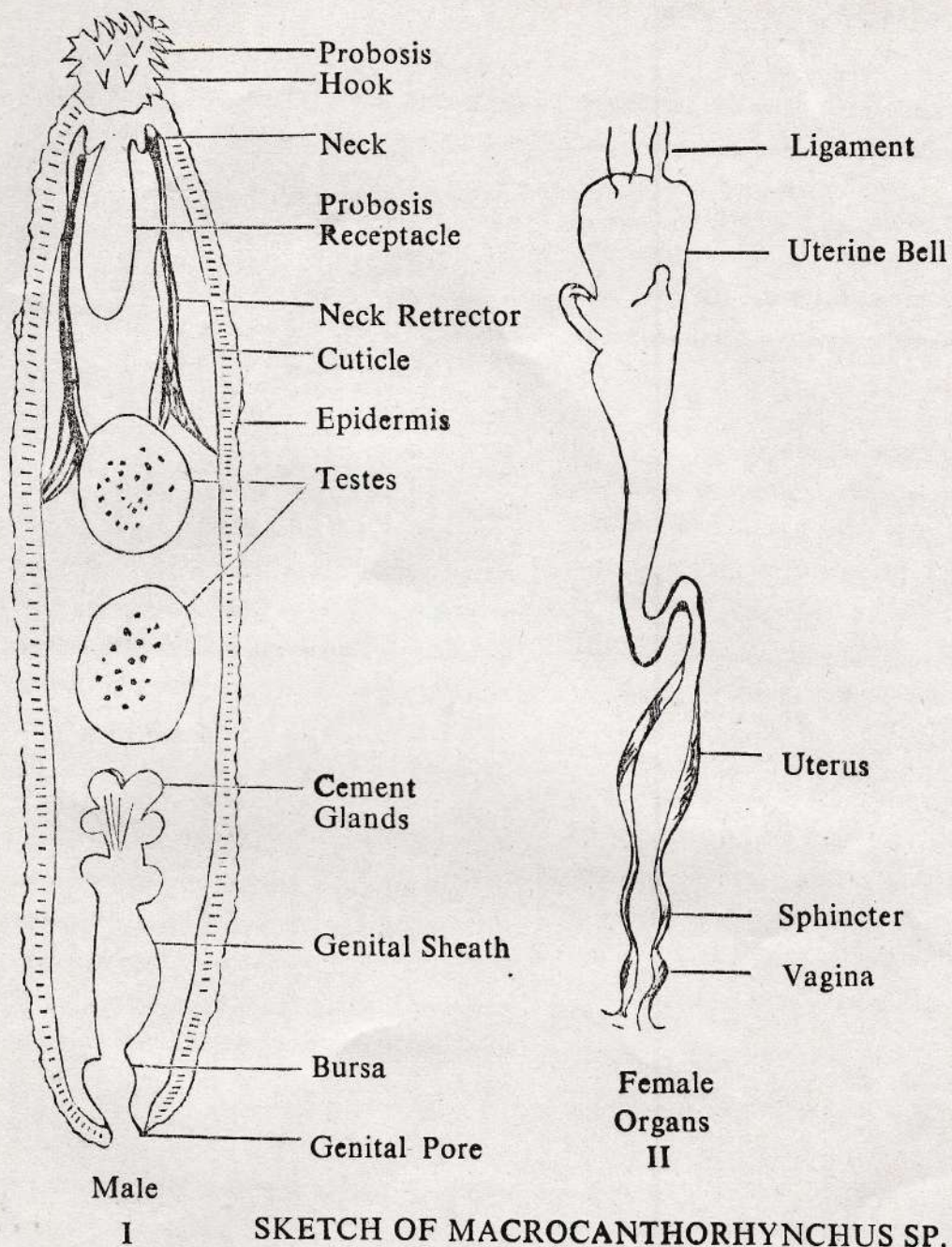
Treatment with piperazine compound was not very satisfactory whereas mansonil was found to be the drug of choice in this observation.

Summary:-

For the first time in Nepal *Macrocanthorhynchus* helminth (thorny headed worm) was recovered in piglets imported from the USSR. The pathology of the disease and the parasitological observations were reported.

Reference

1. Soulsby, E. J. L. Helminth, Arthropods, and Protozoa - 6th Ed. Bailliere Tindall & Cassel Ltd.
2. Kajan Veterinare, Malaysia, Singapore (1972) 4. No I 6 - 6 (En) Ins Public Health. Univ. Herson, Manila, Philippines.



Experiments with High Levels Soyabean Meal in Chicks Diets^{*}

T. P. Shrestha

Agricultural Projects Service Centre, Kathmandu, Nepal.

(Received for publication 10 February 1981)

It is recognised that feedstuffs such as fish meal and meat meal which contain animal protein are better supplements than vegetable proteins for combination with cereals in poultry diets. The reason is that mixtures of cereal and animal protein usually provide a better balance of amino acids than can be obtained in all-vegetable diets. In particular, muscle proteins are rich sources of lysine and methionine and most vegetable proteins are relatively deficient in these amino acids.

Because fish meals are nutritionally more valuable they cost more per unit of protein in world markets than vegetable proteins. Potential supplies of fish meal

are also limited and in some land-locked countries, such as Nepal, the cost of importation makes fish meal very expensive to the home-produced vegetable proteins.

Soyabean meal is widely used as ingredient in poultry diets and provided the meal has been correctly heated, it is known to be an excellent source of protein (Anderson and Warnick; 1965 Warnick and Anderson, 1968). Soyabean protein has an unusually high proportion of lysine (6.4%) but is deficient in methionine (1.5%). Diets based on maize, soyabean meal, and supplementary methionine are extensively used in the USA and there is little doubt that such diets, containing no animal protein, give excellent perfor-

* This work was performed in the University of Reading, England, when the author was studying Post-graduate Course in Animal Production.

mance. It is not known whether soyabean meal can be equally successful if used at higher levels without methionine supplementation in a situation where methionine is unobtainable, or is too costly to import into a developing country, or where the technical facilities to incorporate methionine in the diet do not exist.

Two experiments were therefore designed to determine the effect of feeding high levels of soyabean meal to chicks, with or without methionine supplementation. Herring meal was used as a high quality protein source for comparison and the effect of using different cereal bases was also investigated.

Materials and Methods

544 days-old male Ross I broiler chicks were randomly housed in 4 electrically heated tiered brooders with wire mesh floors. Temperature was controlled by thermostat. Each brooder was divided into 8 compartments and 17 chicks were allocated to each compartment. Diets were randomly allocated so that 2 groups of chicks received each of sixteen diets (experiment 1) or 4 groups received each of 8 diets (experiment 2). Feed and water were supplied *ad libitum* from one day old to 21 days of age. Chick weight

and feed consumption were determined weekly.

Experiment 1

Treatments

Sixteen diets were constructed using either soyabean meal or herring meal as the principal source of protein. In the case of soyabean meal, maize was used as the cereal because this would be the normal choice in Nepal. The herring meal diets used wheat and barley rather than maize, because this gave diets more typical of British conditions and because it avoided the need to add large amounts of fibre to offset the higher energy content of herring meal compared with soyabean meal.

Initially, isocaloric diets were formulated to contain 30% crude protein derived from maize and soyabean meal (diet 10, Table 1) and 24% crude protein derived from fishmeal and a 50:50 mixture of wheat and barley (diet 4). A range of dietary protein levels was then obtained by diluting diets 4 and 10 with an isoenergetic mixture of protein-free materials. In this way protein content of the diet was varied without altering the amino acid composition of the protein.

A further series of diets (11-16) was obtained by adding DL-methionine to diets 5-10. The amounts of methionine added were calculated to bring the total methionine to 0.4% when the diet contained 22% protein and pro rata amounts for higher and lower protein levels. The calculated levels of protein, lysine, arginine, methionine and cystine are given for all 16 diets in Table 2.

Results and Discussion

The growth rate achieved on the all-vegetable diets was very good and at all levels of protein exceeded the growth rate on diets containing herring meal (Table 3 and Figure 1). This result was unexpected. Possible explanations are that the effect was due to the surplus of lysine in the fish meal diets or due to the differences in cereal content of the diets which appeared to affect palatability.

The addition of DL-methionine to the soyabean diets improved growth rate at all levels of protein, confirming that sulphur amino acids were first limiting. Rather surprisingly, the use of supplementary methionine did not noticeably alter the amount of protein needed for optimum growth rate even at high levels of protein (average growth rate on diets

7 and 8 being significantly less than that on diets 13 and 14). This indicates that the unfavourable amino acid balances could not be overcome merely by increasing the supply of protein.

Feed intake on the herring meal diets was substantially lower than on the all vegetable diets of corresponding protein level and this suggests that wheat and barley may have been less palatable to the chicks than the maize. Efficiency of feed conversion was slightly, but not significantly, lower with the wheat and barley diets.

Since the unsatisfactory results obtained with herring meal could have been due to the amino acid make-up of the diets or to the relative unpalatability of wheat and barley when fed as a dry meal, a second experiment was designed to test the effect of combining soyabean meal or herring meal with the different cereals.

Experiment 2

Treatments

Two levels of protein were chosen 18% and 21%, and 8 diets were constructed to give all combinations of protein level, protein source (soyabean

meal or herring meal) and cereal base (maize or wheat and barley), (see Table 4). Diet 8 (maize-herring) was calculated to contain 3.29 kcal ME/g and diet 2 (maize-soya) was adjusted to the same calculated ME value. Similarly, diet 4 (wheat-barley-herring). The 18% protein diets were obtained by dilution with protein-free ingredients. DL methionine was added to all the soyabean diets in this experiment, the addition being calculated to make the level of methionine (relative to requirement) the same as for cystine, cystine being the second limiting amino acid. Calculated levels of lysine, arginine, methionine and cystine are given in Table 5.

Results and Discussion

The growth results of this experiment confirmed those of the previous trial. The soybean-maize diets were again superior to the herring-wheat-barley diets (Figure 2), but in this experiment the diets were not isoenergetic. Substitution of soyabean meal for herring meal in the wheat and barley diet resulted in a significant improvement in growth, indicating that the poor results obtained with herring-wheat-barley were at least partly related to amino acid balance. If the cereal base was changed (with an associated change

in energy level) this also improved the results obtained from the herring-wheat-barley diets. This might be due to an effect on palatability or energy intake but might also be related to the higher arginine content of maize protein (see Table 5) which could offset the adverse effect of the high lysine content of these diets. Neither a change in cereal nor a change in protein supplement made alone, increased the herring-wheat-barley diet up to the level of the soyabean - maize diet.

General Discussion

These experiments show better growth with all vegetable diets than with diets based on herring meal and this result is contrary to many reports in the literature which show that animal proteins generally support better growth than vegetable proteins.

Schumaier & McGinnis (1966) used herring meal as the sole source of protein in a chick diet and showed that growth rate was inferior to that on a maize-herring meal diet, but did not report comparative results for a diet with protein derived from maize and soyabean meal.

The reason for the comparatively

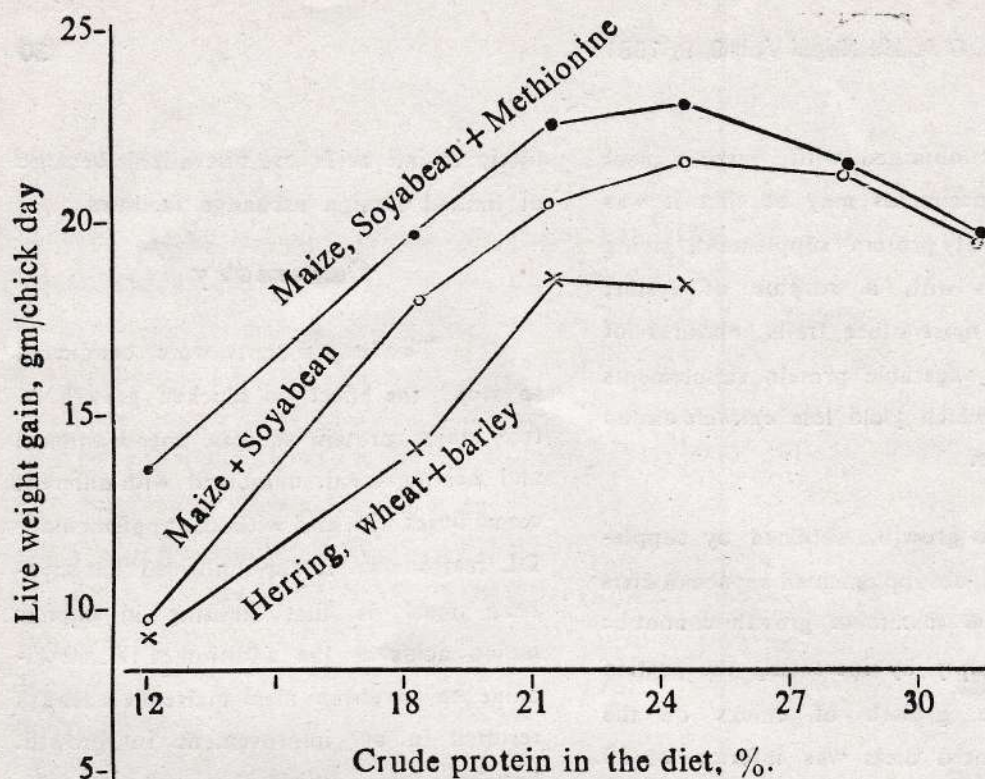


Figure 1. Liveweight gain in Experiment 1

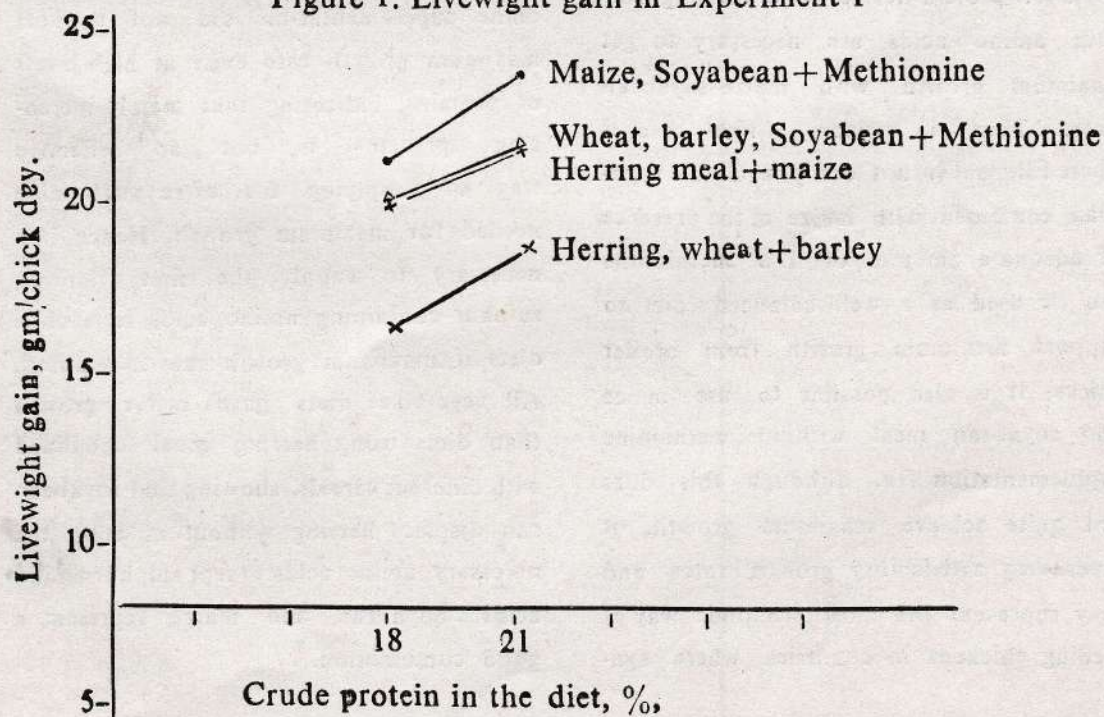


Figure 2. Liveweight gain in Experiment 2.

poor results obtained with herring meal in these experiments may be that it was used as the only protein supplement, giving rise to diets with a surplus of lysine, whereas in most other trials mixtures of animal and vegetable protein supplements were used which yield less extreme amino acid patterns.

The growth obtained by supplemented and unsupplemented soyabean diets indicates that maximum growth cannot be achieved simply by increasing the protein level as the growth of chicks on the unsupplemented diets was inferior at all levels of protein tested. The limiting sulphur amino acids are necessary to get maximum growth with maize-soyabean diets. Thus in places like Nepal where fishmeal is not easily available soyabean combined with maize in the presence of adequate amount of DL methionine can be used as a well balanced diet to support maximum growth from broiler chicks. It is also possible to use maize and soyabean meal without methionine supplementation for, although this does not quite achieve maximum growth, it gives very satisfactory growth rates and may represent the most economic way of feeding chickens in countries where syn-

thetic amino acids are unavailable because of limited foreign exchange facilities.

Summary

Two experiments were conducted to study the effect on chicken growth of two major protein sources, soyabean meal and herring meal, combined with different cereal bases with and without supplementary DL methionine. It was confirmed that soyabean meal is first limiting in sulphur amino acids as the addition of DL methionine to soyabean meal-maize diets always resulted in an improvement in growth. Soyabean meal-maize diets without methionine supplementation did not support maximum growth rate even at high levels of proteins, indicating that merely increasing protein is not an effective way of supplying the extra methionine needed for maximum growth. Hence it is necessary to supply the first limiting sulphur-containing amino acids in such a diets if maximum growth rate is required. All vegetable diets gave better growth than diets using herring meal combined with different cereals, showing that soyabean can displace herring without affecting the necessary amino acids except sulphur amino acids. Soyabean and maize represent a good combination.

References

- Anderson, J. O. and Warnick, R. W. (1965) Poult. Sci., 44: 1348.
 Schumaier, G. and McGinnis, J. (1969). Poult. Sci., 48: 1462.
 Warnick, R. W. and Anderson, J. O. (1980) Poult. Sci., 47: 281.

TABLE 1
 Composition of high and low protein diets used in Experiment 1.

Diet	1	4	5	10
Dietary Protein Level	12%	24%	12%	30%
Herring meal	10.40	20.80		
Wheat	19.20	38.40		
Barley	19.20	38.40		
Soyabean meal			24.96	62.44
Maize			11.24	28.10
Glucose	30.50		35.00	
Starch	10.00		15.00	
Oathulls	6.83		7.25	
Corn Oil	1.00	1.00	2.60	6.20
Limestone	0.87	0.94	0.72	0.90
Dical. Phos	1.33		2.44	1.70
Salt	0.31	0.16	0.44	0.40
Vitamin mix	0.36	0.33	0.35	0.31
<u>Calculated Analysis</u>				
Energy kcal ME/g	2.93	2.94	2.94	2.94
Calcium %	1.01	1.01	1.00	1.00
Phosphorus, %	0.52	0.56	0.52	0.52
Salt, %	0.46	0.46	0.46	0.45

TABLE 2

Calculated amino acid contents of diets used in Experiment 1.

Diet % DL-Met Lysine Arginine Methionine Cystine Protein added.

1	12	....	0.81	0.62	0.27	0.20
2	18	....	1.22	0.94	0.40	0.30
3	21	....	1.42	1.09	0.47	0.35
4	24	....	1.62	1.25	0.54	0.40
5	12	....	0.75	0.90	0.18	0.19
6	18	....	1.10	1.36	0.27	0.28
7	21	....	1.31	1.58	0.32	0.33
8	24	....	1.49	1.81	0.36	0.37
9	27	....	1.68	2.04	0.41	0.42
10	30	....	1.87	2.26	0.46	0.47
11	12	0.037	0.75	0.90	0.22	0.19
12	18	0.055	1.10	1.36	0.33	0.28
13	21	0.064	1.31	1.58	0.38	0.33
14	24	0.074	1.49	1.81	0.43	0.37
15	27	0.083	1.68	2.04	0.49	0.42
16	30	0.091	1.87	2.26	0.54	0.47

TABLE 3

Results of Experiment 1.

Dietary Protein level, %	12	18	21	24	27	30
Protein Sources	Average liveweight at 21 days, g/chick.					
Herring meal, wheat & barley	249	354	447	444		
Soyabean meal & maize	257	435	492	511	506	467
Soyabean, maize & methionine	340	471	531	539	512	573

s. e. of each mean = 12.4 g

Mean Liveweight at 1 day old = 37.8 g

Average feed intake 0-21 days, g/chick

Herring meal, wheat & barley	516	607	687	652		
Soyabean meal & maize	594	752	754	740	706	701
Soyabean, maize & methionine	712	776	806	783	698	646

s. e. of each mean = 18.5 g

Efficiency of feed conversion 0-21 days,
gain/feed

Herring meal, wheat & barley	0.409	0.520	0.596	0.623		
Soyabean meal & maize	0.369	0.528	0.663	0.700	0.663	0.612
Soyabean, maize & methionine	0.425	0.558	0.612	0.640	0.680	0.674

s. e. of each mean = 0.01427

Composition of diets used in Experiment 2.

Diet	1	2	3	4	5	9	7	8
Dietary Protein	18%	21%	18%	21%	18%	21%	18%	21%
Maize	44.10	51.40					67.70	79.00
Soyabean meal	31.90	37.20	27.70	32.30				
Herring meal					13.90	16.20	16.50	19.30
Wheat			25.30	29.50	34.85	40.65		
Barley			25.30	29.50	34.85	40.65		
Glucose	8.00		9.75		8.85		9.74	
Starch	5.80		5.00		3.00		4.00	
Oathulls					1.79			
Cornoil	6.45	7.74	3.30	5.16	0.56	0.65		
Limestone	0.96	1.00	0.96	1.01	1.06	1.12	1.05	1.13
Dical. Phos	2.02	1.90	1.96	1.82	0.56	0.19	0.40	
Salt	0.42	0.42	0.38	0.37	0.23	0.20	0.26	0.23
Vitamin mix	0.35	0.34	0.35	0.34	0.35	0.34	0.35	0.34
DL methionine	0.052	0.061	0.060	0.070				

[illegible]

TABLE 5

Calculated amino acid contents of Diets used in Experiment 2.

Diet No.	% of Protein	Lysine	Arginine	Methionine	Cystine
1	18	1.01	1.31	0.339	0.29
2	21	1.18	1.52	0.395	0.34
3	18	0.99	1.19	0.324	0.29
4	21	1.16	1.39	0.377	0.33
5	18	1.15	0.93	0.39	0.31
6	21	1.34	1.08	0.46	0.36
7	18	1.19	1.03	0.45	0.32
8	21	1.39	1.21	0.53	0.37

TABLE 6

Results of Experiment 2

Dietary protein level, %	18	21
Protein sources	Average liveweight at 21 days, g/chick	
Soyabean meal, maize & methionine	481	523
Soyabean, wheat, barley & methionine	459	488
Herring meal, wheat & barley	389	431
Herring meal & maize	456	488

s. e. of each mean = 9.7 g

Mean liveweight at 1 day old = 41.0 g

Average feed intake 0-21 days, g/chick

Soyabean meal, maize & methionine	743	761
Soyabean, Wheat, barley & methionine	792	778
Herring meal, wheat & barley	669	698
Herring meal & maize	719	745

s. e. of each mean = 10.9 g

Efficiency of feed conversion 0-21 days, gain/feed

Soyabean meal, maize & methionine	0.593	0.634
Soyabean, wheat, barley & methionine	0.528	0.574
Herring meal, wheat & barley	0.519	0.558
Herring meal & maize	0.578	0.599

s. e. of each mean = 0.01385

Role of Livestock in the Economic Development of Nepal

D. D. Joshi

Zoonotic Disease Control Section Department of Health Services

Kathmandu, Nepal.

(Received for publication on June 1981.)

Present Status of Livestock Rearing in Nepal

Livestock rearing is a traditional component of rural life in Nepal, although it is not entirely for commercial purpose. Cattle, buffaloes, sheep and goats are commonly maintained in almost every farm-household for food, fiber, work, power, transportation, and manure purposes. Bullocks and buffalo bulls are the major means of transportation both in small and big

towns and rural areas of the terai. Horses, mules, sheep, goats, yaks and chauries are used for similar purposes in the hills.

According to census done by Planning Commission, HMG, Nepal and Central Bureau of Statistic (1969/70) the human and Livestock population are as given in table - I and II respectively.

Table - I HUMAN POPULATION GROWTH OF NEPAL

<u>Year</u>	<u>Population</u>	<u>Remarks</u>
1911	56,39,000	
1921	55,74,000	
1931	55,33,000	
1941	62,84,000	
1952/54	84,73,000	
1961	94,13,000	
1971	1,15,56,000	Projected
1976	1,23,93,000	Projected
1981	1,37,78,000	Projected if this will be the trend of
2010	2,31,11,966	Population

Table - II LIVESTOCK POPULATION GROWTH OF NEPAL

<u>Kind of Animal</u>	<u>(in '000 head)</u>						
	<u>1966/67</u>	<u>1967/68</u>	<u>1968/69</u>	<u>1869/70</u>	<u>1971*</u>	<u>1972*</u>	<u>1273*</u>
Cattle	5890	5985	6105	6226	6350	6400	6450
Buffalo	3277	3347	3414	3482	3622	3692	3762
Sheep	1975	2018	2063	2108	2200	2220	2250
Goat	2100	2146	2193	2241	2200	2300	2300
Horse	300	307	313	320	322	325	325
Pig	315	350	320	300	300	300	300
Poultry	-	-	-	4888	19000	19000	19500

* FAO Estimation

Contribution of the Livestock Sector to the Country's GDP

Taking the base year 1968/69, the contribution of the agricultural sector to

the country's GDP amounted to roughly 68 per cent and that of the livestock sub-sector to above 15 per cent which is shown in Table - III.

Table - III VALUE OF LIVESTOCK PRODUCTS 1968/69

(Million Rupees at current price)

<u>Commodities</u>	<u>Gross value of products</u>
Meat	231.2
Milk	862.2
Milk product	91.5
Egg	109.6
Hide & skin	3.2
Dung	69.3
Honey & wax	2.0
Wool	23.6
Pig bristle	5.2
Total livestock value added	1397.8
GDP (GNP)	9932.0
Gross Agricultural Product	6406.0
Agriculture's Share in GDP (%)	68.8
Livestock's Share in Gross Agricultural Products (percent)	21.9

Source: Central Bureau of Statistics, HMG, Nepal and Nepal Livestock Development Mission Report, FAO / SATA, Kathmandu, 1971.

Demand and consumption of Livestock Products :

The estimated demand and consumption of various livestock products is expected to increase manyfold in the years to come. The estimated per capita consumption projected for livestock products in 1980 and 1990 based on 1970 consumption figure would be as in Table - IV. Total

poultry meat and egg production in 1975 was 8000 M/T. for Nepal and 195 million per year respectively.

This low production of poultry products was because of no participation of rural people especially weaker section of the farmers in poultry keeping, lack of organised marketing system and high productivity cost (Joshi, 1976).

Table - IV ESTIMATED PER CAPITA CONSUMPTION OF ANIMAL PRODUCTS

in ('000)

Commodity	1970 base Year	1980		1990	
		High	Low	High	Low
Meat (Kg)	4.0	5.6	4.4	8.4	5.28
Milk (Kg)	36.3	47.2	39.9	66.1	47.9
Butter (Kg)	0.665	0.798	0.738	0.998	0.756
Fish (Kg)	0.450	0.584	0.473	0.608	0.470
Eggs (number of eggs)	22	32	26	52	34

Source :- Economic Planning Commission, HMG, Nepal.

Livestock Trade :-

The livestock trade of Nepal with India for the period of 15 years i.e. from 1956/57 to 1963/64 indicated that the

balance was tilted towards India, whereas such trade with other countries remained surplus in favour of Nepal. The detail of such trade is presented in table V.

Total Import and Export Statistics of
Livestock Products for 15

Table V.

A. Import

Country	1956/57	1957/58	1958/59	1959/60	1960/61	1961/62	1962/63
India	18218	14220	13866	17457	19877	24102	29618
China (Tibet)	1952	216	276	2027	3388	4068	4883
Overseas Countries	17	122	-	-	241	-	-
Total	20186	14558	14142	19484	23501	28170	34501

B. Export

India	16231	18003	20553	23834	30117	33168	41096
China (Tibet)	9	81	109	3	130	167	63
Overseas Countries	-	-	-	-	-	-	-
Total	16240	18084	20662	23837	30247	33335	41159
Balance of trade	3946	3526	6520	4353	6746	5165	6658

Source: Joshi, Durja D. (1997). Livestock Trade Statistics of Nepal HMG Press, Kathma

of Livestock and
years

(in '000 Rs)

1963/64	1964/65	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71
38087	46122	59508	49861	26111	36772	93954	41106
4452	2461	5678	4021	1500	1891	698	2824
4	160	409	897	390	544	744	1578
42543	48743	65595	54779	28001	39207	95398	45508
38267	44713	42084	33502	23657	67921	63550	23037
565	734	959	96	423	817	1472	438
94	603	2130	2721	3142	9634	12304	14051
38926	46050	45173	36319	27222	75672	77326	37526
-3617	2793	-20422	-18460	-779	36465	-18072	-7982

andu.

Steps Taken by HMG, Nepal for Its Promotion-

During last two decades agricultural development in Nepal usually implied in the improvement of cereal and cash crop production. But the present trend shows greater appreciation of the importance of livestock farming.

Nepalese farmers especially small holdings can not increase their income only by crop farming because of the size of land holdings. So it was envisaged in the Fifth Five Years Plan (1956/80) that animal husbandry should be encouraged on a commercial basis to improve the income level of rural areas in general and small farmers in particular (Pant 1978 and Dhital 1976).

His Majesty's Government of Nepal has tried to improve livestock and poultry farming initiating a number of national, regional and district programmes in animal husbandry and dairy development activities during the last 20 years.

To help improve the livestock wealth of the country, HMG, Nepal has established nucleus livestock farms and artificial insemination centers to provide better germ plasm to the farmers. The opening of pasture development stations will be useful to make fodder saplings

and improved grass seeds. Similarly, animal health services are made available to the farmers by creating countrywide network of animal health centers, diagnostic and vaccine production laboratories. Timely control of infectious diseases and drenching against helminths will put additional muscle in the livestock development of the country.

Dairy Development Corporation is creating marketing facility to the farmers to sell their products in reasonable rate.

The role of Agriculture Development bank in the supply of input and the function of Agricultural Project Services Centre (APROSC) in the analysis of related project are worth mentioning.

The integrated rural development project implemented in various regions and the Livestock Development Project Supported by Asian Development Bank are expected to bring appreciable improvement in the existing livestock wealth of the country.

Basic Problems associated with Livestock Development

Good breeds of animals, better quality fodder, seedlings of fodder crops

balanced feed, veterinary services, financial support and marketing facilities are not readily available to the farmers.

Meagre veterinary service and marketing facilities in majority of villages deprived the farmers to get economic benefit from poultry farming. Lack of effective livestock, policy trained manpower, livestock statistics and acts to introduce animal quarantine and protect milk and meat from adulteration, cruelty to the animals and veterinary public health are also basic needs for the development of livestock.

Suggestion and Recommendation :-

A master plan for future breeding policy is very vital to upgrade the present indigenous livestock population of the country. Cross breeding using exotic breeds, is the only quicker method of genetic improvement of our animals. Artificial insemination with closest collaboration of animal health services, should be used to the greatest possible extent. Sound planning for the control of infectious and parasitic diseases, and production of fodder crops and fodder trees, should be worked out. Intensive programme for the development of different groups of livestock such as cattle, buffalo, sheep,

goat, pig, poultry and yak should be developed. The farmers should also be assured to receive soft term credit for the purchase of livestock and other essentials of livestock keeping and also to get remunerative price for their livestock products.

REFERENCES

1. Central Bureau of Statistic, Census Report (1969/70) National Planning Commission, HMG/Nepal.
2. Dhital, Bharat P. (1976). Crop-Livestock Integration. A Strategy for small farm development. Paper presented at seminar on "Research Productivity and Mechanization in Nepalese Agriculture" jointly sponsored by CEDA and APROSC Kathmandu, Nepal.
3. Economic Planning Commission, HMG/ Nepal, 1970.
4. Fifth Five Year Plan (1975/80). National Planning Commission, HMG/ Nepal.
5. Joshi, D. D. (1973), Veterinary Public Health Hazards in Nepal, HMG, Press Kathmandu.
6. Joshi, D. D. (1976), Role of livestock in Agriculture Development. Paper

- presented on 10th Seminar - Cum - Workshop on "Development Administration" Organised by CEDA, T. U.
7. Joshi, D. D. (1977). Animal Health Livestock and Dairy Development Statistics of Nepal, APROSC, Kathmandu.
 8. Joshi, D. D. (1978) General outline and Technical Norms for Livestock Project Preparation, APROSC, Kathmandu, Nepal.
 9. Joshi, D. D. (1980), Pashu Jan Swasthya (Veterinary Public Health) A Text book published by Pathyakram Bikash Kendra, Tribhuvan University, Kathmandu, Nepal.
 10. Joshi, D. D. (1979) Livestock Trade Statistics of Nepal (From 1626/57 to 1973/74 F. Y.), HMG Press. Kathmandu.
 11. Joshi, D. D. (1979). Problems of Livestock Development in Nepal. Unpublished paper.
 12. Nepal Livestock Development Mission Report, FAO/SATA, Kathmandu, 1971.
 13. Pant, Thakur N. (1978) Agricultural Development in Nepal, Problems and Prospects. APRSC, Kathmandu, Nepal.



Short Communication

Incidence of Foot - and Mouth Disease in Baglung and Parbat Districts

P. Mainali

Tripureswar, Kathmandu, Nepal.

Received for publication on March 1981.

Foot and Mouth Disease (FMD) is recognised as an extremely contagious disease of cloven hooved animals. The important economic effect of this disease is due to reduced milk and meat production, decreased efficiency of work in draught animals and mortality in young stock and exotic animals.

In this subcontinent FMD is caused by four major types of virus such as O, A, C, and Asia 1. Three additional types SAT1, SAT2 and SAT3 have been isolated in Africa. Within the types there are sub-types which are different in their antigenic relation to some extent. These sub-types have also different degree of virulence. The types of virus prevalent

in Nepal are not fully known so far. The only authentic typing work published by Pyakurəl (1972) has indicated the presence of type O and A including sub-type A22 in some part of the country. So it is necessary to know the virus types present in the country prior to start with vaccination to support national cross breeding programme.

Epidemiology :-

Transmission of FMD presents a complicated picture, as it starts primarily from infected animals during the early stage of infection. The virus is present in saliva and other body secretions. Such carrier animals play major role in

the epidemiology of FMD.

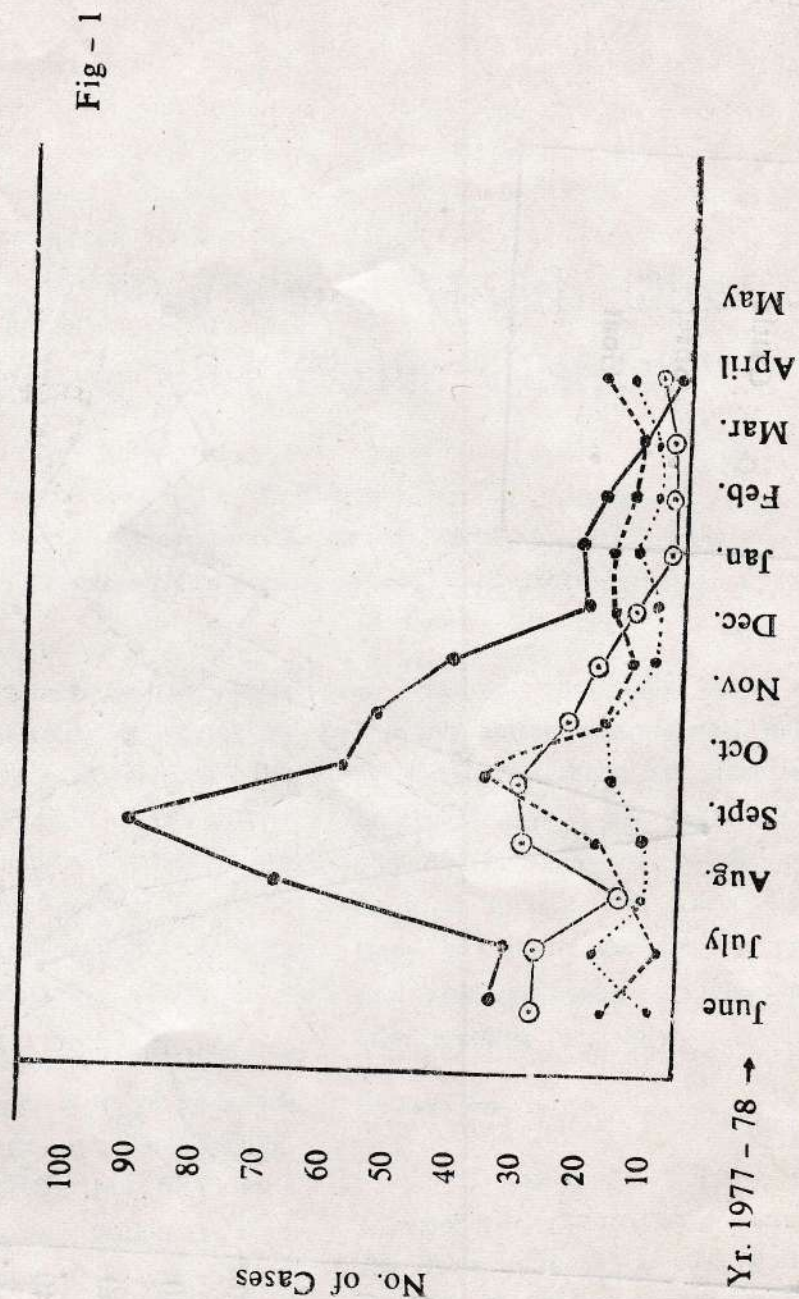
FMD virus remains up to 2 years in the throat of recovered animals (van Bekkum et al 1959). According to Burrows (1966) carrier stage generally persists for 15 months in cattle and 4 months in sheep. Pigs are important disseminator of infection. As it has been assessed pigs excrete some thirty times more virus than cattle or sheep. So pigs are termed as amplifier host. Outbreak of FMD in England (1967-68) and Canada (1951) were amplified by pigs. Man also has been recognized as one of the main disseminator of FMD.

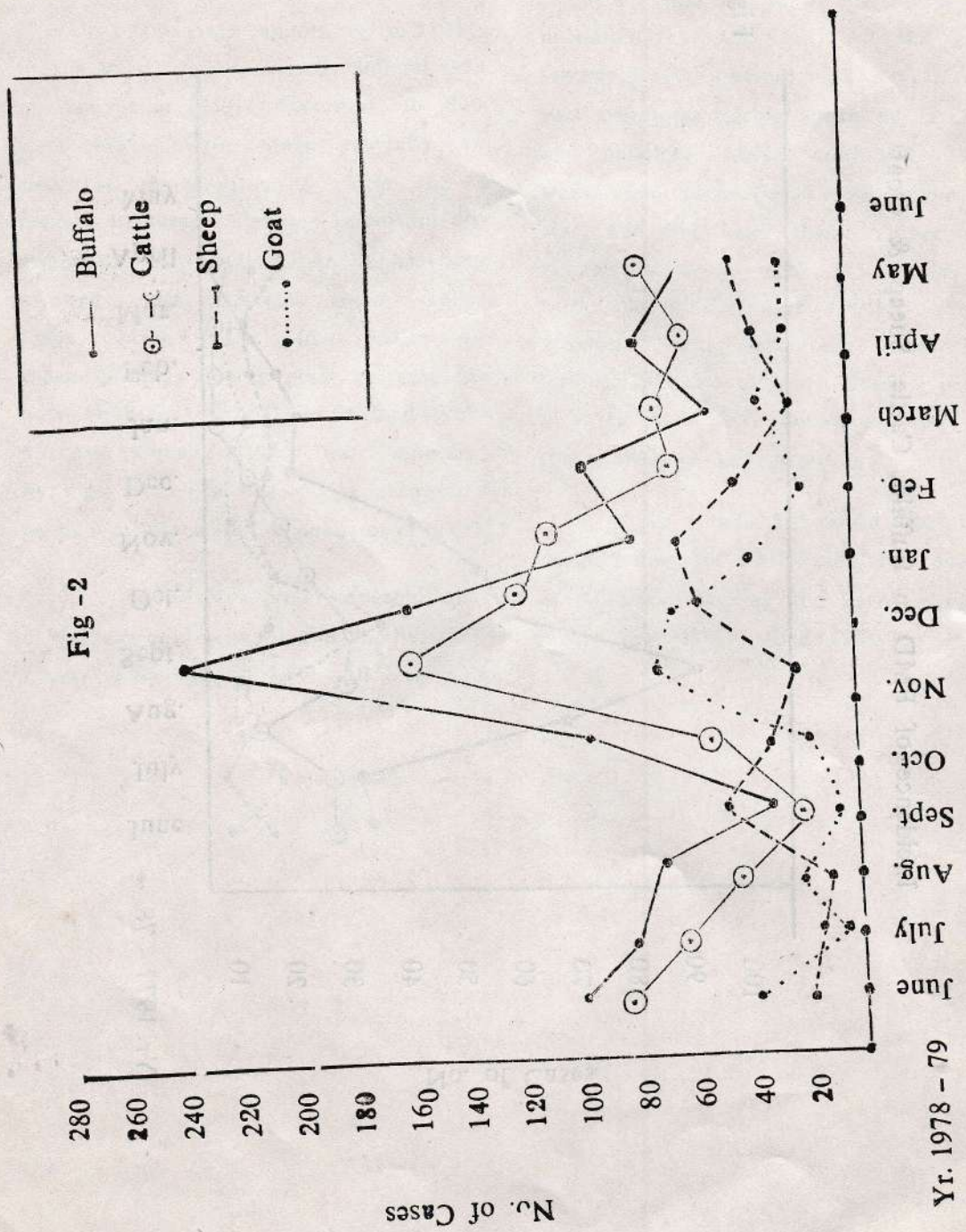
Shukla et al has reported that during one outbreak of FMD in livestock Farm, Khumaltar in 1974, all local and

cross bred cattle and goats manifested symptoms and lesions of FMD but the mortality rate was nil. All the goats recovered after a period of 3 weeks. After that symptoms started appearing in cattle and buffaloes which continued for 7 weeks. The disease was more serious in Jersey and cross-bred than in other local animals. After a week of recovery in cattle and buffalo swine started showing symptoms and developed severe foot lesions. Likewise outbreak took a period of three and half months to infect all the animals of this farm.

Fig 1. and 2., reflect the incidence pattern of FMD in different species of animals of Baglung and Parbat districts in the year 1977-78 and 1978-79.

Incidence of FMD in Buffalo, Cattle, Sheep & Goat





Discussion :-

The incidence of FMD in Baglung and Parbat might have spread either by contaminated feed, water, pasture or by introduction of infected animals from adjoining region or by aerosol infection. The limited knowledge of public about this disease might have been one of the factor for the rapid spread of FMD in these areas.

Conclusion :-

It is observed that the incidence of FMD was maximum during early winter and it started declining after the peak of winter season.

The FMD lesions seen in buffalo were mostly located in mouth, whereas

in cattle lesions were present both in foot and mouth. But in sheep and goat foot lesions were more common than mouth lesions.

References

1. Burrows, R (1966) J, Hyg. 64 : 81
2. Case report register of Baglung Veterinary Hospital (1977 - 1979)
3. Pakural S. (1972) : Bull off. int. Epiz. 77, 1105.
4. Van Bakkum, J. G., Frenkel, H. S., Frederiks, O. H. J. and Frenkel, S (1959) Tijdscher Diergeneesk. 84, 1159.
5. Shukla, R. R., Vaidya, T. N., Joshi, D. D., Pyakural, S., and Upadhyay, K. N. (1974). Bull. Vet. Sc. and A.H., Nepal 3, 10.



Professional News

Life Members of Nepal Veterinary Association

1. Dr. D. D. Joshi General Secretary of this association, became first life member.
2. Dr. Laurence L. Swift Australian Veterinarian working in Asian Development Bank aided Livestock and Animal Health Programme in Nepal.
3. Dr. F. Wilkinson Australian Veterinarian working in Asian Development Bank aided Livestock and Animal Health Programmes in Nepal.
4. Dr. N. C. G. Hopkins British Veterinarian working in Pakhribas Agricultural centre, Nepal.
5. Dr. D. A. Purcell Chief Vet. Pathologist, Animal Health Lab. South Perth 6151.
6. Dr. Mukti Narayan Shrestha, Zoogarden, Jawalakhel, Patan, Nepal.

1. Nepal Veterinary Association is raising Building fund, kindly donate generously. You can directly send the amount in cheque in one of the following addresses. Please mention "Nepal Veterinary Association Building Fund" in the cover letter.

- 1) C/O Veterinary Hospital, Tripureshwar, Kathmandu, Nepal.
- 2) G. P. O. Box 1885, Kathmandu, Nepal.

2. Asian Development Bank has provided soft term loan of 13.9 million to HMG Nepal for the development of Livestock health & production of the country.
3. Dr. D. D. Joshi has been nominated as member of Advisory Panel for Zoonosis in WHO for a period of four years.

They passed away :-

Dr. Dil Bahadur K.C. - the first Royal Army Veterinarian passed away in 1980. He was first veterinarian of Nepal.

Dr. A. S. Khan - veterinary officer of Palpa veterinary Hospital died in an accident in 1979.

The members of Nepal Veterinary Association wish to express their deep sorrow for this irreparable loss, and pray their homage and respect to the departed soul.

4. There are four Veterinary Clinics in & around Kathmandu providing veterinary services to the customers.
- A) Vets. Veterinary Clinics; Jawalakhel.
 - B) Kathmandu Veterinary Clinic, Maharajgunj.
(Opposite to American Embassy)
 - C) Veterinary Clinic, Balaju.
 - D) Veterinary Clinic, Baneshwar.

News from world veterinary association.

- 1- XII World Congress on Diseases of cattle will be held in Amsterdam. The Netherlands from 7 - 10 September 1982. For further information please apply to Dr. H. J. Brenkink, Yalelaan 16, 3508 TD Utrecht, The Netherlands.
- 2- XXII World Veterinary Congress Conference is going to be held in Australia in 1983. The address of the WVC Organising Committee is 28 Charles Street, South Perth, Western Australia. 6151.

Nepal Veterinary Association Executive Committee

President -	Dr. N. B. Singh
Vice - President	Dr. M. N. Shrestha
General Secretary	Dr. D. D. Joshi
Joint Secretary	Dr. P. Mainali
Treasurer	Dr. A. C. Gupta
Regional Members	- Dr. K. P. Dhakal - Eastern Region - Dr. M. N. Lohani - Central Region - Dr. B. M. Shrestha - Western Region - Dr. D. R. Ratala Far - Western Region