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Proceedings of the Fourth National Veterinary Conference

Bulletin of

**Veterinary Science &
Animal Husbandry**

Nepal



Dr. Laxmi
Bansodhara Kathmandu

Official Organ of Nepal Veterinary Association

Courtesy: Promotion of Livestock Breeding Project, HMG/GTZ

**BULLETIN OF VETERINARY SCIENCE
&
ANIMAL HUSBANDRY, NEPAL**

***Proceedings of
The Fourth National Veterinary Conference
of Nepal Veterinary Association***

17-19 November, 1992

Vol. 21-23

1993-1995

Regd. ZCBA 7/2025/26

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Editorial

Ever since Nepal Veterinary Association came in to its being, it has played a vital role in the upliftment of the rural poor by addressing livestock problems in a scientific forum provided by the Association in the form of veterinary conference. The Fourth National Conference held on the occasion of the Silver Jubilee year of the Association was a prelude to the same.

The conference was a resounding success in that the whole gamut of livestock problems were discussed by various national and international experts and conclusion arrived at was presented to the government for implementation.

The dearth of veterinarians is one of the impediments for speedy expansion of veterinary services in the country. Privatisation of veterinary services can complement government's effort towards providing veterinary services in a much larger scale. But to meet the above objective, veterinary manpower need to be produced regularly in the country. Creation of veterinary faculty and a veterinary college within the Tribhuvan University would go a long way in meeting the short-fall of veterinarians in a foreseeable future.

Frequent changes of departmental structure has been a set back for overall livestock development activities. It is earnestly appealed to the government to replace the structure of the present Department back to its original set-up where Department of livestock services had its own identity.

Importation and artificial breeding initiated since many years has resulted in a small but still significant numbers of cross-breed animals spread all over the country. With these high yielding animals, new problems have cropped up. To name a few, infertility, theileriosis, milk fever etc. have been found to occur frequently than in the past. A clear policy to tackle these emerging problems has to be dealt with seriously. Similarly, poultry sector has come up as a cottage and medium scale industry in Central, Western and Eastern regions of Nepal. The present level of services delivery meted out to these industries leave much to be desired. A thorough revision of our policy towards the emerging industries in the livestock sector is the need of the hour. Rising expectation of commercial farmers, entrepreneurs and people engaged in livestock industries has necessitated to retool our service delivery capacity both in terms of quality and quantity. Strengthening of laboratory services and a boost to the privatisation effort would help a great deal to dispense services in an effective manner.

The pace of livestock development can be maintained and further accelerated only when appropriate technology is available. A collaborative efforts between government, individuals and Nepal Agriculture Research Council towards technology generation is a must in order to meet the prerequisite for above objective

The issue containing the proceeding of the Fourth National Veterinary Conference was delayed due unavoidable circumstances for which we apologise.

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PROCEEDINGS OF THE FOURTH NATIONAL CONFERENCE OF NEPAL VETERINARY ASSOCIATION

Kathmandu

17-19 November, 1992

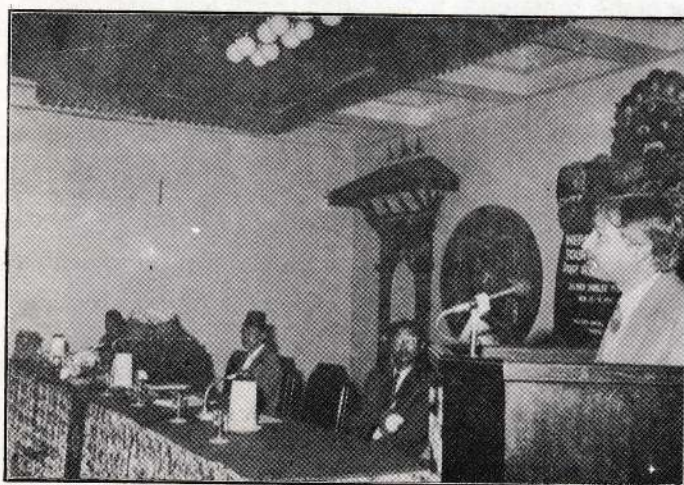
The inaugural ceremony of the Fourth National Conference was held on 17 November 1992 at Hotel Blue Star with the theme of "Healthy Animal is the Symbol of Health and Prosperity" on the auspicious occasion of the Silver Jubilee year of Nepal Veterinary Association. The Silver Jubilee year was celebrated with free animal health camp, blood donation, scientific workshops and seminars in various parts of the country. A one day Veterinary Exhibition and Fair was also organized at the Veterinary Complex, Tripureswor on 16 November 1992. Several Pharmaceutical Companies, Livestock Industrialists, Hatcheries, Feed Manufacturers, farmers, Veterinarians, Technicians and people from various other sectors including higher officials from HMG/N Ministries, Departments and Corporations participated in the programme. Honourable Vice Chairman of National Planning Commission, Dr Ram Saran Mahat inaugurated the programme as Chief Guest and highlighted the importance of livestock in the national economy.

Honourable Minister for Local Development and Agriculture, Mr Ram Chandra Paudel and honourable member, National Planning Commission, Dr Ram Prakash Yadav were received by the President of NVA, Dr T P Shrestha as the Chief Guest and Chairman of the inaugural session respectively. General Secretary of the NVA, Dr S P Gautam presented programs and Souvenir of the conference to the Chief Guest and Chairman of the ceremony. Dr T P Shrestha, President of the Nepal Veterinary Association welcomed the distinguished guests and participants (Appendix I). During his welcome address, Dr Shrestha highlighted the support rendered by the Ministry of Agriculture and National Planning Commission in the endeavour of Nepal Veterinary Association for its professional activities. He mentioned the need to constitute Nepal Veterinary Council and Veterinary College for veterinary education in Nepal and concluded his speech with a firm belief that the above mentioned institutions would see the light of the day in not very distant future.



Chief Guest, Hon'ble
Minister for Agriculture
and Local Development
Mr. Ram Chandra Poudel
inaugurating the
Conference.

Inaugural address by
Hon'ble Chief Guest
Mr. Ram Chandra Poudel



Chairman, Hon'ble
Member of National
Planning Commission
Mr. Ram Prakash Yadav,
deliberating the
Chairman's Remark.

Dr S P Gautam, General Secretary presented the progress report of NVA and highlighted the objectives of the conference (Appendix II)

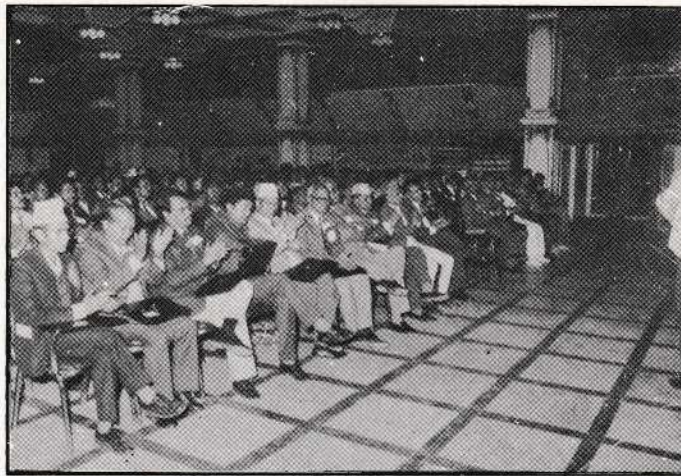
During the ceremony, the Chief Guest gave away special medals and certificates of recognition to the NVA members who had put through long years of service of 25 years in veterinary profession and who donated blood during the Silver Jubilee celebration of NVA (Appendix VIII).

The first issue of "*Vetnary Chaumasik*", a quarterly publication of NVA in Nepali language was unveiled by the Chief Guest. The *Vetnary Chaumasik* was launched with a view to give technical information in a simple form to farmers.

The conference was formally inaugurated by the Chief Guest, Honorable Minister for Local Development and Agriculture, Mr Ram Chandra Paudel by lighting the ceremonial lamp and unveiling the banner. In his inaugural address (Appendix III), the Chief Guest highlighted the importance of livestock in the rural community and role played by veterinarians in uplifting the down trodden masses. He encouraged veterinary scientists to look into the local herbal remedies being practised by villagers in their own way and give a scientific basis for the use of the same which would go a long way in making cost of treatment within the reach of poor farmers. He further highlighted the importance of private practice in service delivery in veterinary field and assured all help from the government necessary to propel this as a viable economic proposition. He also stressed that this would not only complement government's already over stretched services but would also help render quality services.

Honorable Chief Guest mentioned the firm commitment of the government towards establishing a Veterinary Collage and assured all that every formalities have been done and it would be realised in foreseeable future.

Honorable chairman Dr Ram Prakash Yadav, in his concluding remarks, mentioned the importance of veterinary profession in alleviating poverty amongst farmers and reaffirmed National Planning Commission's continued commitment in giving animal health sector priority from national perspective (Appendix IV).



A view of participants in
the inaugural ceremony
of the 4th National
Veterinary Conference

Dr. U. Singh sharing
experiences with the
participants in a technical
session chaired by
Dr. N.B. Singh



A view of participants in
a technical session.

Lastly Dr Sevak Ram Bhandary, Vice Chairman of NVA presented the vote of thanks (Appendix V).

Following this event, technical deliberations were held during various sessions; papers presented during the sessions are included in this proceeding. Technical sessions were followed by Group Discussions and preparation of recommendations. The recommendations of the conference were read by Dr S P Gautam (Appendix VI)

In a closed session, several NVA affairs, including constitutional and financial matters were discussed and the new Executive Committee of NVA was formed. The outgoing office bearers were thanked for their good work and the new comers were greeted and welcomed.

The closing ceremony of the conference was held on 19 November 1992. The Chief Guest of the ceremony, Mr Bindeshwari Prasad Sinha, Secretary to the Ministry of Agriculture, praised the good work done by the veterinary profession and further reiterated that the ground work for the establishment of Veterinary Collage was already done, but there might be some time lag before it comes into fruition (Appendix VII). He mentioned the role of veterinarians in slaughter house for hygienic meat supply and informed that negotiations are on with donor countries for the establishment of slaughter house in Kathamandu and its subsequent proliferation in other potential areas of the country. Mr Sinha provided the Certificate of Honour/Certificate of Appreciation to some veterinarians, technicians and private entrepreneurs for their outstanding contributions in the development of veterinary services in the country (Appendix VIII).

On behalf of the new Executive Committee, General Secretary, Dr B K P Shaha assured the members that the committee will strengthen the Association for the upliftment of the veterinary profession during their tenure.

The new President of NVA, Dr B M Shrestha, committed that the committee will always be actively dedicated to safeguard the professional welfare and rights of the members. Furthermore, he appealed the members and concerned authorities to help the committee for the fulfilment of the NVA objectives. Lastly, Dr Shrestha presented the vote of thanks to the distinguished guests, participants, sponsors, contributors, well-wishers and members of the organising committee of the conference.

Dr. N. P. Ghimire was the Master of Ceremony of the Fourth National Conference of NVA.



Senior Veterinarians
honoured for their
dedicated veterinary
service over a period of
25 years are seen with
the distinguished guests.

Farewell of the outgoing
Executive Committee.



NVA welcoming its
New Executive
Committee.

FOURTH NATIONAL VETERINARY CONFERENCE

November 17-19, 1992

Hotel Blue Star, Thapathali, Kathmandu

PROGRAMME

DAY - 1
November 17, 1992

INAUGURATION PROGRAMME

0900 Hrs	Arrival of the Participants and Registration
1000 Hrs	Arrival of Distinguished Guests
1005 Hrs	Presentation of NVA Badge to Distinguished Guests
1010 Hrs	Welcome speech by NVA President, Dr.T.P. Shrestha
1015 Hrs	Presentation of Souvenir and Silver Jubilee Year Programme by NVA Secretary, Dr. S.P. Gautam
1020 Hrs	Distribution of Certificate of Recognition and Medals to NVA Members by the Chief Guest, Honourable Minister for Agriculture, Mr. Ram Chandra Paudel.
1025 Hrs	Launching of the Veterinary Chaumasac Publication by the Chief Guest
1030 Hrs	Inauguration of the Conference and inaugural speech by the Chief Guest
1045 Hrs	Concluding Remarks by the Chairman Honourable Member of National Planning Commission, Dr Ram Parkash Yadav.
1055 Hrs	Vote of Thanks by NVA Vice President, Dr.S.R.Bhandary
1100 Hrs	Lunch
1200 Hrs	Technical Session # 1

Chairman: Dr. K.P. Dhakal
Rapporteur: Dr. B. Parajuli
Dr. U.M. Singh

1. Impact of dairy activity on the income of rural milk producer in the midwestern region of Nepal
- Dr. D.D.Joshi and Mr. A.J.J. Van den Hoven
2. Economic analysis of animal diseases in Nepal.
- Dr. M.N.Lohani and Dr. D.P. Rasali
3. Relationship of production performance characteristics of Murrah buffalo with the calving at different seasons.
- Dr. I.P.Dhakal and Mr. K.R. Pandey
4. Musk deer husbandry and possibility of farming in Nepal.
- Dr. M.N.Shrestha
5. Incidence of Pseudo-rabies or Aujeszky's disease in animals of Nepal
- Dr. U.Mishra.

1. Phenotypic relationship among litter traits in the swine herd at Lampatan Livestock Farm, Pokhara, Nepal.
- Dr. D.P. Rasali and Dr. M.N.Lohani
2. Controlled animal breeding programme and induction of ovulatory oestrus through the use of eazi-bred C.I.D.R.B. in a dairy herd.
- Dr. B.K. Jha
3. Influence of air temperature and precipitation on the incidence of clinical and environmental mastitis in three dairies.
- Dr. K.P. Acharya

1030 Hrs	Commercial Session
1045 Hrs	Technical Session # 3 continued
	4. Molecular and immunological aspects of <i>Trypanosoma evansi</i> - Dr. V. Singh
	5. Prevalence of flukes in cattle and buffaloes in Surkhet district. - Dr. B. Parajuli
	6. Epidemiological situation of Rabies in Nepal - Dr. G.N. Gangol
	7. Traditional feeds and feeding practices for pigs in Dhankuta district of east Nepal - Mr. D.B. Subba, Mr. P.M. Tamang and Dr. S.N. Mahato
1215 Hrs	Lunch Break
1315 Hrs	Technical Session # 4
1315 Hrs	Chairman: Dr. N. B. Singh Rapporteur: Dr. R. P. Thakur Dr. K. Acharya
	1. Case report on forensic analysis of veterolegal cases - Dr. S.R. Bhandari, Mr. B.S. Tuladhar and Mr. J. Rijal
	2. A report of hepatic coccidiosis in rabbits in Kathmandu - Dr. U.M. Singh
	3. Occurrence of uterine torsion as a cause of dystocia in buffaloes in Chitwan valley of Nepal - Dr. T.C. Bhattarai and Dr. D.P. Rasali
	4. Report on common diseases found in Lulu cattle - Dr. P. Mainali
1515 Hrs	Tea Break
1530 Hrs	Commercial Session
1545 Hrs	Technical Session # 4 continued
	5. Strategic piperazine drenching against <i>Toxocara vitulorum</i> of buffalo calves - Dr. B.R. Joshi and Dr. S.C. Ghimire
	6. Isolation of mycoplasma from the respiratory tract of goats - Dr. A. Pradhan
1645 Hrs	Formation of technical groups and their terms of reference announcement.
1700 Hrs	End of the day's work

Day - 3
November 19, 1992

0900 Hrs	Group work
1000 Hrs	Presentation of recommendations by technical groups in plenary session
1100 Hrs	Commercial Session
1130 Hrs	Lunch Break
1230 Hrs	Discussion about NVA affairs
1430 Hrs	Tea break
1445 Hrs	Election of new office bearers of NVA
1630 Hrs	After-noon break
1700 Hrs	Concluding programme

CLOSING CEREMONY

1700 Hrs	Arrival of guests
1710 Hrs	Welcome of guests by the out going President of NVA, Dr. T.P. Shrestha
1715 Hrs	Oath taking by new office bearers and new members of NVA
1725 Hrs	Presentation of recommendations by Dr. S.P. Gautam
1735 Hrs	Presentation of future plans of NVA by the incoming General Secretary of NVA, Dr. B.K.P. Shaha
1745 Hrs	Concluding speech by the Chief Guest Mr. B.P. Sinha, Secretary to the Ministry of Agriculture
1755 Hrs	Vote of thanks by the new NVA president., Dr. B.M. Shrestha
1800Hrs	Announcement of end of the conference Reception and Dinner follow

ORGANISATION AND MANAGEMENT COMMITTEES OF THE SILVER JUBILEE CELEBRATION AND FOURTH NATIONAL CONFERENCE OF NVA

1. Veterinary Exhibition and Fare Committees

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Chairman	Dr. B.M. Shrestha	Dr. R.K. Khatiwada
Members	Dr. P. Pathak Dr. S.M.S Pradhan Dr. N.P. Ghimire Dr. J.N. Rai Dr. D. Singh Dr. J.L. Amatya	Dr. U.M. Singh Dr. S.R. Aryal Dr. P. Manandhar Dr. B.R. Thapa Dr. K. Acharya

2. Conference Committees

	Organisation and Management Committee	Central Fund Raising Committee
Advisors	Dr. U. Singh Dr. M.N. Shrestha Dr. B.N. Thakur	Dr. P.M.S. Pradhan Dr. T.B. Basnyat Dr. B.M. Basnyat
Chairman	Dr. M.N. Lohani	Dr. B.M. Shrestha
Members	Dr. R.K. Khatiwada Dr. S.M.S Pradhan Dr. N.P. Ghimire Dr. S. Amatya Dr. P. Pathak Dr. G.N. Gangol	Dr. J.L. Amaya Dr. K. Sharma Dr. H.R. Shakya Dr. G.N. Gangol Dr. K.N. Acharya Dr. B.R. Thapa Dr. S.B. Malla Dr. C.R. Bhattarai Dr. I.P. Adhikari

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Dr. K.P. Sankhi
Dr. Y. Yadav
Dr. K.N. Yadav
Dr. D. Sapkota
Dr. R.P. Thakur
Dr. U.P. Singh

Central:

Dr. D.P. Rasali
Dr. I.P. Dhakal
Dr. N.K. Yadav
Dr. I.K. Jha
Dr. B. Khadka
Dr. M.D. Lohani
Dr. B.N. Chaulagain

Western:

Dr. Sivendra Singh
Dr. K.B. Bohara
Dr. N.P.S. Karki
Dr. Amar Shah
Dr. D.B. Singh

Mid-Western:

Dr. K.B. Karki
Dr. D.R. Adhikari
Dr. B. Parajuli

Far Western:

Dr. H.C. Karki
Dr. M.D. Lekhak
Dr. M.S. Karki

4. Technical, Publication and Publicity Committees

	Technical Committee	Publication Committee	Publicity Committee
Advisors	Dr. S.N. Pyakural Dr. U. Mishra	Dr. D.D. Joshi Dr. T. Subba	Dr. K.P. Dhakal Dr. T.N. Vaidya
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5. Constitution Draft Committee

Advisors:

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Dr. N.R. Joshi
Dr. S.L. Shrestha

Chairman:

Dr. P. Mainali

Members:

Dr. N.P. Ghimire
Dr. A. Pradhan
Dr. Sundar L. Shrestha
Dr. S.R. Bhandary

IMPACT ON DAIRY ACTIVITY OF THE INCOME OF RURAL MILK PRODUCER IN THE MID-WESTERN REGION OF NEPAL

D.D. Joshi¹ and

A.J.J. Van den Hoven²

ABSTRACT

This study was conducted to establish the impact of the DDC's activities on the economic conditions of the rural farmers of Dang, Banke and Surkhet districts, in which 200 DDC participating and 100 DDC non-participating milk producing farmers were surveyed. The economic impact on the farmers after DDC operation was found statistically significant. Comparison of the mean income before and after DDC activities on t-test was $t_{cal} (d.f. 498) = 3.60$ and $t_{tab} (0.05) = 1.96$ whereas comparison of income between DDC participating and nonparticipating farmers was calculated and results of the t-test was $t_{cal} (d.f. 298) = 2.75$ and $t_{tab} (0.05) = 1.96$. These results suggested that there has been a positive economic change in the income level of farmers after the establishment of DDC operations in the area.

INTRODUCTION

Nepal has a population of about 19 million and has a per capita Gross Domestic Product (GDP) of about USD 180. Agriculture dominates the economy, contributing 55 percent to the national GDP and employing more than 90 percent of the working population. The agricultural output is derived from crop production (60 percent), livestock (30 percent) and forestry (10 percent). Annual milk production is about 850,000 tons which at world market prices is worth USD 145 million corresponding to 5 percent of GDP (1,2); (DFAMS, 1988/89; DDP, 1990)

The dairy livestock population in Nepal is about 9 to 10 million consisting of about 6.3 million cattle, 3 million buffalo, and about 1,000 yak/chaury in the mountain regions. Available statistics indicate that the population of other animals may have declined

¹ Executive Director/Member Secretary National Dairy Development Board.
² Chief Adviser/Project Coordinator DANIDA/NDDB Bridging Project

marginally while that of the buffalo has increased (DFAMS, 1988/89; DDP, 1990) Dairying is one of the main sources of regular income to the rural milk producer farmers in Nepal.

To provide better services and facilities to the milk producers, the DDC has established a National Milk Grid System which runs from Ilam in the East to Surkhet in the west. Moreover, it has also initiated an Intensive Milk Production Programme in coordination with the previously named department of Livestock Services and Lead Bank Programme of the Nepal Rastra Bank. In 1988 Dang, Banke and Surkhet were linked with Milk grid system of DDC (Joshi and Jepsen, 1990).

By providing a guaranteed market along with remunerative prices for their milk, DDC's activities have played a major role in uplifting the economy of the rural people, especially the small and marginal farmers who cultivate very small land holdings (DDP, 1990).

In order to find out the real impact of the DDC's activities by assessing the change in economic conditions of the rural farmers, a study was felt essential. Therefore, with the support of the food and agriculture Nation, Regional Office for Asia and Pacific (RAPA), Bangkok this study was conducted to find out the impact and bring the farmers views about the DDC's activities.

MATERIALS AND METHODS

A sample of 300 FHHF (out of 1373) were selected which constituted 14.6 percent of the total household in the study area. Out of the sample farmers, 200 farmers were participating in DDC and 100 farmers were non-participating in DDC milk collection activities.

As the study area chosen was in Dang, Banke and Surkhet districts where DDC's Mid-Western Milk Supply Scheme (MWMSS) was established in 1988/89. The Lamahi, Kohalpur, Chhinchu and Birendranagar chilling centres and their mpas and MCC command area were selected for the study.

Primary data collection from FHH was done with questionnaires and check lists. All the collected data were coded and analyzed. The data which were significant were tested for their impact statistically by using the student t-test.

RESULTS

- Livestock is raised for various purposes but almost all of the households reported that cattle and buffaloes are reared for milk purpose.
- Livestock population ratio with human population was approximately 5.6 per household in the sample area.
- Most common animal diseases reported by the FHHS were rinderpest, haemorrhagic septicemia, foot and mouth disease, black quarter, mastitis, tympany and fascioliasis,. About 240 (14%) animals out of the total sample animal population of 1680 were found affected by different diseases.
- About 75 percent of the FHH were found reporting animal diseases to veterinary hospitals, livestock centres and sub-centres and few to the traditional healers.
- About 40 percent of the FHH reported that their animals were vaccinated against most contagious diseases.
- In the study area, the major sources of animal nutrients were rice straw (36.4%), green grass (32%), other crop residues (12.3%), fodder tree (14%) and concentrates (5.3%). Green fodder, concentrates and oil cake are served mainly to those animals who produce milk and straw to those animals who do not produce milk. In the dry season, there is less availability of grasses and fodder to the animal population.
- Two percent of the DDC participating farmers felt that there has been a positive change in the production scenario of milk after the DDC intervention programme. They were satisfied with the present milk collection pattern, timely payment of milk price, market guarantee for selling milk, training on intensive milk production programme to the farmers by DDC, free veterinary services, credit assurance, and livestock insurance. (Table 1).

Table 1. Impact on production after the establishment of DDC operation

S.No.	Farmers Perception About DDC	HH#	%
1	Wishing Assistance from DDC	193	64.3
2	Timely Payment	120	40.0
3	Regular Supply of Animal Feed	62	20.7
4	Establishment of Veterinary Hospital	61	20.3
5	Training on Livestock	19	6.3
6	Access Facility to Reach Milk Collection Centre	8	2.7
7	Provision of Artificial Breeding	2	0.7
8	Provision of Livestock Loan	5	1.7

Utilization of income/saving after the establishment of DDC operation was found to be very encouraging. All the respondents reported that they had some saving. It was significant that the respondents were spending on food and clothing 297 (99%), education of children 280 (93.3%), buying new goods 152 (50.7%), etc. (table 2 and 3)

Table Utilization of income/saving after the establishment of DDC operation

S.No.	Particulars	Responding No.	HH%
1	No. of household responding	299	99.7
2	Expenditure on food and clothing	297	99.0
3	Buying new goods	152	50.7
4	Purchasing new dairy animal	8	2.7
5	Deposit in bank	37	12.3
6	Pay back loan	94	31.3
7	Education of children	280	93.0
8	Increases social expenditure	13	4.3
9	Lend to others	46	15.3
10	Buying jewellery	91	30.3
11	Miscellaneous	9	3.0

Table 3. Household income prior to the establishment of the DDC Operation in Rupees

S.No.	Sources	Minimum	Maximum	Annual Average
1.	Agriculture	0.00	10,000.00	1700.00
2.	Agricultural Wages	0.00	2,000.00	48.00
3.	Other Wages	0.00	6,000.00	360.00
4.	Small and Cottage Industry	0.00	2,500.00	8.00
5.	Business	0.00	10,000.00	77.00
6.	Livestock (except dairy)	0.00	8,000.00	1354.00
7.	Miscellaneous	0.00	10,00.00	109.00
Total		-	-	4156.00

Economic impact of the farmers after DDC operation was found statistically highly significant. Comparison of the mean income before and after DDC activity/intervention was calculated and the following are the results of the t-test for the survey results:

$$t_{cal} (d.f. 498) = 3.60$$

$$t_{tab} (0,05) = 1.96$$

Table 4. Mean Household Income Before and After the DDC Activities in the Study Area.

S.No.	Income Sources	Situation		Change	
		Before	After	Rs.	%
1	Agriculture (excl.dairy)	3102	4002	900	29.0
2	Non-agricultural	1054	2044	990	93.9
3	Dairy				
	(i) Ghee	1450	4680	3230	222.8
	(ii) Milk	1365	20693	7128	52.5
Total 1365		20693	7128	52.5	

Income of DDC participating farmers was significantly increased than the non-participating farmers. The following were the results of the t-test:

$$t_{cal} (d.f. 298) = 2.75$$

$$t_{tab} (0.05) = 1.96$$

Table 5 Income structure of DDC participating and non-participating farm households

S.No.	Income Sources	DDC Participating	DDC Non-Participating	Difference Rs.	%
1.	Agriculture (excl, dairy)	4002	3205	797	24.9
2.	Non-agricultural	2044	1504	540	35.9
3.	Dairy				
	(i) Ghee	4680	2450	2230	91.0
	(ii) Milk	9967	6545	3422	52.2
	Total	20693	13704	6989	50.9

Both the above results suggest that there has been a positive change in the income level of farmers after the DDC operations were initiated in the project area.

DISCUSSION AND RECOMMENDATIONS

National Dairy Development Board (NDDB) and DDC should strengthen its support to MPAs to encourage the milk producing farmers to produce more milk and thereby enabling the DDC and private dairies to collect more milk in order to cope with the demands of urban centres for milk and milk products and to increase the income to the rural farmers.

With changes in human and livestock populations, declining natural resources and increasing demands of urban areas for milk and milk products, new management practices are needed. A dairy policy towards intensive milk production programme geared to maintain the productivity of cattle and buffaloes by introducing more efficient management of forest, cropland, residues/pasture grasses and animal disease control and for the restructuring of the DDC. These measures will help to enhance the welfare of milk producing farmers, particularly the small farmers.

The NDDB should act as a catalyst in the provision of loan for purchasing cattle and buffaloes from the Agricultural Development Bank (ADB/N) and other banking agencies, for arranging insurance for the purchased animals through the credit guarantee corporation and for stimulating different types of training to benefit MPA farmers.

NDDB should develop a dairy policy at national level to make the dairying profession more profitable. Farmers must be enlightened by using popular mass media for the propagation of messages related to animal husbandry service, balanced feed, animal health service and measures to help farmers for increasing their income.

CONCLUSIONS

This study has carefully examined the effect of DDC's milk collection, processing and marketing activities on income of the rural milk producers of the project area. It has been revealed from the study that the farmers felt that there has been a positive change in the production scenario of milk after the DDC intervention programme. After the establishment of DDC's activities in the project area the levels of household income has changed significantly. The change and difference in incomes between "DDC participating" and "DDC non-participating" farmers were compared. It was found that the DDC participating farmers have benefitted not only in the term of increased level of income but also with various direct or indirect supports provided by the DDC. Also utilization of income/saving after the establishment of DDC operation is very encouraging. The increased opportunity created in the survey area by DDC to produce and market rather unlimited quantity of milk has obviously raised hopes of improving the lot of the farming community in general.

The social benefits are numerous ranging from increases in income to improved nutrition and status of the people. Improvement and sustainability of the present DDC activities in the project area would provide economic, environmental and social benefit to the people of Nepal in general and to the project area in particular. DDC should make an appropriate plan and programme for the implementation of the recommendations made in this report.

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ECONOMIC ANALYSIS OF ANIMAL DISEASES IN NEPAL

*Mahendra N. Lohani*¹ and

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ABSTRACT

The available secondary data on animal disease situation in Nepal were analyzed. The results showed that animal diseases inflicted an economic loss of about 845 million rupees annually in the country. Morbidity and mortality accounted for 59.43 and 40.57 percents of the total loss, respectively. Similarly, the share of the parasitic, viral and bacterial diseases to the total loss were 56.39, 33.31 and 9.72 percents, respectively.

About 71 percent of the total morbidity loss occurred in mountains, whereas it was 16.38 percent in the hills and 12.51 percent in the Terai in 1981/92. The corresponding figures for mortality losses are 64.12, 24.00 and 11.89 percents.

Economic losses due to diseases in buffaloes, cattle, pig and sheep accounted for 47.57, 18.46, 18.81 and 12.09 percents of the total, respectively. The contribution of goats and poultry put together was 3.07 percent to the total loss.

The weightage of morbidity and mortality, and the economic ranking of diseases differ in different livestock species.

The public sector resource allocation for animal health input supplies is only about 2 percent of the total economic loss from diseases.

INTRODUCTION

In Nepal, there are about 6.2 million cattle, 3 million buffaloes, 5.3 million goats, 0.9 million sheep, 0.55 million pigs and 10.2 million fowls. There are also yaks, chauries and mules, of which the recent statistics are scarce but are believed to contribute significantly in the economy of mountains and hills. The total contribution of this sub-sector to the national GDP is estimated at about 16 percent.

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Livestock are widely distributed throughout Nepal within integrated farming system. The majority of farm animals are owned by subsistence farmers. Livestock are particularly important in the hills and the mountains where they contribute about 20 percent to the household cash income, most of the balances coming from off-farm employment. In general, mountains households keep more livestock than midhill or Terai households.

The estimated production from livestock in Nepal is 834,000 metric ton milk, 141 thousand metric ton meat, 288 million eggs and 774 metric ton wool in 1990/91. Livestock also provide hides and skin, manure (fertilizer and fuel), agricultural draft power, transportation and religious sacrifices. The official estimate of the animal draft power, transportation, manure, and hides and skin are not reported.

Various studies undertaken in the past as well as the results of the recently conducted farmers' needs assessment workshops (PIBP, 1992a and 1992b) indicated that livestock disease is one of the main constraints limiting the economic growth of this sub-sector. The economic analysis of the livestock diseases in relation to causative agents, animal species and agro-ecological zones are largely limited. It is in this context that the present study has been carried out.

METHODOLOGY

The data obtained from the secondary source - "Animal Disease Situation and its Control Considering Six Selected Districts in Nepal and the Overall Veterinary Supply Inputs on National Basis" (Aprosc, 1991) were extrapolated. The mountain district of Dolakha was considered as representative sample for mountain agro-eco zone, hill districts of Kavre Palanchowk and Palpa for hill agro-eco zone, and Rautahat and Rupandehi for Terai agro-eco zone.

The district economic loss figure in the source data was converted into per animal loss value by dividing with the number of animals of the districts and then multiplied by the total animal number to arrive at the economic loss in respective agro-eco zone.

The economic loss figures from morbidity included estimated losses in terms of milk, body weight, manure and draft power for agriculture and transportation. The mortality losses are estimated on the basis of local prices of livestock in sample districts. These assumptions were taken as such from the primary source data.

LIMITATIONS OF THE STUDY

1. The information on losses due to rinderpest, nutritional diseases and reproductive disorders was lacking in the primary source data. Accordingly, the analysis of this study failed to include such diseases.
2. The source information considered mainly the small holder animal production in the rural areas. The picture of commercial and semi commercial farms are therefore not reflected in the economic loss figures of the present study.
3. The economic loss estimates presented in this study could only be as good as the source data.

RESULTS AND DISCUSSION

Total Economic Losses

The total morbidity and mortality losses due to livestock diseases in Nepal are presented in Table 1.

The total economic loss due to various livestock diseases is about 845 million rupees, annually. About 60 percent of this figure results from decrease in production due to sickness, the loss due to death of animals being only about 40 percent. This would indicate that the chronic diseases are the major cause of economic loss at the chronic diseases are the major cause of economic loss at the macro-level, suggesting the need for added emphasis in controlling them. This would, however, seem different at micro-level. Prevention and control of a killer disease will financially be the priority concern of an individual subsistence farmer.

The disease-wise analysis of the data shows that parasitic diseases caused the highest economic loss (56.39%) followed by viral (33.31 %) and bacterial (9.72%) diseases.

Foot and Mouth Disease inflicted the highest economic loss of all the diseases in livestock, accounting for over one fourth of the total. Fascioliasis and round worms ranked next causing 17.22 and 14.93 percents of the total loss, respectively. Ticks and tick borne protozoal diseases that are reported together accounted for 11.17 percent of the total loss.

Among other diseases, swine fever, stomach worms, tape worms and haemorrhagic septicaemia were important causes of substantial economic impact at macro level.

Morbidity and Mortality Losses

***vis-a-vis* Agro-Zones**

The morbidity losses in livestock production in three different agro-eco zones is presented in Table 2. The data show that the highest economic loss due to diseases causing morbidity in livestock was in the mountains (71.11% of the total) followed by the hills (16.38%) and Terai (12%.51%). This could be explained by the fact that the coverage by animal health services is lowest in mountain terrain due to limitations in mobility and lack of adequate qualified manpower and service inputs. Disease wise, FMD was economically the most important disease followed by ticks and tick borne diseases and fascioliasis.

Table 3 shows the mortality losses in livestock due to various diseases in the different eco-zones. The trend observed in Table 2 was also evident in mortality losses but was comparatively less pronounced. The mortality losses in mountains, hills and Terai were 64.12, 24.00 and 11.89 percents, respectively. The ranking of diseases for the mortality losses are however different from that of morbidity. Round worm infestation inflicted the heaviest economic loss (25.81%) followed by fascioliasis (21.15%), stomach worms (13.93%) and tape worms (12.37%). The economic losses due to mortality from other diseases such as HS, swine fever and FMD were also important.

Economic Losses

vis-a-vis

Animal Species

Species-wise economic losses due to livestock diseases are presented in Table 4. The data showed that the economic loss in buffaloes was highest of all the species (47.57% of the total). This could be explained by the fact that the buffaloes are the animals of highest economic value. Getting a buffalo sick or dead result in losses of milk, meat, manure, and agriculture/transport draft power.

Cattle and pigs ranked next in order, each with about 18 percent of the total losses. The economic loss due to disease in sheep accounted for 12.09 percent of the total losses.

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This could be related to a very high mortality of sheep, particularly of young ones, in trans-human management system in the mountains. The economic losses due to diseases in goats and poultry were considerably low.

Disease-wise Comparison of Economic Losses

Disease-wise comparison of economic losses in various livestock species are presented in Table 5 through 7.

Cattle and Buffaloes: The morbidity and mortality losses accounted for about 71 percent and 29 percent of the total losses respectively in both the cattle and buffaloes. Disease-wise, FMD was of highest economic importance causing about 33 percent and 40 percent losses in cattle and buffaloes, respectively. Fascioliasis, ticks and tick borne diseases, and HS ranked next in decreasing order. Round worms were responsible for over 7 percent losses in both the species.

Sheep and Goats: In sheep the disease of highest economic importance was fascioliasis followed by stomach worms/round worms, ticks and tick borne diseases, FMD, tapeworms and enterotoxaemia in decreasing order. One notable difference in sheep from cattle and buffalo was that the losses from mortality was higher (62.97%) than morbidity (37.03%). This could be related to high mortality, especially of lambs in trans-human production system. The trend of mortality and morbidity losses in goats were similar to those of sheep. The disease of highest economic importance also in goats was fascioliasis, followed by round worms, stomach worms, FMD, ticks and tick borne diseases, and tapeworms in decreasing order.

Pigs and Poultry: In pigs and poultry, the mortality losses were higher than morbidity losses by about two times. Round worm infestation was the disease of highest economic importance (38.51%) in pigs, followed by swine fever (31.90%), tape worms (15.0%) and stomach worms (13.67%). In poultry, Ranikhet disease inflicted the heaviest loss (40.81%), followed by round worms (36.04%) and fowl pox (19.33%).

Public Resources Allocation for Animal Disease Control

The total resources allocated for livestock development program under the Ministry of Agriculture is about Rs. 233.67 million in the fiscal year 1992/93 (Table 8). About 7.27 percent of this amount (i.e. Rs 17 million) has been appropriated for animal health inputs.

In view of an estimated economic loss of nearly 850 million rupees due to livestock diseases, the allocation of 17 million rupees for animal health input supplies (ie.e. about two percent) appears to be very meagre.

CONCLUSION AND RECOMMENDATIONS

There is a very high potential for increasing the livestock production and productivity, increasing rural employment and income, equity distribution and subsequently increasing the national GDP. Unfortunately, the public sector appears to underestimate this potential and fails to take appropriate and adequate measures. As a consequence, Nepal is suffering heavy economic losses annually from livestock diseases.

The losses are very high in mountains, where livestock is the main source of agricultural income. Economically parasitic diseases are more important than either bacterial or viral diseases.

Hence the following recommendations are made:

1. There is a need in the part of public sector to look more seriously on the animal disease problems. A detailed study on economic losses from animal diseases should be carried out on national basis. None of the economically important diseases should be excluded from such studies. A bigger sample size should be taken to represent the different agro-eco zones and different regions. Additionally the commercial and subsistence enterprises should also be included using stratified sampling procedures.
2. The findings of such studies should be adequately utilized in formulating the policy and plan of animal disease control in the country with no prejudice against animal health components.

Table 1. Morbidity, mortality and total economic losses due to various diseases in livestock production in Nepal (1990/91)

Unit: Rs '000

Disease	Morbidity	Mortality	Total	Percent
FMD	202687	17333	220020	26.03
Rabies	0	2058	2058	0.24
Ranikhet	2367	3122	5489	0.6
Swine fever	25864	24860	50724	6.00
Fowl Pox	1879	721	2600	0.31
Ephemeral fever	717	0	717	0.08
Foot Rot	0	0	0	0.00
HS	15510	25302	40812	4.83
Anthrax	0	3048	3048	0.36
Black Quarter	1048	819	1867	0.22
Tuberculosis	0	1777	1777	0.21
Brucellosis	32027	0	32027	3.79
Enterotoxaemia	471	2130	2601	0.31
Fascioliasis	72986	72508	145494	17.22
Stomach worms	7910	47755	55665	6.59
Round worms	37653	88512	126165	14.93
Tapeworms	4	42408	42412	5.02
Ticks/tick borne	85179	9216	94395	11.17
Ectoparasite	12338	0	12338	1.46
Milk fever	3601	1316	4917	0.58
Total	502241	342885	845126	100.00
Percent	59043	40.57	100	

Table 2. Morbidity losses in livestock production in there agro-eco zones in Nepal (1990/91)

Unit: Rs '000

Disease	Mountain	Hill	Terai	Total	Percent
FMD	156524	23085	23078	202687	40.36
Rabies	0	0	0	0	0.00
Ranikhet	0	1627	740	2367	0.47
Swine fever	25545	320	0	25864	5.15
Fowl pox	841	587	450	1879	0.37
Ephemeral fever	89	267	361	717	0.14
Foot rot	0	0	0	0	0.00
HS	7959	2479	5072	15510	3.09
Anthrax	0	0	0	0	0.00
Black quarter	0	0	1048	1048	0.21
Tuberculosis	0	0	0	0	0.00
Brucellosis	18391	3637	0	32027	6.38
Enterotoxaemia	0	471	1	471	0.09
Fascioliasis	33281	17755	21949	72986	14.53
Stomach worms	5204	2094	611	7910	1.57
Round worms	31765	5278	610	37653	7.50
Tapeworms	0	4	0	4	0.00
Ticks/tick borne	58269	23090	3821	85179	16.96
Ectoparasite	6840	1217	4281	12338	2.46
Milk fever	2421	365	815	3601	0.72
Total	357128	82276	62837	502241	100
Percent	71.11	16.38	12.51	100.00	

Table 3. Mortality losses in livestock production in there agro-eco zones in Nepal (1990/91)

Unit: Rs '000

Disease	Mountain	Hill	Terai	Total	Percent
FMD	11159	5234	940	17333	5.05
Rabies	981	550	527	2058	0.60
Ranikhet	190	1584	1349	3122	0.91
Swine fever	23092	1424	344	24860	7.25
Fowl pox	112	475	134	721	0.21
Ephemeral fever	0	0	0	0	0.00
Foot rot	0	0	0	0	0.00
HS	6299	5161	13843	25302	7.38
Anthrax	0	3005	43	3048	0.89
Black quarter	0	324	495	819	0.24
Tuberculosis	1242	535	0	1777	0.52
Brucellosis	0	0	0	0	0.00
Enterotoxaemia	0	1986	144	2130	0.62
Fascioliasis	43455	24794	4260	72508	21.15
Stomach worms	37217	10513	25	47755	13.93
Round worms	58769	16713	13030	88512	25.81
Tapeworms	32642	8882	884	42408	12.37
Ticks/tick borne	4393	668	4156	9216	2.69
Ectoparasite	0	0	0	0	0.00
Milk fever	297	437	582	1316	0.38
Total	219846	82284	40755	342885	100
Percent	64.12	24.00	11.89	100.00	

Table 4. Species-wise economic losses due to livestock diseases in Nepal (1990/91)

Unit: Rs '000

Disease	Cattle	Buffalo	Poultry	Sheep	Goat	Pig	Total	Percent
FMD	51077	160224	0	6729	1162	828	220020	26.33
Rabies	822	949	0	0	0	286	2058	0.24
Ranikhet	0	0	5489	0	0	0	5489	0.65
Swine fever	0	0	0	0	0	50725	50725	6.00
Fowl pox	0	0	2600	0	0	0	2600	0.31
Ephemeral fever	717	0	0	0	0	0	717	0.08
Foot rot	0	0	0	0	0	0	0	0.00
HS	15839	24817	0	0	144	13	40812	4.83
Anthrax	574	2474	0	0	0	0	3048	0.36
Black quarter	1342	525	0	0	0	0	1867	0.22
Tuberculosis	429	1348	0	0	0	0	177	0.21
Brucellosis	3112	28915	0	0	0	0	32027	3.79
Enterotoxaemia	0	0	0	2411	190	0	2601	0.31
Fascioliasis	3228	67498	0	40241	5528	0	145494	17.22
Stomach worms	3621	13017	0	15710	1583	21734	55664	6.59
Round worms	12113	29921	4848	16084	1970	61228	126164	14.93
Tapeworms	2112	6985	173	8385	907	23849	42412	5.02
Ticks/tick borne	29187	51551	173	12537	947	0	94395	11.17
Ectoparasite	1450	10234	166	52	89	347	12338	1.46
Milk fever	1377	3539	0	0	0	0	4917	0.58
Total	156002	401996	13450	102149	12520	159010	845127	100
Percent	18.46	47.57	1.59	12.09	1.48	18.81	100	

Table 5. Disease-wise comparison of economic losses in cattle and buffaloes

(Rs '000)

Disease	Cattle				Buffaloes			
	Morbidity	Mortality	Total	Percent	Morbidity	Mortality	Total	Percent
FMD	46913	4164	51077	32.74	149834	10390	160224	39.86
Rabies	0	4164	822	0.53	0	949	949	0.24
Ranikhet	0	822	0	0.00	0	0	0	0.00
Swine fever	0	0	0	0.00	0	0	0	0.00
Fowl pox	0	0	0	0.00	0	0	0	0.00
Ephemeral fever	717	0	717	0.46	0	0	0	0.00
Foot rot	0	0	0	0.00	0	0	0	0.00
HS	8156	7683	15839	10.15	7253	17463	24817	6.17
Anthrax	0	574	574	0.37	0	2474	2474	0.62
Black quarter	825	517	1342	0.86	223	302	525	0.13
Tuberculosis	0	429	429	0.28	0	1348	1348	0.34
Brucellosis	3112	0	3112	1.99	28915	0	28915	7.19
Enterotoxaemia	0	0	0	0.00	0	0	0	0.00
Fascioliasis	20688	11539	3228	20.66	32673	34825	67498	16.79
Stomach worms	779	2842	3621	2.32	3970	9046	13017	3.24
Round worms	895	11519	12113	7.76	5650	24271	29921	7.44
Tapeworms	0	2119	2112	1.35	0	6985	6985	1.74
Ticks/tick borne	26662	2525	29187	18.71	45033	6517	51551	12.82
Ectoparasite	1450	0	1450	0.93	10234	0	10234	2.55
Milk fever	812	565	1377	0.88	2788	751	3539	0.88
Total	110710	45292	156002	100	286673	115323	401996	100
Percent	70.97	29.03	100.00		71.31	28.69	100	

Table 6. Disease-wise comparison of economic losses in sheep and goat

(Rs. '000)

Disease	Sheep				Goat			
	Morbidity	Mortality	Total	Percent	Morbidity	Mortality	Total	Percent
FMD	4050	2680	6729	6.59	1063	99	1162	9.28
Rabies	0	0	0	0.00	0	0	0	0.00
Ranikhet	0	0	0	0.00	0	0	0	0.00
Swine fever	0	0	0	0.00	0	0	0	0.00
Fowl pox	0	0	0	0.00	0	0	0	0.00
Ephemeral fever	0	0	0	0.00	0	0	0	0.00
Foot rot	0	0	0	0.00	0	0	0	0.00
HS	0	0	0	0.00	0	144	144	1.15
Anthrax	0	0	0	0.00	0	0	0	0.00
Black quarter	0	0	0	0.00	0	0	0	0.00
Tuberculosis	0	0	0	0.00	0	0	0	0.00
Brucellosis	0	0	0	0.00	0	0	0	0
Enterotoxaemia	425	1986	2411	2.36	46	144	190	1.52
Fascioliasis	17312	22929	40241	39.39	2313	3216	5528	44.16
Stomach worms	2802	12908	15710	15.38	359	1224	1583	12.64
Round worms	650	15434	16084	15.75	61	1909	1970	15.74
Tapeworms	0	8385	8385	8.21	0	907	907	7.25
Ticks/tick borne	12537	0	12537	12.27	947	947	947	7.56
Ectoparasite	52	0	52	0.05	89	89	89	0.71
Milk fever	0	0	0	0.00	0	0	0	0.00
Total	37828	64321	102149	100	4878	12620	12520	100
Percent	37.03	62.97	100.00		38.96	100.00	100.00	

Table 7. Disease-wise comparison of economic losses in pig and poultry

(Rs. '000)

Disease	Pig				Poultry			
	Morbidity	Mortality	Total	Percent	Morbidity	Mortality	Total	Percent
FMD	828	0	828	0.52	0	0	0	0.00
Rabies	0	286	296	0.18	0	0	0	0.00
Ranikhet	0	0	0	0.00	2367	3122	5489	40.81
Swine fever	25864	24860	50725	31.90	0	0	0	0.00
Fowl pox	0	0	0	0.00	1879	721	2600	19.33
Ephemeral fever	0	0	0	0.00	0	0	0	0.00
Foot rot	0	0	0	0.00	0	0	0	0.00
HS	0	13	13	0.01	0	0	0	0.00
Anthrax	0	0	0	0.00	0	0	0	0.00
Black quarter	0	0	0	0.00	0	0	0	0.00
Tuberculosis	0	0	0	0.00	0	0	0	0.00
Brucellosis	0	0	0	0.00	0	0	0	0.00
Enterotoxaemia	0	0	0	0.00	0	0	0	0.00
Fascioliasis	0	0	0	0.00	0	0	0	0.00
Stomach worms	0	21734	21734	13.67	0	0	0	0.00
Round worms	30646	30582	61228	38.51	51	4797	4848	36.04
Tapeworms	4	23845	23849	15.00	0	173	173	1.29
Ticks/tick borne	0	0	0	0.00	0	173	173	1.29
Ectoparasite	347	0	347	0.22	166	0	166	1.24
Milk fever	0	0	0	0.00	0	0	0	0.00
Total	57689	101320	159010	100	04463	8987	13450	100
Percent	36.28	63.72	100.00	33.18	66.82	100.00		

Table 8. Public Resources Available for Animal Health Supplies vs. Total Economic Losses due to Diseases

	Description	NRs. (000)
A.	Public sector resource available for livestock program in Nepal (1992/93)	233,671
B.	Allocation for animal health input supplies and other office material (budget heading number 7.5)	18,873
C.	Estimated appropriation for other office material (about NRs 25,000 per district)	1,875
D.	Estimated appropriation for animal health input supplies (B-C)	16,998
E.	Resources for animal health input supplies as percent of the total for the program (D/A* 100)	7.27%
F.	Economic losses due to diseases in livestock production (Year 1990/91)	845,127
G.	Public resource allocation for animal health supplies as percent of the economic losses due to diseases (D/F*100)	2.01%

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RELATIONSHIP OF PRODUCTION PERFORMANCE CHARACTERISTICS OF MURRAH BUFFALO WITH THE CALVING AT DIFFERENT SEASONS

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*K.R. Pandey*²

ABSTRACT

A study of 351 lactation records of Murrah buffaloes spread over a period of 13 years (1979-1991) stationed at livestock farm of the Institute of Agriculture and Animal Science (IAAS), Rampur were studied for performance traits, and 484 calving were analysed for calf survivability upto 1 year age groups. Average values for lactation yield, lactation period, dry period and calf Survivability were evaluated for first 10 lactations. The maximum number of calvings was found during autumn followed by summer, winter and spring. The average lactation yield was 785 litres. Milk production varied between 140 to 2080 litres. The average lactation length and dry period were 292 and 232 days respectively. The higher lactation yield was observed in the the first (836 litres) and second (827 litres) lactation 836 compared to other lactations. Similarly the average lactation milk yield were 1176, 944, 784 and 747 litres and average lactation length were 305, 288, 306 and 283 days for Spring, Winter, Summer and Autumn calving respectively. The average subsequent dry period of Murrah buffaloes calving in Winter, Spring, Summer and Autumn were 306, 182, 244 and 264 days, respectively. The influence of calving season on lactation milk yield was found statistically significant ($P < 0.01$). However, it was found nonsignificant with lactation and dry period. Similarly, parity had significant effect ($P < 0.01$) on milk yield. Lactation milk yield was positively correlated ($r = 0.44$) with lactation period and negatively correlated ($r = -0.13$) with dry period. The overall calf survivability percentage was 84% but this varied between different seasons of calving and age group of the animals. The highest rate of survivability was obtained on spring calving (93%) followed by Summer (91%), Autumn (75%) and Winter (53%). The calf survivability was found minimum upto 3 months of age (58 to 66%) and maximum (85 to 89%) from 3 months to 1 year age. Survivability was slightly higher in female but did not

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differ significantly from that in male. Necessity of better management and breeding practices was felt.

INTRODUCTION

It is a well known fact that the water buffalo has a natural tendency to calve predominantly during certain season of the year i.e. June to November. It has also been reported by a number of workers that the season of calving is a potential factor having effects on the lactation and milk yield of dairy cattle and buffaloes. Predominance of calving during one part of the year leads to fluctuation in milk production during another part of the year. This possess a problem to the producers and consumers on one hand and the milk handling organization on the other, in terms of periodic surplus and short falls.

Season of calving is one of the most important factors which may affect the milk yield and lactation period in buffaloes (Desai and Dharmendra, 1964). Tomar and Tomar (1960) observed that in buffaloes the month of calving was found to have a significant effect on the duration of lactation period. According to them, the highest lactation period was found in buffaloes which calved in the month of April and lowest in buffaloes which calved in the month of July. The period of February to May was found significantly superior in maintaining the lactation duration and in producing higher milk yield.

According to Singh and Singh (1971), 41% of buffalo calves died in terai region from birth to 1 year age. Mishra et al. (1977) reported high mortality in early age upto 3 months and also between 6 to 12 months of age. The mortality was comparatively higher from September to February in buffalo calves. Shrestha et al. (1992) reported the highest rate of the calf mortality during first month followed by 3 to 6 months of age.

In Nepal, very limited studies have been done in the productive performances of Murrah buffaloes. Since not much work have been done on the effect of month and season of calving in the economic traits in buffaloes, an attempt is now made to study the influence of calving season on lactation milk yield, lactation length, dry period and calf survivability in Murrah buffaloes in Chitwan district of Nepal.

MATERIALS AND METHODS

Three hundred and fifty one lactation records of Murrah buffaloes maintained at the livestock farm of IAAS, Rampur during the period from 1979 to 1991 were used to evaluate the effect of calving season on milk yield, lactation length and dry period. The data obtained from 1 to 10 lactations were pooled and analysed statistically.

The records of buffaloes having less than 100 days lactation and of those buffaloes which were culled or died before completing the lactation were not included in this study. On the basis of meteorological observation a year was divided into 4 seasons: (a) Rainy/summer - June to August (b) Autumn - September to November (c) Winter - December to February, and (d) Spring - March to May.

Four hundreds and eighty four calving records maintained at the livestock farm of IAAS, Rampur were analysed. Calf survivability upto 1 year under Chitwan conditions was also studied. The feeding and management of the herd was uniform during the period considered. Analysis of variance (ANOVA) was used to study the effect of calving season on milk yield, lactation period and dry period.

RESULTS AND DISCUSSION

Frequency distribution of calving :

Table 1 presents the monthwise distribution of calving of Murrah buffaloes at the livestock farm of IAAS, Rampur over the period from 1979 to 1991. In 13 year period, the maximum calving (90.28%) was found during June through November. The particular months of high calving occurrences were August (30.37%) and July (15.08%), and that of low occurrence were April (0.61%) and February (0.82%). These findings were similar to those obtained by Pradhan (1979) who reported 76.5% of Murrah buffaloes at IAAS farm calved during July - November. The breeding pattern of buffaloes is characterized by marked seasonal variation. The possible reason for this seasonal breeding behaviour of Murrah buffaloes might have been due to the deficiency of green fodder in winter and summer and due to heat stress.

Table 1. Monthwise distribution of calvings.

Months	Male	Female	Total	Percentages
Jan	6	2	8	1.65
Feb	3	1	4	0.82
March	4	2	6	1.23
April	1	2	3	0.61
May	1	5	6	1.23
June	25	21	46	9.50
July	40	33	73	15.08
Aug	74	73	147	30.37
Sept	40	32	72	14.87
Oct	20	24	44	9.09
Nov	34	21	55	11.36
Dec	9	11	20	4.13
Overall	257	227	484	-

Relationships of Lactation Yield and Lactation Period with Calving at Different Seasons:

The average lactation milk yield and lactation length under study were found to be 785 litres and 293 days, respectively. Table 2 revealed that the highest percentage of buffaloes (50%) calved during the Autumn season followed by Summer (38%), Winter (10%) and Spring (0.5%). Similar preponderance of calving of Murrah buffaloes during Autumn season was also observed by Venkataraman and Venkaiah (1964) at Tirupati, India.

Table 2. Relationships of lactation yield and lactation length with calving at different seasons.

Season	No. of Calvings	Percentage	Av. milk yield (lit)	Av. lactation length (days)
Winter (Dec-Feb)	38	10.85	944.86 $\pm$ 443.78 b	288.10 $\pm$ 82.14
Spring (Mar-May)	2	0.56	1176.78 $\pm$ 432.5 c	305.00 $\pm$ 24.00
Summer (Jun-aug)	134	38.17	784.76 $\pm$ 304.33a	306.18 $\pm$ 106.97c
Autumn (Sep-Nov)	177	50.42	747.66 $\pm$ 314.01a	283.76 $\pm$ 101.93a
Overall	351	100	785.03 $\pm$ 335.13	292.92 $\pm$ 98.66

a, b values within each column differ significantly ($P < 0.01$)

a, c values within each column differ significantly ($P < 0.05$)

Between seasons values with similar superscripts do not differ significantly.

The average lactation milk yield and lactation length were found to be about 1176, 944, 784 and 747 litres and 305, 288, 306 and 283 days for Spring, Winter, Summer and Autumn calving, respectively. However, these variations of lactation milk yield due to season of calving were found to be statistically significant ($P < 0.01$). Winter calvings produced significantly higher ($P < 0.01$) milk yield than Summer and Autumn calvings. Lactation milk yield was found positively correlated ($r = 0.44$) with lactation period. Present finding is in agreement with Desai and Dharmendra Kumar (1964) who reported buffaloes, calving in the off-breeding season, recorded 1.3% more milk in a lactation and found this difference to be significant..

Milk production of Murrah buffaloes at IAAS farm varied between 140 and 2080 litres. In this farm, 78% of buffaloes produced upto 1000 litres of milk, 18% produced 1000 to 1500 litres, 3% produced 1500 to 2000 litres and 1% produced over 2000 litres of milk per lactation. On contrary to present finding, Rana et al. (1992) observed that milk production of Murrah buffaloes varied between 1141 and 3974 litres at Haryana Agricultural University, Hissar, India. Milk production potential of Murrah buffaloes at IAAS farm has been very low in comparison to Murrah buffaloes of India. The possible reason for this may be due to inbreeding and poor management of the herd.

Table 3. Average lactation milk yield and lactation length in different lactations.

Parity	No. of calving	Average milk yield (litres)	Average lactation length (days)
First	119	835.97 $\pm$ 369.20	306.83 $\pm$ 96.65
Second	89	827.96 $\pm$ 355.81	297.22 $\pm$ 95.88
Third	63	719.44 $\pm$ 280.00	265.28 $\pm$ 94.96
Forth	36	667.47 $\pm$ 277.97	266.25 $\pm$ 97.62
Fifth	20	697.30 $\pm$ 203.98	272.55 $\pm$ 83.98
Sixth	12	666.75 $\pm$ 217.90	348.91 $\pm$ 88.92
Seventh	7	725.14 $\pm$ 345.37	335.00 $\pm$ 128.53
Eighth	3	552.33 $\pm$ 128.53	258.66 $\pm$ 99.76
Ninth	1	607.00	260.00
Tenth	1	487.00	252.00
Overall	351	785.03 $\pm$ 335.13	292.92 $\pm$ 98.66

In the present study, higher lactation yield was observed to be 836 and 828 litres in the first and second lactations, respectively (Table 3). Lactation order had significant effect ($P < 0.01$) on lactation milk yield but was found non significant with lactation length. Lactation milk yield was found to be gradually declining from 3rd lactation till 6th lactations. However, Pradhan (1979) reported that the average lactation yield was 1095 litres and highest lactation yield was observed in the 3rd lactation (ie 1253 litres). Similarly, Kharel and Nepali (1984) reported the average milk yield of 1048 litres in Murrah buffaloes at IAAS farm. In India, Tomar and Tomar (1960) recorded the average milk yield of Murrah buffaloes as 1975 litres per lactation. The average lactation yield of IAAS herd is found comparatively lower than Pokhara farm (967 litres).

Distribution of lactation length is presented in the Table 4. The average lactation length was found to be 292 days with highest frequency group of 251 to 300 days (20.51%). Present finding is similar with Kohli and Malik (1960) who reported an average lactation length of 300 days. However, Pradhan (1979) observed the average lactation length of 282 days in the Murrah buffaloes of IAAS farm.

Table 4. Distribution of lactation length

Lactation length (days)	No. of observation	Percentage
100-150	24	6.83
150-200	35	9.96
201-250	68	19.37
251- 300	72	20.51
301-350	64	18.23
351-400	37	10.54
Above-400	51	14.52

It is interesting to note that lactation duration in buffalo that calved during Spring and Summer are practically the same whereas the Winter and Autumn have 17 and 22 days lower duration respectively. Even these durations are found to be non-significant and is in agreement with Desai and Kumar (1964) and Venkataranam and Venkaiah (1964). However, the lactation duration of Summer calvings was found significantly different ($P < 0.05$) from that of Autumn calving (Singh, 1966). Tomar and Tomar (1960) studied the effect of season of all the buffaloes maintained from 1944 to 1959 and observed that the

period from February to May proved best and significantly superior to June to January for lactation milk yield and lactation period.

Relationship of dry period with the calvings at different seasons:

The average subsequent dry period of Murrah buffaloes calving in Winter, Spring, Summer and Autumn were found to be about 306, 182, 244 and 264 days, respectively (Table 5).

The present findings are in agreement with the previous workers, Venkataraman and Vekaiah, (1964). The season of calving had no significant effect on dry period. The shortest dry period was found in the Spring and longest in the Winter. The lactation milk yield was negatively correlated ($r = -0.13$) with dry period.

Table 5. Relationship of dry period with the calving at different seasons.

Season	No. of calving	Percentage	Average dry period (days)
Winter (Dec-Feb)	24	10.0	306.62 ± 212.62
Spring (Mar-May)	2	0.82	182.50 ± 78.50
Summer (Jun-Aug.)	89	37.07	244.77 ± 149.27
Autumn (Sep.-Nov.)	126	52.20	264.39 ± 201.95
Overall	241	100.00	232.47 ± 187.52

Table 6 presents the dry period in different lactations. The mean dry period was found to be 232 days. The dry period was short in first lactation with gradually increasing trend was and found longest in the 6th lactation (309 days). However, Rana et al. (1992) observed the average dry period in Murrah buffalo in India to be only 180 days.

Table 6. Dry period in different lactations.

Order of lactation	No. of observation	Mean dry days	
First	89	205.80	± 114.70
Second	66	217.46	± 204.74
Third	42	266.65	± 211.30
Forth	21	297.23	± 218.92
Fifth	13	224.46	± 157.54
Sixth	5	309.40	± 175.18
Seventh	3	114.66	± 17.24
Eight	1	82	
Nineth	1	118	
Overall	241	232.47	± 187.52

Relationship of calf mortality with the calvings at different seasons:

The calves born during spring and early summer lower mortality than those born in other seasons (Table 7). The highest survivability percentage (93%) occurred among the calves born during spring (March, April and May) and lowest survivability (53%) was recorded in winter (December, January and February) born calves. These observations are in confirmity with the report of Mishra et al. (1977).

Table 7. Relationship of calf mortality with the calvings at different seasons.

Season	No. of calves born	No. of calves died within <1yr			Mortality (%)	Survivability (%)
		Male	Female	Total		
Winter (Dec-Feb)	32	9	6	15	46.87	53.13
Spring (Mar-May)	15	0	1	1	6.66	93.34
Summer (Jun-Aug)	266	13	10	23	8.64	91.36
Autumn (Sep.-Nov.)	171	20	16	36	21.05	78.95
Overall	484	42	33	75	15.49	84.51

The climate in the Spring favours maintenance of sanitary condition at the farm. It was further observed that from September onwards the mortality rate among calves showed an increasing trend reaching lowest survivability in the winter months. This is in agreement with Mishra et al. (1977). The months of December, January and February, comprised of higher level of relative humidity (93 to 96%) and low temperature (7 to 9°C) could have resulted stress to calves (Table 9). During this period, the green matter in the field mostly dries and calf mortality increases at IAAS farm. Similarly, the mortality rate in August and September was higher due to high humidity (84 to 87%), hot weather (33 to 34°C) and rains. Appropriate bedding materials and animal housing would help in this respect. A protective insulator would also protect the calves from chilling.

Table 8. Relationship between weather elements and calf survivability at IAAS.

Month	Temperature° C			Relative Humidity	Survivability (%)
	Max	Mn	Difference		
Jan	22.79	7.82	14.97	96.02	41
Feb	25.90	9.58	16.32	86.33	55
Mar	31.51	13.49	18.02	67.21	79
Apr	26.03	17.39	18.64	53.92	100
May	36.31	21.61	14.70	66.15	100
Jun	35.82	24.11	11.71	78.54	100
Jul	33.33	24.28	9.05	86.83	94
Aug	34.15	24.34	9.81	84.83	81
Sep	33.18	23.51	9.67	87.00	89
Oct	32.14	19.01	13.13	85.77	78
Nov	28.27	12.58	15.69	85.20	71
Dec	24.86	9.41	15.45	93.37	66

In this study, the rate of survivability was low upto 3 months of age (58 to 66%) and higher rate of survivability was observed from 3 months to 1 year of age (85 to 89%), as mentioned in Table 9. the Present finding is similar with Mishra et al. (1977). However, Shrestha et al. (1992) reported that the highest rate of mortality was observed in the first month followed by 3 to 6 month's age. The possible reason for relatively high rates of mortality during first 3 months of age could be the susceptibility of buffalo calves to

neonatal diseases like, pneumonia, colibacillosis, salmonellosis and ascariasis. Calf survivability was found slightly higher (58%) in female but did not differ significantly from male (42%).

Table 9. Effect of age on calf survivability.

Age in month	No. of death			Survivability rate (%)
	Male	Female	Total	
0-1	15	10	25	66.67
1-3	21	10	31	58.67
3-6	4	4	8	89.34
6-12	4	7	11	85.34
Overall	44	31	75	84.51

It is evident from present investigation that despite domestication, this polyoestrous animal still tends to cling to a more or less seasonal sex rhythm. Effect of season of calving on lactation milk yield of dairy animals can be attributed to the feed supply, environmental temperature, intensity of day light and humidity during the period following calving together with gestation effects.

The slightly higher lactation performance of winter calvings appears to be due to the combined effects of possibly higher maximum initial milk yield during Winter, longer lactation duration and late conception. It is interesting to note that buffaloes calving in spring and summer have the shorter dry period of about 182 and 203 days respectively, whereas those calving in winter have the longest dry period of about 306 days. Buffaloes calving during the summer exhibited the maximum level of performance in desirable dairy traits with gains in production and reproduction. Hence, this appears to be the most favourable breeding season for Murrah buffaloes.

It may be stated that season of calving has significant effect ($P < 0.01$) on the milk yield per lactation of Murrah buffaloes, and this statement is further confirmed by the fact that the season of calving has no significant effect on lactation period and dry period. Present study revealed the period from December to May as the best and significantly superior to June to November calving. It would appear from the table or result that calving in the off season (December to May) resulted higher milk yield than those calved in breeding season i.e. June to November and they have also longer lactation period.

September to February has been observed as the most ideal period for breeding in buffaloes. However, breeding of buffaloes during off-season may be induced by simple changes in management. The main approach should be to protect the animals from direct exposure to intense rays of sun, to control the ambient temperature by improving the conditions inside the animal shed and by applying appropriate thermal ameliorative measures. Considerable success was achieved at Hissar, Karnal, Lundhiana and Mathura buffalo farms through this measures. (Tirupathi and Verma, 1988).

CONCLUSION

It is therefore desirable that efforts should be made to increase the number of calvings from February to July which may result in significant increase in the milk yield and economic gain in the dairy industry.

Finally, the calvings in spring and early summer months could be helpful to reduce the calf mortality appreciably. The survivability percentage of calves during winter may be increased by providing adequate feeding as well as warm, dry and sanitary accommodations to calves which could eliminate the adverse effects of climate, bacterial and parasitic burden. Necessity of better management and breeding practices was felt at livestock farm of IAAS to improve the production potential of Murrah buffaloes. Managerial principles applied judiciously would help in optimum economic as well as biological efficiency of buffalo production system. Proper integration and implementation of various routine managerial practices and suitable breeding programme in Murrah buffaloes are the key strategies for improving their reproduction and production potential at the IAAS farm, Rampur.

A massive and systematic selection programme is needed to bring about genetic progress in buffaloes. The use of Artificial Insemination and synchronization of oestrous are the major steps towards enhancement of efficiencies in reproductive and productive performances of buffaloes. Further investigations are required to upgrade the buffaloes of IAAS farm.

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MUSK DEER HUSBANDRY AND POSSIBILITY OF FARMING IN NEPAL

M. N. Shrestha ¹

ABSTRACT

The cost of musk production and the value of musk extraction were studied and compared. Musk production in captivity can be profitable. The Himalayan musk deer can thrive in captivity in the climatic conditions of Kathmandu.

INTRODUCTION

The Himalayan musk deer is an endangered species (I. U. C. N., 1974) and thus prohibited for hunting, un authorised purchase and sale, export and import of deer and its product musk.

Musk is a odoriferous substance used in traditional medicine and in perfumery for its esteemed fixative and aromatic properties. Musk is effective as a general stimulant of the heart and central nervous system (Mukhopadhyay *et.al.*, 1973) and as an anti-inflammatory agent (Mishra *et.al.*, 1962). As an anti-inflammatory agent musk is more effective antidote for snake venom than hydrocortisone (Arora *et.al.*, 1962).

It is also used as a sedative to treat asthma, epilepsy, hysteria, and other nervous disorder and as a stimulant to cure bronchitis, impotence, pneumonia, typhoid, typhus and other ailments (Pereira, 1857; Mukerji, 1953; Chopra *et.al.*, 1988; Anon 1979).

HUSBANDRY

A young male musk deer was brought in the zoo from Jumla district, West Nepal, at the age of approximately 2-month old. It was bottle fed with dairy milk half a liter per day for about one year. It was fed daily with boiled cereal food, seasonal fruits and vegetables as follows:

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Carrots	100g.
Pumpkin	100g.
Potato	250g.
Seasonal green vegetables and bamboo leaves, clover, cauliflower leaves according to availability.	300g.
Banana	100g.
Apple	150g.
Seasonal fruit	100g.
Cooked cereal food (prepared by the zoo)	200g.
Drinking water	ad lib.
Mineral licks	ad lib.

The enclosure measured 5 m. long with 3.25 m wide and 2m, high. The space used by the musk deer for defaecation was almost regularly on a definite spot in the corner of the enclosure except few times away from the spot. The tail is hairless and greasy because of yellowish secretion of the caudal gland. Body weight and measurements are presented in Table -1.

DISEASE

Every month the faecal test was done to diagnose the parasitic infestation if any, and deworming against liver fluke was done every three months on a routine basis.

During Seven years captivity the deer fell sick two times, at the age of three and four years in the summer. At that time the deer was in south-facing enclosure which was too hot for the musk deer. The deer showed the lesions of eczema all over the legs with pruritis and alopecia. The skin problem was treated with the topical use of corticosteroid and antibiotic, and improvement was distinctly noticed within two weeks. At three years of age, it suffered from fever, anorexia, and urinary retention, which was relieved with the systemic use of antibiotic and corticosteroid. It was transferred in an enclosure facilitated with shade.

RESULTS AND DISCUSSION

First of all, the survival of the valuable and delicate musk deer upto Seven years of age itself carries much importance as the previous records of the zoo shows that the musk deer brought into the zoo in different occasions could not live longer than a couple of weeks in captivity. Surviving upto Seven years of age is an indication that musk deer can

thrive, if provided suitable enclosures, husbandry practices along with food and the care. This gives satisfactory reason for musk deer farming in Kathmandu.

In Nepal till now, the farming is limited to domestic animals only. The attention has not been given to the farming of wild musk deer and others. It should be initiated through the governmental agencies to familiarize and popularize the farming to the public. This will safeguard from the illegal poaching of valuable musk deer by providing opportunities of regular employment of the people involved in malpractices, thus should contribute in the conservation of fast vanishing wildlife.

Considering our average daily income of one and half rupees per person, 5 to 6 grams of musk produced annually by a single deer can provide sufficient yearly income to a family for the living as the musk is more valuable than gold. This will also be a source of generating foreign currency by exporting the musk. Profit increases when the number of musk deer is increased.

Table 1. Weight and body measurements of the musk deer

Body weight	9 kg.
Length of the body	76 cm.
Height of the deer	72 cm.
Length of the musk sac	4 cm.
Width of the musk sac	3 cm.
Depth of the musk sac	4.5 cm.
Canine size (right)	5.5 cm.
Canine size (left)	6 cm.
Scrotum size (length)	5 cm.
Scrotum size (width)	5 cm.

Table 2. Value of the Musk and Its Cost of Production

Year	1981	1982	1983	1985	Total
Cost of food, labour, and medicine (Rupees)	1150.00	1265.00	1391.00	1736.00	5542.00
Value of the musk enquire in Ayurvedic medicine shops per 'Tola' = 11.66gm (Rupees)	6,000	7,000	8,000	10,000	-
Value of extracted musk (Rupees)	1029.15	3439.65	1509.43	2585.20	8564.43
Profit expected (Rupees)	-121.85	+2174.65	+118.43	+850.2	+3022.43

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INCIDENCE OF PSEUDO-RABIES OR AUJESZKY'S DISEASE IN ANIMALS OF NEPAL

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ABSTRACT

Two outbreaks of pseudo-rabies one each in Far-Western region in 1984 and central region in 1991 were recorded in buffaloes, cattle and pigs in Nepal. The diagnosis was based on clinical findings, post-mortem examination, laboratory findings and epidemiological observations.

INTRODUCTION

"Pseudo-rabies" is an infectious viral disease of swine which serves as a reservoir and principal source of natural infection. The virus which was first detected by Aujeszky's in 1902 in Hungary, belongs to family Herpes viridae.

Two incidence of this disease were recorded in 1984 and 1991 in Nepal. First incidence of the disease was seen in Buffaloes of Far-western development region at Panchanali Village Development Committee of Deepayal at the end of May 1984 and the second incidence was observed in cattle and pigs of the Central Development region at Livestock Farm Jiri of Dolkha district during in the first week of February 1991.

At the first incidence the disease was diagnosed only on clinical observation while at the second incidence it was dignosed on the basis of clinical observation, post-mortem examination, laboratory findings and epidemiological studies. At both instances, the disease occured naturally, and was effectively controlled through proper preventive measures.

HISTORY

At the end of May 1984, buffaloes at Panchanali Village Development Committee, Deepayal, in the Far-Western Development region were reported to be affected with nervous disorders. The symptoms observed were initial high temperature (108°F)

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followed by subnormal (99° F) temperature before death, profuse salivation, scratching of head with leg, dashing against stone and pillar, restlessness, circling, backward and sudden forward movements, jumping and getting down, very bad smelling black blood stained faces, and yellowish eyes. Of eight clinically affected buffaloes, five died within 6-7 days whilst the eroded skin on the head, tail and body of recovered animals slowly healed up.

During the first week of February 1991, another outbreak of nervous disorder in cattle and pigs was recorded at Livestock Farm, Jiri in the Centre Development region. The principle symptoms observed in cattle were profuse salivation, difficulty in swallowing, trembling, head pressing, and a high temperature (105° F) initially followed by subnormal temperature (96° F). In pigs, initial high temperature (108° F) and subsequent subnormal temperature (96° F), restlessness, profuse salivation, reddening on the ventral side of the body etc were the symptoms observed.

Most of the affected animals died of the disease, and the following diagnostic and preventive methods were undertaken.

INVESTIGATIONS UNDERTAKEN

Epidemiological survey

Questionnaires were prepared and filled up to study the occurrence of the disease, the findings of which is summarized in table 1. In both the outbreak cattle, buffaloes and pigs were kept in the same farm, and the disease occurred naturally. Though the morbidity was low, case fatality rate was very high.

Table 1. Morbidity and mortality rates recorded in different species in two outbreak sites.

Farm	Species affected in the farm	Total No. of animal	No. of animals affected	No. of animals died	Morbidity rate (%)	Mortality rate (%)	Case fatality (%)
Panchanali Jiri	Buffaloes	300	8	5	2.7	1.7	62.5
	Cattle	150	1	1	0.66	0.66	100
	Pigs	32	3	3	9.37	9.37	100

Post-mortem examination

The findings of P.M. examination in different species is summarized below:

In buffaloes inflamed lungs with widespread haemorrhage and necrosed liver were found.

Cattle - No gross changes detected.

Pigs - Large intestine necrosed and spotted with blood.

In the first outbreak at Panchanali farm, laboratory investigation could not be performed. However, laboratory diagnosis were carried out in the Jiri farm outbreak. Based on the clinical symptoms and post-mortem findings, it was decided to investigate for listeriosis, rabies and pseudo-rabies. Therefore lungs & brain were collected aseptically and dispatched to the laboratory on ice without any preservative.

Bacteriological Culture:

Brain and lung tissue were cultured separately on both nutrient agar and 5% sheep blood agar. Non haemolytic colonies of *Listeria* spp. on blood agar were isolated.

Pathogenicity tests for isolated *Listeria* spp.

- (i) Rabbit inoculation: Two drops of bacterial suspension of *Listeria* isolates in distilled water were instilled into both the eyes of one rabbit while only two drops of distilled water was instilled into the eyes of another rabbit. None of the rabbits developed conjunctivitis.
- (ii) Mice inoculation: A group of five swissmice were inoculated intraperitoneally with 1 ml suspension of *Listeria* isolate while the other group of five mice received 1ml of distilled water by the same route. There was no death upto 15 days.
- (iii) Embryonated egg inoculation: A group of five 11 days old embryonated eggs were inoculated intra allantoically with 1 ml suspension of *Listeria* while other five 11 days old embryonsted eggs were inoculated intra-allantoically 1 ml distilled water. There were no death upto seven days.

Virological investigation

- (i) Preparation of inoculum 10% suspensions of brain and lung tissues in normal saline were made using in sterilized mortar and pestle. They were centrifuged at 3000 rpm for 5 minutes, and filtered through 22 millipore filter. Filtrates were kept at - 20° for further investigations.

- (ii) Rabbit inoculation: Three healthy rabbits weighing 1.5 kg were selected, and their temperature recorded. Each of them were inoculated subcutaneously with either 1.5 ml of brain filtrate or 1.5 ml of lung filtrate or 1.5 ml of normal saline solution. Changes in temperature and behaviour post inoculation were noted.

In both the rabbits inoculated with either brain or lung filtrate, temperature or behaviourable changes were noted after 30 hours of inoculation; Initial rise of temperature (105° F), gnawing at the site of inoculation, rubbing of head and body against the cage, paralysis of limbs after 36 hrs and death after 48 hours of inoculation was recorded.

- (iii) Embryonated egg inoculation: Three groups of five 11 days old embryonated eggs were inoculated intra-allantoically with 1 ml of either brain or lung filtrate.

No changes was recorded in embryos inoculated with normal saline while small (1 to 2 mm diameter) white oval and slightly raised pock lesions were found on the ectoderm of chorioallantoic membrane. Central necrosis and mesodermal reactions were also present in old lesions. Mesodermal reactions were also present in old lesions.

- (iv) Mice inoculation: A group of five weaned Swiss mice were inoculated Intra-cerebrally with 0.5 ml of brain filtrate and observed for a month. There was no death of mice for up to a month.

Diagnosis

Absence of signs in mice inoculated intra-cerebrally with brain filtrate ruled out the possibility of rabies, whereas results of the tests conducted with isolated *listeria* spp. (non-haemolytic colonies on blood agar, absence of conjunctivitis in rabbits, no death of *listeria* inoculated mice and embryonated eggs) suggested it to be non-pathogenic. Pathological changes observed in rabbits and embryonated eggs inoculated with brain and lungs filtrate was suggestive of pseudo-rabies.

DISCUSSION

Sero-virus neutralization and fluorescent antibody tests for pseudo-rabies could not be performed due to lack of hyper-immune serum and suitable reagents for confirmatory tests (Hill *et al* 1977; Mohanty *et al* 1981 and Gustafson 1981). However, rabbits and embryonated eggs inoculation tests together with epidemiology, clinical and post mortem findings suggested the disease to be pseudo-rabies.

Pseudo-rabies is caused by an alpha-Herpes virus and is primarily a disease of swine which serves as a reservoir and principal source of natural infection for secondary hosts (cattle, sheep, goat, dogs, cat, ferals and man). Mixed farming system in Nepal could have played a significant role in these outbreaks where carrier pig might have been a source of natural infection to secondary hosts. (Frank-Fenner *et al* 1987).

Virus usually enters pig herds by the introduction of an asymptomatic carrier animal (Baskerville *et al* 1973). Where infection with this virus can occur by ingestion of contaminated food and water, or through aerosol via inhalation, or via lacerated wound. The optimal environmental conditions required for viral survival in the air borne state and the minimal dose which might initiate infection by the respiratory route have considerable influence in the potential for air borne transmission over distance. In this case, disease might have occurred due to air borne spread of the disease within closed herd, but was unable to spread over distance by some reasons which could not be identified. (Gloster *et al* 1984, Donaldson *et al*, 1985).

Cases of bovine Pseudo-rabies occur frequently without classical "Mad Itch" syndrome (Crandell, 1981) as we found in Jiri incidence, but clinical findings in buffaloes of Deepayal resembled to the signs of pruritis. Recent isolation of virus from lungs of naturally infected cattle and pigs without signs of pruritis is suggestive of an aerosol infection by the respiratory route.

Generally the disease is fatal in bovine but in Deepayal incidence there were three survivors which is similar to those described by Hagemoser *et al* (1978) recovery of a four year old beef cow in U.S.A., and Toma & Gilet (1978) - recovery of two cows in Brittany in France. Recovery in some buffaloes could have been due to cell mediated or humoral immunity, mild infection and production of immunity.

Post-mortem findings in bovine and swine is in accordance with the findings reported by Mohanty and Datta (1981), Tayler (1981) and Frank Fenner *et al* (1987). Laboratory findings especially rabbit and embryonated egg inoculations were suggestive of "Peseudo-rabies" as described by Hill *et al*, 1977; Mohanty and Datta 1981 and Gustafson, 1981.

Isolation of *Listeria* spp. from the sample and their laboratory test results namely production of nonhemolytic reaction when cultured on 5% sheep blood agar, absence of conjunctivitis in rabbits on conjunctival instillation, no death of mice and embryonated eggs inoculated were suggestive of non-pathogenic *Listeria* as described by Buchanan and Gibbons (1974) and Blenden (1981).

Epidemiological evidences suggested the sporadic occurrence of the disease at both the places. The mortality rate was found as described by Frank - Fenner *et al* (1987) whereas case fatality rate was slightly higher (Table 1). This higher case fatality rate might have been due to new-outbreak of the disease in nonimmune herds. (Frank - Fenner *et al*, 1987).

Serology was not done as it is not recommended in determining the cause of acute pseudo-rabies infection because the neutralizing antibody is not demonstrable early in the course of the disease. (Crandell, 1981). The optimal levels of antibody occurs between 2 to 4 weeks and persits for long period of time. Cell mediated immune response has been demonstrated by Crandell (1981) which appears before the humoral immunity but its role in immunity is not known.

PREVENTIVE MEASURES:

1. Circulate specific disease regulations to restrict the movement of infected swine.
2. Regulate export and import through SVN testing.
3. Isolate pig from secondary host to minimize infection.
4. Restrict the dogs and cats from exporter to swine or infected carcasses.
5. The practice of uncooked offal feeding to fur bearing or other carnivores must be stopped.
6. Vaccinate the animal timely with appropriate vaccine.
7. In bovine support therapy with electrolytes, calcium and magnesium gluconate, mixture of vitamines, amino-acid, Oxytetracycline and dexamethazone.

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CONCEPTION RATE OF ARTIFICIALLY INSEMINATED CATTLE IN BIRATNAGAR

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ABSTRACT

To study the conception rate in cows of different breeds, artificial insemination was carried out and only those animals in which pregnancy diagnosis was made were considered for this study. 132 cows and heifers were confirmed pregnant after first insemination of 217 animals resulting in 60.80 percent conception rate. Likewise, 16.59% animals required second insemination while remaining animals needed more than two inseminations. Number of inseminations per conception was 1.72, and male and female calf ratio was 1:1.44.

INTRODUCTION

Artificial insemination (AI) is the most important and appropriate technique in the field of animal reproduction in a country like Nepal. Only a few well selected proven males are enough for collecting semen to inseminate thousands of female animals per year. Rapid genetic improvement through wide spread use of outstanding sires, dissemination of valuable genetic material even to small farms, easy export of semen, control of venereal diseases and availability of accurate breeding records necessary for good herd management are some of the potential advantages associated with AI.

This method of breeding is commonly practised in most of the countries, whereas it has not been so widely used in Nepal. Scarce resources and lack of skillful technicians are some of the factors greatly limiting the use of AI in livestock upgrading programmes. However, indiscriminate breeding of cows with unproductive local bulls resulting in declining performance of low grade progenies, high cost and unavailability of high yielding animals with desirable genetic make up and at the same time progressively increasing demand of livestock products have warranted the use of AI programme in the country.

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In Biratnagar, the population of exotic breeds and their crossbreeds is progressively increasing. The insemination of cows with good quality frozen semen resulting in considerably high conception rate has encouraged the farmers to raise dairy cows in the Municipality area.

MATERIALS AND METHODS

Among the several cows of different breeds inseminated by the author in Biratnagar Municipality areas and surrounding area in Morang District from January 1991 to March 1992, only those cows or heifers which were pregnancy diagnosed and well recorded for their pregnancy or nonpregnancy were selected for this study.

The cattle in this town are mostly raised under stall feeding system and are fed with rice/wheat straw and some amount of concentrates, major component of which is wheat bran. Green fodder or grass is short in supply and is less commonly used for feeding cattle.

The animals were inseminated in most cases 10 hr after the beginning of estrus symptoms as observed by the farmers. Insemination was carried out only when oestrus was confirmed through rectal palpation.

Frozen semen received from Animal Breeding and Artificial Insemination Service, Khumaltar Lalitpur was used for inseminating the animals. Pregnancy diagnosis was conducted on 50th day of insemination.

RESULTS AND DISCUSSION

Conception rate

Out of 217 cows of different breeds, 132 cows or heifers were confirmed pregnant after first insemination resulting in 60.83. percent first service conception rate (Table1). Thirty Six animals (16.59 percent) conceived after second insemination, while a few cows required three or more insemination to be pregnant. However, some of these animals failed to conceive until intrauterine medication with GNRH, LH or parental administration of gnrh, lh or prostaglandins were done. Some of these problematic cows failed to conceive even after these antibiotics or hormonal therapy.

Table - 1 Conception Rate of artificially inseminated cows in Biratnagar

	Number of Animals	Percentage (%)
Number of animals inseminated	217	100.00
Number of Pregnent animals at:		
1st insemination	132	60.83
2nd insemination	3	16.59
3rd insemination	5	2.30
More than three insemination	2	0.92
Total	175	80.65

The first service conception rate in this trial is similar to the findings of Kazmar et al. (1981) who have reported 65% pregnancy rate after first service post-pubertal dairy heifers. King et al. (1989), Mikeska and Williams (1988) and Woody and Abenes (1975) have also reported 62.5, 59.3 and 60.8 percent conception rate respectively in cows treated with Synchro Mate B. Overall pregnancy of 175 cows out of 217 animals (80.65 percent) and more than 60% first service conception rate are encouraging results under field conditions, as 60-70 percent first service conception rate is a realistic goal recommended for well managed herds (Schultz, 1984).

Number of services per conception.

175 animals were found pregnant after a total of 301 inseminations required for 217 cows or heifers. Thus, 1.72 inseminations were required for one cow to be pregnant. This is again within the range of recommended goal for well managed herds, as 1.6-1.75 service per conception has been considered one of the measurements of breeding success for many years (Schultz, 1984).

Table 2. Number of Insemination per Conception

Number of Inseminated	Number of Insemination	Number of Pregnant Animals	Number of Insemination Per Conception
217	301	175	1.72

Male female calf ratio.

Based on the available records of 91 cows or heifer in which parturition were taken place in normal period of gestation the number of male and female calves born were 37 and 56 respectively (Table 3).

Table 3. Male Female Calf Ratio

Number of Parturitions recorded	91
Number of twin births	2
Number of male calves born	37
Number of female calves born	56
Incidences of abortions	7

This opportunity of greater number of female calves born was also rewarding for the farmers. Twinning was observed in two cows, out of which one cow delivered two females while the other delivered one male and one female calf.

The incidence of abortion in 2-7 months of gestation were observed in seven cows. Among these, four incidences occurred in one small farm.

In this study non return rate was considerably higher than the true conception rate. some cows returned to heat even between 25 and 50 days after insemination. This indicates either missing of oestrus or early embryonic death.

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A REVIEW OF LITERATURE ON THERMOSTABILITY OF INFECTIVITY AND HAEMAGGLUTININ OF NEWCASTLE DISEASE VIRUS

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ABSTRACT

The thermostability of haemagglutinin and infectivity could be used for characterizing the different strains of NDV to segregate a mutant population or heterogeneous population of virus but great variations were found. Usually the thermostability of haemagglutinin was found to be more heat stable than infectivity. However, lentogenic strains have almost equal or more thermoresistance of infectivity. Virus remained infective for long period under freeze-dried conditions with negligible decrease in titre. Virulence is not related to the heat sensitivity of the virus.

NEWCASTLE DISEASE VIRUS

The Newcastle disease virus (NDV) has been studied extensively not only because of the importance of the disease it causes but also due to its usefulness as a laboratory model for the paramyxovirus group. All paramyxoviruses are structurally very similar. The NDV belongs to the paramyxovirus 1 (PMV-1) group (Alexander, 1987), which has only one serotype. Although the strain variation of NDV cannot be distinguished by polyclonal antibodies they can be distinguished from other paramyxoviruses by serological tests.

Electron microscopy of NDV revealed pleomorphic particles (Schafer, Schramm & Traub, 1949) with diameters ranging from 100 to 600 nm (Andrewes & Pereira, 1972). NDV is a RNA virus characterised by a coiled nucleo-capsid surrounded by a lipoprotein envelope which possesses short spikes. (Cruickshank, 1964; Kingsbury & Darlington, 1968). The activities of haemagglutination, neuraminidase, haemolysis and cell fusion are all associated with this lipoprotein envelope. It is suggested that the NDV infects cells by attachment to specific receptors, fusion of the virus envelope with the cell membrane and

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extrusion of the nucleocapsid into the cell. Release of virus is basically the reverse of infection; nucleocapsid become aligned beneath a modified cell membrane and particles are budded from the cell membrane.

Burnet (1942) discovered the haemagglutinating ability of Newcastle disease virus opening a new chapter in its study. He and others found that the serum of the infected birds were capable of inhibiting the haemagglutinating activity of NDV (Burnet, 1942; Lush, 1943). Since then, the haemagglutination inhibition test has been used to identify NDV. Strain variation in NDV can be differentiated by mean death time in eggs, intracerebral pathogenicity in chicks and intravenous pathogenicity index. Some workers have suggested cloacal mean death time as a means of differentiating the more virulent strains (Alexander and Allan, 1974).

THERMOSTABILITY OF INFECTIVITY

Farinas (1930) appears to have been the first to report about the thermostability of infectivity of the Newcastle disease virus. He placed definite amounts of virus containing material in sealed vials and exposed them to controlled temperatures for 30 minutes. The results of this variable temperature-constant time heat stress study led him to the conclusion that "Avian pest virus dies between 50°C and 55°C with an exposure of 30 minutes duration". This is in agreement with another experiment of similar nature in which virus lost infectivity when heated to 60°C for 30 minutes or 55°C for 45 minutes. (Brandly, Moses, Jungherr & Jones, 1946).

Beach (1942) studied the thermostability characteristics of Newcastle disease virus in chicken lungs in the refrigerator and found that the virus remained viable for 195 days.

In earlier experiment carried on to study the viability of Newcastle disease virus, it was demonstrated (Asplin, 1949) that the virus survived on the skin of experimentally infected eviscerated chicken carcasses stored at 2°C for 96 days and in the bone marrow for 134 days.

In unplucked carcasses stored at the same temperature, virus persisted on the skin for 160 days and in the bone marrow for 196 days. At -20°C of storage, the virus was demonstrated for longer than 300 days. The survival of Newcastle disease virus was studied during the hot season in ambient temperatures of 40-43°C and relative humidities of 20-30 per cent. The virus remained infective for 10 day old chick embryos for more

than 4 weeks in carcasses, five weeks in river, tap water, and over eight weeks in faeces, soil and commercial poultry feed (Saber, Alfalluji, Siam & Alobeidi, 1978). Study conducted by many workers (Rhodes, 1958; Hofstad & Yodar, 1963) have shown that Newcastle disease virus strains vary in their stabilities during extended storage and that viral environments influence these stabilities.

NDV vaccine strain CDF-66 in liquid form was found to be quite stable at different temperatures (Tanwani, Sinha & Malik, 1981). The embryo-infectivity was positive at 4°C, 25°C, 37°C and 45°C for 12 months, 5 weeks, 20 days and 123 hours respectively. A similar study conducted on NDV Mukteswar and 'F' strain revealed that the viral titre decreased by about 50 percent after 70 days at 37°C, by about 25 percent after 91 days at 20-22°C, while only negligible reduction occurred in the freeze dried state after 851 days (Mukteswar strain) and 662 days (F strain) at 22°C (Siddiqui, Mishra & Sinha, 1979). Another study on the LaSota strain revealed that the infectivity of the virus remained within acceptable limits for three months of storage at 4.4°C (Serranilla & Peneyra, 1978).

Working with four strains of NDV of varying virulence, Foster and Thompson (1957), demonstrated that the ability to survive was not related to the virulence of the virus. In their experiment virus were exposed to room temperature, incubation temperature, and temperature of 5°C intervals from 45°C through 70°C for a specified intervals. It was noted that within relatively narrow limits, they had the same susceptibility to heat. This suggests that in nature the more virulent strains of NDV probably would not survive on contaminated materials any longer than those of lesser virulence. This is in agreement with another study (Lomniczi, 1975) where strains of higher or lower heat sensitivity occurred in both lentogenic and velogenic groups.

Lomniczi found that thermostable (I+) and thermolabile (I-) strains with respect to infectivity were uniformly encountered among the 12 avirulent (lentogenic) and fully virulent (velogenic) strains studied. Strain with heat stable (Ha+) and heat labile (Ha-) haemagglutinin were found in the lentogenic groups, whereas haemagglutinins of all examined velogenic strains were heat stable. In most strains studied the infectivity at 56°C were more labile than the haemagglutinin. This is in accordance with the findings of others (DiGioia, Liccardello, Nickerson & Goldblith, 1970 a; Pierce & Haywood, 1973). Lentogenic strain however showed either an almost equal thermoresistance of infectivity and haemagglutinin or a greater resistance of infectivity at 56°C and a consequently lower resistance of haemagglutinin at 50°C.

Some workers presented evidence (Hanson, Upton, Brandly & Winslow, 1949) that the site of inactivation of infectivity for embryos was caused by destruction of the RNA, denaturation of the nuclear protein, or denaturation of protein in the outer cells.

In another study NDV was irradiated at temperatures ranging from 2 to 60°C (DiGioia, Licardello, Nickerson & Goldblith, 1970 b). An interaction between the thermal and ionizing energy was observed in the temperature region of 40 to 60°C. At 2°C, the haemagglutinin was considerably more radio-resistant than the infectivity property. It was believed that radiation inactivation of NDV infectivity at low temperatures was due to nucleic acid degradation and at higher temperatures was due to protein denaturation.

Thermostability of infectivity is widely used as a means of characterising the different strains of NDV. Heat-stable subpopulations of viruses were recorded from Australian V4 strain and N1-ulster strain which were not found in B1, NJ-LaSota, and ENG-F, lenthogenic strains commonly used in vaccines (Spalatin & Hanson, 1976).

Virus isolated from ducks, turkey and waterfowl were generally found to be thermostable (Durham, Poole, Gow & Watters, 1980; Vickers & Hanson, 1982).

THERMOSTABILITY OF HAEMAGGLUTININ

Determination of the heat stability of the haemagglutinin was selected as the first method of approach to the problem of characterising the antigenically homologous strains of NDV (Brandly et al, 1946). Studies on the stability of haemagglutinin (Hanson et al, 1949) showed that a great variation existed between isolates. One isolate was destroyed in a period as short as 5 minutes while that of another was diminished only after 6 hours of exposure. A comparison between the haemagglutinin activity and the infectivity of the same isolate showed that the infectivity had a narrower range of heat stability than the haemagglutinin. This is in agreement with work done by Pierce & Haywood (1973). In contrast, the haemagglutinins of the Finnish strain isolated by Estola (1974) were very labile at 56°C, losing their haemagglutinating activity in 5 minutes. However, no change in infectivity was observed after 180 minutes at 56°C and some infective NDV could still be found after 270 minutes.

In a study conducted to characterize heat resistant mutants of the Najarian strain of NDV, the virus was heated at $56 \pm 0.2^\circ\text{C}$ for varying lengths of time (Goldman, & Hanson, R.P.,

1955). They found that it was easier to isolate mutants which were heat resistant by repeated cycles of short treatment and embryo passage.

Comparative studies have shown that under the stress of heat, infectivity is usually destroyed first followed by haemagglutinin and finally neuraminidase activity (Darrell & Howe, 1964; Francis, 1947; Picken, 1964). This order of increasing stability was attributed to the structural integrity required of the entity possessing the activity, i.e. infectivity is a characteristic of an intact virion, whereas, a polyvalent sub-virion haemadsorbing unit still elicits haemagglutination, and Neuraminidase activity (NA) is demonstrable in an even less organised structure (Darrell & Howe, 1964; Drzeniek, Frank & Rott, 1969).

Pierce & Haywood (1973) found that the inactivation of the haemagglutination resulted in the concomitant loss of NA. That is, the thermal inactivation of HA is correlated with loss of NA. The identical kinetics with which both activities of a given isolate inactivate suggests that a common factor(s) influences their stability as they exist in the envelope integrated state. Other workers also found that haemagglutination and neuraminidase activity were associated with a surface protein designated PVI (Scheid & Choppin, 1973). The absence of these activities in the second virus protein, designated VP2 suggested that HA and NA were associated with a common glycoprotein. The presence of specific and different antibodies were found against the two major components of the envelope of NDV (Seto, Bech & Hoh, 1974). Antiserum directed against the larger glycoprotein molecule, VPI, inhibited HA and NA, had a high neutralizing activity and interfered with cell fusion and haemolysis. Antiserum against smaller glycoprotein molecule VP2 inhibited cell fusion and haemolysis but failed to inhibit the HA and NA.

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PHENOTYPIC RELATIONSHIP AMONG LITTER TRAITS IN THE SWINE HERD AT LAMPATAN LIVESTOCK FARM, POKHARA, NEPAL

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ABSTRACT

The records of 161 swine litters comprising of 1499 piglets farrowed by 62 sows of Landrace, Yorkshire and their crosses at Lamptan Livestock Farm, Pokhara between 1983 and 1988 were analyzed. Means and standard errors of five litter traits relating to litter size at birth, six traits relating to litter size at weaning and five traits relating to preweaning weights were estimated. These values particularly for the total number of pigs born, number of live pigs born, total number of pigs weaned, weaning percentage of the total pigs born, litter birth weight, litter weaning weight and preweaning average daily gain were 9.311 ± 0.192 , 8.994 ± 0.186 , 7.087 ± 0.188 , 77.211 ± 1.539 percent, 10.453 ± 0.240 kg, 59.480 ± 1.934 kg and 0.127 ± 0.003 kg, respectively.

Phenotypic correlations among most of the traits were in general agreement with the results reported in the literature. Five principal components accounting for 91.92 percent of the total variation were extracted from the correlation matrix. The factor analysis of these components revealed five common factors representing characteristic measures of the overall litter performance, the efficiency of weaning, the efficiency of preweaning growth, the litter partitioning according to piglet sex and the losses at farrowing.

INTRODUCTION

Several economic traits expressed by a pig during its life time have direct bearing on its productivity influencing the profitability of the swine enterprise. The litter traits observed in swine between their birth and weaning, apparently indicating their maternal reproductive performance, are of paramount importance to breeders whose major interest lies on securing maximum number of pigs weaned per sow per year.

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In the context of Nepal, the swine production is usually limited to smallholder farms, mostly as subsidiary activity of the subsistence farmers. Although the indigenous pigs are traditionally raised by only certain ethnic communities (Shrestha and Gurung, 1989), the exotic pigs are becoming increasingly popular among farming households.

The major source of improved breeding animals in Nepal is the government owned farms that are mandated to produce improved piglets for distribution to the farmers in various districts. The dispersal of improved piglets at weaning being the only major pig breeding activity, the traits related to litter performance are apparently considered the most important swine traits so far.

Very scanty information on the litter traits was available in Nepal until Rasali (1991) made a systematic analysis of 147 litter records to estimate phenotypic and genetic parameters for six litter traits. This study was undertaken to explore further the litter performance in the largest swine herd in the country for establishing the phenotypic relationships among the litter traits.

MATERIALS AND METHODS

The data used in this study were obtained from the swine herd of Lampatan Livestock Farm, Pokhara. The records of a total of 161 swine litters comprising 1499 piglets farrowed by 62 sows between May 1983 and June 1988 were analyzed. Only the litters that had complete information of preweaning period were included in the analysis.

The herd consisted of three genotypes, namely Landrace, Yorkshire and their crosses. All the animals in the herd were kept under similar management conditions at any given time irrespective of the genotype. Inbreeding was minimized in the herd by preventing the matings between direct relatives.

Measurements of a total of 16 litter traits, namely number of male pigs born (MBO), number of female pigs born (FBO), number of stillbirths (SBO), total number of pigs born (TBO), number of live pigs born (LBO), number of male pigs weaned (MWN), number of female pigs weaned (FWN), total number of pigs weaned (TWN), number of pre-weaning deaths (PO), weaning percentage of total pigs born (WPT), weaning percentage of live pigs born (WPL), average pig birth weight (ABW), litter birth weight (LBW), average pig weaning weight (AWW), litter weaning weight (WW) and preweaning average daily gain (PDG) were considered. As the weaning age of the piglets in the herd during the study period varied from 30 and 60 days, the measurements of the traits related to weaning weights were adjusted to 56-day basis of weaning.

Phenotypic correlations (r) among the 16 litter traits were computed. To further explore the relationship among these traits as varieties by way of reducing their number, set of principal components was derived from the matrix of their phenotypic correlations. In this analysis, enough principal components, i.e., the linear combinations of statistical variables having special properties in terms of variance, were extracted to account for the maximum of the variation in the original varieties, as described by Young et al. (1978). The factor analysis of the extracted principal components was conducted by first selecting the largest coefficient among the principal components as the significant loading for each trait and then grouping the traits with the largest coefficient loadings within each principal component to represent a common characteristic factor.

All analyses of the data were conducted in Statistical Analysis System (SAS Institute, 1985) using an IBM compatible microcomputer.

RESULTS AND DISCUSSION

The means and standard errors (SE) of 16 litter traits are presented in Table- 1.

Table - 1. Means and standard errors (SEs) of litter traits in the swine herd at Lampatan livestock Farm, Pokhara.

Litter Trait (n=161)	Mean	$\pm$	SE
1. Number of male pigs born (MBO)	4.646	$\pm$	0.141
2. Number female pigs born (FBO)	4.348	$\pm$	0.142
3. Number of stillbirths (SBO)	0.317	$\pm$	0.052
4. Total number of pigs born (TBO)	9.311	$\pm$	0.092
5. Number of live pigs born (LBO)	8.994	$\pm$	0.192
6. Number of male pigs weaned (MWN)	3.596	$\pm$	0.137
7. Number of female pigs weaned (FWN)	3.491	$\pm$	0.133
8. Total number of pigs weaned (TWN)	7.087	$\pm$	0.183
9. Number of pre-weaning deaths (PMO)	1.907	$\pm$	0.160
10. Weaning percentage of total pigs born (WPT, %)	77.211	$\pm$	0.160
11. Weaning percentage of live pigs born (WPL, %)	79.868	$\pm$	1.531
12. Average pig birth weight (ABN, kg)	1.181	$\pm$	0.015
13. Litter birth weight (LBW, Kg)	10.453	$\pm$	0.240
14. Average pig weaning weight (AWW, kg)	8.297	$\pm$	0.174
15. Litter weaning weight (LWW, kg)	59.480	$\pm$	1.934
16. Prewaning average daily gain (PDG, kg)	0.127	$\pm$	0.003

n = number of swine litters studied.

Litter size at birth :

The litter size at birth was divided into five important classes of litter traits, namely MBO, FBO, SBO, TBO and LBO, with their mean values being 4.646, 4.348, 0.317, 9.311 and 8.994, respectively. The means of MBO and FBO were approximately in equal ratio. The mean values of TBO, LBO and SBO were comparable with the respective average values (9.20 ± 0.12 , 8.81 ± 0.13 and 0.40 ± 0.6) reported for a chosen swine herd in the Philippines (Arganosa et al., 1990). The mean value of TBO was also consistent with the least square mean of litter size at birth (9.435 ± 0.272) reported by Rasali (1991) in 147 litters. But it was larger than the average value of 8.91 reported in India in 127 litters (Gupta et al., 1983) and the average figures of 7.91 and 8.83 in Yorkshire and Yorkshire X Landrace crosses, respectively reported in Nepal (Shrestha and Gurung, 1989).

Litter size at weaning :

The important traits related to the litter size at weaning were MWN, FWN, TWN, WPT and WPL, with their mean values of 3.596, 3.494, 7.087, 77.211 percent and 79.868 percent, respectively. The numbers of male and female pigs weaned were approximately in equal ratio. The mean total number of pigs weaned was comparable with the least square mean of the litter size at weaning (6.907 ± 0.328) in 140 litters (Rasali, 1991). But this value is slightly lower than the value (7.56 ± 0.23) reported for a chosen commercial herd in the Philippines (Arganosa et al., 1990) and the value (6.93) reported for 8 smallholder farms in Pokhara (Anon, 1988). The means of WPT (82.06 ± 2.27) and 85.81 ± 2.34 , respectively) reported in the Philippines (Arganosa et al., 1990). But the least square means of WPT ($75.296 \pm 838\%$) reported earlier by Rasali square means of litters was slightly lower than the present result. The number of preweaning deaths (PMO) with its mean value of 1.907 is an indicator of pre-weaning losses.

Preweaning weights :

The mean values of ABN and LBW were 1.181 kg and 10.453 kg, respectively. The latter value was comparable with the least square mean of 10.604 ± 328 kg for the trait reported earlier by Rasali (1991). Both the mean values of ABN and LBW in the present study were slightly lower than the mean values of 1.20 ± 0.01 kg and 11.54 ± 0.15 kg, respectively reported in the Philippines (Arganosa et al., 1974/75).

The mean values of AWW and LWW adjusted to 56-day basis of weaning were 8.297 kg and 59.480 kg, respectively. As expected, these figures are higher than the values

(6.626 kg and 47.026 kg, respectively) adjusted to 42-day basis of weaning for 85 litters (Rasali, 1991).

The mean PDG in the present study was 0.127 kg which was slightly lower than the one reported in the Philippines (Arganosa et al., 1974/75).

Phenotypic correlations :

Phenotypic correlations among the 16 litter traits are presented in Table - 2. The larger the number of either male or female pigs born, the significantly higher were the total number of pigs born, the number of pigs born alive, the total number of pigs weaned, the number of preweaning deaths, litter birth weights and litter weaning weights ($P < 0.01$). Highly significant positive correlations of MBO and FBO also existed with MWN and FWN, respectively ($P < 0.01$). On the other hand, significant negative correlation was found between MBO and FWN. Similarly, FBO was negatively correlated with MWN and ABW ($P < 0.05$).

Table - 2. Phenotypic correlations among the litter traits in the swine herd at Lampatan Livestock Farm, Pokhara.

(Correlation Coefficient, $r \times 100$)

Litter traits	MBO	FBO	SBO	TBO	LBO	MWN	FWN	TWN	PMO	WPT	WPL	ABW	LBW	AWW	LWW	PDG
MBO	100	-4	01	64	65	72	-16	41	28	-10	-14	-09	48	-13	26	-12
FBO		100	-05	63	66	-17	77	43	27	-09	-13	-16	49	-12	29	-11
SBO			100	24	-04	-01	-07	-05	01	-28	01	01	-09	11	01	11
TBO				100	96	40	44	60	41	-22	-20	-18	69	-15	41	-14
LBO					100	42	47	63	42	-15	-21	-19	74	-19	41	-18
MWN						100	-03	71	-35	46	45	-01	35	-01	57	-01
FWN							100	69	-26	40	38	-10	44	-02	49	-01
TWN								100	-43	62	60	-08	56	-01	76	-01
PMO									100	-89	-95	-13	19	-21	-41	-20
WPT										100	95	14	02	17	54	20
WPL											100	15	-04	20	54	20
ABW												100	17	50	25	44
LBW													100	-01	47	-02
AWW														100	57	99
LWW															100	57
PDG																100

Values > 16 are significant at ($P < 0.05$); and Value > 20 are significant at ($P < 0.01$).

The number of stillbirths was not significantly correlated with any trait at ($P < 0.01$), except TBO (with positive r) and WPT (with negative r).

Obviously, the higher the number of pigs born, the higher was number of pigs born alive ($r = 0.96$). Both of these traits were, in turn, positively correlated with MWN, FWN, PMO, LBW and LWW ($P < 0.01$).

The TBO was negatively correlated with WPT and ABW (r , 0.22, -0.20 and -0.18, respectively). Likewise, a significant negative correlation of LBO existed with WPL at ($P < 0.01$), and ABW, AWW and PDG at ($P < 0.05$). Both of MWN and FWN were positively correlated with TWN, WPT, WPL, LBW and LWW, and were positively correlated with TWN, WPT, LBW and LWW, and negatively correlated with PMO ($P < 0.01$). The higher the total number of pigs weaned, the higher were the WPT, WPL, LBW and LWW. On the other hand, it was negatively correlated with PMO ($P < 0.01$).

The number of preweaning deaths (PMO) was positively correlated with LBW ($r = 0.19$), but was negatively correlated with WPT, WPL, AWW and LWW at ($P < 0.01$) and with PDG at ($P < 0.05$). The correlation between WPT and WPL was 0.95, while both of these traits were also positively correlated with LWW ($P < 0.01$), AWW and PDG ($P < 0.05$). ABW was positively correlated with AWW, LWW and PDG ($P < 0.01$) and LBW ($P < 0.05$). Highly positive correlations were also evident between LBW and LWW; AWW and LWW; AWW and PDG; and LWW and PDG ($P < 0.01$).

The phenotypic correlations among most of the traits were in general agreement with the results reported in the literature (Arganosa et al., 1974/75; Young et al., 1978).

Principal components :

Five principal components were extracted from the 16 litter traits based on the criterion of minimum eigen value. The factor pattern of five principal components extracted is presented in Table-3. The first principal component (PC1) accounted for 31.96 percent of the total variation, while the subsequent principal components PC2, PC3, PC4 and PC5 accounted for 26.31, 12.98 and 6.97 percents, respectively. All these principal components accounted for 91.92 percent of the total variation and sufficiently represented the 16 litter traits in terms of their variance. In the report by Young et al. (total variation and sufficiently represented the 16 litter traits in terms of their variance. In the report by Young et al. (1978), seven principal components derived from the prebreeding traits accounted for only 79.8 percent of the total variation.

Table 3. The factor pattern of the principal components extracted from the 16 litter traits in the swine herd at Lampatan Livestock from, Pokhara, Nepal.

Trait variates	Principal components				
	PC1	PC2	PC3	PC4	PC5
MBO	0.488	-0.398	0.102	(-0.735)	-0.074
FBO	0.513	-0.427	0.013	(0.712)	0.007
SBO	-0.035	-0.055	0.252	-0.074	(0.920)
TBO	(0.731)	-0.625	0.153	-0.032	0.203
LBO	(0.762)	-0.627	0.087	-0.013	-0.051
MWN	0.668	0.152	-0.118	-0.684	0.026
FWN	0.672	0.029	-0.178	0.680	0.052
TWN	(0.962)	0.131	-0.211	0.017	0.056
PMO	-0.241	(-0.885)	0.349	0.005	-0.125
WPT	0.473	(0.774)	-0.369	0.004	-0.139
WPL	0.439	(0.814)	-0.320	0.007	0.129
ABW	0.004	-0.376	(0.550)	0.011	-0.303
LBW	(0.716)	0.349	0.209	0.025	-0.261
AWW	0.089	0.538	(0.805)	0.073	0.001
LWW	(0.817)	0.384	0.343	0.015	0.017
PDG	0.092	0.528	(0.789)	0.077	0.027

Note: The coefficients in the parentheses are the significant factor loadings of the trait variates.

The analysis revealed that the first factor PC1 included the significant coefficient loadings of TBO, LBO, TWN, LBW and LWW. Clearly, these traits were the most important litter traits and were commonly a measure of the coverall litter performance. The PC2 that included the significant factor loadings of PMO, WPT and WPL commonly represented the efficiency of weaning. The PC3 that included the significant loadings of ABW, AWW and PDG commonly represented the efficiency of preweaning growth performance. The PC4 that included the significant factor loading of MBO, FBO, MWN and FWN revealed the litter partitioning according to the piglet sex. Lastly, the PC5 that included the significant factor loading of only SBO measured the losses at farrowing.

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INFLUENCE OF AIR TEMPERATURE AND PRECIPITATION ON THE INCIDENCE OF CLINICAL AND ENVIRONMENTAL MASTITIS IN THREE DAIRIES

K.P. Acharya ¹

ABSTRACT

Influence of air temperature and precipitation on the incidence of clinical mastitis or environmental mastitis in three dairies was studied for a period of four years (1982-85). Out of 4074 clinical mastitis cases, 2325 (57 percent) were environmental, 320 (7.9 percent) cases were contagious, and 1429 (35.1 percent) cases were clean. Monthly clinical mastitis infection rates and monthly environmental mastitis infection rates of Dairy I was not significantly associated ($P>0.1$) with air temperature or precipitation. These rates of dairy II were significantly associated ($P<0.05$) with the weather parameters. Monthly clinical mastitis infection rates and monthly environmental mastitis infection rates of Dairy III were significantly associated with the weather parameters but the association was very poor.

INTRODUCTION

Mastitis is the inflammation of one or more mammary glands. Mastitis can be peracute, acute, subacute, subclinical or chronic depending upon the severity and duration of the symptoms. Subclinical mastitis is detectable by tests such as California mastitis test, Wisconsin mastitis test or the electronic cell count. Practice of teat-dipping and dry cow therapy has markedly reduced the mastitis caused by *streptococcus agalactiae* and *Staphylococcus aureus*, however mastitis caused by environmental pathogens is still a major problem (Eberhart and Uckalaw, 1977). A random survey of 27526 dairy cows in England has shown that 31% cows were having mastitis and 15% of all quarters had a major pathogen (Francis, 1985).

Since the population of coliform and other streptococci in the environment has been related to the corresponding susceptibility of the quarter and environmental factors such

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as rainfall (Schwabe, 1984) temperature (Francis *et al*, 1981) and humidity (Thomas *et al*, 1983) may predispose the animals to mastitis by coliform and other streptococi (Bramby and Neave, 1975; Bushnell, 1974).

The objective of this study was to study the influence of temperature and precipitation in the occurrence of clinical mastitis or environmental mastitis in three large dairy herds located at the Central Sacramento Valley of California.

MATERIALS AND METHODS

In this study 'clinicals' are the cows in the herd showing one or more of the symptoms of mastitis such as pain, swelling of the udder, induration of the udder and abnormal secretion from the udder. Environmental pathogens are the micro-organisms which are considered to be the normal inhabitants of the environment such as soil, feed, water, litter and the bedding material, and are capable of producing mastitis under certain conditions that are not completely understood. *Klebsiella sp.*, *Citrobacter sp.*, *Enterobacter sp.*, *Pseudomonas sp.*, *Corynebacterium sp.*, hemolytic and non-hemolytic *Escherichia coli*, *streptococcus sp.* other than *Streptococcus agalactiae*, *staphylococcus sp.*, other than *staphylococcus aureus* are considered to be environmental pathogens. 'Contagious' are the clinicals for which the cause of mastitis was attributed to either *streptococcus agalactiae* or to *Staphylococcus aureus*. 'Clean' are the clinicals from which no isolation of microorganisms was possible.

Temperature refers to the average monthly air temperature, where as precipitation refers to the average monthly refers to the total monthly precipitation in centimeters. Dairy I and Dairy II had herd sizes of 600 and 420 respectively while Dairy III had 480 lows in 1982, 470 cows in 1983, 560 cows in 1984, and 650 cows in 1985.

Milk samples from the affected quarter were collected by the farmers themselves and refrigerated until received by the laboratory technicians who went to the dairies every week. Processing of the samples were promptly done as per recommendation of the National Mastitis Council, USA. Organisms were identified mainly on the basis of cultural characteristics supported by Gram's staining and bio-chemical properties whenever necessary.

The two response variables in this study were the monthly rate of clinicals (CR) and the monthly rate of environmental (ER). This rates were computed as follows:(13)

$$CR = \frac{\text{Number of clinicals in a given month}}{\text{Average number of milking cows in that year for the given herd}} \times 100$$

$$ER = \frac{\text{Number of environmental in a given month}}{\text{Average number of milking cows in that year for the given herd}} \times 100.$$

Total monthly precipitation and average monthly temperature recorded at the Lodi Station of the National Oceanic and Atmospheric Administration (1982) were the two independent variables of interest in this study.

For statistical analysis, simple regression and Kruskal-Wallis tests were employed and for significant Kruskal-Wallis Test, the Dunn's (5) test was used for comparisons of mean ranks.

For Kruskal-Wallis test the data on monthly rates of clinicals and environmental was categorized according to the following levels of temperature and precipitation:

Temperature (°C)	Category	Precipitation (Cm.)	Category
<10.05	1	<0.52	1
10.05-15.55	2	0.52-2.54	2
>15.55	3	>2.54	3

RESULTS

Dairy I had 905 clinicals (1982-85) of which 533 (58.9%) were environmental, 121 (13.4%) were contagious and 251 (27.7%) were clean.

Dairy II had 1437 clinicals of which 672 (46.8%) were environmental, 148 (10.3%) were contagious and 617 (42.9%) were clean.

Dairy III had 1732 clinicals of which 1120 (65%) were environmental, 51(2.94%) were contagious and 561 (32.4%) were clean.

Peak periods of clinicals or environmental in both Dairy II and Dairy III occurred during the wet months. Generally summer and dry months tend to discourage the outbreak of clinicals or environmental in both the "affected" dairies, however in Dairy I no such observation could be done. Level of clinical mastitis in Dairy I remained endemic throughout the years.

Table 1. Summary of the Kruskal-Wallis analysis for temperatures and precipitation effects on the monthly rates (1982-1985) of clinical and environmental mastitis for the three dairies.

			H-value	P-value
Temp	Clin		0.78	0.753
Prec	Env		2.89	0.339
Prec	Clin	2		0.679
Dairy III	Env	2	6.51	0.236
Temp		2	10.64	0.039
Temp	Clin	2	7.79	0.005
Prec	Env	2	7.6	0.020
Prec	Clin	2		0.022
	Env	2	6.01	
		2	3.45	0.049
		2	5.532	0.178
		2	4.478	0.063
				0.107

Table 2. Comparisons of Mean Ranks for statistically significant on Kruskal-Wallis Test in Table 1. Comparison made using Dunn's Test.

Dep Var	Ind Var	Category	Freq	Mean	Rank
Clinicals	Temp (C)	< 10.05		11	29.3a
		10.05 to 15.55		13	29.96a
		> 15.55		24	19.35 b
Environ	Prec (Cm)	< .52		16	20.1b
		0.52 to 2.54		8	16.68b
		> 2.54		24	30.02a
Dairy II	Temp (C)	< 10.05		11	32.6a
		10.05 to 15.55		24	18 b
		< .52		16	18.96b
Clinicals	Temp (C)	0.52 to 2.54		8	18.87b
			11	27.5a	
		10.05 to 15.55		13	30.85 a
		> 15.55		24	19.68b

Table 1. Summary of the Kruskal-Wallis analysis for temperatures and precipitation effects on the monthly rates (1982-1985) of clinical and environmental mastitis for the three dairies.

Ind Var	Dep Var	Degree of freedom	H-value	P-value
Dairy I				
Temp	Clin	2	0.55	0.753
Temp	Env	2	2.15	0.339
Prec	Clin	2	0.78	0.679
Prec	Env	2	2.89	0.236
Dairy II				
Temp	Clin	2	6.51	0.039
Temp	Env	2	10.64	0.005
Prec	Clin	2	7.79	0.020
Prec	Env	2	7.6	0.022
Dairy III				
Temp	Clin	2	6.01	0.049
Temp	Env	2	3.45	0.178
Prec	Clin	2	5.532	0.063
Prec	Env	2	4.478	0.107

Table 2 Comparisons of Mean Ranks for statistically significant on Kruskal-Wallis Test in Table I. Comparison made using Dunn's Test.

Dairy II						
Dep Var	Ind Var	Category	Freq	Mean	Rank	
Clinicals	Temp (C)	< 10.05	11	29.3 ^a		
		10.05 to 15.55	13	29.96 ^a		
		> 15.55	24	19.35 ^b		
	Prec (Cm)	<.52	16	20.1 ^b		
		0.52 to 2.54	8	16.68 ^b		
		> 2.54	24	30.02 ^a		
Environ	Temp (C)	< 10.05	11	32.6 ^a		
		10.05 to 15.55	24	18 ^b		
	Prec (Cm)	<.52	16	18.96 ^b		
		0.52 to 2.54	8	18.87 ^b		
Dairy II						
Clinicals Temp (C)	<10.05		11	27.5 ^a		
			10.05 to 15.55	13	30.85 ^a	
			>15.55	24	19.68 ^b	

Table 3. Summary of the results of Simple Regression Analysis of the monthly (1982-1985) rate of clinical and rate of environmental mastitis on Temperature or precipitation for the three dairies.

Dairy I

Ind Var	Dep Var	DF		Fitted Equation	R-squared	F-value
Temp	Clinical	1,46	Y =	3.38 - .0156 Temp	0	0.19209
Temp	Env	1,46	Y =	2.10 - .16 Temp	0	0.4513
Prec	Clin	1,46	Y =	3.18 - .0014 Prec	0	0.0589
Prec	Env	1,46	Y =	1.90 - 0.112 prec	0	0.2003

Dairy II

Temp	Clinical	1,46	Y =	12.26 - .33443Temp	10.1	6.2455
Temp	Env	1,46	Y =	6.11 - .1897 Temp	21.1	13.584
Prec	Clin	1,46	Y =	4.95 - .04295 Prec	17	10.634
Prec	Env	1,46	Y =	2.38 - .1873 prec	21.6	13.985

Dairy III

Temp	Clinical	1,46	Y =	9.98 - .2135 Temp	6.3	4.14
Temp	Env	1,46	Y =	6.34 - .1355Temp	7	4.526
Prec	Clin	1,46	Y =	5.45 + .2460 Prec	8.5	5.36
Prec	Env	1,46	Y =	3.63 - .1253 Prec	5.3	3.611

Dairy II and Dairy III showed prominent fluctuations over the years. For most of the months of 1982 and 1983 Dairy II had a higher monthly rates of clinicals or environmental but Dairy III had a higher monthly rates of clinicals or environmental for most of the months of year 1984 and 1985.

The results of the Kruskal-Wallis Test and regression analysis (Table 1-3) failed to disprove the hypothesis that the monthly rates of clinicals or environmentals in Dairy I is independent of the influence of rainfall or temperature. ($P > 0.1$ for Kruskal-Wallis Test and R^2 - value = 0 for simple regression). The results of Kruskal-Wallis Test and Simple regression analyses for Dairy II showed a significant association ($P < 0.05$ for Kruskal-Wallis Test and R^2 value between 10.1% to 21.6% respectively) between the weather parameters and the monthly rates of clinicals or environmentals. Though these

relationship was not strong enough. Similar results were obtained for Dairy III, however the relationship was still more weaker.

DISCUSSION

Dairy one used sand as bedding material for its cows which could be the reason for a low level of monthly rates of clinicals or environmentals. Dairy I also had its free- stalls covered for the duration of study period which would prevent the house to be muddy and this would have probably kept the coliform population at a lower level around the cows environment.

Dairy II kept its cows in rice-hull bedding and in unroofed houses until November 1983 when covered free-stalls were provided for the cows. During rainy seasons of 1982-1983, the corrals or freestalls were muddy and ponded with rain water. This could have led to a higher monthly rates of clinicals or environmental mastitis in 1982 and 1983. After the cows were moved into free stalls in November 1983, we found a decline in the monthly rates of clinicals or environmentals in this dairy. Dairy II practised backflush system of cleaning on the milk pipeline from the beginning of 1984 which could have added in controlling the coliform mastitis in that year. Dairy III used sawdust as bedding material for its cows and kept its cows under loose housing system on open (unroofed) corrals. From November 1983, Dairy III kept its cows in dried manure bedding. The farmer started making covered free stalls and moved all his cows there by the end of October 1983. Practice of using sawdust and keeping cows in open carrels during first two years following by the practice of keeping cows in dry manure bedding could have caused a higher monthly rates of environmentals in this dairy. Sawdust followed by dry manure bedding in this dairy could have kept the coliform population around the cows environment at a higher level which would be responsible for a greater number of environmentals in this dairy over the period of study.

CONCLUSION

Mastitis is such a complex disease that several factors may have to be considered in trying to understand its epidemiology. Micro climatic conditions of the barn, soil or bedding, temperature, a and humidity could be important parameters for consideration. Absence of significant relationship between the monthly rates of clinical mastitis or environmental mastitis and the weather parameters in one dairy has further emphasized the points mentioned above. However, this study suggested that there was a marginal correlation

between the percent of cows suffering from clinical mastitis or environmental mastitis and the level of environmental temperature and precipitation in case of two dairies.

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PREVALENCE OF FLUKES IN CATTLE AND BUFFALOES IN SURKHET DISTRICT

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ABSTRACT

The prevalence of *Fasciola* and *Paramphistome* infestations in cattle and buffaloes in a mid hill village of Surkhet District was studied. Out of 185 cattle and 37 buffaloes examined, 60.5 percent of cattle and 83.8 percent of buffaloes were found to be positive for flukes on faecal examination. In cattle, prevalence of fascioliasis and paramphistomiasis were 42.2 percent and 25.4 percent respectively, where as that for buffaloes, were 56.8 percent and 35.1 percent respectively.

INTRODUCTION

Parasitic infestations are responsible for major portion of economic losses in livestock industry of Nepal. Among various parasites, *Fasciola* is considered to be the most important parasite economically. Hassel et al. (1979) estimated a loss of Rs. 106 million for 1990 due to fascioliasis alone, in a total estimated loss of Rs. 358.4 million due to various diseases of livestock. In the recent years, few workers have started studies on the various aspects of parasitic diseases in Nepal. However, the prevalence of paramphistomiasis and economic loss due to its pathogenicity has not received much attention. So, this study was aimed to define the patterns of *Fasciola* and paramphistome infestations in the bovines in a mid hill village of Dashrathpur of Surkhet district.

MATERIALS AND METHODS

This study was undertaken at the Dashrathpur village of Surkhet district during 7-13 January 1992. This village is at an elevation of 580m. The average annual rainfall is 1500 mm with the temperature ranging from 4°C to 38°C (Annon 1991).

The total population of cattle and buffaloes in this village was 1673 and 368 respectively. In this study, faecal samples from a sample of 185 cattle and 37 buffaloes from 35 households were examined. Young calves of under one year were excluded from the

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study. The animals under observation were grouped into two groups as young (1 to 3 years of age) and adult (over 3 years of age).

Cattle and buffaloes in the study area are commonly housed during the night. Free grazing system is practiced during the day time, either in the communal grazing land or in the forest area. This area has warm subtropical climate. This village does not have any perennial ponds or lakes, but has a small irrigation canal. Other permanent sources of water are located on the two sides of village where small brook flows to meet the Bheri river. Crop residues and by products are commonly used as the major source of animal feed. Deworming and drenching is done only when the animal is found clinically sick.

RESULTS

In the present study, the prevalence of fascioliasis was found to be 42.1% and 56.8% whereas that of paramphistomiasis was found to be 25.4% and 35.1% in cattle and buffaloes respectively. In general, higher proportion of buffaloes were found to be infested with both *Fasciola* and Paramphistomes, but the difference in prevalence rate of *Fasciola* and Paramphistomes in cattle and buffaloes was found to be statistically not-significant ($p>0.05$). About 10% of the animals examined were found to harbour a mixed infection of both fascioliasis and paramphistomiasis, but the mixed infection was detected only in the adults.

The proportion of cattle and buffaloes positive for *Fasciola* and Paramphistomes eggs on faecal examination is presented in Table 1 and 2.

Table 1. Number of animals positive for different flukes by age.

	Cattle			Buffaloes		
	Young	Adult	Total	Young	Adult	Total
Fasciola only	19 (43.2%)	46 (32.6%)	65 (35.1%)	2 16 40.0%	18 (50%)	(48.7%)
Both Fasciola & Paramphistomes	0 (0%)	13 (9.2%)	13 (7%)	0 (0%)	3 (9.4%)	3 (8.1%)
Paramphistomes only	10 (22.7%)	24 (17.1%)	34 (18.4%)	2 (40%)	8 (25%)	10 (27%)
None	15 (34.1%)	58 (41.1%)	73 (39.5%)	1 (20%)	5 (15.6%)	6 (16.2%)
Total	44 (100%)	141 (100%)	185(100%)	5 (100%)	32 (100%)	37 (100%)

NB: Figure in parentheses indicate percentage contribution within each column.

Table 2. Number of animals positive for different flukes by sex.

	Cattle			Buffaloes
	Male	Female	Total	Female
Fasciola only	32 (31.4%)	33 (39.8%)	65 (35.1%)	18 (48.7%)
Both Fasciola & Paramphistomes	5 (4.9%)	8 (9.6%)	13 (7%)	3 (8.1%)
Paramphistomes only	22 (21.6%)	12 (14.5%)	34 (18.4%)	10 (27%)
None	43 (42.1%)	30 (36.1%)	73 (39.5%)	6 (16.2%)
Total	102 (100%)	83 (100%)	185 (100%)	37 (100%)

NB: Figure in parentheses indicate percentage within each column. Male buffaloes were not studied.

DISCUSSION

In this study both cattle and buffaloes were found to be affected with fascioliasis and paramphistomiasis. The prevalence rate of both types of infection was higher in buffaloes than in cattle. The prevalence rate of fascioliasis recorded in this study is comparable to that recorded in Palpa district (Annon, 1983), but is lower than that recorded in Salija and Bajung hills of Parbat District by Joshi (1986).

In Surkhet District, Thai et al. (1985) have reported liverfluke infection alone to account 67% of the total diseases of ruminants recorded in the hospital. The prevalence of *Fasciola* and Paramphistome in this study were 45.5% and 27.9% respectively in cattle and buffaloes. This suggests that paramphistomes alone or along with *Fasciola* might be responsible for limiting production, and thereby cause economic losses in the livestock industry. So, it is suggested to study on the pathogenic effect and the economic loss due to paramphistomiasis in bovines, and other species of animals.

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TRADITIONAL FEEDS AND FEEDING PRACTICES FOR PIGS IN DHANKUTA DISTRICT OF EAST NEPAL

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ABSTRACT

The practices adopted by farmers in feeding pigs were studied in six Village Development Committees (VDC) of Dhankuta District through a questionnaire survey. Six major ingredients and twelve other seasonal weeds and vegetable tops were collected and analysed for proximate constituents and major mineral elements. The nutritional adequacy on diets of pigs have also been discussed.

INTRODUCTION

Besides poultry, pigs are the most important non-ruminant species in the eastern hills. Because of the increasing demand for pork, pig farming has drawn the attention of farmers of several ethnic groups. A great deal of Pakhribas Agricultural Centre's work in the field of livestock has been directed towards pig improvement by introducing new breeds and husbandry practices.

Feeding is the most important factor in pig husbandry. If properly fed, pigs are capable of rapid growth, and the initial capital investment can be returned in relatively short period of time.

This study records the feeds and feeding system of pigs raised under traditional husbandry practices and aims to provide a profile of the chemical composition of feeds and forages offered to them..

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MATERIALS AND METHODS

Survey

A total of 76 small holder pig farms were visited during the wet season (May-Sept.) in six Village Development Committees (VDC) in the Hills of Dhankuta District. Information regarding feeds and feeding practices were collected from pig owners and recorded on a questionnaire. During the visit, the samples of feeds were collected from the mass of feed being fed to the pigs. The information of the proportion of cereal by-products to green feeds fed per day was based on farmer's estimates.

ANALYTICAL METHODS

The analytical values have been derived from pooled feed samples. The proximate constituents such as crude protein (CP), ether extract (EE), crude fibre (CF), total ash (TA) and nitrogen free extract (NFE) were determined according to conventional methods (Aoac, 1980.) The major mineral elements such as calcium (Ca), phosphorus (P), sodium (Na) and potassium (K) were measured by UV/visible spectrophotometry and flame photometry. Digestible energy (DE) was calculated from the proximate constituents (Anon, 1986).

RESULTS AND DISCUSSION

Seventy five per cent of the pigs reared by the farmers were crossbreds, and 25% were local. Although, a few farmers allow the pigs to scavenge or tether them in fields after crops are harvested, most pigs are raised confined in the backyard of their houses. The pigs were offered 2.5 to 3.0 kg of dry matter per day which is comparable with the values reported by Eusebio et al. (1977) and Yadav et al. (1990) for growers. The pigs were fed twice daily, once in the morning and again in the evening. The different types of feeds used for pigs in the study area are listed in Table 1. The average contribution in the diets of pigs of the different feed ingredients in terms of drymatter are also given.

Table 1: Traditional feeds used for pigs.

Ingredients	Average quantity of ingredients offered		Proportion of drymatter contribution (%)	Feeding methods
	Fresh wt. (Kg)	Drymatter (Kg)		
Cereal by-products:			47.71	
Makai ko bhus (Maize bran) OR Makai ko pitho (Maize flour)	0.50	0.88	31.8	Generally cooked with kitchen swill with or without addition of common salt for farrowing sows and growing piglets. Otherwise, fed as such in combination with brewery residues and green supplements.
Dhan ko bhus (Rice bran)	1.00	0.44	15.91	
Brewery by-products:			9.76	
Jand ko Kat (Distillers residues) OR Jand ko chokra (Washed brewery residues) OR Tonba ko chokra (Brewery residues)	1.50	0.27	9.76	Any one or mixture of these are fed as such or in combination with cereal by-products, green supplements and kitchen swill.
Green vegetables & weeds:			42.52	
Pindalu (<i>Colocasia</i> spp.)	1.00	0.09	3.25	
Mane (<i>Alocasia</i> spp.)	1.00	0.105	3.80	Fed by cooking with cereal by-products, brewery by-products and kitchen swill with or without addition of common salt. Generally fed throughout the year.
Sisnu (<i>Urtica</i> spp.)	1.00	0.17	6.15	
Latte (<i>Amaranthus</i> spp.)	2.00	0.23	8.31	
Pharsi Lahara* (<i>Cucurbita</i> spp.)	1.00	0.112	4.05	*Fed as green fodder during the wet season only, sometimes cooked if other fodders are scarce.
Remai* (<i>Latin name unknown</i>)	0.40	0.045	1.63	
Palunge* (<i>Latin name unknown</i>)	0.30	0.043	1.55	
Dhendufule* (<i>Latin name unknown</i>)	0.30	0.021	0.76	
Ratneulo* (<i>Polygonum</i> spp.)	0.30	0.039	1.41	
Galgale* (<i>Latin name unknown</i>)	2.00	0.24	8.68	
Halhale* (<i>Latin name unknown</i>)	0.50	0.047	1.70	
Xane Jhar* (<i>Latin name unknown</i>)	0.30	0.034	1.23	

The major ingredients of feed were cereal grains and their milled by-products. A large portion of green feeds such as vegetable tops and weeds are also supplied during the wet season (May-Sept). Like brewery residues, green plants such as *Urtica* spp.,

Alocasia and *Colocasia* are also fed throughout the year. Besides these ingredients, the pigs kept in confinement in the backyards also receive kitchen swill. Farmers cook *Colocasia*, *Alocasia*, *Amaranthus* and *Urtica* spp. as a special feed for farrowing sows and young piglets. Although cooking adds to fuel and labour costs, the cooking process reduces irritating principles such as oxalates, chromates and formic acid present in the plant, thus making the plant more digestible.

It can be seen from Table 1. that cereal by-products and brewery residues constituted about 57 per cent of the diet. Among the green feed, *Galgale*, *Latte*, *Sisnu*, *Pharsi lahara*, *Mane* and *Pindalu* were found to be major contributors. The chemical composition of the ingredients of pig feed are presented in Table 2. Due to the extreme variability, the analysis of kitchen swill was not carried out.

Table 2: Chemical composition of the ingredients of pig feed.

Cereal by-products/Green supplements	DM	CP	EE	CF	TA	NFE	Ca	P	Na	K	DE
Jand ko kat (Distillers' Residues)	16.20	17.70	6.80	11.60	5.90	58.00	0.50	0.30	0.06	0.43	15.30
Tomba ko Chokra (Brewery Residues)	18.60	14.60	3.50	11.00	5.05	65.80	2.05	0.36	0.04	0.67	14.95
Jand ko Chokra (Mashed Brewery Residues)	29.54	16.00	4.55	10.98	2.76	65.71	0.64	0.19	0.03	0.16	15.27
Makai ko bhus (Maize bran)	87.62	9.06	4.12	5.94	2.85	78.03	0.32	0.40	0.02	0.43	15.55
Makai ko pitho (Maize flour)	88.60	13.25	2.74	3.68	4.71	75.62	0.32	0.79	0.03	0.71	15.43
Dhan ko bhus (Rice bran)	88.08	19.37	4.15	29.33	18.15	28.40	0.51	0.40	0.05	0.72	12.59
Mane (<i>Alocasia</i> species)	10.42	11.68	1.62	19.43	19.74	47.53	1.78	0.51	0.19	2.70	11.38
Pindalu (<i>Colocasia</i> species)	9.05	17.31	1.78	15.19	16.68	49.04	1.81	0.48	0.14	1.80	13.52
Sisnu (<i>Urtica</i> species)	17.74	13.87	0.97	9.44	18.76	56.96	4.25	0.57	0.14	0.78	13.68
Ratneulo * (<i>Polygonum</i> species)	13.01	9.87	1.14	18.36	12.17	58.46	1.19	0.42	0.20	1.08	13.50
Palunge * (<i>Latin name unknown</i>)	14.45	16.31	0.94	12.32	15.53	54.90	1.59	0.46	0.20	1.39	13.72
Renai jhar * (<i>Latin name unknown</i>)	11.32	26.68	1.01	23.01	16.35	32.95	1.86	0.59	0.15	1.39	12.91
Dhendufule * (<i>Latin name unknown</i>)	7.12	18.87	1.13	14.41	17.56	48.03	1.67	0.78	0.19	1.71	13.44
Latte * (<i>Amaranthus</i> species)	11.53	19.31	1.86	11.24	17.67	49.92	0.08	0.56	0.18	1.84	13.77
Kane jhar * (<i>Latin name unknown</i>)	11.46	15.06	1.39	15.97	18.32	49.26	2.07	0.53	0.13	1.30	13.27
Pharsi lahara * (<i>Cucurbita</i> species)	11.27	15.81	1.42	10.62	17.11	55.04	2.65	0.54	0.11	1.39	13.79
Halhale * (<i>Latin name unknown</i>)	9.25	25.12	2.24	11.24	16.73	44.67	1.35	0.38	0.25	1.48	13.93
Galgale * (<i>Latin name unknown</i>)	12.01	19.18	0.97	16.06	22.14	41.65	4.03	0.27	0.14	1.68	12.94

* During wet season only.

Drymatter (DM) is expressed on g/100g Fresh matter
Digestible energy (DE) is expressed on MJ/Kg DM
All other Values are expressed on g/100g DM

On the basis of the average quantity of different ingredients offered to pigs (Table 1) and the chemical composition of these ingredients (Table 2), quantities of the nutrients received by pigs were calculated. These values, along with the nutrient requirement as suggested by Eusebio et al. (1977) are presented in Table 3 for comparison.

Table 3: Nutrients received and required by pigs.

Energy/Protein/ Minerals	Nutrient received by pigs Pig Live wt. (30-60 kg)			Nutrient requirement of pigs (Eusebio et al, 1977) Pig Live wt. (kg)	
	Wet season	Dry season	10-30	30-60	60-90
DE Mj/Kg DM	14.58	13.67	14.64	14.64	12.13
CP %	15.00	14.0	17.00	17.00	13.00
Ca %	1.23	0.59	0.90	0.60	0.60
P %	0.40	0.38	0.60	0.40	0.40
Na %	0.09	0.05	0.23	0.31	0.31
K %	0.98	0.73	0.25	0.30	0.30
Ca:P	3:1	1.5:1	-	-	-

Amount per kg diet or percent drymatter.

As can be seen from the above table, the diets are deficient in sodium (Na). However, this may not be true if the kitchen leftovers are also considered. The results also indicate sub-optimal level of protein in the diet especially for growers even if kitchen swill, is considered. This might be more serious during the dry season when the availability of green forages is limited. Likewise the energy requirement may also be sub-optimal unless additional fodder sources or cereal by-products are supplemented. Other mineral elements such as Ca, P and K in the feeds were adequate for 30-60 kg liveweight pig for a reasonable level of animal production.

The Ca:P ratio was within the normal range for farm animals. However, it should be understood that the samples analysed were the feed offered to the pigs and not the feed actually consumed by the pigs.

The provision of sodium supplements in the form of sodium chloride (common salt) would have overcome Na deficiency. However, supplementation of kitchen swill needs to be assessed and quantified. Also, availability of crude protein and particularly of DE should be closely monitored in future.

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A REPORT ON HEPATIC COCCIDIOSIS IN RABBITS IN KATHMANDU VALLEY

U.M.Singh *

ABSTRACT

The records of 23 cases of coccidiosis in rabbits autopsied between 1986/87 and 1991/92 at Animal Health Research Division, Tripureswor were analysed. Out of 23 cases, 13 cases (56%) were hepatic and the remaining 9 cases (39.1%) were intestinal coccidiosis. Pathological lesions included enlarged and dark coloured liver with different sizes of necrotic white nodules and microscopic examination showed numerous developing stages of coccidia in bile duct epithelium and areas of necrosis. Impression smear of necrotic foci and microscopic examination of bile revealed numerous coccidial oocysts.

INTRODUCTION

Rabbit farming has been a good prospects as a producer of meat and wool. Angora rabbits are raised for wool production where as Soviet chinchilla and Californian hyaline breeds are raised for meat purpose. In Kathmandu valley few rabbit farms have come up in recent years.

Coccidiosis is one of the major killer diseases of weaner rabbits and it is a common problem encountered in commercial operations. Both meat and wool type rabbits are susceptible to this disease. The incidence and mortality rate depends upon the hygienic conditions in the rabbitry. In rabbits, based upon the organ affected it is classified as hepatic and intestinal coccidiosis (Kumar B, 1982 and Palanisamy, 1990).

Hepatic coccidiosis is caused by *Eimeria stiedae* which attacks and destroys the cells lining the bile ducts of liver. *E. stiedae* reaches the liver via the portal vein and then locates in the epithelium of bile ducts where it results in a severe cholangitis. Schizogony, gametogony and the formation of oocysts occur in the epithelium of bile ducts of the liver of rabbits. The coccidial oocysts liberated from these damaged cells are passed to the gall bladder and are ultimately passed out through the intestine. Under

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suitable conditions outside body in the soil four sporoblasts develop in each oocyst. Each sporoblast divides into two sporozoites when fully developed oocyst is ingested by a rabbit. The eight sporozoites are released in the intestine through the action of digestive enzymes (Macy, 1971 Archibald J. et al, 1973 and Hime, 1979). The oocyst of *E. stediae* are ovoidal and ellipsoidal and 37 x 21 m u in size with a micropyle at the broad end (Urquhart 1988).

E. stediae has been a major problem of mortality and morbidity in commercial rabbitry. So, this study was conducted to identify the disease by clinico-pathological and histopathological investigation.

MATERIALS AND METHODS

Dead rabbits are routinely brought to Central Animal Health Research Laboratory for autopsy. Twenty three cases of coccidiosis in rabbits autopsied between 044-049 (1986/87-1991/92) were followed and their records were analysed. Clinical symptoms of sick rabbits were recorded on the basis of history. Gross pathology of the livers were examined. Microscopic examination of impression smears from necrotic foci in liver. and histopathological examination of affected hepatic tissue.

RESULTS AND DISCUSSION

Table No. 1. Record of Coccidiosis in rabbits (source PM record of AHRD 044-049).

S.N. Year	No. Of Coccidiosis	Age of rabbits	Type of coccidiosis	No. Dead/ Total No.	Mortality %
1986-87	2	-	2 Intestinal	-	-
1987-88	1	-	1 Hepatic	4/14	28.57
1988-89	5	-	3 Hepatic	-	-
			2 Intestinal	2/20	5
1989-90	6	4 Weeks	4 Hepatic	4/15	26.66
		-	3 Intestinal	8/350	2.28
1990-91	5	4 Weeks	4 Hepatic	22/690	3.18
		6 Weeks	1 Intestinal	1/12	8.33
1991-92	3	8.5 Weeks	1 Hepatic	1/16	6.25
		4 Weeks	2 Intestinal	6/40	15
Total	22	-	13 Hepatic (56.52%) 9 Intestinal (39.1)		

Table 1 shows the details of coccidiosis cases in rabbits recorded during 1986-92 at Animal Health Health Research Division. The total number of cases of hepatic coccidiosis

were 56.52% while Intestinal coccidiosis were 9 (39.1%). The age of the affected rabbits ranged from 1-6 months.

CLINICAL SYMPTOMS

The sick rabbits suffering from coccidiosis showed Anorexia, rough haircoat, emaciation and diarrhoea, reluctant to move and bear the body weight, and pot bellied appearance as described by rabbit owners. Similar symptoms were also observed in rabbits affected from coccidiosis by Kumar (1982), Ajayi et al (1987), Palanisami (1990) and Sunyal (1990).

GROSS PATHOLOGY

The liver was enlarged and dark red in color and contained diffuse white necrotic patches which ranged from pin point foci to 6 mm in diameter (Fig-1). Gall bladder was distended with dark bile. Other organs did not show any remarkable lesions. Similar lesions were also recorded in rabbits by Ajayi et al (1987), Vargha (1979) Meshkov (1982), and Urquhart et al (1988).

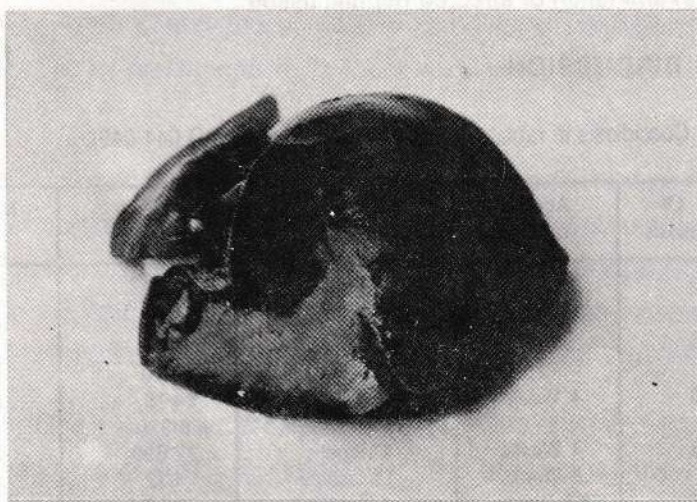


Fig - 1: Liver showing diffuse necrotic nodules and dark red colouration x 100.

MICROSCOPIC EXAMINATION

Coccidial oocysts were demonstrated in impression smears taken from necrotic areas of liver. Large number of coccidial oocysts were also demonstrated by microscopic examination of bile (Fig-2). Histopathological examination of tissues revealed necrosis of hepatic cells and various developing stages of coccidia in the cells lining the bile duct. Bile duct epithelium showed hyperplasia or many folds studded with various stages of coccidia (Fig-3). Similar type of microscopic lesions in liver were noticed by Rosmini (1979), Collins et al (1988) and Vargha (1976).



Fig - 2: Microscopic examination of Bile showing oocysts of *Eimeria stiedae* x 100.



Fig - 3: Section of liver with developing stages of coccidiosis in bile duct epithelium and necrosis of hepatic parenchyma.

RECOMMENDATIONS

1. It is very important that faecal samples from rabbits should be regularly examined for presence of coccidial oocysts. Postmortem examination should be conducted on all the dead rabbits for diagnosis of hepatic coccidiosis.
2. Control of rabbit coccidiosis is based on the improvement in hygiene, breeding and rearing establishment cages, hutches or pens should be cleaned regularly properly everyday (Souls by 1982).
3. As the disease occurs in weaner rabbits it is essential that coccidiostats effective in rabbit coccidiosis should either be mixed in feed or water right from the age of 30-35 days till 3-4 months continuously. If these are to be mixed in water these should be given for 2-3 days continuously every week (Sunyal 1991).

4. The floor of the cages should have a wire network to prevent contact with contaminated faeces responsible for coccidiosis (Sunyal 1991).
5. Elimination of *E. stediae* is ineffective with medication, however initial infection could be prevented. Sulphaquinoxaline 0.05% in drinking water is effective as a preventive regimen for hepatic type. (Palanisami 1990).
6. As single oral dose (100 mg) of trinitazole treated in 2 of 5 rabbits infected with *E. stediae*. Then other rabbits given repeated doses for 2-3 days were cured (Mikhail et al 1981).
7. Treatment with sulphadimidine solution in coccidiosis in rabbits showed good response.

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OCCURANCE OF UTERINE TORSION AS A CAUSE OF DYSTOCIA IN BUFFALOES IN CHITWAN VALLEY OF NEPAL

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ABSTRACT

All of 41 cases diagnosed as uterine torsion among a total of 117 cases of dystocia in buffaloes attended in Chitwan valley between May 1991 and August 1992 were investigated. The results showed that majority of the uterine torsion cases (58.54 %) occurred in Murrah crossbreds, followed by 34.15 percent in local buffaloes but the occurrence was least (7.32%) in purebred Murrah. The occurrence of torsion was highest (41.46%) in the second parity followed by 36.96 percent in the third parity. Majority of the torsion cases (56.10%) were also associated with complete stallfeeding system of management indicating the trend that buffaloes are more prone to the condition under confinement. The findings also revealed that all of the torsion cases attended were clockwise in uterine rotation and most of them (60.88 %) had greater than 180 degree of rotation.

INTRODUCTION

Bovine uterine torsion, a condition of the rotation or twisting of gravid uterus on its long axis, mostly occurs at the time of parturition and rarely during the last trimester of pregnancy (Roberts, 1970). Slipping or falling on the floor and struggling of the dam or violent movement of fetus during labor have been considered as some of the causes of the condition that eventually results in fetal death, adhesion of uterus, toxemia and death of the animal particularly in unattended or improperly attended case (Ganesan, 1992). However, skillful rolling of the dam with or without the use of wooden plank, rotating the fetus with or without laparotomy or a Caesarian section could result in successful detorsion (Roberts, 1970).

Uterine torsion as a cause of dystocia has been an occasional field problem in the reproductive management of buffaloes in Chitwan district (Rasali and Bhattarai, 1991). The problem could have been even serious when a case is not readily recognised by the farmer and allowed to be handled by an unskillful Village Animal Health Worker (VAHW),

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usually responsible for complicating the case under field conditions. This study was undertaken in an attempt to investigate the pattern of its occurrence in the district.

MATERIALS AND METHODS

Among a total of 117 cases of dystocia in buffaloes attended by the authors in Chitwan valley between May 1991 and August 1992, all of the cases diagnosed as uterine torsion were investigated in detail. The cases of uterine torsion were classified according to the genotypes (local, Murrah crossbred and purebred Murrah buffaloes), (Local, Murrah crossbred and purebred Murrah buffaloes), their parities, management systems (complete grazing, semi-stallfeeding with occasional tethering and complete stallfeeding), directions (left and right) and degrees of torsion, categorised as: <90 degree, 90-180 degree and > 180 degree, were recorded. All relevant information available at the time of detorsion was also gathered.

The data were analysed to establish the pattern of occurrence of the condition in buffaloes.

RESULTS AND DISCUSSION

As the simpler cases of dystocia occurring in the district were usually handled by local VAHWs on their own, the authors were called for attending relatively larger number of complicated dystocia cases. Consequently, as high as 41 cases (35.04%) out of the 117 cases of dystocia attended by them in buffaloes were attributed to uterine torsion as compared to only 7.3 percent uterine torsion cases among the cases of dystocia reported in cattle by Roberts (1970).

The present study revealed that in seven cases (17.07%) out of a total of 41 cases of uterine torsion, both the fetuses and dams died despite all care taken during detorsion. On the other hand, the event of recovery of dams accompanied by fetal deaths occurred in 23 cases (56.09%), while in the the rest of the cases both of the fetuses and dams survived.

Occurance among genotypes

Majority of the uterine torsion cases (85.54 %) occurred in Murrah crossbred buffaloes, followed by 14 cases (34.15%) in local buffaloes and only three cases (7.32%) in purebred Murrah as shown.

Occurance among parties

None of the cases of torsion occurred in heifer buffaloes, while the frequency percentages of the cases in buffaloes at first, second, third and fourth parties were 7.32, 41.46, 36.96 and 14.63 percents, respectively. The highest occurrence of the cases in the second parity followed by the third one is comparable in trend with the highest occurrence in the third parity in cattle as reported by Roberts (1970).

Occurance among management systems

Majority of the uterine torsion cases (56.10%) occurred in buffaloes under complete stallfeeding, followed by nine cases (21.95%) in those under both of semi-stallfeeding and complete grazing systems of management indicating the trend that buffaloes are more prone to uterine torsion under complete confinement. This was consistent with the report by Ganesan (1992).

Direction and degree of torsion

All of the cases attended were of port cervical rotation towards right side i.e. clockwise due to the fact that presence of rumen in the left side of the abdominal cavity hinders the anticlockwise rotation of the uterus in most cases.

Most of the torsion cases attended (60.98%) had more than 180 degree uterine rotation, followed by 13 cases (31.71%) with rotation of 90 to 180 degrees and only three cases (7.32%) occurred with less than 90 degree rotation as illustrated in Figure 4.

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STRATEGIC PIPERAZINE DRENCHING AGAINST TOXOCARA VITULORUM INFECTION OF BUFFALO CALVES

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ABSTRACT

Ascariasis was found to be a major disease affecting buffalo calves early in their life and was found to be prevalent in the mid-hills of Nepal. A strategic control programme with piperazine for ascariasis of buffalo calves was tested and its efficacy evaluated. The control programme reduced the infection rate in treated calves, and a significant difference in growth rate was observed among the calves of treated and untreated groups at 45 and 75 days of age. Strategic drenching of buffalo calves with piperazine at the recommended dose rate of 200 mg/kg body weight at 15, 45 and 75 days of age is recommended to check the losses due to this disease.

INTRODUCTION

Infection with large roundworm (*Toxocara vitulorum*) is a serious problem in buffalo calves and is responsible for serious economic losses and calf mortality (Gautam et al., 1967). This parasite infects the calf at the early age posing a serious threat to their survival and growth. Roberts (1989a) has reported a mortality rate of 25% (up to 80% in some area) in the buffalo calves due to this parasite. Losses due to parasitic diseases depend upon the level of infection, pathogenicity of the parasite, host resistance and the nutritional status of the host. Hence, the survival or death of the calf due to ascariasis will also depend upon the above factors.

The disease is prevalent throughout the buffalo raising areas of the world but is a serious problem in the humid tropics (Roberts, 1989a). It is also highly prevalent in Nepal. In the mid-hills of Nepal, 19% calves were found positive for ascarid eggs in faeces as early as fifteen days of age and a total of 95% calves were infected with the parasite within three

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months of age (LAC, 1988). The disease is so common that Nepalese farmers have various traditional remedies against this disease. These traditional remedies vary from roots/barks of various trees to citric acid or from copper sulphate to human urine. In some cases, some of these remedies have shown some efficacy against adult *Toxocara vitulorum* and some of the adult parasites are expelled (LAC, 1988). However, in most of the cases the treatment is attempted so late that these traditional remedies, which have limited potency, are ineffective and lead to the death of the calves.

No study has been conducted so far in Nepal for the strategic control of this parasitic disease. Hence, this study was conducted to formulate and evaluate a control strategy with the most commonly available anthelmintic. Piperazine is known to show good efficacy against ascarid of all domestic animals (Robertson, 1977), is relatively cheap and readily available in the market, and, thus, was selected as the drug for this study.

MATERIALS AND METHODS

This study was conducted at Lumle village from July 1990 to February 1991 with farmers' animals. A total of 26 newly born female calves were identified, ear tagged and their birth date recorded. They were grouped into control and treatment groups in such a way that every alternate born calf was kept in different group. Thus, each group consisted of thirteen calves. Calves of the control group were not treated. Based on the epidemiological information available (LARC unpublished data), a strategic control programme for the calves of treatment group was decided, and the calves were drenched with piperazine at 15, 45 and 75 days of age at a dose rate of 200 mg of piperazine per kg body weight, irrespective of presence or absence of ascarid eggs in their faeces. Faecal samples of both groups of calves was examined by floatation method at seven days and fifteen days of age and at fifteen day intervals thereafter for five months. Body weight of both groups of calves was recorded at 45 and 75 days of age. Calves sold by the farmers before completion of the trial are not included in the analysis.

RESULTS

It was found that about half (5 out of 11) of the calves of the control group were infected within the experiment period. Infection was detected up to 90 days of age but all calves cleared the infection after that age even without treatment. In the treated group one calf was positive at fifteen days of age before the first drenching, and two calves at 30 days of

age, after the first drenching at fifteen days of age. No infection was detected thereafter (Table 1). Difference in infection rates were not statistically significant.

Table 1 Infection rate by *T. vitulorum* in buffalo calves at different ages after birth measured as % animals infected.

Group	Total No. of calves	Age of calves in days						Total infected throughout the experimental period
		15	30	45	60	75	90	
Treated	11	9.0	18.0 (1)	0 (2)	0	0	0	27.0 (3)
Control	12	25 (3)	33.0 (4)	25 (3)	25 (3)	17.0 (2)	8.0 (1)	42.0 (5)

(Figures in Parenthesis indicate number of animals infected, percentage expressed to the nearest whole figure)

The average body weight of calves at 45 days of age was 35.5 kg and 32.2 kg in the treated and control groups, while that at 75 days of age was 42.1 kg and 37.0 kg respectively. A difference of 3.3 kg and 5.1 kg was recorded at 45 days and 75 days of age between the treated and untreated calves (Table 2).

Table 2 Average body weight at 15, 45 and 75 days after birth of buffalo calves either treated with piperazine or left untreated.

Particulars	Average body weight (kg)		
	At 15 days	At 45 days	At 75 days
Treatment group (n=11)	27.7 ± 0.4	35.5 ± 0.9	42.1 ± 0.9
Control group (n=9)	27.3 ± 1.2	32.3 ± 1.8	37.0 ± 2.1
Difference	0.4 kg	3.3 kg*	5.1 kg*

* (Significant at 5% level)

DISCUSSION

The life cycle of *T. Vitulorum* consists of an in-the-host and an off-the-host development cycles of the parasite which is further complicated by the migration of the infective larvae in various tissues of the host. The eggs passed out through the faeces develop to the third stage infective larvae (inside the egg) under the favourable environmental conditions in the gorund. Ingested infective larvae hatched out from the eggs in the

intestine enter to the blood vessels through the gut wall and are carried to various organs including the liver, lungs, muscles etc. where they are trapped and remain dormant for extended period, and are only activated in females during advanced pregnancy. Activated larvae in the later stage of pregnancy are considered to be the source of patent infection to the young calves either through trans-placental (pre-natal) or trans-mammary infection, though the later is considered to be the major route of infection (Soulsby, 1982; Swain et al., 1987). It has also been reported that the prepatent period of *T. vitulorum* in buffalo calves to be 22.3 days (Roberts, 1990). However, in the present study, 17% calves were found to be positive for ascarid eggs in their faeces at fifteen days of age which is in agreement with a previous finding in the same area (LAC, 1988), indicating the possibility of prenatal infection with *T. vitulorum* in buffalo calves in the mid-hills of Nepal. This finding also agrees with that of Soulsby (1982) and Swain et al. (1987) but contrasts from the findings of Roberts (1990), who reported trans-mammary infection to be the only source of patent infection in buffalo calves. This difference might be due to variations in the agro-climatic conditions between different areas or due to some other factors.

The prevalence rate recorded in this study, that is the total number of calves that became infected throughout the trial period, among the calves of control group was low (42%) as compared to the prevalence rate (95%) recorded in the same area in a previous study (LAC, 1988) and that recorded from other parts of the Western Region mid-hills (81%, Larc unpublished data). Reasons for this low infection rate during the year 1990 are not known. However, the pattern of infection - about 15-30% calves being infected at fifteen days of age, with a maximum number of calves affected at one to two months of age and no infection after three months of age - is similar to that of the previous study (LAC, 1988). Piperazine drenching could not clear the infection from all of the treated calves as two treated calves were positive for ascarid eggs in their faeces at 30 days indicating a low efficacy of this drug against this parasite. This is in agreement with the findings of Roberts (1989b) who reported that piperazine, in buffalo calves, is only 42% and 57% effective against immature and mature *T. vitulorum* respectively. However, even with this limited efficacy, strategic piperazine drenching had a significant ($P < 0.05$) effect on the growth rate of calves measured as live weight gain (10-15% difference in body weight between treated and untreated calves). The difference in the average body weight of treated and untreated calves was 3.3 kg and 5.1 kg at 45 and 75 days of age respectively. This indicates that a major factor impeding growth of calves in mid-hills of Nepal is ascariasis, and proper and timely drenching could be effective in preventing such losses.

Another advantage to piperazine is its availability, simple administration and cheap cost of the drug (about Rs. 4/drench per animal).

In the present study there was no mortality of experimental calves. The study was conducted in farmers' property under farmers' management. Nepalese farmers are well acquainted with the symptoms of the disease, and the expelled worms can easily be seen in the faeces. It could be possible that farmers might have treated their calves with one of the traditional drugs without informing about it so as to save them or some other factors like low worm burden might have been responsible for no mortality recorded in the untreated calves.

Various management factors like nutritional and health status of the animal together with inherent characteristics (genetic make up) govern the growth, and productive and reproductive performances of an animal. It has been well documented that, under similar environmental conditions, the early growth rate is directly correlated with the productive and reproductive performances, like age at maturity, age at first calving etc., of the animal in their later age (Arora, 1974). Hence, it can be said that the faster growth rate in the treated calves at their early life will certainly be a beneficiary for their growth, maturity and production.

In this study it was found that all calves with or without treatment were free of infections from 90 days of age onwards in spite of an infection rate of 17% at 75 days, and 8% at 90 days of age. In other studies calves up to 105 days of age were found positive for ascarid eggs in faeces, and infection rate of 40% at 75 days, 14% at 90 days and 5% at 105 days of age was detected (LARC unpublished data). Drenching at 75 days of age is meant to clear any persistent infection after that age, and so improve health and growth rate of calves thereafter. As the infection automatically decreases after 75 days of age, which may however persist up to 15 or 30 days thereafter without treatment, the economic return of piperazing drenching at this age could not be evaluated from this study. Also experimental calves could not be followed for a longer period so as to determine the after-effects of the drenching, and compare their growth rate once the untreated calves cleared of the infection. An experiment in a controlled environment minimising the effects of other factors (both management and health) would be necessary to assess the individual effect of the drenching. However, as shown above, piperazine drenching at 15 days and 45 days of age has been shown to be beneficial in enhancing the growth rate of buffalo calves, and reducing the incidences of possible calf mortality due to this disease.

Further investigations with a more potent drug need to be conducted to develop a simple control strategy against this disease. Also future research needs to be carried out to find out the proper dose rate and to formulate a strategic drenching schedule using traditional remedies (especially herbs) so that it could be recommended to farmers in remote areas who have limited access to conventional drugs. However, till further investigations are made and more easier control strategy is developed, the present strategy for ascaris control could be followed satisfactory.

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नेपाल भेटरिनरी एशोसिएसनको चौथो राष्ट्रिय सम्मेलनबाट पारीत प्रस्तावहरू

RECOMENDATIONS OF THE FOURTH CONFERENCE OF NEPAL VETERINARY ASSOCIATION

१. जनशक्ती विकास र अनुसन्धान (Manpower Development & Research):
 - क) यस एशोसिएसनको तेश्रो राष्ट्रिय कन्फरेन्स (२०४७) मा पारित प्रस्ताव अनुसार नेपालमा भेटरिनरी डाक्टरको कमी तथा आवश्यकता महशुस गरी त्रि.वि.वि. अन्तर्गत रामपुर क्याम्पसमा संचालन भैरहेको BSC एनिमल साइन्स डिग्रि प्रोग्रामलाई केही थप व्यवस्था गरी BV Sc and A H डिग्रि प्रोग्राममा परिणत गरेर संचालन गर्न पशुपालन र पशु चिकित्सा सम्बन्धित जुनसुकै कार्य गर्न सक्ने स्नातक स्तरको जनशक्ति तयार गर्ने श्री ५ को सरकारको बर्तमान नीति र निर्देशन अनुसार त्रि.वि.वि. द्वारा गठित Task Force ले पेश गरेको प्रतिवेदनलाई अक्षरसः तत्कालै स्वीकृत गरी तुरुन्तै BV Sc and A H प्रोग्रामको अध्यापन कार्य शुरू गरिनु पर्ने । त्रि.वि.वि. अन्तर्गत निकट भविष्यमा संचालन हुने B V Sc and A H प्रोग्राम, Institute of Veterinary Science को स्थापना गरी त्यसद्वारा संचालन हुनु पर्ने ।
 - ख) आवश्यकता अनुसार विभिन्न विषयमा स्नातकोत्तर स्तरको जनशक्ति तयार गर्न विद्यावारिधिको लागि थप छात्रवृत्ति उपलब्ध गराई इन्स्टीच्यूट संचालन गर्न दक्ष जनशक्ति तयार गरिनु पर्ने साथै सुविधा श्रृजना भए अनुसार NVRI र त्रि.वि.वि. को Collaboration मा स्वदेश भित्रै M Sc र Ph D डिग्री प्रोग्रामहरू क्रमशः शुरू गर्दै लैजानु पर्ने ।
 - ग) त्रि.वि.वि. ले भेटरिनरी विज्ञान तर्फको मध्यम स्तरीय प्राविधिक (JT/JTA) जनशक्ति तयार गर्ने कार्यक्रम बन्द गरेको र शिक्षा मंत्रालय अन्तर्गत संचालित विभिन्न प्राविधिक शिक्षालयहरू (Trade Schools) द्वारा तालीम (JT/JTA) संचालन गरी सम्बन्धित विषय विशेषज्ञहरूको अभावमा उत्पादित साधारण प्राविधिज्ञहरू पशुपालन तथा पशु चिकित्सा जस्तो जटिल कार्य गर्न अदक्ष हुने भएकाले भेटरिनरी प्राविधिक शिक्षालयको स्थापना गरी त्यसबाट उत्पादित जनशक्तिलाई मात्र यस क्षेत्रमा सेवा प्रवेश गराइनु पर्ने ।
 - घ) कृषि विकास विभाग अन्तर्गत निश्चित अवधिसम्म कार्यरत पशु चिकित्सकहरूलाई उच्च शिक्षा सेवाकालीन तालीम हासिल गर्ने अवसर हालसम्म न्यूनतम रहेकाले त्यस्तो अवसर आवश्यकता अनुसार बढाइनु पर्ने ।

ड) देशमा दक्ष भेटेरिनरी डाक्टरहरूको अत्यधिक अभाव (प्रति डाक्टर १,५०,००० भन्दा बढी पशुहरू) भएको र सरकारी छात्रवृत्ति मै मनोनयन भई विदेशबाट स्नातकोपाधि हासिल गरी फर्केका पशु चिकित्सकहरू संगठनात्मक स्वरूपमा दरबन्दी खाली रहँदा रहदै पनि बेरोजगार रहन पुगेकाले उनीहरूलाई अविलम्ब नियुक्ती दिई प्राविधिक कार्यमा संलग्न गराउनु पर्ने ।

च) विभिन्न छिमेकी मित्रराष्ट्रहरूमा भएको अनुसन्धान सम्बन्धी प्रतिष्ठानको संगठनात्मक स्वरूप नै हाम्रो मुलुकको परिस्थिति सुहाउँदो हुने भएकोले नेपालमा पनि (NARC) अन्तर्गत एक नेपाल भेटेरिनरी अनुसन्धान प्रतिष्ठान (NVRI) गठन गरी पशुपालन व्यवसायसंग सम्बन्धित सम्पूर्ण विज्ञानका अंगहरू (Faculties) का अनुसन्धानात्मक क्रियाकलापहरू एकीकृत रूपमा संचालन गर्नु पर्ने ।

छ) उपरोक्त प्रतिष्ठान अन्तर्गत निम्न अनुसारका महाशाखाहरू समावेश हुनु पर्ने :-

- क. पाश्चर, फिड्स एण्ड न्युट्रिसन
- ख. एनिमल ब्रिडिङ एण्ड जेनेटिक्स
- ग. भाइरोलोजी
- घ. पारासाइटोलोजी
- ङ. ब्याक्टेरियोलोजी एण्ड माइकोलोजी
- च. एनिमल फिजियोलोजी एण्ड रिप्रोडक्सन
- छ. फर्माकोलोजी एण्ड टोक्सीकोलोजी
- ज. इपिडिमियोलोजी, पब्लिक हेल्थ एण्ड मेडिसिन
- झ. प्याथोलोजी
- ञ. बायोकेमिस्ट्री एण्ड एनिमल बायो-टेक्नोलोजी
- ट. एनिमल प्रोडक्ट्स प्रोसेसिङ एण्ड टेक्नोलोजी
- ठ. एनिमल प्रोडक्टसन एण्ड म्यानेजमेन्ट
- ड. एभियन रिसर्च
- ढ. डेरी रिसर्च
- ण. ल्याव एनिमल यूनिट
- त. क्षेत्रीय अनुसन्धान केन्द्रहरू (क्षेत्रीय प्रयोगशाला, लम्ले कृषि केन्द्र, पाखिवास कृषि केन्द्र, पशुपंक्षी अनुसन्धान फार्महरू र चरन फार्महरू)

ज) उपरोक्त प्रतिष्ठानमा संचालन हुने समस्यामुलक अनुसन्धान कार्य बाहेक IAAS लगायत विभिन्न सम्बन्धित सरकारी तथा गैर सरकारी निकायहरू र दक्ष व्यक्तिहरूको साधन र सीप उपयोग गरी ब्यावहारिक तथा सहयोगात्मक अनुसन्धान (Applied and Collaborative Research) कार्य संचालन गर्न पनि NVRI को कार्यक्षेत्र हुनु पर्नेछ ।

२. संगठनात्मक ढांचा (Organizational Set up):

माननीय कृषि मंत्रिज्यूको निर्देशन अनुसार हाम्रो जस्तो अल्प विकसित देशमा एकै व्यक्तिबाट बढी भन्दा बढी सेवा कृषकले पाउन सक्ने जनशक्ति तयार गर्ने भन्ने उदगार यस एशोसिएसनको चौथो राष्ट्रिय सम्मेलनको उद्घाटन समारोहमा व्यक्त गर्नु भए अनुरूप यस सम्मेलनले स्वागत गर्दै निम्न सुझावहरू पस्तुत गर्दछ ।

क) एकै व्यक्तिबाट बहुउद्देशीय सेवा (पशु सेवा) कृषकको घर दैलोमा पुर्‍याउन वि.भी. एस.सी. एण्ड ए. एच. स्नातकबाट पशु चिकित्सा एवं पशु पालनका विभिन्न पक्षलाई हेर्न सक्ने क्षमता भएको हुँदा यसको कार्यमा उपरोक्त बमोजिम व्यक्तिहरूलाई नै राख्नु पर्ने ।

ख) मौजुदा जनशक्ति, भौतिक सुविधा तथा प्रत्येक जिल्लामा गठन गरिएका सकृय पशु पालन व्यवसायी समुहहरू प्रोत्साहित गर्दै लैजान सकिएमा उल्लेखित व्यवसायीकरण, व्यापारीकरण/औद्योगिकरण तथा सघनीकरणको आधारशीला हुन सक्ने हुँदा यस्ता समुहहरूको विकासबाट पशु सेवा सम्बन्धी संभावित सम्पूर्ण सेवाहरू क्रमशः निजीकरण गर्दै लैजान उपयुक्त वातावरणको श्रृजना हुन सक्ने देखिन्छ ।

ग) नव गठित 'एउटै छातामुनी' बाट सम्पूर्ण कृषि सेवाहरू कृषकको घर दैलोमा पुर्‍याउने भन्ने सरकारी नितीले गर्दा पशु विकासको सम्बन्धमा सम्बन्धीत विषय विशेषज्ञहरूको सम्बन्धित कार्यक्रम समेत कृषि विकास अधिकृतमा नै नीहित गराएको हुँदा आफ्नो विषय क्षेत्र बाहेक अन्य क्षेत्रको विषयमा हस्तक्षेप र तरलीकरण (Dilution) हुँदै जाने स्थितिको श्रृजना गरेको छ । जस्तो पशु सेवा प्रविधि र बाली प्रणाली प्रविधि मै पनि आधारभूत भिन्नता हुने भएको हुनाले एक क्षेत्रका प्राविधिकले अर्को क्षेत्रको प्रविधिलाई उपयुक्त र सक्षम नेतृत्व प्रदान गर्न नसक्ने (Guided missile & Misguided men) सर्वविदितै छ ।

यसले एकातर्फ प्राविधिज्ञहरूको बृत्ति विकासलाई (Carrier Development) ठूलो आघात पुर्‍याएकोछ भने अर्कोतर्फ सीमित संख्यामा भएका प्राविधिज्ञहरूलाई आफ्नो दायरा (Carrer) बाहिर घँचेटेर केवल एक सुपरिवेक्षक मात्र बनाउन खोजेकोले यसमा पुनर्विचार हुनु पर्ने देखिन्छ ।

घ) यस एशोसिएसनबाट विगतमा भएका प्रयासको फलस्वरूप तत्कालिन पशु विकास तथा पशु स्वास्थ्य विभाग र पछि आएर पशु सेवा विभागको स्थापना भएको थियो । उपरोक्त दुवै विभागको कार्यकालमा पशु विकासका बहु पक्षीय क्षेत्रमा सकारात्मक परिणामहरू देखा परेको सर्व विदितै छ । कृषि मंत्रालयको वर्तमान संगठनात्मक सुधारले यसलाई कृठाराघात गरी संलग्न प्राविधिकहरू तथा यस क्षेत्रमा संलग्न समस्त कृषक वर्गलाई विचलित तुल्याएकोले अविलम्ब पशु सेवा विभागको पुनर्स्थापन हुनु पर्ने देखिन्छ ।

३. निजीकरण (Privatization):

वर्तमान बदलिंदो वातावरणमा निजी क्षेत्रको सहभागीता समेटी पशु संरक्षण तथा सम्बर्द्धन कार्यक्रमलाई लैजाने सम्बन्धमा प्रविधि विस्तार तथा प्रचार प्रसार गरी उचित वातावरण एवं जनचेतनाको विकास गरी निजी क्षेत्रलाई आकर्षित गर्ने; विविध भौगोलिक क्षेत्रमा विषय र वस्तु विशेषको सम्भाव्यता, श्रोत, साधन एवं जनशक्तिको गुरु योजना तयार गरी सरकारी संघ संस्थाबाट उपलब्ध सेवा टेवा कार्यक्रमको संवेदनशीलता समेत ध्यानमा राखी निजी क्षेत्रमा विकल्प तयार भए पछि क्रमबद्ध रूपमा निजीकरण गर्दै जाने । यसो गर्दा निजी क्षेत्रबाट उत्पादित उत्पादनहरूको गुणस्तर र अनुसन्धान जस्ता कार्यको नियन्त्रणको व्यवस्था श्री ५ को सरकारबाट हुनु पर्ने । यसरी निजी क्षेत्रलाई श्री ५ को सरकारले नीति अनुरूप सुविधाहरू प्रदान गर्ने ।

४. भेटेरिनरी काउन्सिल (Veterinary Council):

तेश्रो भेटेरिनरी राष्ट्रिय कन्फरेन्सले पारीत गरे अनुसार नेपाल भेटेरिनरी काउन्सिलको स्थानमा गरीनु पर्ने ।

५. गुणस्तर निर्धारण र भेटेरिनरी रेगुलेसन (Quality Control and Veterinary Regulation) :

- क) नेपालमा विक्री वितरण भइरहेका पशुजन्य पदार्थहरू जस्तै मासु, दुध, फुल, माछा आदिको निरीक्षण र यसबाट मानिस वा पशुमा फैलिन सक्ने रोगहरूको नियन्त्रण सम्बन्धि कानूनको व्यवस्था हुनु पर्ने । पशुजन्य पदार्थ र पशु आहाराहरूको गुणस्तर परीक्षण नियमित रूपमा विषय विशेषज्ञ मार्फत गराई सधै उच्च गुणस्तर कायम गर्न कानुनी व्यवस्था हुनु पर्ने ।
- ख) नेपालमा भेटेरिनरी सम्बन्धी औषधी उत्पादन, विक्री वितरण, निकासी - पैठारी एवं गुणस्तर निर्धारण सम्बन्धी छुट्टै कानून बनाउनु पर्ने र यस्तो कार्यको नियन्त्रण सम्बन्धीत विषय विशेषज्ञद्वारा मात्र हुनु पर्ने साथै निश्चित औषधिहरूको सुचि छुट्याई योग्यता नपुगेका व्यक्तिहरूबाट अनियन्त्रित प्रयोग गर्नबाट रोग लगाइनु पर्ने ।
- ग) पशुपक्षीहरू मानव जीवनसंग अभिन्न रूपले गासिएकाले जनावरहरूलाई अनावश्यक रूपमा जस्तै खुट्टा काटी दिने, आँखा फुटाई दिने या क्षमताभन्दा बढी बोभ बोकाउने आदि विभिन्न यातना दिने गर्ने व्यक्तिलाई सजाय दिन पाउने कानुनी व्यवस्था (Cruelty Act) हुनु पर्ने ।
- घ) हाल औषधि व्यवस्था विभागबाट भेटेरिनरी सम्बन्धी औषधीहरूको पनि गुणस्तर नियन्त्रण गर्दै आइरेहेको तर दक्ष जनशक्तिको अभावमा सो कार्य सन्तोषजनक ढंगबाट भै रहेको छैन । त्यसैले एउटा छुट्टै निकायको संरचना गरी भेटेरिनरी औषधी व्यवस्था इकाई हुनु पर्ने देखिन्छ ।

- ड) कानूनी रूपमा आउन सक्ने बाधा अडचनहरूमा कमी ल्याउने अभिप्रायले कुनै पनि कानूनी केशमा पोस्टमार्टम गर्नु परेमा भेटेरिनरी ग्रेजुएटले मात्र नै व्यवस्था हुनु पर्ने ।
- च) प्रत्येक भेटेरिनरी चेक पोष्टमा भेटेरिनरी ग्रेजुएटको दरबन्दीको व्यवस्था हुनुपर्दछ ।
- छ) कुनै पनि पशुपंक्षी तथा पशुजन्य पदार्थको निकासी गर्नु परेमा भेटेरिनरीयनबाट अनिवार्य रूपमा प्रमाणीत गराइनु पर्ने व्यवस्था हुनु पर्ने ।
- ज) कुनै पनि सरुवा रोग फैलिएको ठाउँमा सो रोगको नियन्त्रण गर्न त्यस ठाउँका सम्पूर्ण कृषकहरूले आवश्यक सहयोग तथा सल्लाह मान्नु जरूरी हुन्छ । तर कुनै कृषकहरूले सुभाव तथा सल्लाह नमानेमा रोग नियन्त्रण गर्न कठिनाई पर्दछ । त्यसैले सल्लाह नमान्ने कृषकहरूलाई कानूनी रूपमा दण्डित गर्नु पर्ने व्यवस्था हुनु पर्दछ ।
- झ) हाल विभिन्न शहरी इलाकामा पशुबधशालाको समुचित व्यवस्था नहुनाले विभिन्न जुनोटिक र आहारजन्य रोगहरूबाट मानिस पिडित भैरहेका छन् । अतः प्रत्येक नगरपालीकामा पशुबधशालाको उचित व्यवस्था हुनु जरूरी छ ।
- ञ) ग्रा.प.स्वा.का. बाट जथाभावी रूपमा औषधी प्रयोग हुँदा जनावर, कृषक वर्ग तथा जन स्वास्थ्यमा नराम्रो असर परेको छ । अतः ग्रा.प.स्वा.का.हरूले हार्मोन, स्टोराइड, एन्टिबायोटिक र अन्य निषेधित समुहका औषधिहरू प्रयोग गर्न नपाउने व्यवस्था हुनु पर्दछ ।
- ट) ग्रा.प.स्वा.का.हरूलाई सल्लाह, सुभावका साथै उनिहरूले दिने सेवालाई नियमित गर्न अति आवश्यक भएको हुँदा जिल्लाका सम्पूर्ण कार्यरत ग्रा.प.स्वा.का. हरूले अनिवार्यरूपमा भेटेरिनरीयनहरूलाई नियमित रूपमा रिपोर्टिङ्ग गर्नु पर्ने व्यवस्था मिलाउनु पर्ने ।
- ठ) पशुजन्य उद्योग तथा पशुपंक्षी व्यावसायबाट पर्ने बातावरणीय असरको अध्ययन अनुसन्धान कार्यमा भेटेरिनरीयनको सहभागीता गराइनु पर्ने ।

VETERINARIANS HONOURED DURING FOURTH NATIONAL CONFERENCE OF NEPAL VETERINARY ASSOCIATION

A. Veterinarians honoured for their dedicated veterinary service over a period of 25 years

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|-------------------------------|--------------------------------------|
| 1. Dr. Thir Bahadur Singh | 18. Dr. Trailokyananda Vaidya |
| 2. Dr. Maneswar Nath Panday | 19. Dr. Durga Datta Joshi |
| 3. Dr. Shambhu Nath Pyakurel | 20. Dr. Bhawananda Thakur |
| 4. Dr. Nata Raj Joshi | 21. Dr. Padma Nath Sharma |
| 5. Dr. Narendra Bahadur Singh | 22. Dr. Braja Kanta Jha |
| 6. Dr. Dhan Bahadur Singh | 23. Dr. Shiv Lakhan Prasad Gupta |
| 7. Dr. Tej Bahadur Basnyat | 24. Dr. Surendra Kumar Shrestha |
| 8. Dr. Upendra Mishra | 25. Dr. Mukti Narayan Shrestha |
| 9. Dr. Sunder Lal Shrestha | 26. Dr. Bholu Mehar Shrestha |
| 10. Dr. Khadga Prasad Dhakal | 27. Dr. Prabesh Man Singh Pradhan |
| 11. Dr. Murali Datta Lohani | 28. Dr. Lal Bahadur Chand |
| 12. Dr. Udaya Singh | 29. Dr. Madhu Sudan Sharma |
| 13. Dr. Keshab Nath Upadhaya | 30. Dr. Bir Mardan Basnyat |
| 14. Dr. Tulsi Prasad Shrestha | 31. Dr. Shribatsman Malla |
| 15. Dr. Keshab Raj Sharma | 32. Dr. Nil Prakash Singh Karki |
| 16. Dr. Kaman Singh Gurung | 33. Dr. Jap Narayan Bahadur Shrestha |
| 17. Dr. Subarna Lal Shrestha | |

B. Nepal Veterinary Association Members and Veterinary staff honoured for blood donation during Silver Jubilee Ceremony of NVA.

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|-------------------------------|----------------------------|
| 1. Dr. Sabi Amatya | 5. Dr. Jagannath Rai |
| 2. Dr. Sudarsan Prasad Gautam | 6. Mr. Rabindra Vail |
| 3. Dr. Gyanendra Nath Gangol | 7. Mr. Shiva Prasad Khanal |
| 4. Dr. Ram Krishna Khatriwada | 8. Mr. Macha Kaji Maharjan |

C. Honour for outstanding contribution in veterinary profession

1. Dr. Narayan Parsad Ghimire:- as active member of NVA.
2. Dr. Sudarsan Prasad Gautam:- as General Secretary of NVA.
3. Mr. Ishwori Das Shrestha:- as Office Secretary of NVA.