

Special issue of the First National Conference

Bulletin of

**Veterinary Science &
Animal Husbandry**

Nepal



Official Organ of Nepal Veterinary Association

Bulletin of Veterinary Science and Animal Husbandry, Nepal

(Special issue of the First National Conference)

Volume 12

1983

Regd. No. ZCBA 7/2025/26

CONTENTS

	Pages
I. Editorial	i
Proceedings of the first Conference of Nepal Veterinary Association	iii
II. General Articles :	
1) Economic contribution by livestock farming	
T. P. Shrestha	1
2) Zoonoses- a public health problem in Nepal	
D. D. Joshi	8
3) The problem of fodder and its alleviation in the eastern hills	
N. C. G. Hopkins	17
4) Problem and prospects in animal research	
N. B. Singh	26
5) The role of field veterinary officers in animal disease control in Nepal	
A. R. Mercy	37
6) Report on eradication of footrot disease at Lumle Agriculture Centre	
N. P. S. Karki	42
7) Diagnostic aspect of veterinary service in Nepal	
B. K. P. Shah	53
8) Impact of animal health service on national economy	
B. M. Shrestha	60
9) Role of genetic improvement in livestock development in Nepal	
S. K. Shrestha	65
10) Veterinary field activities	
K. P. Dhakal	75

(11) Towards self sufficiency in vaccine production

M. N. Pandey

12) Selection and evaluation of sires for breeding soundness

S. L. Shrestha

85

III. Association News :

N V A Executive committee

91

Life members of N V A

92

Building fund of N V A

94

Financial statement of N V A

95

Professional News

98

IV. Appendices :

I. Welcome address by Dr. N. B. Singh, President N V A

i

II. Inaugural address

by Rt. Hon. Prime Minister Shri Lokendra Bahadur Chand

ii

III. Objectives of the conference

by Dr. D. D. Joshi, General Secretary, N V A

iv

IV. Chairman's remarks

by Hon. Minister of Agriculture and Land reforms

Shri Hem Bahadur Malla

viii

V. Vote of thanks by Dr. U. Singh, Member, N V A

ix

VI. Closing remarks

by Shri Bed Bahadur Khadka, Associate Member,

National Planning Commission

x

VII. Recommendations of the conference

xiii

VIII. List of cash contributors

xix

IX. Contributors of refreshment, Lunch and Dinner

xx

Editorial

The First National Conference of Nepal Veterinary Association (NVA) was successfully accomplished after two days of its deliberations. NVA would consider it a great achievement in its 15 years history if these deliberations and recommendations succeed to achieve its objectives. It is a fact that livestock is one of the most precious wealth of our country. Its development indeed is closely associated with the economic welbing of more than 90% of our rural population. NVA apeals concerned agencies to consider livestock sector as a priority field in our national planning. The suggestions and recommendations of NVA'S national conference are dedicated towards this goal. Timely action on the recommendations will give momentum to the livestock development efforts of His Majesty's Government of Nepal.

Rt. Honourable Prime Minister Mr. Lokendra Bahadur Chand greatly honoured the conference by giving some of his valuable time to come and inaugurate the conference and taking keen interest in NVA's activities. Honourable Minister of Agriculture and Land Reforms Mr. Hem Bahadur Malla encouraged the deligates and observers by accepting the chair of the inaugural session. The guidelines and directions given by Rt. Honourable Prims Minister and Honourable Minister of Agriculture and Land Reforms have motivated the veterinarians of Nepal to dedicate themselves in the task of national development. The veterinarians of this country are enthusiastic to shoulder the various livestock development efforts and consider it a chalange to veterinary profession.

Losing a productive animal means a great economic disaster to the family of a landless farmer whose very survival depends on his animals. On the other hand sickness or death of a bullock can completely paralyse the farming system of a smal farmer. A field veterinarian is a real friend of the farmer, he provides his helping hand by safeguarding the life of the animal, reducing the losses due to diseases of various kind and imporving productive quality of the animals through artificial inse-

mination service which lie under his professional competence. Unlike playing an advisory role he provides his service at the farmer's door.

Although the contribution of livestock to Gross National Product and day to day life of the people is significant, on the contrary we are far behind in technology. We have the highest animal density in the world and paradoxically the poorest veterinary man power. Scarce veterinary manpower is the main problem which has been realised since last so many years unfortunately nothing so far has been done to improve this situation. The conference strongly recommended the need of an Institute of Veterinary Science to produce sufficient number of veterinarians to support the livestock development.

There can be no second opinion that the veterinary manpower can bring positive impact on livestock productivity. It can be anticipated that unless livestock takes the shape of an industry the impact will not be visible. To achieve this the participation of private sectors is the only alternative. The private sectors can flourish only if the country can have good number of experts. It is evident that veterinarian can provide several different types of services to the people interested in any type of livestock enterprise, personally or through some organisation.

It is hoped that the final recommendations made by the conference during the two days discussion will get proper recognition by the concerning authorities of His Majesty's Government of Nepal.

Editorial Board

The 1st Conference of Nepal Veterinary Association

(Kathmandu)

15-16th August, 1983

Proceedings

First day - Monday the 15th August 1983

The inaugural function of the 1st National Conference of Nepal Veterinary Association was held in the hall of APROSC building. Participants started coming and taking their seats from early in the morning and the registration of delegates was started from 8 A. M. A total of 88 veterinarians, 84 from home country (i. e. 80% of the total veterinarians of Nepal or 88% of total vets residing at present in Nepal) and 4 from abroad, attended the conference. Distinguished guests, representatives of professional organisation, drug companies, feed industries, hatcheries and persons closely associated with veterinary profession attended the inaugural function. The hall was packed to its full capacity before 10 A. M.

Inaugural Ceremony

10 A. M.

Rt. Honourable Prime Minister Shri Lokendra Bahadur Chand and Honourable Minister of Agriculture and Land Reforms Shri Hem Bahadur Malla, on arrival were received by Dr. N. B. Singh, President, Nepal Veterinary Association.

Rt. Hon. Prime Minister Shri Lokendra Bahadur Chand and Minister of Agriculture and Land Reforms Shri Hem Bahadur Malla were requested to take the seats of Chief Guest and Chairmam respectively. The Honourable Guests were then presented with the programme of the conference.

Portraits of His Majesty the King and Her Majesty the Queen were garlanded by the Chief Guest and the Chairman.

Rt. Hon. Prime Minister then formally inaugurated the 1st National Conference of Nepal Veterinary Association by lighting the ceremonial lamp in a traditional fashion.

Dr. N. B. Singh, President, Nepal Veterinary Association presented the welcome address (Appendix I). He highlighted the benefits of animal husbandry in raising the economic status of the people.

Chief Guest, Rt. Hon. Prime Minister Shri Lokendra Bahadur Chand addressed the conference (Appendix II). He reiterated His Majesty's Government policy to bring about qualitative improvement in animal husbandry. He wished the conference all success.

Dr. D. D. Joshi, General Secretary of the association shed light on the objectives of the conference (Appendix III).

Speaking from the chair, Hon. Minister of Agriculture and Land Reforms Shri Hem Bahadur Malla touched upon various aspects of livestock development and underlined the importance of veterinary service (Appendix IV).

The inaugural function was a grand start of the historical event of Nepal Veterinary Association. Besides NVA members a good gathering of distinguished invitees adorned the convention of the function. Among the distinguished guests were Dr. Ratna Shamsheer J. B. Rana, Vice Chancellor, Royal Nepal Academy of Science and Technology, Mr. Bed Bahadur Khada, Associate Member, National Planning Commission, Dr. Deep Raj Sharma, Act. Secretary, Ministry of Agriculture, Mrs. C. K. Kiran, Act. Secretary, Ministry of Health, Dr. U. Huntun, WHO Programme Co-ordinator and Representative to Nepal, Dr. Kamala Bhakta Raj Bhandary, Joint Secretary, Ministry of Agriculture, Dr. K. K. Shrestha, Member Secretary, RONA, Dr. K. L. Shrestha, Member Secretary, National Council of Science and Technology, Dr. H. B. Raj Bhandary, Act. Director General, Dept. of Livestock Dev. and Animal Health,

Mr. P. Gorkhali, Director General, Dept. of Agriculture, Dr. S. B. Malla, Director General, Dept. of Medicinal Plant, Dr. A. B. Shrestha, General Manager, Royal Drug Ltd, Miss Sadhana Sharma, Chief Food Research Officer, Central Food Research Laboratory, Dr. D. N. Regmi, Chief, Infectious Disease Hospital, Dept. of Health Services, Dr. T. N. Panta, Executive Director, APROSC, Mr. P. N. Rana, Chief, Agriculture Input Corporation, Mr. P. J. Rana, Executive Chairman, Dairy Development Corporation, and other high level officers of His Majesty's Government and non governmental organisations.

Lastly Dr. Uday Singh presented vote of thanks (Appendix V).

The inaugural function ended at 11.30 A. M. and Rt. Hon. Prime Minister and Minister of Agriculture and Land Reforms with other distinguished guests moved for refreshment. After the refreshment, they had informal chats and group photographs with the participants.

Technical Session I

1.00 A. M. - 5 P. M.

Chairman: Dr. Thir Bahadur Singh

Paper presented and discussed:

1. Economic Contribution by Livestock Farming

Dr. T. P. Shrestha

2. Veterinary Field Activities

Dr. K. P. Dhakal

3. The Problem of Fodder and its Alleviation in the estern hills of Nepal

Dr. N. C. G. Hopkins

TEA BREAK

(v)

The 1st National Conference of Nepal Veterinary Association



Rt. Hon. Prime minister Shri L.B. Chand Inaugurating the conference



Dr. N.B. Singh, President, N.V.A. presenting the welcome adress

Economic Contribution by Livestock Farming

Tulsi Prasad Shrestha*

1. Livestock Farming

Livestock farming is an integral part of socio-economic life of rural people in Nepal. Livestock, mainly cattle, buffaloes, and to a lesser extent sheep, goats, pigs and poultry are maintained by most farm families as source of milk, meat, draught power, wool, eggs and manure. The religious custom of legal bindings on preventing slaughter of female animals has encouraged extensive breeding resulting indiscriminate increase in their population restricting their real usefulness to only manure production. Again, fertility of soil is traditionally maintained by extensive use of animal manure and compost. Further more, the dung is used as source of energy substituting the firewood mostly in tarai.

Bullocks, male buffaloes and horses are used as the means of transportation in the tarai whereas mules, chauries, and even sheep are used as pack animals in the hills.

The average performance of these animals is low mainly because of poor genetic make-up, poor feeding and maintaining them in diseased environment.

The sale of live animals for slaughter and/or draught power together with their products primarily milk, ghee and eggs provides farmer a major source of cash income.

* Agricultural Projects Services Centre (APROSC)

2. Importance of Livestock for Farming System and National Economy

(a) Livestock Population

The livestock statistics are extremely unreliable and the best estimates for the population for 1979 - 80 are set out below.

Livestock	Number in Million	Percent Distribution in		
		Tarai.	Mid - Hills	High - Hills.
Cattle	6.22	34.85	50.73	14.42
Buffaloes	2.75	25.21	61.80	12.99
Sheep	0.58	16.94	55.80	27.26
Goats	3.94	27.98	57.57	14.45
Pigs	0.33	31.88	54.94	13.18
Poultry	6.95	18.54	73.47	7.99
Ducks	0.15	92.52	6.28	1.20

Source: 1. Central Bureau of Statistics

2. Department of Agriculture Marketing Services

3. Various Integrated Rural Development Projects.

The livestock distribution figures in different ecological zones indicate the highest percentage of animals are present in mid - hills which is followed by tarai and then high - hills.

Among the cattle population highest percentage is concentrated in far - western region of the mid - hills, whereas large proportion of buffaloes, sheep, goats and poultry are present in western mid - hills. Pigs are concentrated in eastern mid hills.

92.52 per cent of ducks are distributed in tarai alone.

These figures indicate that Nepal has one of the highest livestock populations per unit of cultivated area than any country in the world.

The average rural household of 5.8 persons keep an average 2.50 cattle, 1.10 buffaloes, 0.23 sheep, 1.59 goats, 0.13 pigs, 2.80 poultry and 0.06 ducks.

(b) Role of Livestock in National Economy.

Role of livestock has a significant place in the national economy.

Product Originating in Livestock 1976-77

	in Million "Rs"
Milk and milk products	1342
Meat	344
Poultry and eggs	644
Hides and skins	141
Wool	164
Others	3
Sub - total —	2638
Manure used in Agriculture	240
As fuel	46
Bullock labour	375
Sub - total —	3299
Less intermediate products (Net)	306
Total Value of Livestock	2993*
GDP For total Economy —	16255
Gross Agricultural Products —	10389
Agricultural Share in GDP (%)	64
Livestock Share in GDP (%)	18
Livestock Share in Gross Agricultural Products	29
* Consists of Livestock Products	2638
Manure as fuel	46
Sales to agriculture net	309
Total Value of Livestock —	2993

Source: National Accounts Projects, The Agricultural Sector of Nepal, National Planning Commission Secretariat - 1976/77.

Livestock contributes about 18 per cent of the total GDP in the form of milk, milk products, meat, hide, skin and manure and shares 29 per cent of the agricultural GDP. The export of livestock products in 1980/81 amounted to Rs. 144.4 million, Rs 26.7 million from ghee and 117.7 million from hides and skins. Imports of livestock and livestock products consist mainly live animals for slaughter and wool for carpets, milk products and eggs, which amounted to Rs 120 million.

(c) Livestock and Environment.

During the past when the human and livestock populations were not competing to the arable land, adequate cultivated lands were available for crop production and sufficient green fodder and roughages were available for livestock. During that period it could be told that these were supporting each other, livestock providing manure to the farms and the farms providing greens and crop residues to livestock. Later on as the population of both human and livestock started increasing tremendously they started destroying the pasture and forest relentlessly for survival, consequently the environmental imbalance is increased resulting in soil erosion, shortage of fodder and firewood supply and reduction in food production.

Livestock needs continuous supply of greens and roughages which are received mainly from pasture, forest and crop production. Hence, livestock, forestry and crop production are closely interrelated in Nepal in order to continue supporting each other.

3. Livestock and Household Economy

Livestock contribute a significant impact in household economy. The important economic flow from livestock: to crops as manure, farm power and transport; to household as milk and milk products, meat and meat products, eggs, cash income and employment; and to market and industries as surplus milk and milk products, live animal, meat, eggs, wool, hides, skin and bones. The inputs received to maintain the economic flow to livestock: from crops as grains and crop residues; from pasture as grasses and grazing; from forest as fodder and grasses and finally from the household as capital inputs and labour.

Income is perhaps the most important quantifiable indication of economic development which a family receives from agricultural and non-agricultural sectors. The

milk,
ltural
n, Rs
stock
milk

source of agricultural income are: crops and crop by-products, livestock and livestock products, horticulture and other. Whereas for non-agricultural income are; salary, wages, rents, pension, remittances of earning from outside the country, income from business and others.

Average Rural Family Income

'Rs'

Category	Major Components			Total Agricul- tural Income	Total Non - agri- cultural Income
	Crops	Horti- culture	Lives- tock		
1. Marginal Farm Families					
Irrigated Farms	NA	NA	NA	1824	1694
Unirrigated Farms	1234	717	437	2493	2383
2. Small Farm Families					
Irrigated Farms	2097	473	1295	4177	1529
Unirrigated Farm	1899	405	1085	3574	1335
3. Medium Farm Families					
Irrigated Farms	3734	1621	1430	6805	1842
Unirrigated Farms	2667	548	1350	4584	1282
4. Large Farm Families					
Irrigated Farms	3762	NA	3395	8227	1931
Unirrigated Farms	2580	NA	1881	5144	1453
Rural Nepal Average	NA	NA	NA	3588	1981

Source: A Survey of Employment, Income Distribution and consumption pattern in Nepal, summary, Report, Volume - IV.
HMG, National Planning Commission Secretariat, Kathmandu, Nepal. 1978.

The above table shows the total rural family income from agricultural and non - agricultural sources for the four farm size categories. The agricultural income increases with farm size but the non - agricultural income peaks with marginal farm family.

Again, it indicates that livestock holds second important position for contributing the family income. Its share is above 45 percent in the agricultural income of large farm families, which is followed by 30 percent of small farm families and 24 percent of medium farm families. The marginal farm families, income constitute lowest livestock share.

Another study — "the role of livestock in the farming system in two cropping system of Nepal (Mathema S. B. and Van Der Veen M. G.)" also indicates that the size of benefit from livestock increases with farm size, however it provides a significant contribution to household income even in the very small farm. Livestock contributes 27 per cent of the income of households in Pardi Bhandi and 20 per cent of the income in Khandbari. In fact these informations cannot be generalised in the national context due to various limitations of the study. However it is interesting to note that further rise in income from livestock source can be expected if government supports for providing credit facilities at low interest rates, supplies improved breeding animals, provides best fodder and grazing area and arranges animal health services along with extension and training services at the farm - gate level.

Summary.

Livestock farming is an integral part of socio - economic life of rural people in Nepal. Livestock are maintained by all farm families for obtaining milk, meat, draft power, wool, eggs and manure. The sale of surplus livestock and livestock products generate cash income to the farm family.

Nepal's highest livestock population per unit of cultivated area in the world has contributed 18 per cent of the total GDP in the national level whereas it contributes 24-45 per cent of the total agricultural income of average rural family in four farm size categories.

The level of livestock income could be significantly further boosted up if government supports for providing credit facilities at low interest rates, supplies improved breeding

animals, provides best fodder and grazing area and arranges animal health services along with extension and training services at the farm - gate level.

REFERENCES

1. A Survey of Employment, Income Distribution and Consumption Patterns in Nepal, Summary Report, Vol - IV, His Majesty's Government, National Planning Commission Secretariat, Kathmandu, Nepal, 1978.
2. Nepal Agriculture Sector strategy study Vol. - I, II, Asian Development Bank, 1982.
3. The Role of Livestock in the Farming Systems in Two cropping systems program Technical Report, 1980.
4. National Accounts Projects, The Agricultural Sector of Nepal National Planning Commission Secretariat, 1976/77.



ZOONOSES - A PUBLIC HEALTH PROBLEM IN NEPAL

D. D. Joshi*

Introduction:

Zoonoses have been defined as "those diseases and infections which are naturally transmitted between vertebrate animals and man (WHO/FAO Expert Committee Report 1959/1982). Other definition is as all communicable diseases of man transmitted by vertebrate animals are usually called "animal diseases of man" or Zoonoses (Lysenko, Ed. 1982).

There is a global importance of certain bacterial, Viral and parasitic zoonoses and their major impact on the health and economy of many peoples. This impact is enhanced by the fact that in addition to direct transmission, a great number of such zoonoses may be transmitted to man from animal reservoirs via animal foods, other animal products and animal wastes. Other important zoonoses are Vector-borne zoonoses, which depend totally or partially on arthropod Vectors to maintain chains of infection in and between animals and human beings, thereby exposing large numbers of people to the diseases in question, such examples are as: plague, Japanese encephalitis, Russian spring-summer encephalitis, tickborne encephalitis and fleaborne encephalitis.

There is a great awareness among many public health officers of other countries and they are concerned primarily with the organization of comprehensive zoonoses control and eradication programmes, the development of surveillance and control programmes for the protection of vulnerable groups, the impact of zoonoses or socio-

* Chief, Zoonotic Diseases Control Section

economic development and the problems presented by emerging zoonoses. Effective control of the major zoonoses is indispensable to the achievement of the goal aimed by WHO and its Member States, namely that of achieving an acceptable level of "Health for all by the year 2000".

Epidemiology & Classification of Zoonoses:

A reliable epidemiological basis is essential for the prevention and control of human zoonotic diseases. Zoonotic diseases are divided mainly into three categories on the basis of causative agents.

1. Bacterial Zoonoses
2. Viral Zoonoses
3. Parasitic Zoonoses

Epidemiology of these above mentioned zoonoses are extremely diverse in their etiology, specificity of a causative agent for the given host, clinical manifestations in many ways of transmission from animals to humans, the distribution pattern and socioeconomic significance. Each of these criteria can be taken as a basis for the epidemiological classification of zoonoses. There are two of such criteria.

1. The way of the causative agent penetration into the recipient organism.
2. The way of transmission of the causative agent from the donor to the recipient.

However, the epidemiological classification of zoonotic infections foci is extremely inadequate. Hence it is one of the causes of insufficient progress in zoonoses control. Schwabe has described four principal types of zoonoses (Schwabe 1968)

1. The Direct Zoonoses e. g. rabies, brucellosis.
2. The Cyclo Zoonoses e. g. taeniasis, hydatidosis.
3. The Meta Zoonoses e. g. arbovirus infections, Japanese encephalitis, trypanosomiasis.
4. The Sapro Zoonoses e. g. histoplasmosis, Larva migrans.

Epidemiological classification of zoonotic foci are based on the patterns of epidemic process in zoonoses. These patterns are as follows (Lysenko Ed. 1982).

(A) Epidemic process development in natural foci of zoonosis.

1. Spread of infection from wild animals to man e.g. tick borne encephalitis.
2. Spread of infection from domestic animals to man e.g. trichinellosis.
3. Spread of infection from man to man e.g. trypanosomiasis.

These above mentioned epidemic process are categorised in two types:

1. Epizootic process in a natural focus.
2. Epizootic process among domestic animals.

(B) Epidemic process in settlement foci of zoonoses

1. Epizootic process among domestic animals.
2. Dependent epidemic process.
3. Independent epidemic process (Spread of man to man infection).

Present Status of Zoonotic Diseases in Nepal:

Most Commonly found, diagnosed, and recorded zoonotic diseases both in animal and human of Nepal are as follows (Joshi 1982, Report of zoonosis 1982).

1. Rabies.
2. Japanese encephalitis (Arbo - virus encephalitis)
3. Brucellosis
4. Salmonellosis
5. Echinococcosis/Hydatidosis.
6. Leishmaniasis.
7. Toxoplasmosis
8. Fascioliasis
9. Trichinellosis.
10. Taeniasis
11. Leptospirosis
12. Glanders
13. Staphylococcoses
14. Streptococcoses
15. Contagious ecthyma
16. Ascariasis.

17. Snakebite poisoning

18. Tuberculosis.

Zoonoses Surveillance, Diagnosis and Control Activities in Nepal:

Zoonotic Diseases Control Section (ZDCS), Epidemiology and Statistics Division of the Department of Health Services has started epidemiological surveillance, diagnosis and control activities of some of the important and highly prevalent zoonoses of the country.

Rabies:

Rabies is most dangerous disease both for human and animals. 99% of human rabies is from dogs. Pre and Post exposure immunization of dogs and other animals is shown in Table 1. Post exposure human treatment rendered against rabies in different hospitals for the year 1981/82 is presented in Table 2. Reported death cases of hydrophobia (human rabies) in different parts of Nepal is shown in Table 3. Every month 50000 ml of sheep brain BPL antirabies vaccine is being imported by this section through WHO. Biological Products Division, Rabies control project is producing sheep brain Phenolised vaccine for animal use. This section is also responsible to produce BPL Sheep brain vaccine for human use in near future.

Rabies surveillance and control project has now been just started in Kathmandu Valley with close co-operation of Ministry of Health and Agriculture and all three town panchayats of the valley.

Table 1.

Pre and Post Exposure Immunization of Dogs and other animals by different Veterinary Hospitals.

Immunization	Number of animals immunized in Years.					
	1977/78	1978/79	1979/80	1980/81	1981/82	Total
Pre Exposure	2544	2798	4163	5090	3423	18178
Post Exposure	535	711	889	891	1075	4101

Post Exposure Human treatment against Rabies in Different Hospitals for the year (1981-1982).

Table 2.

S. N. Hospitals	Number of cases vaccinated (treated)				Total	
	Male child	Female child	Male adult	Female Adult	Male	Female Total
1. Janakpur Hospital Dhanusa	170	67	208	78	378	145 = 523
2. Sariahi Hospital Sariahi	5	—	3	1	8	1 = 9
3. Narayani Zonal Hospital Birganj, Parsa	139	57	162	42	301	99 = 400
4. Hetanda Hospital Makawanpur.	6	1	7	2	13	3 = 16
5. Shree Mahendra Chikitsalaya Bharatpur, Chitwan	46	25	50	38	96	63 = 159
6. Infectious Diseases Hospital, Kathmandu	973	466	1537	732	2510	1198 = 3708
Grand Total	1339	616	1967	893	3306	1509 = 4815

Table 3.

Reported deaths due to Rabies in different parts of Nepal.

S. No.	Hospitals.	Number of Death Cases Reported					Total
		1978 .	1979 .	1980 .	1981 .	1982 .	
1.	Infectious Disease Hospital	5	4	6	15	5	= 35
2.	Koshi Zonal Hospital,	4	2	4	6	1	= 17.
3.	Sagarmatha Zonal Hospital.	2	3	2	1	1	= 9.
4.	Janakpur Zonal Hospital	3	2	4	6	2	= 17.
5.	Narayani Zonal Hospital, Birganj.	4	1	3	5	2	= 15.
6.	Ramechhap Hospital	-	2	1	4	1	= 8.
7.	Lumbini Zonal Hospital Butwal	1	3	2	4	2	= 12.
8.	Bharu Zonal Hospital Nepalganj.	2	4	3	2	3	= 14.
9.	Gorkha Hospital	-	1	4	5	1	= 11.
10.	Karnali Zonal Hospital, Dume.	2	3	5	2	1	= 13.
11.	Surkhet Hospital Bheranagar	5	6	3	7	3	= 24.
12.	Kailali Hospital	2	1	2	1	3	= 9.
13.	Kanchanpur Hospital, Mahendranagar.	1	2	1	1	1	= 6.
Grand Total.		31	34	40	59	26	= 190.

Source:- Author's Survey and Hospital Records.

Japanese Encephalitis (J. E.)

J. E. is reported, diagnosed and recorded first time in Rupandehi district of Nepal in 1978. Since then an epidemiological study of viral encephalitis (J. E.) was conducted by ZDCS and completed in 1982. (Khatri et al 1982). This disease is caused by arboviruses (arthropod borne animal viruses) infection. Its epidemiological cycle is in domestic animals (pigs & horses) and birds (wild & pet) and blood sucking arthropods (Mosquito - culicine spp.) Cases and deaths due to J. E. during 5 years are shown in Table 4. Serological findings of J. E. both in human and animals during the year 1980/81 is presented in Table 5. The infection rate in human and animal is 38.7% and 28.85% respectively.

Table 4.

Recorded cases and deaths from J. E. in Nepal
(1978 - 1982)

Year 1978 - 1982

Year	Age group recorded cases						Age and sex not stated	Total cases and death		
	0 - 4 years		5 years to 14 years		15 years and above.					
	C	(D)	C	(D)	C	(D)				
1978	20	(7)	60	(11)	93	(30)	248	(65)	427	(119)
1979	26	(7)	33	(10)	33	(9)	90	(23)	182	(49)
1980	78	(25)	231	(73)	29	(25)	20	(9)	622	(231)
1981	17	(4)	20	(6)	27	(6)	—	—	54	(16)
1982	71	(15)	292	(117)	342	(99)	132	(60)	843	(390)
Total	212	(58)	636	(217)	778	(374)	502	(156)	2128	(805)
% of Total	9.9	(72)	29.8	(270)	36.6	(46.4)	23.6	(9.4)	100%	

Table 5.

Serological findings of J. E. both in human and animals
During the year 1980/81

S. No.	Serum Samples of	Total serum tested,	Positive serum sample	% of infection
1	Human	431	167	38.74
2	Animal	146	42	28.85

Brucellosis:

Human serum samples from clinically suspected brucellosis cases have been collected regularly from Bir Hospital, Teku, Kathmandu. Incidence rate for three years is 6.08 (1430 samples tested) which is very alarming situation (see Table 6).

Animal serology is also being carried out in Animal Diseases and Parasite Control Division. It is found that the infection rate in cattle and buffalo is higher than sheep and goat, which is 8.70% (1069 sample) and 3.64% (247 samples) respectively (Table 7).

Table 6.

Serological finding of human Brucellosis in Kathmandu,

Year	Human serum samples,			
	Total sample tested,	Positive serum sample,	Negative serum sample,	% of Infection
1979/80	150	16	134	10.66
1980/81	530	29	501	5.47
1981/82	750	42	708	5.60
Total	1430	87	1343	6.08

Table 7.

Serological findings of Animal Brueellosis in Kathmaddu.

Year	Catle and Buffaloes				sheep and goats		
	Total Sample tested	Positive serum sample	% of infection		Total Sample tested	Positive serum sample	% of Infection.
1976/77	199	12	6.03		65	2	3.10
1977/78	276	9	3.26		120	4	3.33
1978/79	265	11	4.15		52	3	5.76
1979/80	95	24	25.26		—	—	—
1980/81	95	21	35.59		—	—	—
1981/82	175	16	9.14		—	—	—
Total	1069	93	8.70		247	9	3.64

Echinococcosis/Hydatidosis Survey:

Recently this activity has been started by ZDCS in Local slaughter houses. The collection data of human cases also have been started from the operation theater of Bir Hospital. The first preliminary report will be published in January 1984.

Snakebite Surveillance:

This activity is introduced by the ZDCS from last fiscal year. The snakebite human poisoning cases are more in plain (Terai) district of Nepal. Human death cases are recorded more than 100 per year. The final report will be published in near future.

REFERENCES

1. Khatri, I. B. Joshi, D. D., Pradhan, T. M. and Pradhan S. P. Status of Viral Encephalitis (Japanese encephalitis) in Nepal 1983. J N M A, Vol 21 No. 1 PP: 97 - 110.
2. Lomonko, A. Ed. (1982) Zoonoses Control Centre of International Project, GENT / UNEP / USSR, Moscow.
3. Schwabe, C. W. (1969) Veterinary Medicine and Human Health, Williams and Wilkins Co, Baltimore, 2nd ed, USA.
4. WHO / FAO Expert Committee Report 1959. WHO HQ, Geneva.

Now we are here at your service for all kinds of Veterinary supply.

ANTU TRADING CIRCLE

Dharan Road

Biratnagar, (Nepal)

Phone: 2075, 2079

Authorised stokist:

Cadila, Pfizer, glaxo, pearl Chemical, Cynamide, Indian Herbs, Bhartiya Bootee Bhawan and Concept pharmaceuticals.

THE PROBLEM OF FODDER AND ITS ALLEVIATION IN THE EASTERN HILLS

* N C G Hopkins

Introduction

Many people working with livestock in developing countries agree that shortage of fodder is one of the major constraints to increasing animal production. Nepal is no exception to this general statement and it may be argued that, with one of the greatest rural human population densities in the world (0.11 ha per person), the animal nutrition problem here is greater than in most other countries.

This paper describes the existing fodder situation with regard to ruminants in the eastern hills and suggests methods for its alleviation. Until this fundamental requirement of an adequate plane of nutrition has been met, the benefits due to other inputs such as animal health programmes and improved breed introduction cannot be fully realized.

Existing fodder situation:

During and immediately after the monsoon there is sufficient green fodder available for maintenance and production purposes. Animals put on weight lost during the dry season and without doubt are at the peak of condition compared to the rest of the year. Most are stall fed in order that they do not wander into growing human food crops. They are fed cut grass, maize thinnings, weeds, crop residue from early harvested crops etc. Fodder is not a problem at this time.

As the year progresses, the amount of green fodder available decreases and crop residue and fodder trees play an increasingly important part. The principal crop residue

* Livestock Adviser, Koshi Hill Area Development Programme

used is rice straw. Yields per hectare vary considerably according to rice variety, husbandry, etc. 7000 kg DM/ha may be taken as an average figure with an energy value 5.3 MJ per kg dry matter.

Maize stover is also fed, although to a lesser extent. It is estimated that yields are approximately 2000 kg DM/ha with an energy content of 7.3 MJ/kg DM.

Fodder trees provide a very valuable source of green fodder during the dry season. They are for the most part individually owned and managed. Little work has been done on the yields of these trees. An average of 50-90 kg fodder/tree/year is a reasonable figure although individual species e.g. *Ficus lacor* can give considerably more (150 kg/ year).

TABLE 1. Analysis of six common fodder trees

Fodder species	Dry matter (%)	Crude Protein (% DM)	Metabolisable energy (MJ/Kg DM)
Koeralo (<i>Bauhinia variegata</i>)	31	15	8.49
Tanki (<i>Bauhinia longifolia</i>)	33	18	6.97
Khanyu (<i>Ficus cunis</i>)	38	10	5.28
Safed cattro (<i>Ficus lacor</i>)	39	12	9.5
Dudhilo (<i>Ficus nemoralis</i>)	32	11	7.45
Kutmero (<i>Litsea polyantha</i>)	40	12	5.02
Average	35.5	13	7.1

It will be appreciated that analyses will vary according to stage of growth, season when cut, time of cutting etc.

TABLE 2. Area of fodder tree holdings

Farm Size (ha)	0 - 0.5	0.5 - 1.0	1.0
Trees per farm	7.0	16.8	25.3
Trees per livestock unit	2.52	4.0	8.0
L. U. per ha	8.0	6.0	2.5

It can be seen that the farmer with the larger land holding has the advantage over the smaller one in terms of fodder tree per livestock unit.

For communal forest, an estimate of 5000-7000 kg/ha/yr for fodder yield has been made. However, if degraded by overlopping and overgrazing, as is frequently the case in the hills, yields will be reduced to 1,000/kg/ha/yr. Excessive overgrazing has resulted in tremendous deterioration of natural pasture. It has been estimated that by protecting naturally occurring grassland and thus preventing overgrazing, production can be increased from 1,000 to 6,000 kg/ha/yr.

Quantification of energy situation:

It is possible to estimate the minimal energy requirements (for maintenance only) of livestock. Knowing stocking rates, this can be determined for an area of land of certain size. One can also quantify the energy available from the same area of land.

In Table 3 the energy situation with regard to fodder in the KHARDEP area is shown.

TABLE 3. Energy balance on land holdings of different sizes
(megajoules = MJ)

Holding size (ha)	Energy available (MJ)	Energy required (MJ)	Difference (MJ)
0.25	10.500	16.200	-5.700
0.50	21.490	22.280	-1.190
1.00	41.527	19.440	22.089

Table 3 illustrates that farmer with a small land holding is in an acute energy deficit situation. The man with 0.5 ha is almost producing sufficient energy to satisfy the maintenance requirements of his animals. The farmer with 1.0 ha or more has a substantial amount of energy available for production purposes.

The calculations used to derive the figures in Table 3 are based on many assumptions and a very simplistic approach has been adopted. There are many variables which could be introduced e.g. different crops and cropping patterns fodder from communal land etc. These are important but little data are available. They have thus been omitted.

The approach does, however, serve to demonstrate the point that the small farmer is in a grossly energy deficit situation and heavy reliance must be made upon communal land. In the KHARDEP area, 25% of the population live on 0.25 ha or less and thus fall into this category.

Methods of alleviating the fodder deficit Situation:

Several methods are advocated. Many have been proven in Nepal, others are practised elsewhere in the world.

1. Stall feeding

This practice is widely carried out premonsoon and during the monsoon months when all possible land is under cultivation. Farmers are therefore familiar with the idea. For the remainder of the year it is not widely used and it is strongly felt that stall feeding should be more widely advocated as it confers the following advantages:

- a) greater production of fodder per unit area of land compared to grazing the same area of land. This is widely accepted and 'cutting and carrying' is growing rapidly in popularity in many countries. Absence of constant grazing pressure allows plants to regenerate and permits continual sustained production. This means more fodder will be available per year from a given area of land.
- b) Maximum use of manure produced may be made. It will all be collected as opposed to the random scattering which occurs with the grazing animals. Thus a greater quantity of manure will be available and the quality will also be better as it can be correctly stored and applied at the optimum time of year.

- c) The comparative isolation in which stall fed animals will help to limit the spread of infectious diseases. Some of the diseases encountered e. g. Haemorrhagic septicaemia and F. M. D. are very infectious and spread rapidly through a susceptible population. Animals maintained in a stall on a farm will be less at risk than those on communal grazing.
- d) Collection and storage of all manure coupled with stall feeding should help to break the life cycles of internal parasites such as *Fasciola* sp. and various nematodes. Since many cases of infection are not apparent but nonetheless have an adverse effect on production, any measure aimed at reducing the level of infection is deemed desirable. Coupled with routine drenching at regular intervals, levels of parasite infection will be drastically reduced.
- e) Extremes of temperature, wind, sun and rain can have a marked negative effect on animal production.

Assuming that the stall is correctly constructed, it will provide protection against climatic stress. Local materials e. g. bamboo and thatch are perfectly adequate. This will have a very beneficial effect on production as it will mean that the animal will be able to utilise fodder more efficiently.

- f) Energy which would have expended while grazing will be conserved by the animal. In conditions of poor pasture, an animal can walk many kilometers in a day in search of fodder. The energy saved will be available for production purposes.
- g) The more palatable fodder species will not be eaten out. Under a free grazing situation, an animal will naturally select the more palatable and reject the less palatable species. Heavy overgrazing eliminates the palatable species and other, less productive, species take over. This is especially relevant to goats which are very selective feeders. This plant succession has already led to the establishment of the pernicious weed *Eupatoria* (Banmara) in many parts of the eastern hills.
- h) In the absence of overgrazing, a ground cover will become established helping to reduce erosion which is already a problem in many parts of the country.

It is recognized that stall feeding must be associated with increasing the fodder resource. It is also seen that it is idealistic to expect farmers to stall feed all the time and that some free grazing will occur.

One of the disadvantage with stall feeding is that the fodder must be cut and carried to the animal. This will increase the labour demand on the farmer and his family. This must be offset against the benefits described above.

2. Establishment of more Fodder Trees:

Fodder trees are already an integral part of the farming system and farmers are familiar with them. The majority of farms can greatly increase the number of fodder trees held. These can be planted along the borders of non-irrigated terraces, on waste land, on grassland and in gulleys on the farmer's own land. Seedlings are available from the panchayat nurseries, which are being set up under the Community Forest Development Project. As it takes 6-7 years before trees yield reasonable amounts of fodder, a suitable stopgap is provided by the use of improved grasses. At present there is not much liason between Dept. of Livestock Development and Animal Health and Dept. of Forestry personnel. This must be increased.

3. Planting improved grasses and legumes:

Experience at Pakhribas Agricultural Centre in eastern Nepal has shown that high yields can be produced by introducing grass and legume species with correct management. For *Setaria anceps* grown on terrace risers, yields of 17,000 kg DM/ha were found when the grass was cut monthly throughout the year. *Desmodium* sp. was felt to be the most suitable legume. Farmers can plant improved grass and legumes on land not capable of growing crops. In the absence of grazing pressure, they will make a valuable contribution to the fodder resources.

4. Community Forest Development Project:

This joint HMG (Nepal), UNDP, FAO and World Bank programme offers perhaps the greatest nationwide 'hope' to the fodder, fuel and timber problem. New legislation has been enacted which gives the villages greater responsibilities for and benefits from, existing forest and from plantations to be established. Forest nurseries are being established which will supply fuel, timber and fodder species for planting on communal land and on the farmer's own land. Under this programme,

two new form of land tenure have been introduced: Panchayat protected forest. Panchayat is responsible for the planting and protection of trees. They have total rights to the products. Panchyat Forest is a new plantation established on government-owned wasteland. Panchayat Protected Forest is an existing forest which needs to be upgraded or maintained with suitable management. Grazing animals is not permitted but people may cut and carry fodder.

III. Pasture management:

In areas of common grazing, correct management and improved grass and legume species would undoubtedly have a very beneficial effect on fodder yields. However, these improvements must be agreed on a community basis as for the community Forest Development Programme. In the absence of legislation, voluntary agreement is necessary to restrict grazing. This is, unfortunately, seen as being optimistic but, where possible, must be encouraged.

4. Treatment of Roughages:

As crop residues form such an important part of ruminant diets, means of increasing nutritive value will be highly advantageous. The technical means of treating straw are well established but, as yet, little work has been done on this process under the small farm situation in Asia.

Recent work in India at Pantanagar University recommends that a 4 - 5% urea solution be added to rice straw at the rate of one litre per kg. The straw is then stocked for four weeks and may then be fed. It is estimated that digestibility of urea ensiled straw is increased by 10% and intake by 30 - 50%. Work has also been conducted in Bangladesh in which rice straw was treated with the same quantity of urea as above but was then stored in mud-lined bamboo baskets for 20 days before being fed. Crude protein content, dry matter intake and metabolisable energy content all increased significantly.

The effect of urea on straw is well documented. In the Nepal hills, a method of straw treatment is required which will be acceptable to the small farmer. Work must be urgently carried out in this field.

7. Preservation of Fodder:

There is an abundance of green fodder during the monsoon period. In certain low rainfall areas e.g. Jumla hay can be made. Constant high humidity in the monsoon means that attempts at hay making have been largely unsuccessful. Silage is satisfactory under large-scale conditions but in the prevailing small farmer situation the high percentage of spoilt material resulting from aerobic fermentation makes it unacceptable. The use of additives etc. is not appropriate for the hills of Nepal.

8. Fodder Crops:

Land capable of growing food staples should not be used for growing fodder crops. There is however to a certain extent, a 'gap' in the existing cropping system. Only rice or maize crop is taken off some of the land which cannot be irrigated, which is followed by a long fallow period. This period is successfully utilised by a number of farmers for growing wheat or millet as a follow-on crop. In the Terai, some farmers are growing berseem and oats as a fodder crop. There are, however, still large areas of land used for one crop only. The most promising fodder crop appears to be an oat/pea mixture. It is hoped that this method will have great potential for the future.

9. Use of Azolla Sp.

Recent work has shown the feeding value of Azolla sp. a free floating aquatic fern which carries a nitrogen-fixing blue-green algae as a symbiont. Azolla sp is already used in paddy in Nepal. In Sri Lanka it has been grown specifically for use as a livestock feed for pigs and calves. This appears to be a very useful feed with a protein content of 28% DM and digestibility of 68%.

10. Reduction of Livestock Population:

The remaining way to alleviate fodder deficit is to reduce the demand by reducing livestock numbers. This is a problem faced by many people working on animal production in developing countries. Nepal is especially difficult as livestock form

such an integral part of the farming system. One possibility is to encourage the export of surplus animals to neighbouring countries. It is recognized that this at present is illegal but it is hoped that the serious fodder situation may be of necessity to bring about a change.

Conclusion:

The purpose of this paper is to describe and demonstrate the acute fodder problem in the hills of Nepal. It is too easy to assume that animals will receive enough nutrition and therefore to concentrate on other fields of work such as clinical treatment, drenching and vaccination campaigns, distribution of improved breeds etc. These are also very important but to fully realize their potential benefit the problem of fodder must also be worked at.

**RABIES IS A NATION WIDE PROBLEM
BOTH IN HUMAN AND ANIMAL POPULATION**

We always produce quality
vaccine to protect your

VALUABLE ANIMALS
from
RABIES.

For Reliable Diagnosis of Rabies

We are at your service
&

We never forget how important
you are

Rabies Control Project

Tripureshwar, Kathmandu
Phone:- 2-11335

PROBLEM AND PROSPECTS IN ANIMAL RESEARCH

N. B. Singh *

Research is an analytical inquiry about something. The reputed French Scientist Louis Pasteur, the founder of the Science of Microbiology, Immunology, Epidemiology and Parasitology had said "there is no applied and fundamental science, there is science and its use in practice." The present trend is to group scientific study as

A) **Basic research:** Experimental study of problems of inherent scientific interest and merit which is not necessarily concerned with solving immediate problems. Basic research provides fundamental knowledge which can be the basis for problem oriented research.

Pure basic research (curiosity motivated) has no economic or social aim other than advancement of knowledge. Curiosity motivated research had been responsible for great discoveries like atomic energy, recombinant DNA technology and several other scientific achievements.

Strategic mission oriented research (within a specified broad area) contributes for great discoveries and generates basic knowledge for the solution of well identified practical problems.

B) **Applied research:** aims at solving well recognised problems. It is the application of fundamental scientific knowledge for solving identified problems.

C) **Disciplinary research:** within a limited faculty for example Veterinary Science and profession recognises research on disciplinary basis such as:-

Pre-clinical: basic science such as biochemistry, physiology etc.

* Animal Diseases & Parasite control Division, Tripureswar, Kathmandu

• **Para-clinical:** basic disease processes and laboratory diagnostic aspects.

Clinical: application of the knowledge in package for solving disease problem.

Scientific research is necessary for the development of appropriate technology. Technology can be defined as idea, method or equipment through which inputs are converted into output. West Australian Institute of Technology defines technology as "application of creative thinking and ingenuity to the solution of definable and practical problems in all fields of human endeavour."

Modern technology has much merit. It can make a country economically sound and strong. Several developing countries are very poor inspite of their rich national resources. Importation of modern technology without capacity to adopt, sometimes can be disastrous for developing countries. Well adopted skill and indigenous technology available in developing countries can be updated through research. Proper amalgamation of modern technology with local skill can be far superior for developing countries. Technology developed in industrialized countries has made the life much easier. This is the age of technology. Development of a country can be judged through its research capability. Poor quality and insufficient manpower is the basic problem before developing countries like Nepal. Lack of motivation to scientists has created problem of retention of available scientific manpower in developing countries. Because of poor technological level developing countries are facing several difficulties in raising the living standard of the people. Ignorance is the sole cause of the poverty and misery in the third world countries. Not less than 400 million people living on this earth today are the victims of food problem. Nepal is no exception to this. More than 50% of the health problem of the people of this country are directly related to protein and other deficiencies. In Nepal density of livestock is the highest in the world. Livestock provides 25-40% of the cash income to small farmers, contributes 15% in GDP and shares 25% of the total agricultural sector. Livestock in this country is also considered, as the backbone of agriculture besides being a principal source of food (protein), work power, manure, fuel etc. But when we look at per-capita consumption of animal products probably it may be the lowest even in Asian standard. Thus sufficient nutritive food (animal source) and employment for 1.5 million people is the challenge before the animal scientists of this country. It is possible to double livestock production through the application of suitable technology.

Veterinary science and profession is very closely associated with major biological resource (domestic and wild animals). Research in any aspect of animal science whether it is animal health problem (diseases, infectious, parasitic, toxicological, nutritional, genetic or related to faulty husbandry) or production (breeding, feeding, management and marketing) are well under the competence of veterinary science and profession.

Protein synthesis is the life process. Animal body synthesises protein for its vital life activities such as reproduction, growth, maintenance of health etc. Research for development of a technology that can intensify the process of biosynthesis within animal's body and insure the losses due to diseases can elevate the livestock out-put. Nepal definitely has better environment for livestock development. The task before the scientists in this field is to intensify research and develop an appropriate technology to achieve maximum from limited resources. It is very true that we can not stretch our agricultural land unlimitedly but technology has no limit. There is good scope for achieving more from our monogastic and ruminant livestock if we could mobilize and improve our available resources with the help of advance knowledge. Human brain, strong will for work, and a clear vision are the best capital resource of a country. Brain, hard work and suitable environment are necessary to make things happen or take shape.

Problems of research:

There are great many constrains in development of animal research. The basic problems can be identified as:

Poor manpower Situation: There is no institute for higher education in veterinary science and animal husbandry in Nepal. As a result there are very few personnels available both for livestock development and research activities. At present nearly 200 Vets are deficit for differt animal health activities in the Government sector. One Vet. in this country has to serve nearly 300000 animals. Specialized (M. Sc., Ph. D.) man power is insignificant. Under these circumstances it would be an exaggeration to talk much of research. His Majesty's Government is effortful to encourage farmers to produce more and more livestock products and make the country self reliant on animal products. But unfortunately shortage of manpower has become a serious bottleneck.

Management: Good management system is the prerequisite for effective research. Administrative system of civil servants is not suitable for good quality research output.

Status of researcher: Researcher in this country has low status in government and other walk of life. Because of no prospect being in research even good genius and talented personnels leave country, become non professionals or try to become administrator for better status.

Type of responsibilities: In most instances a scientist is responsible for several different types of activities and gets very little or no time for research work.

Negligible research funding: It is difficult or at times impossible to continue the work due to non availability of funds or research material at right time.

Financial state of researcher: A tight salary compels the worker to seek part time job to meet the family expences. Thus he gets no time to devote for research.

Lack of motivation: There is no incentive such as status in society, academic gain, promotion to higher level, recognition for work or monetary advantage for dedicated research work.

Study and training oppertunities: Scientist get little oppertunity for higher study and training in specific field.

Type of work: Work assigned to the scientist differs from his faculty of specialiazation in most instances.

Poor facilities: Non availability of scientific literature or reference material, inadequate laboratory equipments, unreliable services such as water, electricity, maintenance and repair of equipments, creat difficulty in initiating and continuing the work.

Lack of research guide: No research guides, supervisors and support staffs are available to guide, supervise and monitor research finding.

Lack of coordination: In most cases the research is done in isolation as there is no mechanism for co-operation between research institutes, within the country and with other parts of the world.

Lack of extension agencies: There is poor extension organisation to take the research output to the ultimate user for diffusion.

No feed back: Complete absence of feed back and follow up mechanism.

No research information service: There is no documentation centre from where a scientist can update his knowledge about recent development in science and technology.

Prospect of research:

Livestock can become a leading industry in Nepal in near future if the constraints to the research are removed and better research environment is created. Livestock raising is one of the fields of activity which has been adopted by larger population. It can be the dependable economic support to the poorest landless farmer and a viable profit making industry for economically well placed people.

Strategy of Animal Research:

1. Development of technology for better economic return from biological resources. Improve productivity and minimise spoilage taking place anywhere from producer to ultimate consumer.

Maximization of output from minimum input.

Domestication of non-conventional species of animals (musk deer to extract the valuable musk, Angora rabbit, Angora and pashmina goats for production of fine fiber for industry.

2. Improved quality of human life:

More protein food of animal source for physical and mental well being of the people.

Better environmental hygiene to control communicable diseases.

Prerequisite for research development:

The first step in promotion of research development could be the creation of a research environment through the development of:-

Research manpower Development:

Research scholars are the real assets of a country. Qualified and skilled researcher is the first and foremost prerequisite for research development. To achieve this:

University should produce graduate, post graduate and doctorate level scientists and technological personnels in sufficient number without delay. This could be done through establishment of institute of veterinary science and animal husbandry. So that competent manpower covering all aspects of animal sciences (health and production) could be generated within the country in sufficient number to gear up development of research.

Recognition of existing government institutes for research and teaching. This could be the best use of limited available facilities for developing scientific man power in the initial stage. Opportunity for higher qualification such as Graduate, Master and Ph. D. degree can attract competent scientists. This can be one of the ways to motivate the research student towards better research output. The student can under take research projects as part of their thesis work.

Enrolment of the HMG technical staff by university for higher education on specific faculties. This can update academic qualification and research knowhow of the scientist not involving extra cost and without diverting researcher from assigned duty.

By sending large number of students to foreign country for higher education. Qualified teachers under the University can initiate research based on available resources as a part of duty.

University should recognise HMG by research organisations and honour competent HMG scientists (honorary or visiting professor, readers and research guides) to make optimum use of available manpower and to bring the scientists of the country closer.

Concerns like drug companies, feed industries, commercial livestock concerns organisations like RONA and NCST could promote research man power development by awarding scholarships and grants.

Competent scientists should be invited to under take research project on contract. This can help in promotion of research and updating research capability.

Financial organisation like Commercial banks should grant longterm soft loan to the students under condition of payment after getting employment. In this way even poorest scholars can continue their higher education and talent can be brought of lime light.

II Research management:

Research manager play key role towards good research output. Research manager needs a combination of scientific knowledge and administrative skill. A manager needs to play diverse role and should have integrity and clear vision for the development of organisations.

Training is necessary to make a research manager more effective in every aspect of research management. Through training, research manager can acquire better skill on:

- Administration: (a) personnel (b) financial (c) procurement.
- Management: foreseeing, leading, controlling, directing, planning, fixing priorities, coordinating, evaluating, monitoring and if necessary restructuring research projects.
- Communication: ability to give clear and accurate directions and comments on research activities.
- Documentation: preparation of progress report, technical report and scientific reports.
- Training and teaching: to update the skill of the different level of workers and improve their performance.
- Motivation: Capability of motivating the subordinate and winning their confidence.
- Maintenance of inter-relationship between research group and researchers in person.

III Motivation to researcher:

- Providing better status to satisfy psychological and physiological needs of the researcher.
- Recognition for the achievement
- Attractive salary.

- Opportunity for higher qualification for updating of the skill.
- Visits of foreign countries where he can exchange views with fellow scientists and get acquainted with new techniques.
- Participation in workshop, symposium and seminar to make him proficient.
- Better working facilities for smooth uninterrupted working.
- Suitable institutional infrastructure to facilitate working.
- Better social security to maximized active participation and more devotion in research.
- Free time for creative thinking, study of literature and work.
- Availability of research guides and competent research support staff.
- Good library, scientific literature and reference material facilities.
- Reliable services such as consistent water and power supply, effective equipment repair and maintenance service.
- Efficient extension to carry the research output to the ultimate user and a reliable feedback mechanism.

Research Methodology:

- (1) Collection of facts (2) Analysing the situation (3) Identifying the problems. (4) Fixing of priority based on its economic, social or public health importance (5) Developing plan of action (6) finding out the cause of the problem and relevant information (7) Hypothesizing (8) Implementing plan of action, survey/experiment (9) Evaluating the findings. (10) Seeking solutions of the problem (11) Compiling and concluding the research findings (12) Studying the economic impact of the project.

Research field where veterinary scientist can contribute.

- **Animal health:** Current knowledge of the disease is necessary for effective disease control.
- Investigation of the profitability of animal health activities.
- Identification of prenatal, postnatal and post weaning mortality problems.
- Epidemiological investigation of infectious and parasitic diseases and their surveillance.
- Study of resistance pattern in microbes and parasites.
- Study of favourable genetic combination in consideration with adaptability and productive potentialities.

- . Biological and drug production.
- . Disease and conditions causing sterility and abortion.
- . Nutritional, Metabolic and Toxicological condition.

2. Nutrition:

There is great dearth of feed and fodder for livestock. It is estimated that our animals get near about 53% of their feed requirement.

- . Better use of crop residue and agricultural byproducts as animal and poultry feed.
- . Study of integration of livestock with the cropping pattern (Agricultural) and forestry.
- . Selection and propagation of suitable fast growing fodder species.
- . Study of usefulness of non-conventional resources as animal feed.
- . To develop fodder conservation technology especially in high hills.
- . Inter-disciplinary approach to develop community pasture.
- . Synchronization of reproductive cycle in relation to feed situation.

3. Genetics:

Improvement of productive traits in our animals with due consideration to adaptability and disease resistance.

- . Different combination of local and exotic genetic material.
- . Selection of productive traits in local animals.
- . Semen preservation technology.
- . Embryo transplant experiments.
- . Natural and artificial breeding, its impact on genital health of animals (metritis, brucellosis, vibriosis, etc.)

4. Management:

Introduction of exotic blood necessitates a change in altitude and pattern of conventional management system for better profitability from livestock, especially when livestock takes the shape of an industry.

Avoidance of stress due to faulty husbandry practices which may predispose animal and birds to disease and severely affect productivity.

Economic management of available feed resources.

Production of better quality products for more economic return.

Synchronization of breeding in consideration with (a) Saving labour (b) improve fodder and feed situation (c) Potential and better marketing situation.

Minimization of spoilage of the products.

Identification of diseases which could be herd health problem.

Calling of undesired quality animals (poor genetic potential and from disease control point.)

Sanitary aspects in commercialized livestock or poultry (waste disposal, or recycle)

Zoonosis and environmental health

Disease common to man and animals. Diseases for which animals serve as the principal source of infection such as Rabies, Brucellosis, Encephalitis, Parasitic Zoonoses etc.

Contemporary biological science

Veterinary Scientist can play key role in advancement of contemporary biological science such as molecular biology, biochemistry, biophysics, endocrinology, microbiology, parasitology, entomology, genetic engineering, comparative pathology, virology, comparative medicine, pharmacology etc.

Basic information record for livestock research: (Data)

Reproduction:

Faecundity, Sex ratio, Fertility, Birth weight, Multiple birth, Birth rate, Suckling unit, Conception rate, Survival rate, Malpresentation, Variation of sperm (Male factor, Female factor), culling, selection.

Disease: Parasitic survey records, Postmortem record, Laboratory record, Epidemiological record, Slaughter house records, Hospital record, Drenching trials, Nutritional, Hereditary or genetic diseases, Ecology.

Feed: Pasture utilization, pasture quality, supplement feeding, standing crops, use of cereal stubble, non conventional resource utilization as livestock feed, stocking size of profitable grazing area.

External linkage

- . Use of research result for technological development.
- . Working relationship between universities, research institutes, farms and community.
- . Feed back mechanism.

Dissimination of research output/Technology

- . Use of technology (Beneficiaries)
- . Extension agencies and communication medias
- . Policy makers.
- . Training institutes.
- . Research funding organisations.
- . Research organisation of similar nature.

Reference

Data Karnali sheep farm (1980)

Data based on records of Jiri Livestock farm,

Rajbhandari and others 1973. A study of cattle improvement in Nepal
(Khumaltar farm records)

Report on preparatory phase of Parasite control project HMG/SATA 1973.

Sherchand and others 1973. A study of cattle improvement in Nepal.
(Khumaltar farm record)

Singh, N. B. Basnyat, B. M. Bomeli, GEW and Eichenberger J.

First Technical report, Disease Investigation & Parasite control project.

THE ROLE OF FIELD VETERINARY OFFICERS IN ANIMAL DISEASE CONTROL IN NEPAL

A. R. Mercy *

Introduction

The Field Veterinary Officer (F. V. O.) advises livestock owners on number of aspects of animal health and production. In the area of disease control the F. V. O. is involved in the diagnosis and treatment of disease in individual sick animals and in the prevention and control of disease in the livestock population of their district.

Because of the relative importance of the individual animal to livestock owners in Nepal it is not surprising that the greatest demand for veterinary advice is for the diagnosis and treatment of disease in individual animals. Whilst this area of work will undoubtedly continue to be a major part of the F. V. O.'s activity, greater emphasis needs to be placed on diagnosing and recording diseases which are responsible for serious herd mortality and or loss of production.

A definitive diagnosis of animal diseases is essential to enable correct treatments to be administered and to provide sound information on which to base a disease control programmes for livestock populations. A tentative diagnosis based on clinical observations and or reports from owners can sometimes be incorrect and lead to the wrong treatment being given or the wrong control measures being carried out.

In the case of individual animals the use of sophisticated laboratory tests to confirm a diagnosis is not practical and the clinician's judgement must be relied upon. However in the case of disease outbreaks where a number of animals are affected or are at risk it is much more important to try and confirm the diagnosis. In these

* Veterinary Services Specialist, Nepal-Australia Livestock Development Project.

cases failure to establish the correct diagnosis may result in quite costly loss of animals and/or production in the herd involved. Therefore where a number of animals are involved in a disease outbreak, it is important that a thorough investigation be carried out to establish a diagnosis.

Whilst a number of major disease outbreaks have been confirmed in Nepal over the years, there is a lack of reliable data on the prevalence of most livestock diseases. This incidently is not a problem peculiar to Nepal or developing countries but exists to some extent also in developed countries. To overcome this lack of information we need to have an effective system of investigating and recording the occurrence of disease in livestock.

The F. V. O. is the first "line of attack" in gathering this information which is essential to enable sound Regional and National disease control policies to be developed for Nepal. Because of the difficulties of communication and transport for livestock owners in Nepal, F. V. O. may have to be prepared to move out into the field more to obtain this information.

One of the major aims of the Livestock Development Project is a national programme to improve animal health in Nepal. Under this objective it has been proposed to:-

- (i) Increase the utilisation of the Central Animal Health Laboratory for diagnosing diseases.
- (ii) Have a standard method of disease reporting from field veterinarians.
- (iii) Undertake intensive disease reporting/monitoring in specific areas.
- (iv) Have a standard system of reporting and recording laboratory diagnosis.

Some aspects of these objectives will be discussed in relation to the activities of F. V. O.

Utilisation of the Central Animal Health Laboratory (CAHL)

Although a central Diagnostic Laboratory has existed in Nepal for many years, its utilisation by F. V. O.'s for confirming diagnoses of animal diseases has been limited. The main reasons for this situation are: difficulties in communication and transport, lack of facilities, laboratory equipment and trained laboratory personnel, and lack of equipment for collecting material in the field. Whilst the problems of communica-

tion/transport will continue, significant improvement has been and will continue to be made in the areas of facilities, equipment and trained laboratory staff. Officers have recently received post-graduate training in the disciplines of Histopathology, Virology, Bacteriology, Serology, Parasitology, Foot Mouth Disease and Laboratory Techniques. Existing laboratories have received new equipment and a new laboratory complex is being built which will significantly enhance the diagnostic capabilities of the Central Animal Health Laboratory.

Equipment for collecting and submitting sample to the C.A.H.L. will be distributed in Veterinary Hospitals together with a manual of procedures for F.V.O.'s giving details of how to collect and submit specimens for confirming the diagnosis of the different animal diseases.

Investigation of Disease Outbreaks

The essential components of a thorough disease investigation include:

- (a) Obtaining a good history (epidemiological data)
- (b) Examination of sick animals (clinical signs)
- (c) Post-mortem examination (gross pathology)
- (d) Laboratory confirmation (analysis of samples)
- (e) Reporting of diagnosis
- (f) Formulation of control measures (advice to farmers)

(i) Notification of Disease Outbreaks by Farmers.

A number of problems make investigating disease outbreaks in Nepal difficult but not impossible. Not the least of these is the tendency for livestock owners to only seek veterinary advice when animals are sick and not when they die. Veterinary Officers will need to stress to farmers (in extension programmes) the value of obtaining information from dead animals. Request owners and livestock assistants based in villages to report deaths and any sickness in groups of animals promptly to the Veterinary Hospital or Service Centre. Every effort should be made to examine the animal as soon as possible after death as post-mortem decomposition severely limits the usefulness of information and samples taken from carcasses which have been dead for some time.

(ii) Collection of epidemiological data.

A prerequisite to establishing the correct diagnosis and the significances of the problem is to record complete details of the history of the disease outbreak, i.e. species affected, total animals in the group, date of first death/illness, number dead, number sick, age, sex, condition of the animals. The history should include, recent changes in management, feeding, husbandry, environment etc.

Details of a thorough clinical examination of any sick animals should be recorded noting any deviations from the normal.

(iii) Post-mortem examination and submission of samples.

A thorough post-mortem examination of any dead animals should be carried out. Each body system should be examined carefully and deviations from the normal is recorded. The appropriate samples should be collected from apparently abnormal organs, tissues and preserved according to the instructions given in the Manual for Collection and Submission of Samples for Pathological Examination. Each sample must be clearly identified.

The details of the epidemiological data, history, clinical examination, post-mortem examination and samples submitted, should be recorded on a Report of Disease Investigation form. The samples together with the report should then be packaged in a suitable container (esky box or other container), addressed clearly to: The Central Animal Health Laboratory, Tripureswar, Kathmandu, and dispatched by the most direct route. Ideally this should be by air document or hand carried to enable the samples to arrive at the laboratory in the shortest possible time. It is important to try and notify the C.A.H.L. that samples have been dispatched and the details of their arrival so a check can be made that they arrive.

(iv) Laboratory analysis and reporting

On receipt of samples from the field CAHL will process them and report the results back to the F.V.O. who can then make the appropriate advice to the farmer. This may be to confirm the advice already given based on the tentative diagnosis or to give alternative advice if the laboratory tests indicate something different.

In either case it is important that the results be forwarded back to the F.V.O. as quickly as possible. In cases where a diagnosis can not be made the laboratory

can suggest possible alternatives. Similarly the laboratory will be able to give advice to the F.V.O. in cases where inappropriate samples have been submitted.

Disease Reporting and Monitoring

Another major role of the F.V.O. in disease control is in the area of regular reporting of the incidence of disease in their area. An important aim of the Livestock Development Project is to establish a system of standardised reporting in order to document the occurrence of disease in the various species of livestock throughout the country. It will be apparent that the value of this disease reporting will depend largely on the accuracy of the information submitted. Hence the need for an effective method of disease investigation as outlined above. A system involving monthly disease reporting detailing the occurrence of disease, some epidemiological data on the outbreaks and the method of diagnosis is proposed.

F.V.O.'s may also be involved in specific surveys and monitoring programmes in their area to determine the prevalence of individual diseases e.g. sentinel herd programme, parasite surveys, slaughterhouse surveys etc.

Conclusion.

The final step will be to collect and analyse all the information gathered from: laboratory records, reports of disease outbreaks, monthly disease reports, surveys and monitoring programmes. A systematic approach involving close collaboration between field and laboratory veterinarians is required to develop effective disease control programmes and improve animal health in Nepal.

REPORT ON ERADICATION OF FOOTROT DISEASE AT LUMLE
AGRICULTURAL CENTRE

N. P. S. Karki *

Introduction

Sheep is most desirous species of animal in the agricultural system of Nepal. It uses animal feed resources from remote area such as alpine pasture and forest land under the present migratory system of rearing. Most of the return in term of wool, mutton and manure is used by poor communities living in very cold region of higher hills.

An estimated population in 1981 (FAO), show a total of 2.399 million with production of 8 million kilogram mutton and 4.248 million kilogram greasy fleece. These products in current market price value to Rs. 391.936 million. Furthermore, crop production under the acidic soil condition of the hills totally depends on sheep and goat manure.

This enterprize appears to be gradually decreasing. Table 1 shows the total popuation in part of Kaski, Lamjung and Manang district, under migratory system in different years.

* Lumle Agricultural Centre, Lumle.

Table 1

Area	Recording Year		Recording Year		Difference
	Sheep	Goat	Sheep	Goat	
	1977 DEC		1982 DEC		
1. Kaski (Between Seti and Madi river)	2379	1797	2517	1641	
	1978 DEC		1982 DEC		Sheep population
2. West Lamjung (Between Rudi and Marsyangdi river)	3979	2770	3936	2656	Decrease by 1.02 %
	1979 DEC		1982 DEC		Goat population
3. East Lamjung	2193	2253	1746	1876	Decrease by 2.37 %
	1979 DEC		1982 DEC		
4. Manang	984	NA	970	NA	
Total	9553	6820	9169	6173	

LAC study in 1977/1978 of footfat free zone in Ghandruk area:

Cause for population decrease:

Lamb mortality	=	47.70%
Abortion	=	4.23%
Sale (Lamb + adult)	=	24.58%
Total	=	76.51%

Considering the above decreasing pattern of 76.51% compared with 70-76% lambing, there does not arise question of population rise.

Mortality pattern*:

Born Dead	=	14%
Six month disease	=	14%
Other disease	=	22%
Plant poisoning	=	3%
Accidents	=	17%
Predators	=	14%
Missing	=	16%
Total		100%

(* source LAC Annual Report 1977/1978.)

Above results show only 36% mortality by diseases and rest of the losses are due to faulty management practices. Internal parasites may account for large part of mortality percentage.

In such weaker livestock enterprise a new disease 'footrot' is being added. At present, the disease is confined in Chepe river of Lamjung in east and Seti river of Kaski in east, if it spreads to other parts, sheep industries in Nepal will collapse.

Footrot Disease:

Footrot is a infectious bacterial disease of the feet of sheep and goats. It does not arise spontaneously and requires predisposing factors for its spread. Of the many predisposing factors, wetness of feet, injury to interdigital skin from grass seed and larvae of strongyloid worm, rich lush pasture, leeches, mishaped feet are the common ones. All these factors are in abundance in Nepalese condition where sheep are raised under migratory system.

There are many other foot diseases such as bulbar necrosis, contagious ecthyma, interdigital dermatosis, ulcerative dermatosis, strawberry footrot, shell hooves and above all abscess from various causes. But none of them are as damaging as footrot.

Footrot is characterised by the separation of hoof from soft tissue of the feet due to spread of infection underneath the horn of the hoof. One or more hoofs at

a time are infected. As a result of infection, extreme pain is caused and the animal walks on its knee. Under migratory system, it leads to malnutrition resulting in great loss in lamb, lambing percentage and growth retardation.

Causative agent is *Fusiformis nodus* (*Bacteroid nodus*) which being an anarobe does not survive more than two weeks in pasture land. Infected animals alone are the main source of infection.

A similar bacteria *Fusiformis nechrophorus* which cause interdigital dermatosis help to spread the disease by opening portal entry to the footrot bacteria of the pasture land. Presence of *Fusiformis nechrophorus* in abundance in nature have been reported from India and Afganistan. Most tedious job in eradication of the disease is to indentify the subclinical cases.

History of Footrot Disease:

Shepherds and sheep owner of Kaski area claim that the disease was first time seen in 1960 ever since sheep imported from New Zealand for Pokhara Livestock Farm mixed up with their flocks. This have been contradicted by Mr G. M. Bennet, the Colombo Plan Consultant from New Zealand in 1958 by stating the presence of disease in Nepal. However, clinically the disease was diagnosed at Siklish village by a team of Nepalese and Swiss Vets in 1970.

Worsening situation due to the disease was reported by Mr J. S. Flatt, the senior agricultural advisor for Gurkha Reintegration Scheme of Nepal in 1971. According to his report, two third sheep population were found suffering from the disease and actually one third of them walking on knees.

Until 1975, no effort from any organisation was made for the control of the disease. In the mean time footrot spread to other areas through contact of flocks in common alpine pasture, and their movement to disease free area. The disease was believed to be confined in an area between Seti river in west and Marsyangdi river in east, however, later survey showed the presence of disease in Manang and East Lamjung.

First attempt to control the disease was made by sheep, goat and wool development project of UNDP/HMG in December 1975 in West Lamjung area and

by Lumle Agricultural Centre in Kaski area. After UNDP/HMG winded up in 1978, total work is undertaken by LAC. From 1978 until now, all area in Lamjung and Gorkha districts have been surveyed for the presence of the disease. Finding of survey result confirms that the disease is confined in the area between Seti river and Dordi river in east.

Present Footrot Prevelent Area:

Table 2: Footrot area and animal population in three districts where treatment was provided.

Area	No. of flocks	Population		Total	Remarks
		Sheep	Goat		
1. Kaski (East of Seti and West of Rudi River)	21	2732	1829	4561	
2. West Lamjung (Rudi East and Marsyangdi West)	31	4313	3177	4490	
3. East Lamjung (Marsyangdi East and Dordi West)	46	3103	2964	6067	
4. Manang (Chame South East)	22	1039	1585	2624	Stationary Sheep 278 Goats 752
5. Risk area (Dordi East and Chepe West)	33	2796	2383	5179	

Pasture situation and epidemiology of Footrot:

From village to village, there is change in the system but generally animals are exposed to three district environment in different types of pasture land

1. **Alpine pasture** (July - September): Alpine pasture are steepy in many places and extended between tree line and snow line on Southern slope of Manasalu, Lamjung and Annapurna Himalayan range. Ground remains wet from July to September with rain and cloud cover most of the time.

2. Summer pasture (within forest line, May - June and October - November): Summer pasture are at an altitude between 6000 ft. MSL. They too are wet and heavily infested with leeches. The pasture is very sparse and is scattered in patches; mostly forest under cover provides feed to the animals. Animals face heavy rain on upward and downward movement to alpine pasture. In the green lush growth of vegetation the feet remain constantly wet.

3. Village pasture (December - April): Village pasture at the time of arrival of flocks from alpine pasture remain wet but dries up gradually as spring approaches.

As flocks come down from alpine pasture, about 40% animals are found infected. During dry winter, there is spontaneous recovery but percentage of it could not worked out as treatment was offered at village level. In 1982/1983, with one dipping at this stage; a recovery rate in overall infected population was found to be 90 percent. Fresh case detected after monitoring, during the campaign in March/April show 4.7% of infection this can be considered as carriers.

Flocks with 4.7% of infected animal, spread the disease at Summer pasture where predisposing factors are in abundance.

Methods of Treatment:

Each individual animal is turned up, and the feet are pared to search out the lesion. After proper paring clean and infected animals are passed through foot bath for one minute in 10% formalin. Infected animals in addition are given intra muscularly, 70,000 I. U. procaine penicilline together with 70mg streptomycin per kilogram live weight. This treatment is repeated at an interval of 5 days for three times during campaign. Dipping of feet is done in plastic baby bath tubs available locally in the market.

Proper paring of feet to expose the lesion to air and dipping of feet in proper drug is prerequisite of the treatment. Other treatment such as parental antibiotic have only complimentary effect. It has been noticed that if antibiotic is not combined with treatment in highly infected flocks, recovery rate goes poor and as high as 28% carrier animals could be left at the end of third dipping. Where as combination with antibiotic, percentage of carriers is found around 2% only.

In the initial stage, only one campaign for footrot treatment was conducted in November/December at the height of infection and many carrier animals were left at the end of treatment. This jeopardise the whole effect of campaign in absence of slaughtering policy. From 1978 second campaign annually was organised prior the animals reaching to Summer pasture. This exercise also suffered, and failed to remove a few carriers at the end of treatment.

From 1982/1983 treatment procedures adopted are:

- | | |
|----------------------|---|
| a. November/December | - Monitoring the disease. |
| b. February/April | - Campaign on eradication of the disease. |
| c. June/July | - Follow-up visit to flocks. |

Vaccine:

Clovax vaccine was used from 1977 winter footrot campaign and was continued until 1979 winter. Neither the infection level nor the carrier animals at the end of treatment were reduced, thus, it was discontinued.

Recently, a trial is set in 9 flocks on Footvax vaccine (using 5 strain vaccine) produced by ICI Tasman Ltd, New Zealand and result will be available after coming November.

Carrier Animals:

Animals not responding to the treatment and with very bad mishaped feet are slaughtered. Compensation is paid at the rate of Rs. 8.00 per killogram liveweight and carcass is handed to the owner. This has been done in accordance with the decision made in a meeting at the office of Gandaki Zonal Commissioner.

Many of the sheep owner and shepherds of the area are co-operative and have been realising the value of removing carrier animals from the flocks. In case of resentment some time we are helpless in absence of any legislation to impose restriction at the national level. The result of removing carrier animals is favourable and flocks send without such animals return from alpine pasture without disease.

Man Power:

It is the biggest constrain in eradication of footrot disease any where else in

the world. In our case transportation of materials and handling semiwild animals all over the steeping slopes of higher hills creat more problem.

Constitution of each of the four working team:

Senior staff - 1, Supervisor - 1, Team leaders - 2, Team members - 4, Porters - 7.

Superviser down to team members, work on trimming feet where as porters handle the sheep and dip them in foot bath. Trimming the feet during spring time is not a relishable job, it requires a considerable strength. Hardy ex-servicemen from army and some young people from Gorkha and Dhading districts have been doing this job very efficiently.

Effect of Footrot in Sheep Production:

It is difficult to quantify losses as a result of footrot disease in private properties. As far as general observation is concerned restriction of movement under migratory system of rearing, the animals suffer very badly from malnutrition almost to the level of starvation most of the losses seen are:

- . high lamb and adult mortality
- . stunted growth and late maturity
- . poor lambing percentage due to loss of body condition
- . poor fertility
- . loss in wool yield

Comparing 13 flocks of East Lamjung having acute level of infection with other disease free 19 flocks within two years, gave the following results.

	Population in April 1981	Population in April 1983	Remarks
Clean flocks (19)	1935	2185	12.91% increase
Infected flocks (13)	1124	677	39.76% decrease

Other factors remaining same between clean and infected flocks there is a loss of 52.67% as a result of footrot disease.

Present Situation of Footrot Disease

Percentage of infection decreased sharply only within the area between Seti river of Kaski and Dordi river of Lamjung. On areawise basis, many flocks are now free

achieved but it has no meaning as we can not continue the programme for ever. We aim eradication and flocks after flocks are made free from the disease. This is the right time to initiate the country. Co-operation of all concerned to this challenging job of protecting our sheep industry is vital to the country. Thus, veterinary profession can be honoured for its role in achieving the objective of improving livestock production.

Reference:

1. Barber D. M. L. 1979,
"Footrot in Sheep", Vet Record 1 Sep 1979, Page 194
2. Beveridge W. I. B.
Necrobacillosis Footrot etc.
Advance in Bacteriology Volume II
3. Blood, D. C. Henderson T. A. 1979
Veterinary Medicine, Chapter 20.
4. David Kennday 1979
Footrot a real Headaches
Supplement to Agri Gazette, Vol 88, No. 6
5. Littlejohn, Annie I. 1957 The State Vet Journal, Vol XII No. 35
6. Thomes J. H. 1957,
Eradication Contagious footrot of sheep.
Australian Vet Journal Vol 33, No. 16, 263-266

DIAGNOSTIC ASPECT OF VETERINARY SERVICES IN NEPAL

B. K. P. Shaha *

Background Information:

The first recorded development of Animal Health Services in Nepal dates back to 1998. Considering the great animal disease problems FAO sent Dr. H. B. Shahi as consultant to study the situation and Dr. Shahi recommended for the establishment of a competent diagnostic laboratory in Kathmandu along with rinderpest control and other infrastructural development in Veterinary Services. On the recommendation of Dr. Shahi, Government of India assisted to built up veterinary infrastructure in the form of buildings, equipment, training and providing consultancy on rinderpest control. Meanwhile in 1969, Dr. Sitha Raman an FAO expert, was assigned to work for the rinderpest control programme and establishment of a vaccine production laboratory. Dr. Sitha Raman in his final report suggested for the development of veterinary diagnostic facilities and need for manpower development.

In 1969/70, livestock mission (FAO) along with other recommendations suggested for a parasite laboratory and parasite survey in Nepal. Following which, Govt. of Switzerland sent a team of experts for feasibility study on the parasite problems. In 1973, SATA and HMG agreed for the establishment of a parasite diagnostic laboratory in Kathmandu and to survey the parasite situation in some parts of Nepal. In 1974 Dr. Veera Raghwan, a WHO expert strongly recommended for the production of Rabies vaccine both for animal and human use and initiated lab diagnosis of the disease.

Late Dr. Shyam Bir Malakar in 1968, was the first to start laboratory diagnosis of the parasitic diseases. The diagnostic work was supplemented gradually in various

* Central veterinary Hospital, Tripureswar, Kathmandu.

disciplines like serological test for Brucellosis, intradermal test for T. B. and Johne's disease By Dr. D. D. Joshi, Pathological and bacteriological work by Dr. N. B. Singh, Virological diagnosis by Dr. S. Pyakural and finally Dr. U. Mishra worked for veterinary public health.

Thus the diagnostic system started taking shape. In 1974, after the termination of SATA/HMG Project on parasite control, parasitology laboratory was integrated with the disease investigation laboratory and became Disease Investigation and Parasite Control Project. Later in 1978 Asian Development Bank agreed to upgrade the Central Diagnostic Laboratory, as well as to update two Parasite control programme regional laboratories and one central FMD laboratory. In the mean time Rabies Diagnostic and Vaccine Production Laboratory is coming up under the HMG/WHO/ADB Programme. The Regional Diagnostic Laboratories which received limited input are still to be developed with equipments, building and manpower.

Organisation:

Presently the Central Animal Health Laboratory is headed by Chief Pathologist followed by Pathologist, Bacteriologist, Parasitologist, Virologist, Serologist, and is running efficiently. The following chart will clear the organisation pattern of the Central Animal Health Laboratory. Each and every unit is independent in their work but they are all integrated with each other in diagnostic work. In almost all unit the manpower has been trained abroad in various disciplines under the technical assistance of NALD Project. Besides the Central Animal Health Laboratory, the National FMD Control Project and Rabies Control Project are involved in specialized diagnostic services.

We are very much optimistic about the improvement of Laboratory Services in near future. The four Regional Laboratories are at Biratnagar, Janakpure, Pokhara, and Nepalgunj.

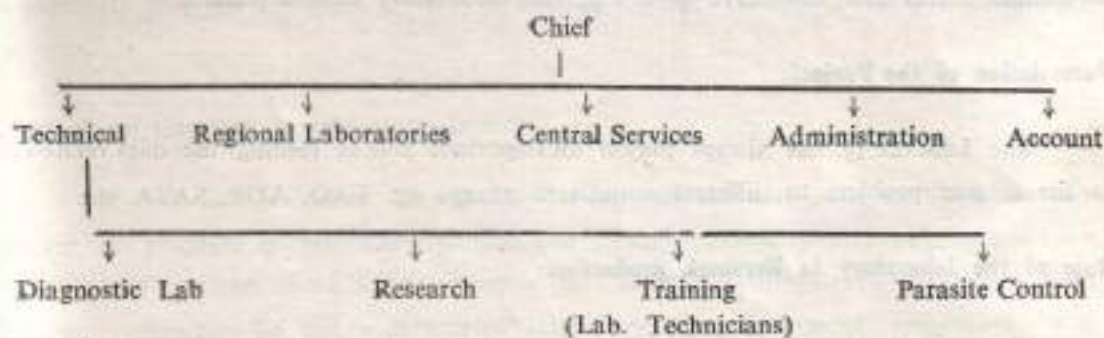
Laboratory and animal health activities:

The laboratory services in Nepal is involved in following activities:

- i) **Report of the outbreak:** Any outbreak of the disease in the country will be reported to the AHL for rational diagnosis through the fastest route of communication.

CENTRAL ANIMAL HEALTH LABORATORY

Organisation (activities)



- Pathology (General, Clinical, Poultry, Histopathology)
- Bacteriology and Mycology
- Virology
- Parasitology
- Serology
- Biochemistry and Toxicology (To be developed)
- Epidemiology and public health

- ii) There is a regular flow of samples from the field for diagnosis and reports are sent immediately back to the field to assist field veterinarians.
- iii) The laboratory is also responsible for collaboration between Veterinary Public Health and Public Health Laboratory to sort out the Zoonotic problems.
- iv) **Epidemiology:** This Laboratory maintains the epidemiological record of the disease existing in Nepal based on monthly epidemiological report received from every district veterinary hospital.
- v) **Research:** This laboratory also assigns the scientists with research problems related to animal health and will serve as a reference laboratory in near future.

Formulation of the Project:

The Laboratory has always played an important role in feeding the data related to the disease problem to different consultant groups eg. FAO, ADB, SATA etc.

Role of the laboratory in livestock production:

The Central Animal Health Laboratory is also indirectly responsible to increase livestock production. CAHL provides the services for:

- i) Screening of different diseases in Govt. as well as private livestock farms. (T. B, Johne's Disease, Brucellosis) and Salmonellosis in poultry.
- ii) Control of the disease: This organization has played very important role in controlling parasites which are considered as economically significant problems
- iii) Screening and monitoring of important viral diseases of livestock and poultry also involved in better disease surveillance.

Future scope of Laboratory Services:

Awareness about laboratory diagnosis is gradually developing among the livestock and poultry farmers. Now, it has become a trend to do detail laboratory investigation prior to prescribing treatment or initiate control measures. The rational laboratory diagnosis not only saves the time but also makes treatment and disease

control economic and effective. The misuse of antibiotics and some scheduled drugs needs to be stopped and better drugs could take up their place. Laboratory recommends the right medicine after investigating its effectivity. Though some of the laboratory investigations are a bit lengthy and time consuming but their value can not be under estimated. The scientists try their best to provide quick diagnosis by using modern techniques. In this connection serological, fluorescent antibody test and electron microscopy in diagnosis of particular disease are proved to be very fruitful and quick in services, although these electronic equipments are not only costly but their maintenance cost is also very high. A time will come when the use of electronic equipments will be economic and may be justified in terms of reduced cost of laboratory services.

Role of veterinarians in laboratory services:

To work in Laboratory, one has to be very skillful and proficient in his subject matter. A graduate in veterinary science and animal husbandry with appropriate knowledge and interest in laboratory work has sufficient competence to initiate basic laboratory investigation but sophisticated laboratory procedures need specialised higher education on the particular subject. Even in zoonotic health problems a Vet can give his helping hand in fields such as diagnosis and control of zoonoses. Veterinarians are also involved in diagnosing wildlife diseases in wild life conservation centres.

Duties of laboratory units:

Pathology: Pathology unit is overall incharge of diagnostic team and is responsible for the following works:

- i) Post-mortem of all dead specimens received at the laboratory and in the field.
- ii) Assignment of samples to different units.
- iii) Clinical pathology test.
- iv) Histopathological study.
- v) Collection of lab findings of different units and reporting back the final result.
- vi) Research activities and maintain liaison between different units of the laboratory.

Parasitology: is involved in following activities.

- i) Routine faecal examination for clinical cases.
- ii) Survey of parasitic diseases in different localities to study the epidemiology and parasitic ecology.
- iii) To conduct regular drenching programme in identified pocket area.
- iv) Engaged in research on parasitological problems of the kingdom.
- v) Culture and identification of the parasites.
- vi) Evaluation of economic impact of effective anthelmintics by field trials.

Bacteriology: Carries out following responsibilities:

- i) Isolation and identification of Bacteria.
- ii) Study of antibiotic resistance pattern and selection of suitable antibiotics for different organism.
- iii) Preparation of transport media and swabs for collection of materials from the field.
- iv) Isolation and identification of fungus.
- v) Involved in research activity on infertility problem and mastitis in cattle.
- vi) Carry out pathogenecity test.

Virology: under takes following responsibilities.

- i) Isolation, culture and identification of different viruses.
- ii) Preparation of tissue culture for lab work.
- iii) Isolation of viruses in experimental animals and in chick embryo.
- iv) Collection and dispatch of samples to reference laboratory for further investigation.
- v) To conduct viral serology to detect evidence of viral diseases of livestock and poultry.
- vi) Detection of antibody level in vaccinated animals such as Rinderpest.

vi) Involved in research activity.

Serology: is responsible for following activities;

- i) To carry out all bacterial serology.
- ii) Screening test of different diseases eg. Brucellosis, T. B., J. D., Salmonellosis.
- iii) Involved in research activity.

Biochemistry and Toxicology:

- i) To analyse tissue, feed plant etc to see their chemical contents which may be responsible for pathological condition.
- ii) Collection and identification of toxic plants and their toxic principles.
- iii) Assist in identifying deficiency diseases.

Epidemiology: This unit maintains epidemiological records of different diseases. These records clearly indicate the seasonal and regional pattern of various infectious and parasitic diseases. These records provide the main basis for the research and in project formulation and publication of annual technical report of the activities.

Regional laboratories: Are now only capable of rendering parasitological diagnostic services. These laboratories will be full fledged in future.

IMPACT OF ANIMAL HEALTH SERVICE ON NATIONAL ECONOMY

B. M. Shrestha *

Introduction

Agriculture is the dominant industry of our country and accounts for more than 90% employment and 70% of GDP. Livestock contribute about 15% of overall GDP and 25% of agriculture sector. Livestock is an indispensable part of agricultural production system. The average rural household of 5.8 persons with 1 hectare of cultivated land (Janison, 1980) keeps on an average 1.6 Buffaloes, 3.8 cattle and 2.2 goats which was found to be the highest ratio of livestock per household in the world. Livestock development programme launched during 6th five year plan period is expected to increase the production of meat and milk to 11600 and 149000 M. T. respectively.

Economy of livestock production: To supply the recommended levels of animal protein for the human population by the year 2000 AD, production of milk, meat and eggs will have to be increased substantially. An increase of this magnitude is only possible through increase in livestock productivity. To increase the livestock productivity, good animal health programme is essential because healthy animals alone can give optimum output. According to Keshary (1978) animal disease problems remain a barrier to livestock development programmes in this country.

If we critically look at the declining trend of livestock productivity and try to analyse the situation, it is evident that a number of factors are responsible for the situation.

* Livestock Development Project, Resource Centre, Nepalgunj.

The major problems can be the high prevalence of infectious and parasitic diseases.

Hassel & Associates estimated the loss of Rs. 3175 million rupees in 15 years time, Shing and others reported the estimated annual loss due to liverfluke disease alone to be worth 200 million rupees. Other important factors are poor genetic quality of the local animals and low quality as well as insufficient feed resources and ignorance of the modern husbandary practices among farmers. Estimated economic losses due to some of the important animal diseases is shown in the Table. 1.

Table 1: Estimated loss in million Rupees. (Hassels & Associates, 1979)

Disease	1980	1985	1990	1995
Foot and Mouth	110	123.3	134.4	144.8
Liverfluke	85	92	106	111
Haemorrhagic septicaemia	18	20	21	24
Rabies	4	4	4	5
Ranikhet	51	57	63	67
Fowl Pox	1	1	1	1
Brucellosis	3	4	4	4
Others	20	22	25	28
	293	323.3	358.4	384.4

Economic justification for any investment to be made on animal health needs to be based on cost effectiveness analysis. But in case of diseases like rabies threatening human life and well being of the people, social aspect could not be ignored. It has been realised that in a developing country like Nepal veterinary service is the immediate need of the farmer.

Investment made in the field of animal disease control programme can be economically justified on the basis of increased production. An example of the impact of disease control programme in terms of benefit/cost for FMD in India was 6:1, Trypanosomiasis in Nigeria 5:1 and deworming in Bangladesh was 25:1 (Mia & Kibre 1970)

The number of veterinarians in the whole country is 107, of this slightly above 50% are involved with animal health activities. There is great dearth of veterinarians and para veterinary man power even to carry out the existing animal health activities. In every country, veterinary profession directly contributes to livestock production system. Brine Hedley (1983) stated that the availability of veterinary services in any form in any area of a country, reduces the rate of animal mortality significantly.

Effort may be made in Nepal also to economically evaluate the impact of major disease control programme like Rinderpest eradication, Foot Rot control and parasite control programme.

Animal Health Programme: To provide the animal health services to nearly 95% of the rural population is a great challenge before the Department of Livestock Development & Animal Health.

Veterinary faculty is one of the oldest unit in the Ministry of Agriculture. And after 40 years of its existence even today there is a great shortage of the veterinary manpower. During the last 20 years, infrastructure for veterinary service was build under Indian assistance but there is no reliable system to fulfil the manpower need. As a result the disease control programme is suffering a lot. A veterinarian in this country has to serve nearly 300,000 heads of animals.

Almost many of the tropical diseases of animals are found in Nepal. Besides this because of unrestricted inflow of animals several exotic diseases has been threatening our livestock.

Our manpower situation is such that it is not possible to maintain regular surveillance and continue followup programmes. Reappearance of rinderpest in 1973 after 9 years of control is a burning example of our poor animal health manpower. Even after the control of second rinderpest out break through mass vaccination, we were bound to discontinue our follow up programme. A recent outbreak in neighbouring Indian state indeed is a great risk to our animals. Inspite of the realization of the risk we are vaccinating a small number of animals against rinderpest in selected districts under Livestock Development Project.

At present the animal health activities are rendered through.

1. Biological Products Division - to manufacture most important animal and poultry vaccines to meet the demand.
2. Animal Disease and Parasite Control Division - to extend diagnostic facilities to the veterinary hospitals, initiate disease control programme (Parasite control) and carry out research.
3. Veterinary Division - to provide technical guidance on field veterinary programmes, implement infectious disease control programme of national interest.
4. Veterinary Hospital in each of the 75 districts, to carry out and supervise animal health activities in the district.
 - a) Integrated rural development Programmes
 - b) Livestock development centres.
 - c) Coordinated livestock development centres.
 - d) Veterinary dispensaries
 - e) Check posts

Besides, each veterinary hospital trains local person from each village panchayat on veterinary first aid to make emergency service available at the village level. These village animal health workers are allowed to charge for their services and medicine.

The programme for strengthening of existing animal health infrastructure is under way with the Asian development bank loan and other bilateral agencies. But unfortunately there is no provision for training graduate, postgraduate and midlevel technical man power which is needed to shoulder different animal health and production programmes.

Preventive medicine and veterinary extension activities are more important in present context. Vets must convince the farmers about the modern technology of livestock production. Now the seeds of these concepts have taken root. I have the privilege to work especially in rural areas of Banke and Bardia districts and could succeed to generate the awareness among the farmers towards the animal health and production programme. I am pleased to inform the house that the farmers are quite receptive to the technology extended by experts.

By better extension technology we can further achieve and maintain the higher standard of animal health and productivity. It has been my feeling that the animal health programmes could play an important role in national economy, provided the services rendered are effective and timely. I have a strong feeling that the economic analysis of animal health programmes like benefit cost ratio on major diseases control are to be carried out which will contribute to show the impact of Animal Health Services in total national economy.

Reference:

1. Department of Livestock Development and Animal Health: prog. Rep. 1982 - 83
2. Ellis, P. R. - Asian Livestock VI, 5 May 1981.
3. Hassel & Associates - Livestock Development Project, Nepal, Appraisal 1979.
4. Hedley Brine (1983) - Personal Communication.
5. Janison D. T. - Population Committee Report, Nepal, 1980.
6. Joshi, D. D. - Livestock Trade Statistics of Nepal, Kathmandu 1979.
7. Keshary, K. R. - Livestock Production in Nepal, Proceeding of Livestock Development Programme for the Asian small farmer, 55th Annual Conference of Australian Veterinary Association Sydney, 1978.
8. Mia M. A. and Kibra Q. C. (1979) - A study of Livestock for the second plan, Bangladesh.
9. Nepal Agriculture Sector Strategy study Vol. II HMG/ADB, Dec. 1982.
10. Singh, N. B. Report on preparatory phase of Parasitic Control Project HMG/SATA 1973.
11. Statistical pocket book (1982), Central Bureau of statistics, Kathmandu.
12. Veterinary Division, Tripureswar, Kathmandu: Record (1982 - 83)

ROLE OF GENETIC IMPROVEMENT IN LIVESTOCK DEVELOPMENT IN NEPAL.

S. K. Shrestha *

Livestock the potential national resource:

With 6.7, 2.6, 0.55, 3.8 and 0.4 millions of cattle, buffaloes, sheep, goats and swine respectively, Nepal is considered to be the richest in livestock resource. Livestock is the integral part of the socio-economic structure of the rural people. Our religious sentiment, social bindings and behavior is focused towards the promotion of animal husbandry. Agriculture definitely occupies a top most position in term of employment generation and GDP but it is very much dependent on livestock. In spite of enormous effort put forward in developing agriculture all over the world, crop farming is still completely dependent on the blessing of nature in most parts of the world. Although by food habit we are mainly grain eaters but to what extent and how long we should be dependent on uncertain natural condition for grain production is the big question we need to ask ourselves. Effect of natural hazard on animal production proved to be minimum. Considering all these facts livestock needs to be identified as one of the most potential unexhaustable national resource of this country. Strategy of national development should be focused towards maximum exploitation and mobilization of the local materials for the economic development of the country.

Problems in livestock farming:

Livestock farming in Nepal, is entangled with many serious problems. Some of the problems are unique in nature and others we have created from our one sided development approach.

* Livestock farm, Khumaltar.

1. We have the highest number of livestock per household and perhaps the lowest livestock productivity in the world.

2. We are facing a tremendous shortage of animal feed and fodder. This situation is much aggravated with high livestock population and our tendency to rear livestock mainly in low productive and difficult portion of land.

3. Genetically most of our native livestock are inferior in productive quality and whatever better traits we have they are deteriorating very fast because of unscientific selection and culling procedures adapted for breeding.

4. We have a great reservoir of animal diseases. Some new fatal diseases are being diagnosed which are supposed to be introduced through indiscriminate import of live animals. We have a great shortage of veterinarians and the infrastructure to overcome animal health and production problem is too inadequate.

5. Our religious sentiment, social binding and law do not allow us to undertake drastic actions such as slaughter of unwanted or even incurable diseased cattle and female animals.

6. Data on livestock are scanty and unreliable.

7. Basically we do not have a sound national breeding policy.

Strategy on livestock development and genetic improvement programme:

Breeding, animal health, nutrition and management are the four major components necessary for livestock development. Adequate livestock marketing facility may give a considerable push to the production. How far the present credit facilities are beneficial to the average farmer for the promotion of their livestock farming needs to be thoroughly evaluated.

Services like disease control, breed improvement through intensive A. I., nutrition and management no doubt can bring a significant improvement in livestock production. All of these components are not only important in livestock development but also are very closely related and complementary to each other. Livestock and livestock

product marketing system can motivate farmers towards industrialized farming. In field level, district veterinary hospitals can provide all the above services in package to the farmers without significant increase in administrative and other expenditures.

Occasionally question is raised about the role of genetic improvement in livestock development. High quality genetic material, without the support of other services, if not have negative impact will hardly lead towards better production. Based on this principle there is a school of thought that in the beginning of livestock development process emphasis should not be given to genetic improvement, inspite of the fact that major share (about 50%) of increasement in livestock production is attributed to breeding alone. But when we come to reality and try to analyse the existing situation we find an entirely different story.

Farmers knowing the limited productive potentiality of their animals give little attention to improve the level of nutrition, animal health and management service as they cost extra money. They would rather like to adhere to traditional system of farming. Some change in the attitude of the farmers towards the animal health programme is marked which is mainly because (a) Diseases kill or make animals unfit to work adversely affecting their agriculture (b) They think that animal health service is available free. (c) Some who have valuable (productive) animals try to protect, provide better feed and management. Similarly some change in outlook of people have been observed in and around the urban areas. More investment in livestock feeding is associated with the possession of genetically superior animal and existance of fairly good marketing channel for livestock and livestock products. This indicates that productive animal and market facilities are the real stimulent to farmers. Thus breeding (genetic improvement) services should at least be one component of the package programme. Otherwise our effort and repeated slogan of better feeding, adequate veterinary services and improved management practice will have no meaning, in antoher word, we can fall into complete failure in our livestock extension work. Further the urgency of the genetic improvement programme can be justified as.

1. Genetic improvement programme takes a long time to creat any impact so it should be started without delay.

II. Contribution of genetic improvement to increase the productivity in the present condition is expected to be about 50% which is highest in comparison to other components like nutrition, health service and management.

III. Genetic improvement programme needs more complicated infrastructure and trained and skilled manpower.

Risk involvement in genetic improvement programme:

1. Genetic improvement programme if carried out in isolation may cause a negative impact on productivity.

2. There is a high risk of exotic and indigenous disease with the import of exotic germ plasm. If proper precautionary measures are not taken in time, it can lead to a disaster.

3. The choice of exotic breed and fixing of level of genetic improvement should be based on the basis of utility of animal, under local situation, climatic condition, ability to survive on local feed and fodder, animal health problems and awareness of the local people.

4. If the selection of breeding animal is not based on scientific procedure there is a chance of quick spread of hereditary diseases.

5. Venereal diseases can spread very fast if genital hygiene is not maintained through regular health check.

Genetic improvement programme:

Principal involvement in the implementation of genetic improvement programme mainly depends upon, types of livestock, local situation, awareness of the people, geographical situation and resources available. Almost nothing is known about production potentiality of our native breed of livestock. In general observation, specially in case of goat the local animal appears to be reasonably productive. In such condition breeding should be done through the selection among the native breeds of goats rather than infusion of exotic blood which obviously creates a lot of adoption problem.

A burning example of this is the failure to establish Saanen blood and terrible mortality of the goats which were brought in from India during Agriculture year both in government and the private farms. There are some serious problems which jeopardise the breeding through selection among the local animals.

I. People are fascinated by the new and attractive look of exotic breed of animals which creates an images of superiority.

II. Goat being the meat animal generally the one with the best performance is selected for slaughter which may bring a situation of negative selection.

III. Selection should be based on the records which is not used by our farmers.

In term of production majority of our livestock breeds are inferior which has to be engineered by cross breeding or upgrading through import of superior germplasm. Since many years we are busy in upgrading the local animals by distributing improved breeding male (bull, buffalo bull, buck and ram) without really knowing very much about its impact, because of the terrible lack of the follow up programme. Available informations in this direction is not very encouraging, because of misuse and poor management of the valuable breeding animals. In case of buffalo bull, every year we have to import lot of breeding animals pouring lot of money out side the country and this appears to be a never ending process; rather every year it is towards increasing trend. In Nepal artificial insemination was started long back (about 25 years ago) but the progress is rather very slow. It is pity that artificial insemination could not be started in buffalo, although it has been successfully carried out in our neighbouring countries and other parts of the world. Artificial insemination service in cattle has not reached even to easily accessible areas. Conception rate of artificial insemination in cattle in Livestock Farm, Khumaltar is encouraging (more than 75% on the basis of actual pregnancy diagnosis and birth), But very little is known about its fate in field condition. With all these comments a serious attention is urgently needed to be paid to improve and extend the artificial insemination programme in this country.

Choice of exotic breed and fixing of the percentage for the genetic improvement is perhaps one of the most important aspect in the breeding programme and should be decided considering the following major points.

1. Breed characteristic and production potentiality of both the exotic and native breed of animal should be explored to know the desirable and undesirable characters of the breed.

2. Local utility of the livestock.
3. Geographical situation and climatic condition of the country.
4. Most feed fodder and disease situation.
5. Socio - economical states of the people.

Traditionally in Nepal, cattle is reared for bullock and manure production just to support the agriculture farming. Milk production of the local cattle is just a byproduct and is hardly sufficient to meet the nutritive requirement of its own calf. Although cattle are scattered all over the country but mostly concentration is in the midhill region. Considering all these points, for the last many years breeding policy in cattle is fixed to improve the genetic material of the local cattle with Jersey breed not more than 50% level. In a process to investigate the suitable exotic dairy breed to be used for upgrading the genetic material of the local cattle, a study is going on in the Livestock Farm, Khumaltar, since last few years. Local cows are impregnated with the imported frozen semen of Jersey, Brown Swiss, Holstein Friesian and Ayrshire breeds and the performances of the cross bred (F_1) are recorded. The results obtained so far are compiled and shown in table I, and II. Some more time have to be spent before we can come to any conclusion from this study.

In case of buffalo, which is the main dairy animal, breeding policy being to continue to work with Murrah, irrespective of the percentage of improvement. Recently, possibility of introduction of Nilli - Ravi breed of buffalo (available in Pakistan) in some of the pocket areas is discussed. Production potentiality of Nili - Ravi both in term of milk and meat production is almost similar to Murrah.

Jamunapari and Barberi are some of the exotic breed which have been tried to upgrade the genetic material of the local goats. Informations about the positive impact of the work are very little in the village condition. As already mentioned the local goats specially in the midhill region of the western part of the country are

Table (1)
Sex ratio and Body weight gain:

S. N.	Breed	Sexratio M:F	Body wt gain (Kg)						Adult body wt	Remarks
			Month O	3	6	9	12	15		
1	NH/50	1:1 (22)	19.05 (22)	46.35 (18)	79.89 (18)	113.8 (6)	136.38 (8)	164.5 (4)	305 (9)	
2	NB/50	1.5:1 (25)	17.52 (25)	45.70 (22)	79.41 (22)	102.05 (19)	127.27 (11)	148.55 (10)	275.3 (4)	
3	NJ/50	2.33:1 (30)	16.33 (27)	46.16 (25)	76.36 (22)	105.26 (19)	122.56 (16)	145.65 (11)	266.0 (4)	
4	NA/50	1.4:1 (24)	16.19 (21)	45.32 (22)	79.43 (19)	106.18 (17)	130.44 (16)	163.1 (10)	282.4 (5)	
AV			17.26	45.27	45.83	106.82	129.16	155.95	282.18	

Figures inside () indicate
Number of observation

NH = Nepali Holstein Friesian
NB = Nepali Brown Swiss
NJ = Nepali Jersey
NA = Nepali Ayrshire

Table (II)
Reproduction and Production records:

S. N.	Breed	Puberty		Maturity		First age of calving (day)	First Lact		2nd Lact		3rd Lact		Calving inter- val (day)
		Age (day)	Wt (19)	Age	Wt (kg)		MY Lit	LD (day)	MY	LD	MY	LD	
1	NH/50	420 (10)	161.93 (10)	528 (9)	186.83 (9)	764 (9)	1485.25 (8)	218 (8)	1452.25 (5)	274 (5)	1142 (1)	216 (1)	420 (7)
2	NB/50	477 (6)	152.42 (6)	670 (5)	193.6 (5)	976 (5)	1276.1 (3)	275 (3)	1603 (1)	331 (1)	—	—	435 (3)
3	NJ/50	456 (5)	130.4 (5)	584 (4)	174.75 (4)	861 (4)	1568.3 (3)	343 (3)	1654 (3)	296 (3)	2643.5 (1)	397 (1)	435 (5)
4	NA/50	558 (6)	158.5 (6)	718 (5)	195 (5)	1018 (5)	1245.5 (4)	263 (4)	428.5 (1)	111 (1)	—	—	571 (3)
	AV	478	150.8	625	185.05	905	1393.8	295	1289.43	256	1892.75	306	465

Figure inside () indicate number of observation
MY — Milk yield
LD — Lactation day

found to be reasonably good prolific and of good body size. So priority should be given for breeding by selection among the local goats. In any case level of exotic blood should not be more than 25%.

Crossbreeding work in pig is not started mainly because of big difference in the body size of local and exotic breed and even more important is the social cause.

Many European breeds of sheep were tried to upgrade the genetic material of the different local breeds in the government as well as in private farms with the encouraging results. But frequent import of germ plasm in the form of live animal is the main constrain of this upgrading programme

Some years back improved Chouris were produced by crossing the Naks with frozen semen of Brown Swiss, in Livestock Farms Solukhumbu. The improved chouries are kept under observation. But even if the result of this work proved encouraging implementation of this programme is not just possible.

Summary:

Livestock farming in Nepal has got its unique importance and should be developed with a package programme of improve breeding, nutrition, health and management services. Depending upon the types of livestock, its utility, a agroclimatic condition, socio - economical status, and feed and disease situation, definite breeding policy should be adopted and implimented accordingly. A proper precautionary measure should be taken not to import the exotic disease along with the germplasm. Native breed of livestock should be thoroughly studied and a scientific approach of selection among the local breed must be planed. A serious attention should be paid in regard to the improvement and extension of artificial insemination in cattle, buffalo and perhaps in other livestock is the urgent need of today. Genetic improvement work so far carried out should be properly evaluated with a strong followup porgramme and future line of action must be planed accordingly.

VETERINARY FIELD ACTIVITIES

K. P. Dhakal

Introduction

Nepal is economically an agro-based country where livestock plays an important role in the farming system. we have large number of unproductive animals which need to be improved by providing breeding, feeding and health services as a package programme. Veterinary field service accounts the highest priority in terms of actual need of the farmer's specially in our situation. Moreover animal health service directly deals with the very survival of animal, as well as it is the prerequisite for launching the breeding and feeding programme. Impact of an effective veterinary field programme can also be visualised for controlling the zoonotic diseases like T. B., Brucellosis, Rabies etc. which otherwise can be a great human health hazard.

Background Information:

In Nepal, Veterinary Service started in the year 1939 with one hospital at Kathmandu. The need of animal health programme was greatly realised by HMG, as a result of which in 1959 negotiation started with foreign agencies to extend the veterinary services all over the country. The successful control of the Rinderpest, the most devastating cattle disease, with the assistance of FAO and Indian Aid mission created mass awareness among all the sector of the people regarding the value and urgency of veterinary field service. Tremendous demand for an effective disease control programme from all the sections of the country indicate the magnitude of the need for field veterinary

Shagarmatha Integrated Rural Development Project, Rajbiraj

service in this country. Now the veterinary hospitals have been established in all the 75 districts and efforts are being made to extend the animal health service to the farmer's door through a number of livestock development centres. Field activities are being further supported by providing services like adequate vaccines and diagnostic facilities through Biological Product Division and Disease Investigation Laboratory respectively. Presently overall veterinary facilities are being upgraded under Livestock Development Project and different Integrated Rural Development Projects.

Field activities:

Apart from Animal Health Programme, veterinarians in field are also actively engaged in extension, training and animal production aspects.

1. Prophylaxis and control of contagious diseases: Surveillance of common contagious livestock and poultry diseases like H. S., B. Q., F. M. D., Swine Fever, Fowl Pox, Ranikhet (New Castle), Rabies etc are the primary concern of the field veterinary activities.

Such diseases are being kept under control through the regular vaccination. Effective control of rinderpest can be considered one of the commendable achievement of field veterinary activity. However the outbreak of the exotic diseases has become a great challenge to the veterinarians working in field and laboratory.

Collection and dispatch of the pathological materials to the concerned laboratory for the proper diagnosis is one of the important aspects of field services. Similarly Veterinary Division is being regularly informed about the epidemiological situation of the animal diseases in the country.

2. Control of Parasitic Diseases: Parasitic diseases as a whole are of great economic importance in this country. Such diseases are being handled by field staff through regular mass drenching and treatment programme.

3. Treatment of clinical and surgical diseases: Clinical and surgical cases are being attended in hospital and subcentres under the supervision of field veterinarians.

4. Animal Breeding Programmes: Field veterinary activity supports the breed improvement programme by providing services like Artificial Insemination, control of

veneral diseases, pregnancy diagnosis, attending to obstetrical cases, protecting the cross bred progeny etc. In a place where A. I. is not conducted field veterinarians are responsible for the distribution of breeding animals, health care and management of the breeding stock.

5. **Nutrition programme:** Good nutrition is essential to get optimum output from animals. District Veterinary Hospitals are involved in supplying grass seed, fodder saplings to the farmers and encourage them to establish nursery and produce good seeds to fulfil local demand.

6. **Training Programme:** Training is necessary to improve the skill of farmers and technical personnels. Veterinary Hospitals are directly involved in organising and conducting different types of training like progressive farmers training, small farmers training, village level animal health workers training, up-grading training to the field staff.

7. **Extension Programme:** Extension is the proper media to acquaint the farmers with better technology, motivate and encourage them to adopt more profitable farm practices. Field Veterinarians are closely associated with the farmers and their immediate problems. They provide emergency service to the farmers and keep the farmers well informed through farmers meeting, field visits and distributing poster, pamphlets, booklets, grass seed packets etc. Veterinary Hospitals organise livestock fairs, animal markets and encourage progressive farmers by awarding prizes and certificates of merit.

8. **Procurement of necessary inputs:** Field veterinary services take the responsibility of procuring different necessary inputs to gear up their field programmes. These inputs include equipments, medicines, vaccines, grass seeds, plant saplings, bulls, fertile eggs, chicks, extension materials etc.

9. **Other activities:** Field veterinary services are responsible for all the livestock development and animal health activities of the Department of Livestock Development and Animal Health in the district level. In nutshell field Veterinary Services provide all necessary services in package.

District hospitals supervise and control livestock and animal health activities in the district under the various integrated and co-ordinated livestock development programmes.

10. Constrains of field services:

- . Insufficient technical manpower.
- . Insufficient physical facilities.
- . Lack of legislation for disease control
- . Insufficient supply of inputs such as medicines, grass seeds, semen etc.
- . Very tight budgetary provision.
- . Lack of indoor facilities for sick animal.



WITH BEST WISHES

FROM

Wockhardt Veterinary Private Limited

POONAM CHAMBERS

DR. ANNIE BESANT ROAD

WORLI

BOMBAY - 400018

INDIA

TOWARDS SELF SUFFICIENCY IN VACCINE PRODUCTION

M. N. Pandey *

In olden days keeping livestock, specially cow, was considered both prestigious and a holy act. Cows were the symbol of prosperity as seen from various names given such as 'Kamadhenu' (one that can bestow the things desired) and 'Laxmi' (the goddess of wealth). This bovine species was placed in high status of a mother (Goumata) and considered as liberator of the soul.

Kings and sages used to possess several thousands of cows as their property, as we find in industrialised world to day where as in our own part of the world things have changed a lot and cow raising has become a lower grade job. Several things may be responsible for this change in outlook, however devastating infectious livestock diseases could be one of the major factors.

It is sad that Nepal, which was a net exporter of livestock products only a few decades back has now become a net importer.

The technology originated in the western world has revolutionised livestock production system. Modern research has provided the ways and means by which the declining production can be converted into progressive production system.

In the initial stage of development, control and eradication of major livestock diseases can create an environment for livestock industry. HMG is well aware of this situation. The need of a strong veterinary service was felt long back (Shahi 1958). Successful control of devastating rinderpest outbreak of Pokhara valley in 1953 with

* Biological Products Division, Tripureshwar.

the use of wet GTV can be considered an important event. There after outbreaks of different infectious diseases were controlled through mass vaccination. Control of rinderpest in a country like Nepal was a gigantic task. The Nepalese Vets with the assistance of FAO India and OXFAM successfully controlled the disease.

Veterinary profession in this country is confronted with several difficulties. The greatest hurdle is the very small veterinary manpower. Other difficulties are:

1. A veterinarian in this country has to look after the largest population of livestock and poultry. Furthermore, all the major livestock and poultry diseases are found in this country. Under these circumstance diseases are constant threat to our livestock and poultry.

2. Because of common frontiers and free movement of animals, diseases can enter from any point across the border.

3. The lack of legislation makes the regulatory aspect of disease control very difficult.

4. Indiscriminate use of breeding bulls and poor A. I. organisation has created problem such as spread of venereal diseases, metritis, placentitis, abortion and dystocia.

5. All the HMG animal health institutions are suffering from acute manpower shortage, leading to poor quality field and laboratory services.

6. No manpower is available to extend animal health and AI services through non government sources.

It is well established that veterinary profession can show its impact on the herd health problem. Realising this HMG with the external assistance established a Veterinary Laboratory at Kathmandu in 1965 with an aim to make country self sufficient in livestock and poultry vaccines. Table 2. shows the types of vaccines being produced and annual production. The demand of other vaccines at present is being fulfilled through importation.

Veterinary Laboratory (Biological Products) came as a part of the FAO/OXFAM/ICM/HMG Rinderpest Vaccination Programme. Since then this laboratory is

Table 1. Proportion of Livestock and Poultry to Veterinarians in different countries:

Country	Number of livestock (in thousands)	Number of poultry (in thousands)	Number of Veterinarians	Number of livestock per Veterinarian	Number of birds per Veterinarian
Argentina	94390	42880	2000	47195	21440
Australia	161714	53962	3326	48621	16224
Bangladesh	49315	93500	952	52011	98214
Brazil	163950	437300	18000	9108	24294
Canada	26667	93233	3995	6675	23337
Egypt	9165	36940	8702	1053	42*3
India	370384	147000	18000	20576	8166
Israel	775	30744	450	1722	68320
Japan	14552	286656	25175	578	11386
Korea Rep.	3881	51773	2633	1473	19663
Nepal	16517	22412	106	155820	211433
New Zealand	8044	6499	918	87629	7079
Pakistan	92124	67169	1499	61457	44809
Philippines	14600	60390	320	45625	188718
Sri Lanka	3082	6441	370	8329	17408
UK	53395	137412	7057	7566	19471
USA	203082	401960	38000	5344	10578
USSR	342578	1029300	80000	4282	12866

Source: FAO Production year book, 1981

Table 2. Vaccines produced by Biological Products Division in different years:

YEAR	(Vaccines in thousand doses)						
	Rinderpest (GfV)	H. S. (Broth)	H. S. (Alum ppt.)	Rabies	Newcastle FI	Newcastle R,B	Fowl Cholera B. Q.
2022/23	443	—	—	—	—	—	—
2023/24	792	1.2	—	—	—	—	—
2024/25	556	3.2	—	—	—	94	30
2025/26	355	5.6	—	—	—	—	60
2026/27	89	4.6	—	1	66	344	135
2027/28	172	51.4	—	17	10	305	—
2028/29	174	43.6	—	16	34	—	—
2029/30	261	52.6	—	23	266	255	119
2030/31	178	54.4	—	87	443	261	201
2031/32	578	89.6	—	29	—	—	163
2032/33	142	229.4	—	39	415	434	438
2033/34	1548	200.0	—	75	357	345	362
2034/35	1315	200.0	—	82	464	405	200
2035/36	589	131.2	—	83	200	195	262
2036/37	679	231.4	—	111.5	855	912	546
2037/38	205	259.84	—	111	990	2426	549
2038/39	200	404.8	—	246	1202.4	1322	601
2039/40	118	—	499	325	1200	2000	600
2040/41	100	—	700	—	1400	2000	800

(To be produced)

busy in preparing freeze dried goat tissue Rinderpest vaccine, Ranikhet disease vaccine, Fowl Pox vaccine, Haemorrhagic Septicaemia vaccine, and Rabies vaccine for animal use. The total production in the first year i. e. 2023/24 was only 793.2 thousand doses while in 2039/40 the volume reached 4.4 million doses. The importation of these vaccines has been totally stopped.

The production of large quantities of few types of vaccines does not mean that we are self sufficient. There are many more contagious diseases prevalent in this country for which we do not have any means to control. Because of small number of attending qualified veterinarians (Table 1) a small fraction of the total population is being served.

There is great demand for veterinary services in Nepal. The farmers, politicians and local administration every year ask for more and more veterinary units for their districts.

Accepting this challenge HMG has under taken National Animal Health Programme under ADB loan assistance. The upgrading of existing Biological Products Division is one of the components of this programme.

The present laboratory area of manufacturing unit is being renovated and some more buildings are being added to it. Upgrading training for technicians and provision of latest machines are being made. Within few years the laboratory may start producing larger volume of modified improved vaccines and add more types of vaccines such as Anthrax, B. Q., Enterotoxaemia, F. M. D., Rabies Flury Strain and others. Within next 2 to 3 years only, this laboratory may be in a position to produce sufficient vaccines to cover whole animal and birds population. But it will take many years to build up competent trained man power to achieve the objective.

SELECTION AND EVALUATION OF SIRES FOR BREEDING SOUNDNESS

S. L. Shrestha *

Selection of sires is a very important job for the genetic improvement of the herds. The sire passes 50% of his genes to the offsprings of first generation and 87.5% of his genes would be present in the offsprings of third generation. Therefore selection of bulls should be done very carefully to increase the maximum possible genetic gain. The ancestors, progeny and the collateral relatives of the bull are also considered for any undesirable characters while selecting the bulls. And if any undesirable characters with respect to jaws, feet, temperament, udder, tendency to mastitis and bloat, difficulty in milking, and any other detrimental characters are present in any of the relatives of the bull, it should be culled. Otherwise the bull might transfer those undesirable characters to its progeny. This is why progeny testing is needed.

The present trend of considering male calves from improved breed and graded crossbreds for breeding purposes without progeny testing can be considered as a wrong practice. The consequences are inefficiency in breeding standard and can possess various genital defects such as cryptorchidism, testicular hypoplasia and other semen abnormalities. This is why the impact of breeding is not satisfactory.

Breeding bulls are selected mainly on the basis of his ancestors, three pedigree records i. e. dam's performance, sire's proof and maternal grandsire's proof as well as his own performance. Moreover the performances of his paternal sisters, paternal sisters of dam, his maternal sisters, maternal sisters of dam and his grand dam etc.

* Regional office, Dept. of Livestock Development & Animal Health, Biratnagar.

may also be considered. Van Vleck (1969) reported the correlation of 0.479 with sire's proof, 0.573 with sire's and dam's record, whereas 0.614 with records of all the above relatives. Moreover the correlation of the three pedigree information was 0.516 versus 0.513 with the sire's proof and dam's record. So there was very little correlation as the generations go further and further back. Similarly, if a young bull is progeny tested even with five daughters only, which will keep more weight than to consider his father's proof who had been progeny tested with any number of daughters. Hence the three progeny records i. e. sire's proof, dam's performance and maternal grand sire's proof are good enough to select the bulls for improving the herds. And the gain by using a lot of information, is small as compared to the individual's own record. Therefore the progeny test is the accurate indicator of breeding value of a bull (Henderson 1964).

More the number of traits for the selection of bull less the selection differences and the degree of superiority of bull also decreases with the increased number of traits. Because the rate of genetic gain increases as the increase in selection difference (i. e. the increase in selection intensity and phenotypic standard deviation) and the heritability of the trait decreases as the generation interval increases (the average age of the selected parents when the offsprings are born). Therefore, the heritability of a trait and the selection difference should be higher and the generation interval shorter for the quicker and greater genetic improvements. So to make generation interval shorter the young bulls are progeny tested as early as possible so that the genetic gain per year is increased. Thus there will be a greater selection differences and greater genetic gain if the trait, milk yield only, or a few traits are considered rather than considering too many traits.

Either the bulls of young ages are selected on the basis of three progeny information (milk yield) for progeny test or the best bulls are produced by mating the best progeny tested sire with the elite cows (selected best dams) selected on the basis of their own milk yield and other desirable characters and their dam's yield and sire's and maternal grand sire's proof, which is also known as **Contract mating**.

The male calves born from contract mating are reared in a good nutrition and good management, so that they reach the puberty soon and progeny test can be

performed as early as possible. And these young bulls are compared amongst their contemporaries for every respects and examined for breeding soundness before starting the progeny test.

The semen from these selected young bulls are inseminated to several unselected cows spreading each bull's semen into various herds (at least 300 unselected cows per bull). When these cows get calves and the calves reach puberty these heifer calves are again mated with the bulls. And when the daughters get calved, their average milk yield are compared with the respective herdmates, and the difference is known as selection difference. The more the number of daughters in-calf, the more the progeny test is accurate. Fifty to sixty daughters in-calf are usually said to be a good number for progeny test. The influences of environment are eliminated by distributing the large number of daughters into several herds in different environmental conditions. The effect of age at calving, season and year of calving are also eliminated by inseminating the daughters and herdmates which are born at the same season and year. Otherwise it should be corrected by age, season and year factors if they are not born in the same year and season. If they are born in the same season and year the formula is as follows:

$Y = X - S$. Where X = mean average of daughters of the bull.

S = mean average of herdmates.

Y = breeding value of herdmates.

Thus the breeding values of the bulls are evaluated by the daughter's performance, and selected or rejected on the basis of the bull's health and fertility test. The fertility of the bull is also observed from the first service conception rate of the unselected cows and their daughters during progeny test which is a good indicator of the fertility of bulls.

Before the progeny test is being carried out, the young bulls from the contract mating undergo health test and fertility test (semen examination). And if any breeding unsoundness is detected, the bull must be culled. The health and semen examination of the bulls is done as follows:

History and the record of the bulls is observed for any illness in the past, recent sickness, any preventive vaccinations, the general body condition, physical fitness, nutritional defect and any breeding unsoundness of his sire, dame and any of the relatives, should be considered as a defect and usually culled while evaluating the breeding soundness of the bull.

Physical Examination on clinical health of bulls and **specific examination** of the general condition of the reproductive organs like sheath and its contents, scrotum and its contents, and pelvic genitalia are examined by visual inspection and palpation. The general body condition temperament, attitude, age, teeth, eyes and locomotor disorders like hip joints, hoofs, back of the bull and any defects either congenital or acquired, are carefully searched. Any unusual symptoms like coughing, discharges, bloody urine, diarrhoea and defects of any system of the body that might affect the present or future health of the bull, are also investigated.

The scrotum and testes are palpated very carefully for the shape, size and consistency to detect the testicular hyperplasia, hypoplasia, fibrosis, orchitis atrophy, pain, tumours, abscess, incomplete descent of one or both testicles, one or both cryptorchidisms, hernias, adhesions and any other anomalies. The epididymis and spermatic cords are also palpated for any abnormalities like segmental aplasia, enlargements, hematoma, granuloma, abscess and epididymitis etc.

The sheath and penis are also palpated and examined for the detection of tumours, abscess, discharges, adhesions, stenosis of the prepuce, phimosis, paraphimosis, prolaps of the sheath, balano-posthitis, granular venereal diseases and some specific infections like IBR and other non-specific infections. The penis is exteriorised and carefully examined for infantile penis, persistence of penile frenulum, diphallus, hypospadias, epispadias, inter-sexuality, congenitally short retractor penis muscle and tight penile adnexa. The penis is also examined for deviations of penis like spiral deviation or corkscrew deviation, and traumatic lesions of penis like penile hematoma or broken penis, laceration, contusion and strangulation of penis.

The seminal vesicles, ampullae, urinary bladder, kidney etc. are also examined by rectal palpation for size and consistency to detect the seminal vesiculitis, nephritis, induration, atrophy, adhesions and any other anomalies.

Preputial sampling and blood samples of the bull are also examined for the lab-diagnosis of infectious diseases like brucellosis, vibriosis, leptospirosis, trichomonas, infectious balanoposthitis (IBP) and infections, bovine rhino-tracheitis (IBR) etc. The bulls are tested against tuberculosis and Johne's disease.

So if any of the defects are found the bulls are immediately culled.

The young bulls must undergo fertility test. Because if the semen of the bull is not satisfactory or contains a severe sperm abnormalities, there is no use of performing progeny test for such bulls. But before culling, six to eight ejaculates from one or two year old bulls and three to four ejaculates from mature bulls are examined to make sure that the semen sample is the representative sample of the bull. Because the semen picture might differ according to the age and the working and resting stage of the same bull.

Although colour, consistency, volume, density, mass activity, motility, live and dead percentage, abnormal sperm percentage, sperm concentration and total sperm of the semen are considered to evaluate the semen, but the concentration, motility, morphology, i. e. abnormal sperms, are more important and a greater correlation exists between the sperm morphologic characters and final semen quality (Caroi et al, 1963). But Carol et al did not relate to actual fertility. There are primary and secondary abnormalities in semen and the primary abnormalities have more serious effects on fertility than secondary. The primary abnormalities should not be more than 10% and secondary abnormalities should not be more than 20% in a normal semen sample.

Serving capacity and serving behavior are the important components of the evaluation of bull for breeding soundness, especially for natural service. Serving capacity is the number of services during the mating period or number of services during the test period of fourth minutes which are highly correlated to fertility. The bulls, sometimes do not show locomotor disorders and genital defects during physical examination, will show the disorder and defects during service capacity test. So those bulls and bulls having poor service capacity may also be culled especially when the bulls are used for natural service.

The service capacity depends on the sex libido and service behavior of the bull and availability of the number of estrus cows as well. The bull having a good sex libido takes less time to react or has a less reaction time for service. The bull erects and protrudes his penis and mounts over the cow within a very short time, the penis seeks the vulvar opening very quickly and gives a very good ejaculatory thrust, which is a good serving behavior of a bull. So serving capacity test and serving behavior are watched carefully while evaluating a bull for breeding soundness.

Therefore, these selected bulls under health test and fertility test are progeny tested as described above. Regarding the fertility test the most reliable test is likely to be his fertility results following the first mating season. And best bulls, amongst the progeny tested sires are selected for A. I. on the basis of their daughter's performance. While selecting the bulls, emphasis should be given with respect to dairy character for milk yield like udders, placement of teats, ease of milking, resistance to diseases e. g. mastitis, bloat, dystocia, and other detrimental characters as already discussed. As the heritability of milk yield is about 0.3, the bulls can very well be selected as above to increase the milk yield of the progeny. But inbreeding should be avoided, which causes inbreeding depression and reduces fertility and yield, by using the other best bulls at the Artificial Insemination Centre.

References:

1. Carrol, E. J., Ball, Leslie, and Scott, J. A. (1953) Breeding soundness in bull- A summary of 10,940 examination, J. A. V. M. A. Vol. 142: 1105-11.
2. Henderson, C. R. (1964) Young sire selection for commercial artificial insemination, J. Dairy Science 47:439-41.
3. Van Vleck, L. D. (1969) Relative selection efficiency in retrospect of selected young sires. J. Dairy Sc. 52:768-74.