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Proceedings of the Fifth National Veterinary Conference

Bulletin of
Veterinary Science &
Animal Husbandry
Nepal



Official Organ of Nepal Veterinary Association

Courtesy : Promotion of Livestock Breeding Project, HMGN/GTZ

BULLETIN OF VETERINARY SCIENCE & ANIMAL HUSBANDRY, NEPAL

*Proceedings of
The Fifth National Veterinary Conference
of Nepal Veterinary Association
(Vetcon '96)*

11-13 September, 1996

Vol. 24

1996

Regd. ZCBA 7/2025/26

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Editorial

Dr. Swyam Palani

The importance of livestock industry in the national economy of Nepal is increasing steadily and its projected contribution is in a sharp inclining trend. Improvement in animal productivity and production can only be expected from healthy animals and it can only be sustained if the improvement programmes are environment friendly and adapted to the local conditions. Hence, the need is to develop eco-friendly and sustainable production system which could be maintained under the local conditions. In addition to other requisites, this goal will only be achieved with an effective animal health service in the country, which requires national veterinary service to be competent and the disease diagnosis, reporting and control system to be efficient. The state veterinary service should reach to the interior rural areas where livestock production is the main occupation of the people. Thus wider distribution of veterinary hospitals with more number of competent and well qualified veterinary professionals is required.

Development needs some changes in the existing farming practices and in most of the cases associated with its inherent problems; as has been observed in many other countries. The problems associated with livestock development are declining biodiversity of animal genetic resources, increased susceptibility of the high yielding animals to many of the diseases and development of resistance in insects, pests and disease causing organisms to the available chemicals and drugs.

Hence, the inherent production potential of the indigenous livestock population and their resistance against various diseases and insects/pests should be identified and this potentiality should be utilised in the livestock development programmes of the country. The use of chemicals should be regulated by law before the problem of resistance in insects/pests and micro-organisms becomes widespread. Antibiotics, anthelmintics, insecticides, pesticides and hormones used or produced for animal use should be sold with the prescription of qualified veterinarians.

The livestock development programmes should be balanced to the socioeconomic and ecologic conditions of the country and our approach should be aimed to produce healthy animals in a healthy environment, for better livestock production and increased farmer's income.

The theme of this conference was timely and the issues discussed were relevant to the needs of the country. It is hoped that, the outcome of this conference would be useful to design the future livestock development strategy of the country.

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Mr. Sher Bahadur Deuba
Rt. Honourable Prime-Minister
Inaugurating the Vetcon '96



NVA President Dr. B.M. Shrestha
Deliberating the welcome address



Dr. Thir Bahadur. Singh
honoured with Narendra
Memorial Trust Prize by
Rt. Honb'le Prime Minister
Sher Bahadur Deuwa

**PROCEEDINGS OF
THE FIFTH NATIONAL CONFERENCE OF
NEPAL VETERINARY ASSOCIATION
(Vetcon 96)
Kathmandu
11-13 September 1996**

The fifth national conference of Nepal Veterinary Association was organised from 11 to 13 September 1996. with the theme of "*Healthy Animals for Friendly Environment, Better Production for Poverty Alleviation*", at the International Convention Hall, Baneshwor, Kathmandu Nepal.

The conference was inaugurated by Rt. Honourable Prime Minister Sher Bahadur Deuba and Chaired by Honourable Minister of State for Agriculture Prem Bahadur Bhandari. Delivering the inaugural speech, Rt. Honourable Prime Minister pointed out the need for strengthening Veterinary Services for the overall development of the country (Appendix II). The welcome speech was delivered by the Nepal Veterinary Association President Dr. B.M. Shrestha (Appendix I) and the objectives of the conference was highlighted by the General Secretary Dr. B.K.P Shah. The ex-Vice Chancellor of Tamil Nadu University of Veterinary Science Prof. Dr. Gyan Prakash stated the importance of veterinary science in South Asia for overall development of the sub-continent. The chairman Hon. Minister of State Prem Bahadur Bhandari stressed the role of veterinarians for the overall livestock development of the country and stressed that the recommendations of the conference should also consider the requirements of the 9th five year plan as well (Appendix III). Lastly Dr. Mukti Narayan Shrestha, Life Member, NVA and Director General of the Department of Livestock Services presented vote of thanks (Appendix IV).

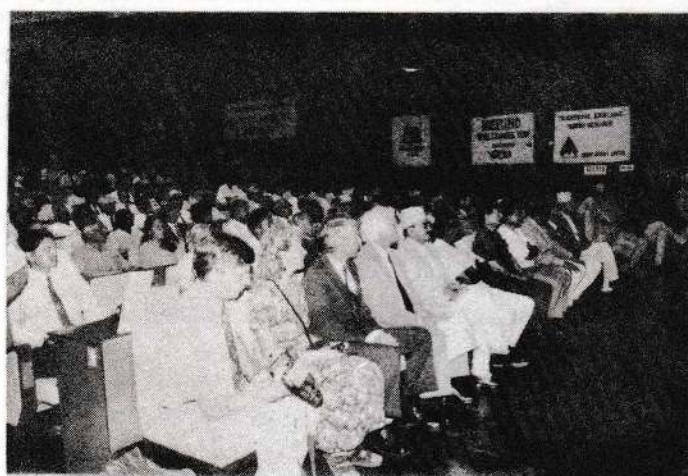
The conference was attended by 225 veterinarians from all the districts of Nepal throughout the country including some foreign participants from USA, Germany, Belgium and SAARC nations. A total of 45 scientific papers were presented on various subjects.

In a closed session, the general assembly approved the revised constitution of the association 2053 (Appendix-VIII) and elected the new executive body for the next 2 years period. The executive body elected were as follows:

Dr.Prahlad Sapkota	President
Dr.M.N. Lohani	Vice-President
Dr.N.P. Ghimire	General Secretary
Dr.S.P. Shrestha	Joint Secretary
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Dr.A. Shah	Regional Coordinator, Mid western
Dr.K.B. Bogati	Regional Coordinator, Far-western



Dr. M.N. Shrestha deliberates
vote of thanks.



A view of audience of Vetcon'96



A view of blood donation
programme

The closing ceremony of the conference was held on 13 September 1996. The Chairman of the ceremony, Mr Dan Bahadur Shahi, Secretary, Ministry of Agriculture highlighted the importance of livestock farming in agriculture system and economy of the country. He further reiterated the contribution of veterinarians in livestock sector (Appendix V).

The following personalities were honoured for their invaluable contribution in the field of veterinary services of the country by the Chief guests of the inaugural and closing ceremonies, Rt. Honourable Prime Minister Sher Bahadur Deuba and Honourable Minister of State for Agriculture Prem Bahadur Bhandari respectively:

Narendra Memorial Trust Prize

Rs.10,000.00 with a letter of recognition to Dr.T.B Singh for his invaluable contribution to veterinary service in the country.

A prize of Rs.5000.00 to Mr. M.P. Ghimire as the first student of the 4th year B.V.Sc & A.H examination.

Nepal veterinary Association Prize

To Dr. Prahlad Sapkota and Dr. T.P. Subba for their continuous 25 years professional service.

To Dr. Peter Quesenberry for his contribution in the production of Paravets in Nepal.

Environment and wild life Prize from IUCN:

To Dr.Prem Sundar Shrestha for his clinical services to an injured Black Panther.

All Correspondence to the NVA should be Addressed to:

General Secretary

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A view of technical session

Honb'le Minister of state for
Agriculture Prem Bahadur
Bhandari, addressing the closing
ceremony of Vetcon'96



The newly elected executive
committee of Nepal Veterinary
Association

ANIMALS, ENVIRONMENT, PROSPERITY AND HEALTHY CITIZENS

N.B. Singh¹ and N.P. Ghimire²

ABSTRACT

The role of livestock in the socio-cultural fabric of Nepalese society and its contribution towards the economy of the country is discussed. The paper describes the direct and indirect contribution of livestock towards preserving the environment by way of providing alternative to fuel wood and improving soil fertility. The important role of livestock products in the health of human beings is highlighted.

Introduction

Environment related problems are not only of our day to day concern but in fact it is a burning global issue. Undoubtedly healthy and active citizens are the very foundation of a nation. Animal in good health is the pre-condition for livestock productivity. Motivated human resource can do much to bring about change in the society. Economic development of any country is the product of human activity. Nature has given us natural resources in the form of abundant water, climatic variation and a wide range of bio-diversity. If these natural resources are wisely harnessed for the benefit of the nation, it can help us to climb the ladder to prosperity. The knowledge, skill, information, science, technology, and the management capability can only prepare us to make our position in the present open market economy. Thus, education and mass awareness could be considered the very base for our development. A good veterinary service system is found to work as the spring board in livestock enterprise.

Present Status

In spite of various obstacles and being a less privileged sector, livestock contributes substantially in our national economy. Livestock sector contributes around 31% of total agriculture and 15% of national GDP. Its indirect benefits to agriculture and environment can be substantial if evaluated. Nepal has about 7 million cattle, 3 million buffaloes, 6 million goats, 0.9 million sheep, 0.6 million pigs, 14 million fowls and 0.2 million ducks. The livestock production and per unit productivity is low compared to many countries. The annual output of milk, meat, wool and eggs is 950,000 MT, 60,000 MT, 600 MT, and 390 millions nos. respectively.

The benefit from livestock, besides the improvement in citizens health, are employment to housewives and semi-employed labour force in rural societies, livestock related enterprises cash income, power for agriculture and transport, animal manure to maintain soil fertility and improve soil quality. Nepal produces 41.4 million MT of livestock manure (Pande, 1996). It is estimated that 81,100 MT of dry dung is used as dung cake, the alternate to fire wood which is equivalent to 20,400 MT of oil (Pande, 1996). The estimated bio-gas potential of Nepal is sufficient to operate 1.3 million bio-gas plants (Pande 1996). If these potentials are exploited, it can make a saving in foreign exchange for import of chemical fertiliser, farm equipment and oil. Livestock can help in cultivation

¹ Kathmandu Veterinary Clinic, Panipokhari, Maharajung, Kathmandu.

² Central Veterinary Hospital, Tripureswor, Kathmandu.

of forest by reducing pressure on wood. Unlike in countries like Singapore where animal litter specially pig drooping led to a serious environment problem, which forced Singapore to abandon its thriving pig industry in 70s, in Nepal livestock dung is a valuable resource. It could be of interest to have some of the Indian experiences in livestock sector. After the success of green revolution, India is moving fast towards achieving white revolution. India has already succeeded in establishing itself as one of the poultry producing countries. It is reported that 20 million working animals in India contribute to about 40,000 HP of animal power which is equivalent to 30,000 MW nearly equal to total power generated in India at about 1/3 the cost, 15 million animal driven vehicles on Indian roads significantly contribute in transport. Around 237 million cattle in that country at a collection rate of 66% has the potential to produce 22,425 million cu m of bio-gas equivalent to 13,904 million litters of kerosene per year. The slurry from these bio-gas plants can increase agriculture productivity by 30%. As an alternate to fire wood it can make a saving worth rupees million 500 IC of forest (Sharma, 1987).

Livestock as the only Property

The 20 high hill districts occupying 43 % of land is inhabited by 11% of the population of Nepal. For the people of this region livestock is the only property, and animal husbandry is the way of life. The main products of this region is about 185 MT of yak cheese produced by 25 cheese factories, meat animals, wool and some wool products such as carpet, blankets, etc. Ecologically this region is most vulnerable. The high stocking of livestock in the limited pasture and forest, the high encroachment of forest for human need of fire wood and timber is leading to loss in natural vegetation resulting in soil erosion, land slide and other natural disaster. Effort to deal with the problem by government and some international agencies and some NGOs in the past have done very little in protecting the hill environment. Increasing tourism is also inviting fast deforestation. Some high hill districts are also losing forest as the wood is being illegally sold across the borders.

Veterinary Services

There had been little change in veterinary manpower situation. In 1970s the ratio of veterinarian to livestock was 1:300000 whereas presently it is 1:77,000. Nepal still has the lowest number of veterinarian per head of animal. Government has been the only responsible institution for livestock development, however, in recent years some NGOs are providing services in selected pockets. The government services of various kind are made available to farmers through 75 District Livestock Service Offices and their Livestock Service Centres/Sub-centres, six diagnostic laboratories, different livestock farms, semen banks all under government help in livestock development. Nepal Agriculture Research Council has production and health component. Private veterinary clinics are coming up as a result of growing demand for veterinary services. Recently government has commented for encouraging private veterinary practice but it has yet to take shape. Due to the shortage of veterinary man power most private veterinary clinics are running on part time basis and are centred around cities serving mostly as pet clinics. At present there are 35 veterinary private clinics and two privately run veterinary laboratories in the country. If government policy of encouraging private veterinary services can assure and motivate veterinarians and manpower situation is improved, better and prompt veterinary services comprising of a package animal health, management, advisory, artificial insemination, sterility control, and emergency services could be organised for the benefit of the farmers. Self employed veterinarians could be made an alternate to government veterinary services bridging the existing gap in veterinary services of the country.

Major Issues Related to Livestock Development

- Policy planning related to (a) breed, breeding for genetic improvement, (b) fodder, pasture, livestock feed and feed ingredients, additives, (c) livestock health, diseases, zoonosis and private practice etc., (d) livestock and environment related issues, (e) Financing institutions and Insurance, (f) products marketing and technology, information.
- Low level of awareness among majority of farmers on technology, production skills and management of livestock as a commercial opportunity.
- Shortage of veterinary graduates and relatively insufficient infrastructure.
- Acute shortage of fodder and feed resources. Lack of co-ordination and co-operation between ministries, other line agencies to solve livestock fodder problem and other environment related issues.
- Poor research facilities, weak research-extension link, and inadequate extension services.
- Limited artificial insemination service which is mostly centred around cities.
- Mismanagement and loss of valuable pedigree breeding stock imported from abroad. Due to gross neglect and absence of proper veterinary supervision, high mortality of farm animals through plant poisoning and predation and even with diseases which could have been easily cured. The existing system of purchasing good milch buffalo by milk vendors in 2nd and 3rd lactation which could be good buffalo genetic resource, goes to slaughter after the lactation; this is a national loss. Bull calves with good genetic inheritance (with good sire and dam) are let loosed in the street of cities for starving and death is a source of urban pollution.
- Old concept to consider livestock as an agriculture based subordinate activity has negative impact on livestock sector in spite of its high economic potential.
- Mostly livestock are blamed for environmental degradation, which in fact is an issue related to mismanagement, lack of co-ordination between related agencies in spite of awareness and policy matters.

Socio-Economic Opportunities

The vast potential of livestock sector needs to be exploited for the national well beings. Some of the contributions of this sector are: (a) mass employment specially for rural housewives, (b) an easy source of a cash income for rural poverty alleviation and (c) means of livelihood even to landless people. Livestock sector has a good potential of growing into an industrial scale. Availability of livestock products in market leads to improvement in consumers health. It also supports general agriculture productivity at relatively lower cost and maintain soil quality. There is an indirect help in

the conservation of environment and help in saving foreign currency by providing indigenous alternative to chemical fertiliser and fire wood. Furthermore, it has large options to develop into commercial enterprises as the market forces are in favour, for example:

- An attractive market, increasing tourist and export possibility.
- Livestock sector is fully indigenous resource based and local manpower intensive industry. It is manageable with less complicated technology and skills.
- Livestock has a good potential for growth in productivity with little intervention of good breed, feed, improved management and health care.
- Under a planned approach with suitable government policy, livestock could positively contribute to improve environment.

Production Opportunities

- Livestock products milk, meat, wool, fur, hides, skins, eggs etc., as primary products.
- Enterprises dealing with some value added livestock products as sweets, dairy products, baby food, confectionery, meat and meat products, egg products, wool, woollen cloths, blankets and woollen carpets, processed skin hides and fur products etc.
- Over the year there had been a considerable growth in enterprises associated with livestock such as livestock feed industry and business. Presently there are more than 89 feed factories in the kingdom. A large number of veterinary pharmaceutical companies, stockist and retailers (for veterinary drugs), poultry hatcheries (for day old chicks), commercial livestock breeder farms, industries for manufacturing bio-gas plants and other agriculture and livestock related industries provide job and business opportunities.
- Livestock related service sectors e.g., veterinary private clinics, diagnostic laboratories, artificial insemination services, livestock advisory services, banking, insurance, product marketing services, etc. are becoming popular.

Some suggestions to make livestock a leading economic activity

- Formulate suitable policies keeping in view short and long term livestock development strategy to attract private sector participation.
- National level joint commitment of related ministries, such as Agriculture, Forest, Local development and Environment for co-ordinated fodder pasture development programme in collaboration with local people if implemented, can serve the purpose of all four ministries in a way. This approach can meet the fodder need of livestock, can help maintain forest cover helping in conservation, improve fertility of soil and the quality of environment and thus provide better opportunities for economic development of local people of villages.

- There is a need for the improvement and conservation of genetic resources by all means under the national policy frame work. Making maximum use of available genetic resource for example intensifying the artificial insemination service in areas having marketing possibilities; continuing natural service using selected good cross bred bulls. Bulls progeny from good sire and dams roaming in the city streets could be used with advantage as good genetic resource to upgrade the indigenous cattle in the remote villages. Through legal provision, controlling good quality bull buffalo calves and cows of breeding age having good milk potential from going to slaughter houses. The female buffaloes with good productive character should be protected by the state from going to slaughter through a legal provision.
- The fodder pasture situation which is crucial, needs government intervention through policy as well as by using following options:
 - introduction of agro-forestry,
 - development of agro-silvi-pastoral systems,
 - planting of fodder tree, fodder shrubs and grass in all wasted lands,
 - improving and better managing the available natural pastures,
 - introducing crop rotation with grass, inter-cropping of grass species with main crops, allocating some part of land for fodder cultivation (and making evaluation in economic terms),
 - training farmers in silage and hay making for use in the dry season,
 - making farmers aware on the use of non-conventional feed resources of proven value such as Urea-Molasses, poultry litter etc.,
 - culling the number of unproductive animals and by replacing them with better productive one, maintaining animals indoors on balanced feed and natural fodder.
- Improving in health condition of animals through proper and timely animal health care system and disease control.

In conclusion, it can be said that through suitable policy, co-ordination and co-operation of different line agencies, educating farmers through suitable training, motivating private sector in all aspects of livestock activities in a market oriented (commercial orientation) livestock sector can do much towards rural poverty alleviation. Now this is the time that the nation must attempt to derive full potential latent in livestock sector. The day may come when we may not need to import wool from New Zealand. The ultimate goal of **Healthy Animals, Healthy Environment, Healthy Citizen in a Prosperous Country** will be achieved if we act to-day towards meeting this goal.

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PROBLEMS AND PROSPECTUS OF VETERINARY DRUG BUSINESS IN NEPAL

H.R. Shakya¹

ABSTRACT

The problems and prospects of veterinary drug business in Nepal have been reviewed and necessary measures for its promotion are recommended.

Background

Veterinary drug business in Nepal is as old as the veterinary profession itself. Its pace of growth is also as slow as that of veterinary profession. For the proper growth of the veterinary medicine market, availability of technical manpower (Veterinarians and veterinary entrepreneurs) are essentially needed. Just 30 years ago, Nepal depended totally upon its nearest neighbour India for total supply of veterinary medicines including the required feeds for poultry and cattle. Number of qualified veterinarians were also very few and virtually little was done from the government to make the people aware of the vast potentialities of the livestock and poultry farming and its scope to support the national GDP as veterinary profession as a whole was totally neglected by both government and public sector.

Since veterinary drug business totally depends upon the availability of skilled technical manpower (Vets) and development of poultry and cattle industry, its use, need, and knowledge was very much limited even 30 years before and scope of veterinary medicine was naturally scanty and it was unthinkable to start a separate veterinary counter during that time. Therefore, it is quite appropriate to mention some of legends of Nepal who has contributed directly or indirectly to change the course of history in veterinary drug business to the present stage. They are Dr Thir Bahadur Singh, Mr Panna Lal Shrestha, Late Mr Singh Raj Joshi, Late Mr Megh Vikram Shah, Mr Kalyan Raj K C, Swamy Krishnanand Bharati and many others. We owe lots of gratitude to those stalwarts for their invaluable contribution to the development of poultry and vis-à-vis veterinary drug business in Nepal. Because of lack of skilled vets and technicians in the veterinary field those days, poultry and cattle keepers including the animal lovers never felt that *animal's health was actually their wealth*. Lack of educated people involved in the poultry and cattle farming and lack of technical and logistic support from the government sector made the poultry/cattle farm industry a non-profitable business. That really made the growth of the industry slow.

Problems of Veterinary Drug Business at Present

Majority of the veterinary chemists are basically unskilled, untrained and non-professionals. This is one of the few reasons that they are unable to provide the required services to the customers who come and buy medicines without doctor's prescription. As on to-day there is no any provision being made to any of the veterinary chemist for basic training program for pharmaceutical products dispensing from the counter like the one human chemist undergoes. As per the Drug Administration law, nobody can open a medical counter nor it will be registered at Department of Drug

¹Severn Seas Pharmaceuticals Pvt. Ltd, Kha 1/282, Nachhu Galli, Tebahal New Road, Kathmdndu.

Administration (DDA) without the certificate of *Byabasayi Talim Pramanpatra* issued by the DDA. Since there is no one in the DDA to represent the veterinary department, veterinary chemists are the worst sufferers. They are facing lots of problems at the time of registering the company and their products especially when the manufacturer is new. Till today, DDA has not allowed the animal feed supplements, medicines to get registered and due to the same reason, customs duty is raised from 1% to 32% time and again. This is the acute problem every importers are facing today. Few years ago, Livestock Department had made one committee for approving the feed supplements for import from abroad. Now the customs at Birganj and other entry border points do not recognise the approval letters issued by that committee. This has to be taken very seriously. As long as this confusion remains, the customs duty on animal feed supplement continue to vary and the veterinary chemist and ultimately farmers will continue to suffer.

There are very few Vets who are actively involved in the private practice in poultry sector. Therefore, majority of the poultry farmers and feed manufactures have made the habit of purchasing the medicines on their own or on the advise of the veterinary chemist. This need to be discouraged.

Diagnostic services from the HMG laboratories need to be further standardised and extend its professional services to the needy farmers else where in the Kingdom of Nepal so that correct treatment is done. The professional diagnosis will prevent the expected misuse of the medicines by farmers on trial and error basis. Although veterinary chemists are dispensing the treatment products to the farmers strictly on the basis of the doctors prescription, problems of self purchase of poultry medicines by the farmers and dispensing the same by the chemist is becoming a matter of great concern. This problem can be solved only when maximum number of the Vets come into the field of practice not only in canine, cattle but poultry as well.

Prospects of the Veterinary Drug Business in Nepal

It has been an accepted fact that after a lot of ups and downs, poultry industry have come up in a big way and poultry industry is proving itself as one of the most viable farm industry that suits the people of Nepal. It is a matter of great pride to have some of the areas like that of Narayanghat, coming up as a vast potential belt for poultry industry. Major credit goes to a man who is no other than B V Rao of Nepal, Swamy Krishnanand Bharati. He and his associates had done lots of untiring efforts to make the Chitwan as the biggest poultry belt in Nepal.

If we go just 30 years back, we could hardly count the veterinary counters else where in Nepal as because there were no scope of sales because of insignificant numbers of Vets in the professional practice. Because of the same, little amount of essential vet medicines were used to be made available by human medicine counters as an additional commodity to serve the needy farmers. Now we have more than 300 veterinary retailers, more than 50 whole sellers and 9 super distributors all over Nepal. This sudden rise in the number of Vet counters amply give an example of growing veterinary business in Nepal. Its prospects and scope for further growth is tremendous because our livestock farm industry has just started putting its footstep in the development and vast scopes are yet to be tapped. Even at this stage there is potential for more than Rs. 2000 million market for veterinary drug business alone.

There was an approximate import of veterinary medicines and feed supplement in last financial year 2052/53 from India and abroad valued more than Rs. 350 million excluding the market share taken by the local veterinary pharmaceutical houses which was around Rs. 40 million including that of local herbal preparations. It seems that only 20% of the market potentialities are being tapped so far.

The wide gap between the market potentialities of veterinary drugs and feed supplements and its demand is around 80%. There are many factors that played a role in it. They are mainly:

- Lack of the availability of veterinary technical services to the farmers in most of the rural parts of Nepal.
- Lack of the veterinary medicine services counters in the rural areas.
- Lack of the awareness on the part of the farmers of the importance of livestock health and its return to them.
- Lack of the skilled technical manpower in majority of the feed manufacturing and hatchery business.
- Entrepreneurs are less quality conscious than required and very few of them believe in profit making than profiteering in business.
- Poor purchasing power of the farmers.

As on today, cattle farming in Nepal is not being taken seriously by the entrepreneurs in spite of having tremendous scope to grow and once cattle farm industry takes its pace of growth it will still give lots of boost to veterinary drug business. It is a matter of great pride to have our own veterinary college to have opened in IAAS, Rampur. This will definitely meet the growing demand for the skilled technical manpower else where in Nepal. Because of the sudden hike in the number of qualified veterinarians, canine market has grown tremendously. However, we owe lots of gratitude to Dr Mukti Narayan Shrestha for his untiring contributions in the service and development of canine market in Kathmandu.

Today we are proud to have more than 50 veterinary clinics all over Nepal and out of it, 25 clinics are located in Kathmandu alone.

A decade ago, none of us had ever imagined that veterinary pharmaceutical business would be viable and sustainable in Nepal. The above all positive contributing factors made it possible to motivate the Nepalese entrepreneurs to go for veterinary pharmaceutical industry. Today we have more than 10 veterinary pharmaceutical houses that manufacture veterinary medicines. Since the success or failure of any pharmaceutical houses do not always depend upon the availability of the market. It does also depend upon their marketing skills, marketing inputs and best of all the quality maintenance in the products which always becomes a triumph card for the success of any product. Those who runs their respective business in profiteering motive never hits the success. It holds good for any type of the business. Therefore, it is a must for every one of the entrepreneurs who are in the veterinary business either in medicine, feed, hatchery or any other field, to compromise in the quality and not have profiteering motive behind rather every one of us must do a profit making business.

There is one more vital sector which is still not being tapped by the veterinarians is diagnostic laboratory sector. Nepal do not seem to have any well equipped diagnostic laboratory in public sector which has tremendous amount of scope to have a profitable business along with the services to the needy farmers. This will not only enhance the standard of treatment, it will motivate lots of farmers to expand their farm strength and become a professional farmer. Ultimately it will boost the drug business. Lack of proper diagnostic services always cripples the practising veterinarians and treatment merely based on the tentative diagnosis make not only the customer a loser, but also our credibility will be at stake and indirectly the farmers lose interest in their farm expansion.

Suggestions

- Treatment of the animals based on proper diagnosis and laboratory test has become a subject of utmost importance and need to make the farming profession more lucrative and dependable. This will drastically reduce the cost of the treatment to the farmers and increase the faith on the profession in general and veterinarians in particulars. Therefore, we must motivate the private sector to have a well equipped diagnostic laboratory for both poultry and cattle at least one in every major poultry and livestock rearing area.
- Serious thoughts and attention need to be given to solve the problems of registration of veterinary drug and animal feed supplement items at the DDA under deputation from the Dept. of Livestock Services (DLS). This will make the registration process much more easier and solve the feed supplement problems at once.
- Basic training program on veterinary drugs, feed supplements and its dispense system to be organised either by the DLS or by the Nepal Veterinary Association for all unskilled and untrained veterinary chemist, has become an utmost need. Later on, we can make it a mandatory to have a basic training for one who wants to open a veterinary counter else where in Nepal.
- Veterinarians being the back bone of the veterinary drug business, need to become much more professionals, while in practice as well as at the time of purchase of veterinary medicines.
- More and more practising veterinarians need to practice in poultry sector also so that the poultry farmers need not make self purchase of the medicines. This will prevent them from the habit of self purchase of medicines and thus can avoid misuse of the drugs.
- Veterinary Council as a regulatory body should be established as early as possible.
- Monopolistic drug supply system of HMG through the *Sajha Swasthya Sewa* has to be abolished due to high cost of operation and irregular supplies because of which farmers' are the ultimate sufferers.

COMMERCIAL POULTRY PRODUCTION IN NEPAL : A CRITICAL REVIEW

M.N. Lohani¹, T.C. Bhattarai² and J.L. Amatya³

ABSTRACT

The commercial poultry industry of Nepal produced 9.8 million day-old chicks, 351 million table eggs and 17.29 thousand metric ton of chicken meat in 1995/96. The per capita availability of commercial hen egg and chicken meat were 17.47 and 0.86 kg., respectively. The value of commercial poultry products and by-products including poultry feed was Rupees 4,354 million in current market price. The contribution of this sector to country's total and agricultural GDP were 2 and 5 percents, respectively. Additionally, this sector generated a total of 29,165 direct employment, mostly in the rural area.

The constraints limiting the further expansion, growth and sustainability of commercial poultry sector are lack of a systematic and organized marketing infrastructure, paucity of nutritious and economical foodstuff for poultry, inadequate technical support services, failure to provide 'agriculture status' to this sector, and failure to provide fair market competition environment. These problems can only be corrected by the government determination and seriousness through related policy reforms and program implementation. Failure to do so makes this sector highly vulnerable with a danger of complete ruin in future.

INTRODUCTION

Nepalese poultry industry has been characterized by back-yard type in rural areas and small scale operations of highly prolific international strains of broiler and layer birds around town areas. Even though the flock size is small (majority of them containing 100-300 birds only), we call it "commercial" because these specialized hybrid birds, housed in total confinement and fed on commercial poultry feed, are reared with profit making business motive. In the last decade, this industry has experienced a massive growth and expansion. Although a reliable data to substantiate or reject this claim is lacking, people involved in this sector for over a decade confide that the growth has been over 10% per annum. The reason behind this growth are many fold. The important ones are

- Low capital investment, to initiate the enterprise
- Less land requirement,
- Easy access to credit facility
- Supply of chicks, feed, and health services as well as marketing of poultry products is organized by the feed manufacturer/supplier,
- Quick returns within weeks in case of broilers, and less than six months in case of layers

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Poultry is the most efficient converter of raw foodstuff into one of the most useful sources of high quality animal protein for humans. It generates significant employment potential for the growing population. The development of this sector will not only conserve the national reserve of scarce foreign currency through import substitution, but also has a high potential for export, particularly to the Tibet autonomous region of China, Republic of Bangladesh and even gulf countries. It is in this context a critical review of Commercial Poultry Production in Nepal has been undertaken with the following objectives:

- to assess the present situation of commercial poultry sector,
- to assess its role in national development,
- to identify the constraints limiting its further growth and expansion, and
- to suggest possible measures to overcome these hurdles.

METHODOLOGY

The data generation is based on the secondary information obtained from Nepal Feed Industries Association, Nepal Hatchery Association, Nepal Poultry Farmers Association, Nepal Veterinary Pharmaceutical Dealers Association, and data from statistics of Nepal.

The information, obtained in bits and pieces, were put together and missing gaps were filled with best estimates given by specialists. In absence of documented time series data, this was the best and often, the only possible option available.

The data generated in this way were processed, tabulated, interpreted and discussed keeping in view the present government policy and the future of Nepalese Poultry Industry.

The constraints underlying this sector and possible measures to overcome them were identified after discussion with people actively involved in, and/or concerned with the growth and expansion of poultry production.

RESULTS AND DISCUSSION

Commercial Poultry Production

The statistics relating to commercial poultry production in Nepal during FY 1995/96 are presented in Table 1. The data reveal that there were over 2 million layer-type hybrid birds of different age group in Nepal. All of these birds were of brown egg variety as demanded by the egg market of the country. Over 80% of these birds are concentrated in Kathmandu valley, Chitwan and adjoining districts, and Pokhara, which may be referred as the "egg basket" of Nepal. Broiler, in the population of over 1.5 million, is also concentrated in the same area, mainly due to their proximity to major market centers. Broilers are grown for 7-8 weeks, there by allowing to have 5-6 harvests per year.

The annual estimated production of commercial chicks of brown egg layer and broiler strains by Nepalese Hatcheries were 1.4 and 8.4 million, respectively. This supply satisfies the demand for over 99% of brown egg layer and 85% of broiler chicks. About 15% broiler chicks comes from Indian Hatcheries of West Bengal and Uttar Pradesh, often in the form of 'dumping' and overflowing the market, there by severely 'hurting' financial viability of Hatchery Industry of Nepal.

The data suggest that the total demand for poultry feed in the country in 1995/96 was 133.37 thousand metric tons (Table-1). The entire quantity of poultry feed was manufactured and marketed

by Nepalese Feed Industries. However, many raw ingredients of poultry feed, particularly soybean oil meal, fish meal, sunflower cake, sesame cake, groundnut cake, and deoiled mustard cake were imported from India. There are no industries in Nepal to produce these protein feed ingredients as their by-products. Without these ingredients, manufacture of balanced poultry ration becomes economically unfeasible. The HMG of Nepal seems to be unaware of, or not serious about this critical vulnerability of the Poultry Industry.

Table 1. Population and production of commercial poultry products/by-products and feed in Nepal, 1995/96¹

Description	Commercial		Parent Breeders		Total
	Layer	Broiler	Layer	Broiler	
Poultry population, No.000	2,106	1,517	30	105	3,758
Day-old chicks, No.000	-	-	1,400	8,400	9,800
Poultry feed, Kg.000	77,220	50,050	1,200	4,900	133,370
Chicken eggs, No.000	351,176	-	-	-	351,176
Chicken meat, Kg.000	3,201	13,832	32	224	17,289
Poultry Manure, Kg.000	19,305	12,513	300	1,225	33,343

¹Data extracted from Annex I.

The data also suggest that over 351 million brown eggs and 17,289 MT of chicken meat were produced in the country in 1995/96. Most of these products were marketed in the urban centers of inner Nepal. The demand in towns bordering to India are met by the eggs and chicken produced in India. The present HMG policy of levying duties ranging from 1-40 percent on importation of poultry production inputs, but duty free privilege on importation of commercial chicks, eggs and chicken meat makes the Nepalese market a 'heaven' for foreign producers on the cost of Nepalese producers.

Besides eggs and chicken meat, the commercial poultry sector is producing more than 33,000 MT of poultry manure as by-product. Poultry manure is a high quality organic fertilizer. It has the potential of completely substituting the whole range of imported chemical fertilizers thereby conserving the scarce foreign currency reserve of the country.

Human Nutrition

The per capita availability of commercial chicken eggs and meat is presented in table 2. The data reveal that the 17.47 commercial eggs and 860 gm chicken meat per capita was available in 1995/96. An attempt was made to compare these figures with the Agriculture Statistics figures of 1994/95 published by Ministry of Agriculture. It was found out that the HMG statistics on poultry sector were underestimates, because the sample survey area did not include the 'egg basket' pockets of Nepal.

Table 2. Per capita availability of eggs and chicken meat, 1994/95 & 1995/96

Particulars	Total		Per Capita	
	No./Qty.	%	No./Qty.	%
Total eggs, No. ¹	383,122,000	100	18.82	100
Commercial Chicken eggs, No. ²	351,176,000	92	17.47	92
Total Meat, Kg ¹	158,748,000	100	7.80	100
Total Chicken Meat, Kg ¹	9,676,000	6	0.47	6
Commercial Chicken meat, Kg ²	17,289,000	11	0.86	11

¹Source : Statistical Information on Nepalese Agriculture, 1994/95. Ministry of Agriculture. Per capita availability calculated by using total human population as 20.36 Million. The total egg availability figure includes duck and hen eggs.

²Calculated by using data from table 1 and total population of Nepal as 20.79 Million

The contribution of commercial poultry sector on human nutrition should not be valued from per capita availability indicator alone. The poor farmer producing these products would consume whatever is not suitable for marketing but fit for immediate home consumption (e.g., thin shelled eggs, under/over sized eggs, weak birds, etc.). As a matter of fact, he/she would have hardly a chance to buy and provide these products to his/her family, if he/she were not a producer. In this way the commercial poultry industry also provides opportunity to improve the nutritional status of children in the rural area.

Contribution to National Economy

The country's total GDP and contribution of Agriculture sector in 1994/95, and contribution of commercial poultry sector in 1995/96 are presented in Table 3. Where as contribution of commercial poultry sector in total GDP is 2 percent, its share in total agriculture GDP is 5 percent.

Table 3. Contribution of Commercial Poultry and Poultry Feed on GDP, 1994/95 & 1995/96

Description	Value (Rs.000)	%
Total Gross Domestic Product (GDP) ¹	210,532,000	100
Contribution of Agriculture on total GDP ¹	87,072,000	41
Contribution of Commercial Poultry and Feed on total GDP ²	4,354,710	2

¹Source : Statistical Information on Nepalese Agriculture, 1994/95. Ministry of Agriculture

²Data extracted from Annex I

This contribution of commercial poultry, which at present is concentrated in a few pockets, is not only significant in itself, but also proves its high potential for further growth and expansion in other feasible districts.

Employment Generation

The rural employment generation potential of commercial poultry production and allied sectors is another very important aspect to be considered. At present, there are nearly 30,000 people getting full employment in commercial poultry production and marketing business (table 4). The fact that this employment opportunity is generated from activities concentrated in only few pockets indicates its tremendous potential for creating more employment, particularly in the rural area.

Table 4. Employment generation from commercial poultry and allied sectors, 1995/96¹

Employment generating sectors	Employment (No.)
Commercial poultry raising sector (farmers)	18,788
Chick production and marketing sector	490
Raw feed ingredients supply sector	281
Feed premix and poultry medicines/vaccines supply sector	1,000
Feed manufacturing and marketing sector	2,807
Chicken meat and egg marketing sector	5,799
Total number of people employed	29,165

¹Data extracted from Annex II

Constraints

The data in the preceding chapters present the commercial poultry sector as buoyant and highly promising for the country's economic development. But there are also numerous constraints which make its future quite gloomy and vulnerable in Nepal. The major constraints are as follows :

- **Lack of infrastructure for collection, transportation, handling, processing and marketing of poultry products.** The marketing channel of eggs and chicken meat are undeveloped and unorganized. As a result, the market price of these perishable poultry products heavily fluctuate every now and then. Sometimes the fluctuation is as high as 50 percent. Such a situation makes the profitability of the industry highly uncertain and quite often inflicts heavy losses to poultry farmers.
- **Paucity of nutritious and economical foodstuff for poultry.** The exclusive source of protein foodstuff like soybean oil meal, sunflower cake, til cake, fish meal, oyster shell and deoiled mustard cake necessary for manufacturing poultry feed is India. The quality of these foodstuff varies significantly between lots there by affecting the quality of poultry feed. The continuous inflow and price of these raw ingredients is also very uncertain.
- **Failure to provide the poultry sector 'Agriculture Status' by the government, extending the same relief to poultry as in agriculture.** The poultry breeding enterprises, hatchery operations as well as commercial poultry production units are classified under 'Industry' category. As a result the various benefits provided by the government to crop and horticulture enterprises are not extended to poultry sector.
- **Little or no animal husbandry extension and technical services to poultry units.** The poultry disease diagnostic facility is inadequate both in terms of number and quality to provide prompt and reliable services to farmers. The government livestock extension service does not have programs to meet the specific service needs of commercial poultry farmers.

- **Failure to provide fair market competition environment to Nepalese poultry farmers.** Poultry production inputs such as breeding flocks, foodstuff, vitamins, minerals, vaccines, medicines, equipment, machinery, etc. are imported from India on which HMG has been levying custom and other duties ranging from 1-40 %. These duties, and additional cost of transporting these inputs up to the production site makes its cost much higher in Nepal than in India. Additionally, the municipality tax is levied five times on machinery and equipment, feed raw material, manufactured feed, chicks and poultry products. These taxes plus other additional costs outlined above make the cost of poultry production much higher (about 20%) in Nepal than in India. On the other hand, advanced technology and larger economy of scale in India further lowers its production cost there. Under such a scenario, the Nepalese products have to compete with duty free Indian commercial chicks, table eggs and chicken meat in Nepalese market.
- **Failure to protect local markets from being used as 'dumping site'.** The current law of Nepal permits unrestricted flow of Indian poultry products into Nepalese market. Whenever there is a market glut in India, the surplus poultry products is dumped in the Nepalese market thereby inflicting hard economic blow to local producers.

Solution to Constraints

In general, the nature of the said constraints suggest that there is a lack of Government commitment in Nepal. To achieve the expansion, growth and sustainable development of this sector, the government must be serious and take necessary measures boldly. In specific terms, the following policy reforms and program implementation is a must.

- **Infrastructure development for collection, transportation, handling, processing and marketing of poultry product.** A national level project should be implemented with foreign technical assistance and financial support. Its components should include opening new market centers, small scale slaughter houses with processing and packaging facilities in major cities, slaughtering regulations, a powder egg plant, training to local producers, etc. Additionally, policy reforms conducive to export of commercial chicks, table eggs and chicken needs to be carried out.
- **Supply of foodstuff for poultry.** The government should promote the production of soybean, sunflower and sesame oil seed in the country. Industries which produce oil cakes as by-product should be promoted in the country. Additionally, the country's demand for the raw material of poultry feed should be assessed, imported, and supplied by the Agriculture Input Corporation to feed millers.
- **'Agriculture status' to poultry sector.** The government should reform the current 'biased' policy and provide 'agriculture status' to poultry sector extending the same relief to it as in agriculture.
- **Government services to poultry units.** The government should include commercial poultry development program in potential pockets of the country. Modern poultry disease diagnostic facilities should be established in such pockets.
- **Fair Market competition environment.** The government must reform the current tax policies so that the Nepalese Poultry Industry can compete with its Indian counterpart. The custom duty and municipality tax on poultry production inputs as well as products should be scrapped.

- *Protection of local market to be 'dumping site'* The unrestricted flow of poultry products from India to Nepal must be stopped through necessary policy reforms and program implementation.

CONCLUSION

Massive government intervention, both in terms of policy and resources has resulted in rapid and sustainable growth in crop and dairy production in many countries, which are glorified as 'Green Revolution' and 'White Revolution', respectively. Unfortunately, the poultry sector never received its fair share of government attention. On the contrary, the revolutionary achievement in this sector, largely through private sector efforts, is gloomily received. Now the time has come that the national policy makers be serious on these related issues and implement necessary policy reforms for the expansion, growth and sustainable development of this sector. Failure to do so will lead to a disastrous end of poultry industry of Nepal.

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Annex I. Commercial Poultry and Feed Production, 1995/96

Particulars/Description	Commercial		Parent Breeders		Total
	Layer	Broiler	Layer	Broiler	
Day old chicks marketed					
Per week (No. '000)	27	175			202
Per year (No. '000)	1404	9100			10504
Production cycle per year	0.67	6	0.67	0.67	
Commercial Poultry Population.					
all age groups (No. '000)	2106	1517	30	105	3758
Poultry Feed Production MT ¹	77220	50050	1200	4900	133370
Value of feed (Rs. '000) ²	857142	653153	14400	63700	1588395
Commercial Production of Poultry Products					
Chicken eggs (No. '000) ³	351176				351176
Chicken meat, MT ⁴	3201	13832	32	224	17289
Day old chicks (No. '000) ⁵			1400	8400	9800
Value of Products (Rs. '000) ⁶	1325622	1175720	44720	170240	2716302
Poultry by-products ⁷					
Manure, MT	19305	12513	300	1225	33343
Value of Manure (Rs. '000)	28958	18769	450	1838	50014
Total Value Feed & Poultry Products (Rs. '000)					4354710

¹ Feed consumption per bird per prodn. cycle : Commercial Layer 55 kg and Broiler 5.5 kg, Breeder Layer 60 kg and broiler 70 kg

² Price of feed based on the average market rate: Rs 11.10, 13.05, 12.00, and 13.00 per kg, for commercial layer, broiler, layer breeder, and broiler breeder feed, respectively.

³ 2/3 of layer population are in laying stage; average productivity 250 eggs/layer/year

⁴ 2/3 of layers are replaced annually, a culled bird has 1.9 kg ave. live wt. with 80% carcass. Commercial broiler harvest 6 times a year, a bird has 1.9 kg ave. live wt. with 80 % carcass, 2/3 of Breeders are replaced annually, a culled layer and broiler has 2.0 & 4.0 kg live wt., respectively with 80% carcass

⁵ 2/3 of breeders are in production stage, each breeder layer and broiler hen produces 70 commercial layer female chicks and 120 commercial broiler chicks, respectively.

⁶ Eggs, chicken meat, layer chicks and broiler chicks are valued at the present market price: Rs 3.00, Rs 85.00, Rs 30.00 and Rs 18.00, respectively

⁷ Manure production is equivalent to 25% of feed consumed by poultry. Value of manure at present is an average of Rs 75 per 50kg sac, or Rs 1.50/kg

Annex II. Employment Generation, 1995/96

Employment Generating Sectors	Employment (No.)
Number of People Employed in :	
Poultry Production ¹	18788
Chick Production /Marketing ²	490
Feed Ingredient Supply ³	267
Feed Premix and Poultry Medicine/Vaccine Supply ⁴	1000
Feed Production and Marketing ⁵	2667
Poultry meat & Egg marketing ⁶	5799
Total Number of People Employed	29011

¹ Average commercial poultry farm size is 200 birds and gives full employment to one person

² A small hatchery unit with production and sale of 300,000 chicks per year gives employment to 15 people. Source : Nepal Hatchery Association, 2053 (B.S.)

³ An average trading company with a manpower of 12 persons sells 20 MT of raw feed ingr. per day or 6000 MT/yr. (300 working days). Source: Nepal Feed Industries Association, 2053 (B.S.)

⁴ Poultry vaccines and medicines plus feed premixes valued at 200 million Rupees is sold annually in Nepal. A small vet. pharmaceutical trading unit with a manpower of 3 persons has a transaction Rs 600,000.00 per year. Source : Nepal Veterinary Pharmaceutical Association, 2053 (B.S.)

⁵ A small scale Animal Feed Industry with a total manpower of 30 persons produces, whole sales, and transports 3000 MT of Feed to its dealers. An equal number of manpower is required for retail sale and transportation of feed to small poultry raisers. Source : Nepal Feed Industry Asson., 2053 (B.S.)

⁶ A small scale butcher having a work force of 3 persons trades 50 kg dressed chicken, or 15 MT/Yr. Similarly, one person trades 500 eggs/day or 150000/yr.

INFLUENCE OF BODY SIZE ON MILK PRODUCTION ON DAIRY COWS

B. Sharma¹

ABSTRACT

A total of 30 multifarious cows (22 Friesians and 8 Jerseys) with similar Milk Fat (MF) yields were selected for the experiment with an objective of examining the importance of differences in body size on their efficiency of producing milk. Bodyweight (BW) of the cows ranged between 310 and 565 kilograms and they were between 4-7 years old. The experiment was designed as a 25 day grazing trial in which the cows were divided into three size groups- large, medium and small, 10 cows in each group (8 Jerseys in the small group). The three groups of cows were offered a generous daily herbage allowance (mixture of high quality perennial rye grass and white clover) and grazed side by side in separate parts of a paddock. It was found that the medium group (Friesians) ate 3.9% less dry matter (DM), produced 2.8% less milk energy and were 2.6% more feed efficient than the large group (Friesians); the small group (mainly Jerseys) ate 13.4% less DM, produced 8.7% less milk energy than the medium ones and were 5.1% more efficient. However, the accuracy of the results may have been reduced due to breed effects and therefore warrants further investigation within the same breed.

INTRODUCTION

Dairy production system in New Zealand is based on the efficient utilization of grazed pasture by lactating cows. From managed grasslands, dairy cows can obtain adequate amounts of nutrients and energy at low cost to achieve a high level of productivity per hectare well within the limits fixed by cows' genotype. Three main factors are involved in determining the level of milk production from grasslands.

- the quality, quantity and seasonal distribution of grass grown;
- the proportion of the grass grown that is actually harvested by the cattle;
- the efficiency with which the cattle convert the harvested feed into milk.

(Mc Meekan, 1960)

Compared to the agriculture in the United States and Europe, the use of energy intensive fertilizer nitrogen is low in New Zealand pastoral farming (Daly, 1990). However, pasture containing white clover in addition to rye grass has the advantage of requiring less use of fertilizer nitrogen and such a mixed herbage is available in abundance throughout the country. Therefore, dairy farming systems in New Zealand is considered 'efficient' because input costs are very low in comparison with those in most other systems throughout the world.

With the recognition of larger breeds, the smaller ones are being gradually replaced elsewhere. However, the effect of body size/breed on milk production has not been precisely identified in New Zealand conditions. The present study was, therefore, commenced with the broad objective of

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providing information on the importance of body size in influencing the efficiency of milk production.

MATERIALS AND METHODS

A total of 30 multifarious cows (22 Friesians and 8 Jerseys) were selected and these cows produced approximately similar amounts of milk fat (MF) per day but varied greatly in body weight (BW) and conformation. The age of the cows ranged between 4 and 7 years, and while no account of calving date was taken, most of the cows were in early to mid lactation. The cows were divided into 3 groups according to BW with 10 cows in each group, as follows:

Group	Bodyweight (Kg)
Large	458-565 (all Friesians)
Medium	412-459 (all Friesians)
Small	310-393 (2 Friesians and 8 Jersey)

During the experimental period, the cows were allocated a generous herbage allowance and grazed side by side on separate parts of a paddock. Little increase in body size, foetal growth or fat deposition was expected. Therefore, metabolisable energy (ME) requirements for milk production and maintenance only were calculated according to ARC (1980) in order to estimate the area of pasture required each day. For grazing, an area of approximately 0.5 ha was divided into 3 parts every day for three groups of cows. Thus, every 24 hours, they were given a fresh part of a paddock. The cows were milked twice daily at 0530 and 1530 hours.

Milk yields and percentages of MF, Protein and lactose were measured for individual cows on 3 days each week. During the 4 experimental weeks, the cows were weighed after the morning milking every Monday and Friday.

For the determination of faecal output, two alternative marker methods were used. Each experimental cow was given chromic oxide (Cr_2O_3) pills (containing chromium), one in the morning and one in the afternoon. Administration started on day -4 and continued until day 13. Faecal samples from each cow were collected twice daily in the field, one before the morning milking and another in the afternoon before milking. The faecal samples were bulked over 2 consecutive periods of 5 days each, starting on day 3. On day 13, each cow was dosed with controlled release capsule (CRC) of Cr_2O_3 . This leads to an improved means of estimating feed intake in grazing animals because CRC provide for the continuous uniform release of Cr_2O_3 into the rumen (El Du and Penning, 1982; Parker *et al.* 19989). Faecal samples were collected once daily and bulked over 2 successive periods of 4 days each, starting on day 18. The concentration of Cr in the faeces was measured by means of atomic absorption spectroscopy according to the procedure described by Parker *et al.* (1989). Dry matter intake (DMI) was calculated using the following equations:

$$1) \quad \text{FDMO} = \text{RR}/\text{Cdm}$$

where,

FDMO = faecal dry matter output (kg DM/day)

RR = expected average daily release rate of Cr (g /day); the release rate was 13.68 g/day for two pills per day and 1.197g /day for the capsules.

Cdm = concentration of Cr in faecal dry matter (g/kg)

$$2) \quad \text{DMI} = \text{FDMO}/1\text{-DMD}$$

where,

DMI = dry matter digestibility (%)

Energy in milk was estimated from milk composition as follows:

$$\text{Net Energy in milk (NE milk (NE milk))} = F*38.5 + P*24.5 + L*15.7$$

Where,

F = kg MF produced/day

P = kg protein produced/day

L = kg lactose produced/day.

Feed efficiency was calculated as NE milk divided by metabolisable energy intake expressed as a percentage. Live weight change for each cow was estimated by calculating a liner regression of LW on day number. The intake and performance data of the large and small body size groups were subjected to analysis of variance (Stakelum and Conolly, 1987).

RESULTS

Composition of the pasture herbage consumed by the experimental cows is given in Table 1. It is evident from the table that the quality of pastures used was high.

Table 1: Composition of the pasture herbage

	CP (%)	DMD (%)	Calculated MJME/kg DM	Ash (%)
Period 1*	20.00	77.00	11.50	10.30
Period 2*	19.50	78.50	11.80	10.15

Period 1* = duration after pills administration; Period2* = duration after CRC administration;
MJME = Megajoules of metabolisable energy

The means and standard deviations of the body measurements, feed intake, production, LWG and feed efficiency (FE) are presented in Table 2 and 3.

It was found that there was a significant difference between body size in three groups of cows. Statistical analysis has shown that DMI of the small group was significantly different from the other two groups. Although MF yield from all groups was almost similar, there was difference in protein and lactose yields. And the small group was found to have the highest FE.

Table 2: Means and standard deviations of the traits for three size groups of cows for Period 1

Variable	Large		Medium		Small	
	Means	SD	Means	SD	Means	SD
Height (cm)	132.00	2.60	127.00	2.60	117.50	4.90
LW (kg)	513.30	31.70	433.50	15.70	353.40	33.50
LW ^{0.75} (kg ^{0.75})	107.80	5.00	95.00	2.60	81.40	5.80
DMI (kg/day)	18.60	2.00	17.90	1.40	15.80	1.09
MEI (MJ/day)	213.80	22.60	205.70	16.20	181.50	12.60
NE Milk (MJ/day)	81.70	12.10	79.50	8.30	73.10	6.60
MF yield (kg/d)	1.05	0.15	1.06	0.14	1.03	0.09
Protein yield (kg/d)	0.86	0.12	0.83	0.08	0.73	0.09
Lactose yield (kg/d)	1.20	0.19	1.16	0.11	0.99	0.16
LWG (kg/d)	0.50	0.35	0.61	0.24	0.60	0.20
FE (%)	38.00	0.06	39.00	0.06	41.00	0.50

Table 3: Means and standard deviations of the traits for three size groups of cows for Period 2

Variable	Large		Medium		Small	
	Means	SD	Means	SD	Means	SD
Height (cm)	132.00	2.60	127.00	2.60	117.50	4.60
LW (kg)	519.50	30.64	443.50	17.41	364.10	33.77
LW ⁰ (kg/d)	108.80	4.82	96.60	2.85	83.30	5.80
DMI (kg/d)	19.70	1.42	19.60	1.57	16.30	1.50
MEI (MJ/d)	232.30	16.70	230.90	18.60	192.70	17.70
NE Milk (MJ/d)	82.30	7.90	77.70	5.90	74.20	7.50
MF yield (kg/d)	1.07	0.09	1.02	0.10	1.05	0.11
Protein yield (kg/d)	0.86	0.09	0.80	0.05	0.74	0.10
Lactose yield (kg/d)	1.27	0.17	1.18	0.11	1.05	0.19
LWG (kg/d)	0.50	0.35	0.61	0.24	0.60	0.20
FE (%)	36.00	0.04	34.00	0.02	39.00	0.03

Statistical analysis has shown that DMI (MEI) had strong relationships with milk production, LW^{0.75} and LWG in the large group. In the medium group, there was significant association between DMI (MEI) and LWG and this relationship was absent in the small group. FE was significantly related with NE milk in the medium and small groups. Data were also analysed separately for Friesians and Jerseys. For Friesian cows DMI was positively related to LW^{0.75}. Level of milk production also had no significant association with DMI. None of the above relationships were significant in Jerseys. When the data of both breeds were combined, all measures of size were significantly related to DMI, but LW^{0.75} showed the highest correlation coefficient.

DISCUSSION

Reliability of Intake Estimates using Chromic Oxide

The purpose of dosing the experimental cows separately with pills and CRC containing Cr₂O₃ was to compare the level of faecal output obtained from the two methods and to guarantee some results in the event that some capsules were regurgitated, although many authors are not satisfied with the results of pills due to a diurnal variation in the recovery of Cr₂O₃ (Bramduberru *et al.* 1991; Parker *et al.* 1989). In agreement with the findings of these authors, a diurnal variation in the recovery of Cr₂O₃ from animals dosed with the pills was apparent, the Cr concentration was lowest in the afternoon and highest in the morning faecal samples. However, in spite of almost uniform release rate of Cr in the faecal samples from the animals dosed with capsules, the mean DM intake in this

study was underestimated by 10.2% compared to the actual intake. With pills, this was overestimated by only 2.4%. This implied that when faecal samples were collected two times a day, pills containing Cr_2O_3 were more reliable than capsules.

Effects on Body Weight

Hooven *et al.* (1968, cited by Morris and Wilton, 1976) plotted efficiency against BW and found a maximal efficiency at an intermediate BW (about 540 kg). Stakelum and Conolly (1987) compared the performance of large (LW-554 kg) and small (LW-500 kg) cows and found relatively lower food conversion efficiencies of large cows especially at low yields, but it was concluded that at differences of 50 kg LW the gross efficiencies are unlikely to be very large. In the present study the differences in the BW between 'large' and 'medium', and 'medium' and 'small' were 80 kg and that between 'large' and 'small' was 160 kg. Medium-sized cows in period 1 were 2.6% more feed efficient (gross) than 'large' ones, and 5.1% less efficient than small cows. Thus, the large cows appeared to be least efficient. It was found that with the increase of every unit of $\text{LW}^{0.75}$ ($\text{kg}^{0.75}$) gross efficiency generally decreased by 0.2-0.3% (average 0.25%).

CONCLUSIONS

Feed involves one of the major costs in a pastoral dairy farming, and profitability could be enhanced if more efficient cows were used. To measure the individual efficiency of grazing cows, herbage intake as well as production must be accurately determined.

Feed intake of lactating dairy cattle is affected by three main factors body size or LW (for maintenance), level of production and LWC. In addition, milk production is also related to body size. Although cows with similar MF yields were chosen in the present study to minimize a source of variation if affecting efficiency, production measure in energy terms did vary considerably due to higher yields of lactose and protein from larger animals. Differences in the amounts of lactose and protein produced between breeds were more pronounced than between cows within breeds; Friesian cows consistently produced higher amounts. Thus effects of body size were confounded by breed effects.

Nevertheless, the present evidence has shown that bigger Friesian and Jersey cows within and across breeds produce greater amounts of NE milk than their smaller herd mates, although they do so less efficiently. However, it is not certain how the efficiency would have been affected if the cows had been randomly selected from each of the breeds. For more precise results, it would be useful if the effects of body size within and across breeds are dealt with separately using larger sample sizes.

Although economic efficiency was not considered in the present experiment, it is evident that the smaller cows are more efficient and in grassland farming, more cows can be fed per unit area that should result in higher per hectare production and greater economic efficiency. Also, if production is measured only in terms of MF yield, Jersey cows would bring greater economic returns compared to the Friesians.

In Nepal, if adequate grasslands are available, pastoral farming should get the first priority since this system can establish everlasting friendly environment and handsome natural display.

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EFFECTS OF ALTITUDE, MANAGEMENT SYSTEM AND PARITY ON THE PRODUCTION PERFORMANCE OF MONSOON CALVING HILL BUFFALOES

D.P. Rasali¹

ABSTRACT

Data from a milk recording study conducted in the western hill districts of Parbat and Kaski during 1993/94 were analysed to evaluate the performance of indigenous hill buffalo cows calving between mid-July and mid-September 1993 and reared under farmers' management. The three factors examined were location altitude, management system and parity of the animal. The analysis revealed that the overall least-squares (LS) means of age at first calving of 108 buffaloes, calving interval of 109 buffaloes, 305-day lactation yield of 131 buffaloes and fat content in milk of 126 buffaloes were 50.5 ± 1.9 months, 574 ± 40 days, 995 ± 44 litres and 7.2 ± 0.4 per cent respectively with their co-efficient of variation of 18.4, 34.6, 25.6 and 27.6 per cent respectively.

Among the three factors considered, only the effects of altitude on age at first calving and 305-day lactation yield were statistically significant. The LS means for age at first calving were 54.7 ± 2.4 , 48.2 ± 2.1 and 48.6 ± 3.0 months in high, mid and low hills respectively ($P=0.0242$), and those for lactation yield were 995 ± 57 , 875 ± 49 and 1116 ± 68 litres in the high, mid and low hills respectively ($P=0.0008$). There were also considerably wide variations in the lactation yield range between and within altitudes. The results indicated the trend that reproductive performance of the hill buffaloes was relatively more efficient and their lactation yield higher in the low hills as compared to the high hills.

INTRODUCTION

Buffaloes are the multipurpose and economically the most important livestock raised under the farming systems of Nepal. They are the provider of milk, milk products such as Ghee (clarified butter oil), dung (manure and fuel), meat and hides, draft power for crop cultivation and also reserve capital for the farm households.

Most of the buffaloes particularly in the hills are indigenous in their genotypes, although some crossbreds born from crossbreeding of the indigenous buffaloes with Indian Murrah breed are found in the local pocket areas. In the former Extension Command Area (ECA) of Lumle Agricultural Research Centre (LARC) covering 24 Village Development Committees (VDCs) of Kaski, Parbat and Myagdi districts, 6.1 per cent of the buffalo population were the Murrah crossbreds, whilst the rest were all indigenous hill buffaloes in 1990 (Clinch and Vaidya, 1993).

Despite the considerable socio-economic importance of these indigenous buffaloes, very little is known about their inherent characteristics and production potential. Only recently, there are some study reports specifically focusing on the indigenous hill buffaloes (ABD, 1995; Rasali and Joshi, 1996) with the recently growing interest in animal genetic resources in the country (Shrestha, 1995;

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Pradhan and Rasali, 1995). Rasali *et al.* (1996) compared production performance of indigenous buffaloes with their Murrah crossbreds across various blood level bands through a milk recording study conducted in the LARC's ECA during the year 1993/94. A further analysis of production performance of indigenous hill buffaloes from this study as influenced by factors, namely the location altitude, management system and parity is presented in this paper.

MATERIALS AND METHODS

Experimental Animals

A milk recording study in buffaloes was conducted in the LARC's ECA covering VDCs of Kaski and Parbat in the western hill districts (Rasali *et al.* 1996). Buffaloes which calved during monsoon between mid July and mid September, 1993 were identified in the farm households in the area. Based on their breeding records obtained from the ECA field staff responsible for livestock extension services in their respective VDCs, and also verification with the concerned owner farmers, necessary information on the identified animals were established.

Data from a total of 131 indigenous hill buffaloes accumulated during the milk recording study were available for analysis in which the records of the hill buffaloes were classified according to their location in the ECA into three hill altitude ranges - high hills (> 1600m asl), mid hills (900 - 1600m asl) and low hills (<900m asl), and according to the management systems of the animals as practised by the owner farmers into two categories as complete stall feeding and semi-stall feeding. Parity of each animal was determined by enquiring the owner farmers about the breeding history of the animal.

Observations/Recording

Feeding systems of the animals under the milk recording study were monitored by enquiring the farmers about the approximate quantities of feed stuff offered to them on daily basis at the fortnightly intervals during the recording period.

The reproductive performance of the buffaloes was recorded from the breeding history record each animal as given by its owner and verified by the ECA field staff who was responsible for monitoring the animal.

Milk recording was initiated in the buffaloes starting on seventh day post calving and continued subsequently at 15 day intervals throughout the lactation or until the buffaloes were no longer retained due to their sales in the households of the identified owners during the lactation period. The daily milk yield of each animal was obtained from milking in the morning and evening on the day of recording and was adjusted to four teat basis. The standard lactation yield was calculated to 305-day basis as suggested by Basu (1995) from the milk recordings at 15 day intervals. The milk fat content was estimated around 5-6th month lactation using Gerber's fat test method.

Analysis of Data

The feed stuff recordings of buffaloes monitored in the present study were classified into four major categories, namely green grasses/shrubs, tree fodder, crop residues and grain based feed given as "Kundo". From the fortnightly feed stuff recordings, average daily quantity of each feed stuff category was computed for each of the four seasons, monsoon (mid June - mid Sept), autumn (mid Sept - mid Dec), winter (mid Dec - mid Mar) and summer (mid Mar - mid Jun). In order to obtain

some indicator trends of buffalo feeding, the percentage frequencies of the animals grouped as being offered none, ≤ 15 kg or >15 kg of the roughage feed stuffs, and none, ≤ 1.0 kg or >1.0 kg of "Kundo" grains on average daily basis across seasons were computed. SPSS PC+ (1992) software was used for data analysis.

Data on a total of 108 buffaloes for age at first calving, 109 buffaloes for calving interval, 131 hill buffaloes for standard lactation yield and 126 for milk fat percentage were finally available for analyses. A mixed model was employed for least-squares analysis of fitting constants for each trait examined (Harvey, 1990) as follows:

$$Y_{ijk} = \mu + A_i + B_j + C_k + E_{ijkl}$$

where,

Y_{ijk} = the observation of the trait;

μ = Overall mean;

A_i = fixed effect of i th location altitude;

B_j = fixed effect of j th management system;

C_k = fixed effect of k th parity of the animal; and

E_{ijkl} = random error.

The number of observations in the sub-classes (the levels of factors) were not adequate to analyse the data for interactions among the factors.

The lactation yield of the buffaloes was also classified into its ranges (class intervals) and the extent of its variation existing across the factors was analysed using frequency distribution (SPSS, 1992).

RESULTS

Feeding Management

All the milk-recorded hill buffaloes were managed by the farmers under their prevailing conditions, and were fed with the feed stuffs available under the existing farming systems. The overall percentage frequencies of the hill buffaloes categorised as being given at the levels of average daily quantities of the four different classes of feed stuffs across seasons during the period of their milk recording are presented in Figure 1.

The results indicated that the majority of the hill buffaloes (over 85%) were given green grasses/shrubs during monsoon and autumn seasons from the crop lands or forests at the average daily rate exceeding 15 kg. During the subsequent seasons, winter and summer, green grasses/shrubs were relatively less important feed stuffs as most of the animals were given up to 15 kg or even none of the green grasses/shrubs.

During monsoon, feeding of tree fodder in milking hill buffaloes was negligible. However, during the subsequent two seasons, autumn and winter, tree fodder was given to 83% and 71% of the animals respectively at the rate of up to 15 kg on an average daily. During summer, this feed stuff was little less important, only 48% being given daily at the rate of up to 15 kg of the feed stuff.

Nearly one-third of the buffaloes (30%) were given crop residues at the daily average rate up to 15 kg during monsoon season. On the other hand, crop residues were important feed stuff in the subsequent three seasons as the most of the animals milk-recorded had access either up to 15 kg crop residues or even exceeding 15 kg on daily average basis. The majority of the buffaloes were given grains in the form of *Kundo* at the daily average rate up to 1.0 kg throughout the four seasons.

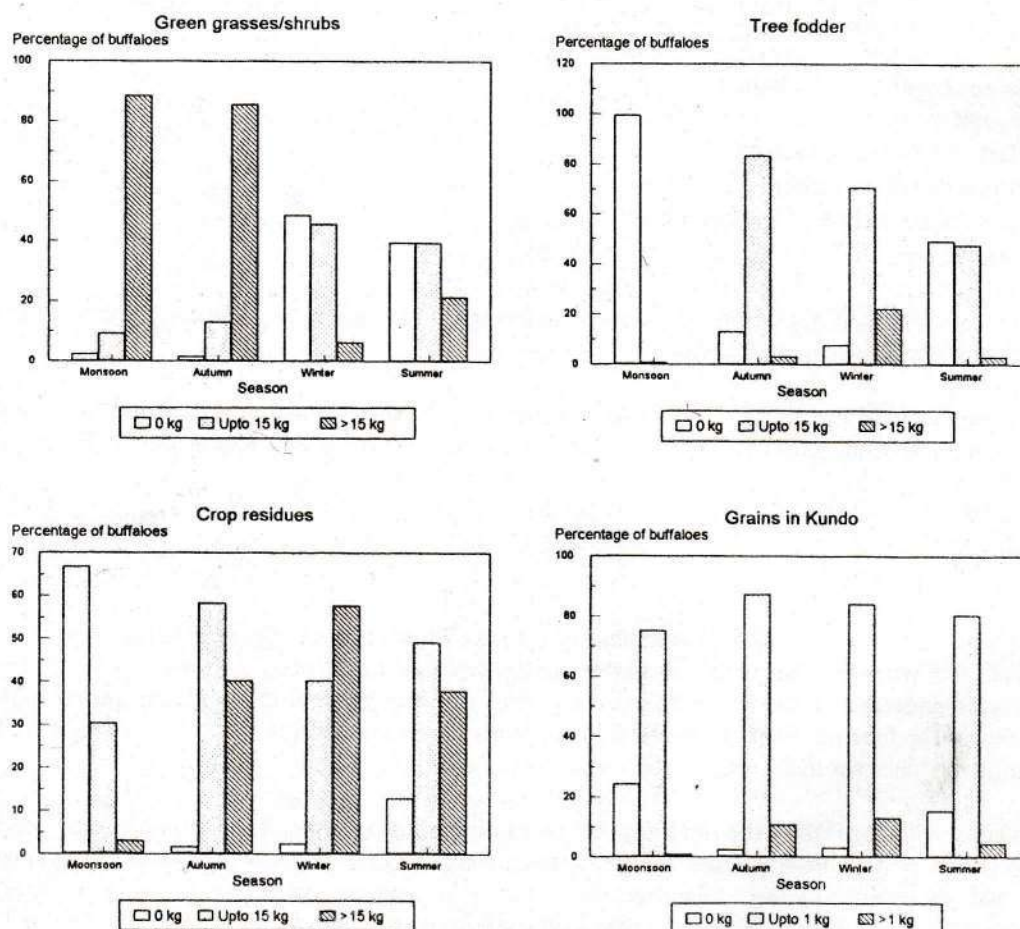


Figure 1: The frequency histograms of hill buffaloes provided with the feed stuffs in the daily average quantities across four seasons in the ECA.

Reproductive Performance

The least-squares (LS) means with standard errors of the two reproductive traits in milk-recorded buffaloes are presented in Table 1 showing that the overall LS means for age at first calving, and calving interval in the total samples were 50.5 ± 1.9 months, and 574 ± 40 days respectively.

The results indicated that the age at first calving was significantly different across only the location altitude ($P=0.0242$) when it was fitted in a least-squares fixed model along with the other factors, management system and parity of the animal. On the other hand, the effects of all these factors, as location altitude, management system and the parity of the animals were not significant ($P>0.05$) on calving interval in the same model.

Table 1: The least-squares means and standard errors of two reproductive traits in the monsoon calving buffaloes across the factors in the ECA (1993-94).

Factors	Age at first calving, months	Calving interval, days
ALTITUDE:	($P=0.0242$)	($P=0.3016$)
High hills	54.7 ± 2.4 (25)	622 ± 50 (24)
Mid hills	48.2 ± 2.1 (68)	572 ± 43 (65)
Low hills	48.9 ± 3.1 (15)	529 ± 56 (20)
MANAGEMENT:	($P=0.3287$)	($P=0.1775$)
Stall feeding	52.0 ± 1.5 (95)	526 ± 25 (101)
Semi-stall feeding	49.0 ± 3.2 (13)	623 ± 71 (8)
PARITY:	($P=0.3449$)	($P=0.9435$)
1	57.9 ± 2.4 (20)	NA
2	51.5 ± 2.5 (22)	599 ± 51 (19)
3	51.2 ± 2.6 (22)	612 ± 52 (24)
4	50.5 ± 2.7 (17)	563 ± 53 (21)
5	52.5 ± 3.9 (7)	521 ± 65 (11)
6	51.6 ± 3.7 (8)	572 ± 68 (11)
7	48.8 ± 7.1 (2)	594 ± 82 (6)
8	50.0 ± 5.1 (4)	580 ± 72 (9)
9	45.3 ± 7.1 (2)	505 ± 138 (2)
≥ 10	45.7 ± 5.1 (4)	624 ± 85 (6)
OVERALL MEAN	50.5 ± 1.9 (108)	574 ± 40 (109)
CV%	18.4	34.6

NA = Not applicable

Figure in the parenthesis indicates the number of observations

Lactation Yield

The least-squares means and standard errors of 305-day standard lactation yield and fat percentage in milk around 5-6 month of lactation in milk recorded hill buffaloes are presented in Table 2. The results indicated that the lactation yield of buffaloes was significantly influenced by location altitude ($P=0.0008$) but not by the managerial factor and parity of the animals when all these factors were fitted in a least-squares model.

The overall standard lactation yield was 995 ± 44 litres. Across altitude, the highest standard lactation yield among all milk recorded hill buffaloes was observed in the low hills (1116 ± 68 litres) followed by the high hills (995 ± 57 litres) and the mid hills (875 ± 49 litres). The standard lactation yield tended to be higher as the parity increased from first to fourth and then it remained more or less uniform up to seventh parity after which the yield tended to decline although the factor was not statistically significant ($P=0.0641$).

The minimum and maximum values for lactation yield for 131 hill buffaloes were 378.3 and 1959.6 litres respectively with unadjusted mean of 979.5 ± 23.8 litres. When the lactation yield values were divided into the class-intervals of >300-500, >500-700, >700-900, >900-1100, >1100-1300, >1300-1500, >1500-1700, >1700-1900 and >1900 litres, the X^2 test of the frequency distribution of these lactation yield ranges was significant across the factor altitude ($P=0.008$) but not across the management system and parity. Figure 2 shows considerably wide variations in the lactation yield ranges between and within altitude ranges.

The overall fat percentage in milk around 5-6th month of lactation in buffaloes was 7.1 ± 0.3 which was not significantly influenced by any of the factors, as altitude, management and the parity of the animal which were fitted in a least-squares fixed model.

Table 2: Least-squares means and standard errors of 305-day lactation yield and milk fat percentage in buffaloes milk recorded across the factors in the ECA (1993-94)

Factors	305-day standard lactation yield (litres)	Milk fat (%)
LOCATION ALTITUDE:	($P=0.0008$)	($P=0.4772$)
High hills	995 ± 57 (27)	6.8 ± 0.5 (27)
Mid hills	875 ± 49 (84)	7.4 ± 0.4 (81)
Low hills	1116 ± 68 (20)	7.3 ± 0.6 (18)
MANAGEMENT:	($P=0.4018$)	($P=0.9033$)
Stall feeding	1027 ± 32 (117)	7.2 ± 0.3 (112)
Semi stall feeding	963 ± 76 (14)	7.2 ± 0.6 (14)
PARITY:	($P=0.0641$)	($P=0.8776$)
1	855 ± 62 (20)	7.4 ± 0.5 (20)
2	998 ± 64 (21)	7.5 ± 0.5 (21)
3	1073 ± 64 (24)	7.0 ± 0.5 (24)
4	1090 ± 64 (22)	6.6 ± 0.6 (18)
5	1096 ± 86 (10)	7.1 ± 0.7 (10)
6	1042 ± 85 (11)	7.8 ± 0.7 (10)
7	1123 ± 107 (6)	6.6 ± 0.9 (6)
8	922 ± 92 (9)	7.6 ± 0.7 (9)
9	756 ± 182 (2)	7.2 ± 1.5 (2)
≥ 10	1000 ± 110 (6)	7.1 ± 0.0 (6)
OVERALL MEAN	995 ± 44 (131)	7.2 ± 0.4 (126)
CV%	25.6	27.6

Figure in the parenthesis indicates the number of milk recorded animals in each level of a factor

DISCUSSION

The data presented on feed stuffs given to the hill buffaloes could not be reliable due to the fact that they were not actually weighed but were verbal approximation of the farmers. However, they were indicative of the trend in existing feeding systems across the seasons in the western hills. High amount of green grasses/shrubs offered to most of the buffaloes during monsoon and autumn clearly indicate the relative abundance in supply of the feed stuffs during these two seasons. The tree fodder was available during autumn, winter and summer in decreasing order of the proportion of buffaloes. The crop residues were given to the highest percentage of the buffaloes during autumn and winter but the relatively higher percentage of the buffaloes were given ≤ 15 kg of the feed stuff on daily average during autumn, whilst higher quantities of the feed stuffs (>15 kg) were given during winter. During summer, relatively higher percentage of buffaloes were given ≤ 15 kg of crop residues, followed by the percentage of buffaloes given quantity >15 kg of the feed stuff. Thus, these feed stuffs were given largely to compensate for the diminishing availability of green grasses/shrubs and tree fodder during these seasons. The more or less uniform percentage of buffalo given "Kundo" grains in about uniform average daily quantities of 1 kg across seasons reflected the ration allocation for their

milk production. The trend was evident that the farmers' were adjusting the feeding regimes of the milking buffaloes not only to compensate to some extent for the winter and summer feed deficit, but also for consideration for production of milk.

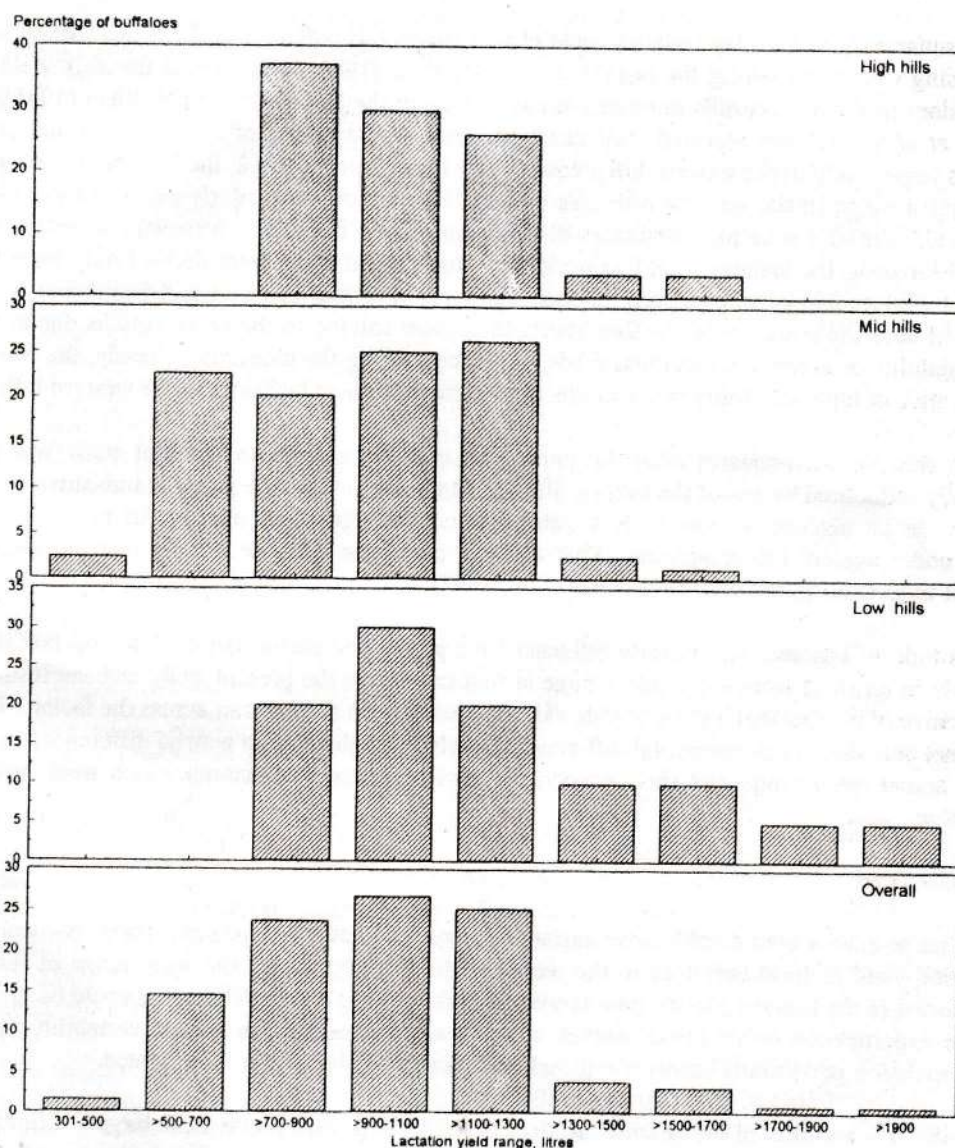


Figure 2 : Frequency histograms of the hill buffaloes with their lactation yield ranges across the altitudes and in the overall in the western hills.

The least-squares means of the age at first calving and calving interval in all the buffaloes under the present study were generally longer than those of Indian buffaloes, particularly Murrah in which case the two traits were reported in the range of 39.3-54.4 months and 339-537 days respectively (Nagarcenkar, 1979). On the other hand, the mean ages at first calving in local buffaloes of Phewa area in the western hills (56.1 months), in half bred Murrah buffaloes of Jiri area (57.5 months) and in Murrah buffaloes in Pokhara (55.3 months) as reported by Shah (1981/82) were longer than in all the hill buffaloes in the present study, whilst the calving interval in local buffaloes (524 ± 30.3 days) as reported by Joshi *et al.* (1992) was relatively lower than in the hill buffaloes in the present study.

The least-squares mean 305-day lactation yield of indigenous hill buffaloes in the present study was not surprising when considering the facts that Shrestha *et al.* (1988) had reported the milk yield of local buffaloes in the eastern hills to be as high as 918 kg in the first parity, whilst Shah (1981/82) and Joshi *et al.* (1992) had reported their lactation yields in the ranges of 303.0-1009.8 and 364-1466 litres respectively in the western hill areas. As is evident from Figure 2, the fact that the overall lactation yield range in the western hills was extremely wide, and particularly ranges of the yield across the hill altitudes were high, indicates the high variability of this trait between and within the altitudes. Moreover, the lactation yields considered in the present study were derived only from the sample of buffaloes that calved between the monsoon months of mid-July and mid-September, 1993 which could have the tendency of yielding higher than those calving in the other months due to the better availability of green and nutritious feeds and fodder during the monsoon. Clearly, the results were indicative of high variability in the productive potential of these buffaloes in the western hills.

The result that the least-squares mean fat percent in milk samples in the present study was not significantly influenced by any of the factors, altitude, management and the parity is indicative of the trend that the fat percent is more or less stable despite the significant increase in milk yield in buffaloes under western hill conditions. This was also consistent with the finding that the average fat content in local buffaloes was 7.4% (Joshi *et al.*, 1992).

Hence, altitude as a factor, significantly influenced the production performance of the hill buffaloes particularly in terms of lactation yield and age at first calving in the present study and the result is also indicative of the fact that a considerable variation exist in the former trait across the factor. This could be not only due to environmental differences but also probably due to genetic differences in the buffaloes across the altitude and their genotype x environmental interactions which need further investigation.

CONCLUSIONS

There seems to exist a considerably wide variation in the productive performance traits, particularly the lactation yield of local buffaloes in the western hills as indicated by the wide range of results being reported in the literature in the past as well as in the present study. Whilst this could be greatly due to the experimental errors across studies, it could well be due to high genetic variability in the buffalo population particularly across the altitude which needs to be further investigated.

The reproductive maturity of indigenous buffaloes in the western hills seems to be largely influenced by non-genetic factors such as altitude of the animal being evident for age at first calving, and needs further investigation into improving reproductive efficiency of the buffaloes under western hill conditions.

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NUTRITIONAL MANIPULATION TO PREVENT MILK FEVER - A REVIEW

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ABSTRACT

The basic principle of dietary manipulation to prevent milk fever is to provide high plasma calcium level at the time of parturition to overcome the sudden high demand of calcium. The supplementation of anionic salts just do the same. The anionic salts bring about a mild acidosis in the body thus increasing the rapid absorption of calcium through intestine and bone calcium resorption. Thus the extra cellular level of calcium increases which helps in coping with the demand of calcium particularly in the early lactation. To be more sure of prevention of the disease, anionic salts should be supplemented with high calcium diet so that sufficient amount is absorbed through intestine. Among the anionic salts ammonium salts (such as NH_4Cl and NH_4SO_4) may be used commonly as it is cheaper and effective as any other anionic salts.

INTRODUCTION

Milk fever (parturient paresis) is a metabolic disease occurring most commonly around the time of calving and is characterized by hypocalcemia, general muscular weakness, circulatory collapse and depression of consciousness. The disease has been present among the dairy animal since the old days but the incidence has increased appreciably in modern times due to the genetic selection of high yielding animals. The faulty nutrition and management has increased the incidence of the disease. The purpose on this report is to review some recent nutritional developments concerning the etiology and prevention of milk fever.

Pathophysiology of Milk Fever

Calcium (Ca) is one of the most important minerals required by the animal body for the maintenance of musculature, skeleton, blood vessels and neuro-transmission. The body maintains a certain required level of ionized calcium (10mg/100ml of blood) in the circulation. The calcium comes into the circulation from two sources, absorption through intestine and mobilization from the bones.

These two sources are monitored by $1,25\text{-(OH)}_2\text{vitD}_3$ and parathyroid hormone (PTH), respectively. $1,25\text{-(OH)}_2\text{D}_3$ is an active metabolic derivative of vitamin D, and PTH is the hormone secreted by the parathyroid gland. Generally, in a healthy animal, the body Ca, demand is fulfilled by the passive absorption of dietary Ca, but when the serum Ca, level goes down beyond the capability of this normal process, the two stated monitors come into play for rescue. The PTH is plasma Ca, level regulated hormone, so when the Ca, level goes down the hormone is secreted by the gland. PTH regulates both bone Ca resorption and renal $1,25\text{-(OH)}_2\text{D}_3$ production (Engstrom *et al.*, 1978). The thus produced $1,25\text{-(OH)}_2\text{D}_3$ helps in active absorption of Ca from the intestine and resorption from

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renal tubules. These three mechanisms i.e. bone Ca, resorption, active absorption from intestine and renal resorption maintain the Ca homeostasis. The mechanisms are sufficient during the normal periods but in the periparturient period; the story is a little different. Colostrum contains 2.3g Ca per litre. A dairy cow commonly produces 10 litres of colostrum in one milking. That means 23g Ca is lost per milking which is approximately 6 times as the extracellular pool contains (Goff *et al.*, 1987). Through Ca drainage in colostrum, the serum Ca level starts decreasing rapidly. The Ca homeostasis mechanism gets stimulated, but it takes about 48 hrs to get it completely functioning. During this 48 hrs lag period, the animals may become deficient in Ca and may develop the signs of milk fever. In heifers, the lag period is short so they recover from the disease rapidly. But in general the older the cow, the longer the lag period and more severe the disease. The severity of the disease depends upon the length of this lag period.

Dietary Manipulation for the Prevention of Milk Fever

Milk fever has always remained a big problem for dairymen. The economic loss caused by it is tremendous. According to Schultz (1986), the annual loss due to milk fever is more than \$120 millions in the USA. Although treating the diseased animal with Ca therapy (orally or IV) is successful but the recovered animals are more prone to mastitis, ketosis, dystocia, retained placenta, downer cow syndrome, displacement of the abomasum, uterine prolapse and recurring milk fever, which all together reduces the mean productivity life of a dairy cow by about 3.4 years (Goff *et al.*, 1987). So the best and cheapest way to tackle milk fever is to prevent it.

In earlier days, people tried to prevent milk fever by providing their animals with high Ca diets during the dry periods. Unfortunately, the results were drastic. The practice led the occurrence of disease to more extent than to prevent it. It was theorised that the cause of this rise in incidence is that when a high Ca diet is fed to the cow during the dry period, its daily requirement for Ca, can be met almost entirely by the passive intestinal absorption of dietary Ca. As a result, active intestinal Ca absorption and bone Ca resorption mechanisms are homeostatically depressed and become quiescent. At the onset of lactation when the Ca demand increases suddenly, the thus depressed homeostatic mechanism could not come to aid in time and the animal develops milk fever.

The prevention of milk fever depends upon shortening the time of the onset of the Ca homeostatic mechanisms. If we are able to provoke these mechanisms just before parturition, then there will be sufficient level of Ca in the circulation to overcome the suddenly increased demand. This will be the best way of prevention. To this end, the traditional method is to feed diets having low concentration of Ca during dry period. Pioneer works on this method were done by Kendall *et al.* (1969), Goings *et al.* (1974); Pickard (1975) and Westerhuis (1976). These workers observed that the limiting of Ca helps conditioning the dry cow to Ca deficiency and makes her better able to respond to the higher Ca demand that occurs when she begins her lactation.

Westerhuis (1976) administered ethylene diamine tetraacetate (EDTA) intravenously to a group of cows during the dry period to lower the Ca level in the blood. EDTA binds with plasma Ca to form a complex, which is rapidly excreted through urine. This sudden output of Ca induces a decrease of blood Ca level, hence stimulating the PTH and activating the Ca homeostasis mechanisms. The experiment showed that infusion of EDTA prevented the milk fever when the cows were fed on a low Ca diet (61gm/day) but it was not effective when the feed contained high Ca diet (193g/day). Because of the high Ca diet fed normally during dry period under field conditions, EDTA infusion was not able to prevent milk fever under farm circumstances. This spurred interest in lowering the Ca intake with the diet fed during the last 6 weeks of dry period. It was found that a poor diet prepartum and a Ca rich diet postpartum decrease the milk fever case to zero. Morrissey and Wasserman (1971)

working on chicks showed that birds fed diets low in either Ca or phosphorus increase their efficiency of Ca absorption from the small intestine and later on it was suggested that the mechanism of these adaptive effects operates through increased circulating levels of $1,25-(\text{OH})_2\text{D}_3$ (Corradino, 1973).

As quoted by Oetzel and Shaver (1990), the feeding guidelines for dry cows that follow the traditional method of preventing milk fever include Limiting Ca intake to less than 80-100g/day; Limiting P consumption to less than 45g/day; Holding Ca:P ratio to less than 2:1 without exceeding P limits.

Some workers (Kendall *et al.*, 1970; Josson *et al.*, 1980) however, observed that the restriction of dietary Ca intake in the late prepartum period was not always efficacious for preventing milk fever. Boda (1954, 1956) and Wiggers (1975), stated that generally only when Ca is restricted to less than 20g/day could prevention be certain.

Although the traditional method of limiting the Ca intake during dry period works fine for the prevention but farmers often face difficulty to formulate ration from available foodstuffs which contain low Ca to achieve the prescribed rate of Ca intake. The most commonly used feed in the United States is alfalfa hay or silage which contains a high concentration (1.9%) Ca. So according to the method, this feed should be replaced by the feed containing low Ca. such as grass-hay or silage, corn silage, small grain silage etc. Shifting to these special forages the commonly available foodstuffs may be expensive as well as difficult for an average farmer. So, though the method may be an effective practice, the farmers do not take it up.

Dietary Anion-Cation Balance

More recently, the concept of anion cation balance in the prevention of milk fever has come into light. This concept is the outcome of several investigations done since the early seventies. The results are more reassuring and currently appears to be the best way to prevent milk fever.

Anions and cations are the terms used to describe minerals in ration depending upon their electric charges. Anions have a negative charge, whereas cations have a positive charge. Ration anions are chloride (Cl^-) sulphur (S^{--}) and phosphorus (P^{--}) while cations include sodium (Na^+) potassium (K^+), calcium (Ca^{++}) and magnesium (Mg^{++}).

The anion-cation balance in diet which is also known as dietary cation-anion difference (DCAD) is calculated by subtracting the milli equivalent (MEq) weight of anion from the milliequivalent weight of cations per 100g of total dry matters as given below, (Beede *et al.*, 1992)

$$\text{DCAD} = \text{MEq} (\text{Na} + \text{K}) - \text{MEq} (\text{Cl} + \text{S}) / 100\text{g DM.}$$

The major effect of DCAD is on the systemic acid base status in the body. Body has an ability to maintain a certain level of electrical neutrality and pH inside. Whenever this environment is disturbed, the body mobilises certain ions to bring back the normality. Rations having negative DCAD (i.e. anions > cations) compels the body to produce positively charged ions (H^+) to neutralise the effects of Cl^- , SO_4^{--} etc. Thus an acidosis general compensatory mechanisms are triggered on to annul alteration in blood pH. Bone tissue serves as an important reserve of carbonate (CO_3^{--}) which buffers and corrects acidosis. In the process, bone Ca is mobilised and absorption of Ca from the gut is also enhanced. This goes on as long as the animal is on the anionic diets. Thus a higher blood Ca

level is maintained which is immensely helpful to the cow in the periparturient period in meeting a sudden increase in demand for Ca.

Early field investigations (Ender *et al.*, 1971) on anion-cation balance concept were based on acidifying the feed with HCl and H₂SO₄ or giving acidic diets. The acidic environment increase the solubility and ionisation of Ca in the gut hence helping its rapid absorption. These researchers fed two groups of cows on acidic (ATV silage) or alkaline (Beets) diets. They found that milk fever is induced by alkaline diets and prevented by acidic diets, respectively on diets containing either an excess of cations or anions. Among them 10 cows with cationic diet developed milk fever whereas only 1 cow on anionic diet developed the disease.

Block (1984) used 19 cows each receiving a basal diet with DCAD's of +33MEq/100G (cationic) or -13 MEq/100g (anionic) in a 2 year switchback design. None of the cows consuming anionic diets had milk fever whereas 9/19 cows developed this condition with cationic diet. He stated that "because anions are considered acidogenic and cations alkalogenic the hypothesized mode of action is that an excess of acid forming elements in times of Ca stress will increase concentration of Ca in blood either via increased intestinal absorption or bone mobilisation". This conclusion was confirmed by Gaynor *et al.* (1989), who in their experiment fed 17 cows on anionic or cationic diets and analysed their blood samples weekly before parturition and daily after parturition. They found 1,25-(OH)₂vitD₃ and plasma hydroxyproline (an index of bone Ca resorption activity) to be higher in the blood of the cows fed on high anionic diet suggesting a high intestinal Ca absorption and bone Ca resorption.

Oetzel *et al.* (1988), fed 12 cows on anionic (-7.5 MEq/100g) or cationic (+18.9 MEq/100g) diet with either 53 or 105g Ca/day for 3 weeks prepartum. The anionic diet was made by supplementing 100g each of NH₄Cl and NH₄SO₄ per cow daily. The incidence of milk fever in cows having supplementation of anionic salts was 4% while that in cows without the supplementation of anionic salt was 17%. The plasma level of ionised Ca was higher in cows fed the anionic diet. Using risk analysis, it was found that when Ca intake was high, supplementation the diet with these ammonium salts reduced the risk of hypocalcemia by ten fold.

Goff *et al.* (1991) fed two groups of cows either on a highly anionic or a highly cationic alfalfa haylage diet beginning approximately 6 weeks prior to parturition. The group fed on a high cationic diet had significantly more cases of milk fever (6 out of 23) than those fed on the high anionic diet (1 out of 24). Monitoring of plasma 1,25-(OH)₂vitD₃ profiles suggested that cows fed on high cation diet failed to produce adequate amounts of this hormone and according to these workers this may be the underlying cause on milk fever. The cows fed highly cationic diet were less responsive to parathyroid hormone than those fed on a highly anionic diet. They found that the secretion of PTH in response to developing hypocalcemia was similar in both the groups but the plasma hydroxyproline level was higher on cows on the anionic diet. PTH not only regulates the bone Ca resorption but also regulates the renal 1,25-(OH)₂vitD₃ production. Since the PTH levels in both groups fed on cationic diets were similar but the 1,25-(OH)₂vitD₃ and hydroxyproline level were lower in the group on the cationic diet, the workers suggested that this may be because prepartal diets high in cation decrease the ability of bone and renal tissues to respond to PTH.

Tucker *et al.* (1992) fed 120 cows on alfalfa hay based diets beginning 4 weeks before their expected calving dates. Diets contained 1.6% Ca and were supplemented with a DCAD of -3MEq/100g or +9 MEq/100g. They found that feeding a low vs high DCAD in a high Ca diet for 3 weeks prepartum

did not reduce the incidence of milk fever. They further concluded that the prophylactic effects on the occurrence of milk fever of feeding a low DCAD during the dry period may be absent when diets contain more than 1.6% Ca and DCAD is more than or equal to 3. For prophylactic measures, when high Ca diets are fed to the dry cows, dietary cation-anion balance apparently must be reduced below -3 MEq/100g of diet dry matter.

Oetzel (1991) used meta-analysis techniques to analyze the data from 75 published trials to determine nutritional risk factors for milk fever. Trials included 1165 cows, out of which 214 developed milk fever. The concentration of sulphur (S) and DCAD were the two nutritional factors most strongly correlated to the incidence of milk fever. It was observed that dietary sulphur had the greatest influence on the incidence of milk fever. Increasing dietary sulphur concentration lowered to the odds ratio of milk fever whereas increasing sodium (Na) and crude fiber (CF) had the opposite effect. Relationship of dietary Ca to milk fever was found to be non linear, relative risk of milk fever was greater at 1.16% dietary Ca and was lowered as dietary Ca deviated either direction from 1.16%. Extremely high (2%) or low (0.25%) dietary Ca lowered the relative risk of milk fever. Here, it is worth noting that National Research Council (NRC, 1989) recommends that S should not exceed 0.40% of dietary DM.

The works by Lomba (1978), Oetzel (1991) and Goff *et al.* (1991), Tucker *et al.* (1992) and all showed that milk fever can be well prevented by high anionic diets even if the feed is containing high Ca concentration. So a practical implication of anion-cation balance concept of milk fever is that the farmer need not worry about milk fever inducing potential of commonly available high Ca containing foodstuffs like alfalfa.

The only drawback of anionic salts is that they are very unpalatable and therefore, are difficult to topdress. Shaver and Oetzel (1990) suggested to mix palatable ingredients such as distiller's dried grains and molasses with diets supplemented by anionic salts to make them more palatable. They also recommended to feed the topdressed mixture supplemented by anionic salts twice daily, blending with silage whenever possible. Storing grain mixes containing anionic salts may also reduce the palatability of the grain mix especially during hot weather. To overcome this problem, it is better to mix the anionic salts with the grains just before feeding during summer.

Supplementation of anionic salts may seem a little economic burden for a farmer. But according to the investigations carried out by Block (1984) and Oetzel (1988), a short feeding period (20-21 days prepartum) and less anionic diet (DCAD -75 MEq/Kg DM) is equally effective in preventing the disease. Oetzel *et al.* (1988) found that ammonium salts (e.g. ammonium chloride) are effective as well as less expensive and are easily available, so can be used commonly. The beneficial effects of ammonium chloride salt for increasing intestinal Ca absorption, was first shown by Kendall *et al.* (1969). Later works by Barithwate (1972) and Horst and Jagensen (1974) confirmed these findings in various animal species. However French workers, Roux and Barlet (1980) experimenting on the effect of NH_4Cl absorbed that the salt was completely ineffective in preventing milk fever. It means that the efficacy of the anionic salts is variable under different feeding conditions prevalent in different countries.

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EFFECT OF GONADORELIN IN COWS AND HEIFERS ASSOCIATED WITH REPRODUCTIVE PROBLEMS

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ABSTRACT

Gonadorelin was used in thirty-two cows and heifers during treatment of some exotic and crossbred cattle suffering from reproductive disorders. Eight out of twelve anestrus cows and heifers exhibited estrus after one or two injections of gonadorelin at the dose regimen of 0.5 mg and 0.25 mg, respectively. Of seven cows cysts of four cows were regressed when the drug was administered once or twice at the dose rate of 0.5 mg per animal. Of the thirteen repeat breeder cows and heifers six animals did not repeat the estrus after intramuscular injection of the same drug at the dose rate of 0.5 mg and 0.25 mg per animal.

Pregnancy was confirmed 50 days after artificial insemination in five out of eight anoestrus cows (62.5%), three out of four cows with cystic ovaries (66.7%) and six out of thirteen repeat breeder (46%) cows.

INTRODUCTION

Reproductive disorders are one of the major problems in the exotic and cross bred cows and heifers. Anestrus, cystic ovaries and repeat breeders are some of the main problems associated with reproduction of high yielding cows.

Two forms of anestrus have been noticed depending on the presence of a palpable corpus luteum ('apparent' anestrus or 'silent' estrus) or its absence ('true' anestrus). Cystic ovary is another common cause of infertility of dairy cows. The cysts may be single or multiple, in either the left or right ovary and are some times hard and rather difficult to rupture manually. Both infectious and noninfectious causes contribute to repeat breeding or conception failure in farm animals. Gonadotropin releasing hormone (GnRh) secreted in the hypothalamus stimulates hypophysis to release follicular stimulating hormone (FSH) and leutinising hormone (LH). The former stimulates the germinal epithelium to develop follicle which in turn becomes graafian follicle to initiate the reproductive cycle in cows and heifers. The later plays key role for ovulation and rupture of the follicular cysts and thus bring back the cows normally cycling.

Based on these principles, the hormone was used in cows and heifers to study its effect on anestrus, cystic ovaries and repeat breeding cases and to observe the fertility in the treated animals.

MATERIALS AND METHOD

The genital organs particularly the ovaries of the cows and heifers with reproductive problems of Biratnagar and Pokhara area were examined through rectal palpation. At the same time, feeding and management of those animals were improved and parasites and genital tract infections, if any were treated with respective drugs. The ovaries were examined two times at an interval of 8-12 days and

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the problems were identified. Gonadorelin (fertigyl® a synthetic GnRh, manufactured by Intervet Holland) was administered in cystic cows at the dose regimen of 0.5 mg intramuscularly. Similarly, the drug was used at the dose of 0.5 mg and 0.25 mg, in cows and heifers respectively to treat anestrus and repeat breeding problems. Breeding was not allowed for the animals 'in heat' within a week of the drug administration. The ovaries of the treated cases were reexamined 10-15 days after the first injection. Another dose of the drug was administered in the cases which were not completely recovered. The responding animals, in the next estrus were inseminated artificially or allowed for bull breeding.

Like wise the drug was administered in repeat breeder cases at the time of insemination. Pregnancy diagnosis was performed 50 days after breeding.

RESULTS AND DISCUSSION

Occurrence of Estrus

Eight out of twelve anestrus cows and heifers exhibited estrus after one or two injections of fertigyl while the remaining animals were found unresponsive (Table 1.2 and 3). In all responding animals vaginal discharge was observed within a week of drug administration. Corpus luteum (CL) was palpated 10-12 days after treatment and estrus was noticed at normal expected time. It is very interesting to note that single injection of GnRh could induced estrus in a 7 years old Holstein heifer and delivered a female calf after single insemination.

Demise of Cysts

Cysts of four cows out of seven treated were found completely regressed after one or two injection of the same drug. The drug response in this study is slightly less than the result reported by Fraser (1986) who informed that the drug is 70 percent effective in the treatment of the ovarian cysts. This is most likely occurred because the hormone response depends on the nutrition and management of the animal, and most importantly second injection should be provided to the cows which did not respond to the 1st dose. The cows of eighteen months fresh and another one of nine months fresh were cured after single administration. No cyst could be palpated when the ovaries of these animals were examined 10-15 days post treatment.

The cysts of the remaining cows still persisted when second palpation was done; hence the administration of second dose was suggested. One of these non responding cows was treated again with the same drug. The ovaries in the following examination were found cyst free and thus she was inseminated in the next estrus. The size of the cysts reduced and regenerated again in some of the cows. This type of case here is considered nonresponsive.

Pregnancy diagnosis was conducted only in three treated cases and two of them were found pregnant.

Table 1: Effect of gonadorelin on anestrus, cystic ovaries and repeat breeding cows/heifers in Biratnagar

Animals	Abnormality	Treatment	Treatment effect	Pregnancy result
Jersey heifer (4yrs old)	anestrus	single	no response	-
Holstein heifer (7 yrs old)	anestrus	single	estrus induced	pregnant
Holstein cow (18mon fresh)	anestrus	double	estrus induced	pregnant
Holstein cow (5 mon fresh)	anestrus	single	estrus induced	non pregnant
Holstein cow (5 mon fresh)	anestrus	single	no response	-
Holstein cow (9 mon fresh)	anestrus	single	no response	-
Holstein cow (22 mon fresh)	cystic ovaries	single	cyst still present	-
Holstein cow (9mon fresh)	cystic ovaries	single	cyst still present	-
Holstein cow (18 mon fresh)	cystic ovaries	single	no cyst	pregnant
Holstein cow (18 mon fresh)	cystic ovaries	single	no cyst	not examined
Holstein cow (24 mon fresh)	cystic ovaries	double	no cyst	pregnant
Holstein cow (9 mon fresh)	cystic ovaries	double	no cyst	not pregnant
Holstein cow (22 mon fresh)	cystic ovaries	double	cyst still present	-
Holstein cow (15 mon fresh)	repeat breeder	single	non return	pregnant
Holstein cow (12 mon fresh)	repeat breeder	single	non return	pregnant
Jersey cow (12 mon fresh)	repeat breeder	single	repeat again	-
Holstein cow (10 mon fresh)	repeat breeder	single	non return	pregnant
Jersey cow (Unknown)	repeat breeder	single	repeat again	-

Anestrus cases = 6	Cystic ovaries cases = 7	Repeat breeding cases = 5
Treatment response = 3	Trt. response = 4	Treatment Response = 3
Pregnancy = 2 (CR 67%)	Pregnancy - 2 out of 3 cows examined	

Table 2: Effect of Gonadorelin on Anestrus, Cystic Ovaries and Repeat Breeding Cows/Heifers in Pokhara

Animals	Abnormality	Dose	Treatment effects	pregnancy result
Holstein cow (21 mon fresh)	anestrus	single	no response	-
Jersey cow (10 mon fresh)	anestrus	double	estrus induced	repeated
Holstein cow (18 mon fresh)	anestrus	double	estrus induced	pregnant
Holstein cow (6 mon fresh)	anestrus	single	estrus induced	pregnant
Jersey heifer (18 mon old)	anestrus	single	estrus induced	
Holstein cow (60 mon old)	anestrus	single	estrus induced	pregnant
Holstein cow (19 mon old)	repeat breeding	double	non return	pregnant
Jersey cow (unknown)	repeat breeding	single	no response	-
Holstein cow (18 mon)	repeat breeding	single	no response	-
Holstein heifer (30 mon fresh)	repeat breeding	single	non return	pregnant
Holstein heifer (27 mon fresh)	repeat breeding	single	non return	not pregnant
Holstein cow (12 mon fresh)	repeat breeding	double	non return	pregnant
Holstein cow (35 mon fresh)	repeat breeding	single	no response	-
Holstein cow (13 mon fresh)	repeat breeding	single	no response	-

Anestrus cases studied = 6	Repeat breeding cases studied = 8
Treatment response = 5	Treatment response = 4
Number of pregnancy = 3 (CR 60%)	Number of pregnancy = 3

Table 3: Summary of the effects of hormone therapy on different reproductive disorders in animals

Disorders	Cases studied (No.)	Treatment response (No.)	Pregnant animals (No.)
Anestrus	12	8 (67.0%)	5/8 (62.5%)
Cystic ovaries	7	4 (57.0%)	2/3 (66.7%)
Repeat breeding	13	6 (46.0%)	6/13 (46.0%)
Total	32	18 (56.3%)	13/24 (54.1%)

Fertility Improvement in Repeat Breeders

Six out of thirteen repeat breeding cows and heifers were diagnosed pregnant when one or two doses of gonadorelin was administered at the time of artificial insemination. No abnormality in the genital organs was detected in this group of animals, however several breeding failed to make them conceived. Delayed ovulation due to LH shortage could be the reason of infertility in these cases. Administration of GnRh probably led the LH surge which hastens the ovulation, and consequently conception took place. Britt (1987) has also suggested the application of GnRh in such animals to stimulate the LH surge. The hormone is, therefore effective to improve the reproductive performance of dairy animals.

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DRUG SELECTION AND USE ON CLINICAL MASTITIS IN BUFFALOES

I P Dhakal¹

ABSTRACT

A Study was carried out at veterinary Teaching Hospital, Institute of Agriculture and Animal Science, Rampur during 1994 to 1996 to determine the prevalence rate, etiological agent, antibiogram pattern and efficacy of some potent antibiotics for the treatment of clinical mastitis in buffaloes. This study revealed that majority of the buffaloes at first lactation and within 2 months of lactations were affected with clinical mastitis. 47% of the quarters were positive to california mastitis test (CMT). Coliform (30%) was the most frequently isolated organisms followed by Staphylococcus, Non-coliform gram negative bacilli and Streptococcus spp. Results indicated that majority of the buffaloes were affected with clinical mastitis at summer and monsoon season in comparison to winter seasons. Antibiogram revealed that majority of the isolates were sensitive to Gentamicin, Chloramphenicol, Enrofloxacin, Ciprofloxacin, and Cephotaxime. However, most of the isolates were resistant to Ampicillin and cloxacillin. Among the various drugs use in the treatment Gentamycin (Gentim), Enrofloxacin (Meriqine), Ciprofloxacin (Ciprobid) and Cephotaxime (Taxim) were having good results against the isolates of gram positive and gram negative bacteria. Efficacy of the drug in the field condition revealed that Gentim injection intramammary as well as parental and Merquine injection only by parental administration are proved to be the most effective in comparison to other antibiotic preparations tested.

INTRODUCTION

Mastitis is a complex disease which involves different pathogenic agents. It is recognized worldwide as the most costly disease in the dairy animals. Effective treatment of mastitis is hindered due to indiscriminate use of various antibiotics leading to bacterial resistance. During 1930 and 1940s when sulfonamide and antibiotics were first introduced there was hope that these drugs would soon put an end to mastitis. The initial belief was lost when it became evident that many chronic infections could not be cured. The ability of the microorganisms to develop resistance to drugs was also demonstrated.

The primary concern of most dairy farmer is how to make the best use of antibiotics and other drugs in treating clinical cases. The selection of antibiotic is made easier if milk samples are collected from all clinical cases prior to initiating therapy for culture in a laboratory to identify the microorganisms. Drug sensitivity testing can also be conducted on such microorganisms making decision for future therapy.

Treatment of mastitis is difficult due to the involvement of multiple causative organisms and development of drug resistance due to indiscriminate use of antibiotics. In the present study, various antibiotic preparations were selected on the basis of drug sensitivity test used in the buffaloes affected with clinical mastitis. The objectives to undertake this study were to identify the etiological agents

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and their prevalence at different seasons, *in vitro* drug sensitivity and efficacy of various preparations against clinical mastitis in buffaloes.

MATERIALS AND METHODS

Study Population

Fore milk sample was collected separately in sterilized test tubes from nearly 110 buffaloes stationed at different villages of Chitwan district. History and relevant information such as age, lactation number, date of calving and date of collection of samples were recorded. The buffaloes brought at veterinary teaching hospital IAAS, Rampur, District Veterinary Hospital, Bharatpur and different livestock subcentres were examined. As seasons are one of the environmental factors which may have certain influence in the spread of the disease (Roy *et al.*, 1983), seasonal divisions were made as follows: winter (November to February), summer (March to June) and monsoon (July to October).

California Mastitis Test (CMT)

It was performed as a diagnostic test of each quarter milk samples following the procedure of Pandit and Mehta's (1969). Preparation of the reagent was prepared locally following the above reference. The reaction was classified as negative, trace, 1, 2 and 3 as strong positive. All the tests were performed and read by the senior author to eliminate the personal subjective bias.

Bacteriological Examination:

Aseptically collected milk samples were streaked on 5% bovine or sheep blood agar plates and MacConkey Nutrient agar plates. The resulting growth from the respective plates of the media were purified and identified on the basis of Gram's reaction, morphology and colony characteristics.

In vitro-drug sensitivity

Different strains of organisms isolated from clinical cases of mastitis were subjected to drug sensitivity test to the following antibiotics using paper diffusion method as suggested by Anon (1961). Growth from 5 colonies of the organisms were transferred into a tube of Trypticase soya broth and incubated 2 to 5 hr. at 30°C so as to obtain a turbidity. The broth culture were evenly spread by smearing over the surface of Mueller Hinton agar plates. The plates were allowed to dry for a brief period. The antibiotic discs (Hindustan Dehydrated media Bombay) were firmly applied. Then the plates were kept at 10°C for 3 to 4 hrs to allow prediffusion of the disc. The plates were then incubated at 37°C for 18 to 24 hrs. and sensitivity were observed by measuring the zone of inhibition.

Following chemotherapeutic agents were used for *in vitro* drug sensitivity test such as amoxycillin, ampicillin, cloxacillin, chloramphenicol, ciprofloxacin, erythromycin, gentamicin, kanamycin, streptomycin, ceftaxime and enrofloxacin.

Treatment of Clinical Mastitis in Buffaloes

Buffaloes with positive samples were treated on the basis of the results obtained from the *in vitro* drug sensitivity test.

1. Gentim injection (gentamicin sulphate 100 mg)- 2.5 ml of Gentim was diluted with 5 ml of distilled water and given intramammary daily for 5 days.
2. Ciprobid (ciprofloxacin 50 mg)- 25 ml intramammary daily for 5 days.
3. Meriquine injection (enrofloxacin 750 mg)- 15 ml subcutaneous injection daily for 3 days.
4. Kancin injection (kanamycin 250 mg)-250 mg in 5 ml of distilled water intramammary daily for 5 days.
5. Taxim infection (cephotaxime 250 mg)- 350 mg Taxim and 2 ml distilled water was mixed and given intramammary daily for 5 days.

The quarters were re-examined clinically and bacteriologically after 7 days of the treatment and was considered to be cured when the milk from the affected quarter was free from gross abnormality and yielded no pathogens.

RESULTS

Study Population

Nearly 110 buffaloes located at different villages of Chitwan district were examined for clinical mastitis. The milk sample was collected from 179 quarters affected with clinical mastitis and analysed for different parameters. Majority of the quarters were treated with intramammary preparations. However, very few animals were treated with parental antibiotic injections.

Study population of buffaloes affected with clinical mastitis at different lactations is presented in Table 1. Buffaloes of 1st to 6th lactations were most commonly examined. Maximum number of buffaloes were affected with clinical mastitis at first lactation (49%) followed by 4th lactation (18%) and sixth lactations (3%)

Table 1: Prevalence of clinical mastitis at different lactations.

Lactation	Positive (number)	Percentage
First	50	49.01
Second	15	14.70
Third	12	11.76
Fourth	19	18.62
Fifth	2	1.96
Sixth & above	4	3.92

The occurrence of clinical mastitis at different stages of lactation is presented in Table 2. Maximum number of animals were affected with clinical mastitis within 2 months of lactation (50%) followed by 2 to 4 months (26%). Only 4% of the animals were affected with clinical mastitis at 6 to 8 months of lactation and 9% above 8 months.

Table 2: Prevalence of clinical mastitis at different stages of lactations.

Stage of lactation	Positive (number)	Percentage
Up to 2 months	50	50.50
2 to 4 months	26	26.26
4 to 6 months	10	10.10
6 to 8 months	4	4.04
Above 8 months	9	9.09

Frequency of buffaloes that showed CMT scores is given in table 3.

Table 3: CMT scores on milk of buffaloes affected with clinical mastitis

CMT scores	Number	Percentage
Negative	66	36.87
Trace	28	15.64
1	26	14.52
2	20	11.17
3	39	21.78

CMT = California Mastitis Test

Out of 179 quarters tested, 14%, 11%, and 21%, of the quarters were having CMT score 1, 2 and 3 respectively. However, 36% buffaloes were found negative in this study. The trace reaction was noted in only 15% cases.

Bacteriological Examination

Relative frequency of different types of microorganisms associated with clinical mastitis are presented in Table 4. Coliform was the most frequently isolated organism (30%) followed by *Staphylococcus* species (26%), non-coliform Gram negative bacilli (13%) and *Streptococcus* spp (11%). Only 2% of the quarters were affected with *Corynebacterium* spp. In this study, 17% of the quarters were affected with mixed infection with coliform and non-coliform Gram negative bacilli as well as *Staphylococcus* + *Streptococcus* spp. in majority of the cases.

Table 4: Relative frequency of different types of organisms isolated from clinical mastitis.

Bacteriological status	Positive number	percentage
<i>Staphylococcus</i> spp.	45	26.16
<i>Streptococcus</i> spp	20	11.62
Coliforms	52	30.23
Non-coliform gram-ve bacilli	22	12.79
<i>Corynebacterium</i> spp.	03	01.74
Mixed infection	30	17.44

Prevalence of Clinical Mastitis at different seasons

The occurrence of clinical mastitis in buffaloes at different seasons is presented in Table 5.

Table 5. Prevalence of clinical mastitis In Buffaloes at different Seasons

Seasons	Positive number(110)	Percentage
Winter (Nov.-Feb.)	26	23.63
Summer (March-June)	44	40.00
Monsoon (July-Oct.)	40	36.36

Figures in parenthesis indicates number of buffaloes examined.

Result showed that 40% of the buffaloes were affected with clinical mastitis at summer seasons followed by monsoon (36%) and winter (23%).

In vitro drug sensitivity test

In vitro drug sensitivity pattern of microorganisms isolated from buffaloes with clinical mastitis is presented in Table 6.

Staphylococcus spp. were most sensitive to meriquine (94%) followed by gentamicin (90%), chloramphenicol (85%), ciprofloxacin (65%), kanamycin (63%) and amoxycillin (60%). These organisms were least sensitive to cloxacillin (6%) and ampicillin (24%).

Streptococcus spp were most sensitive to chloramphenicol, meriquine and ciprofloxacin (100%) followed by gentamicin and cephtaxime (88%) and cephalixin (71%). These species were least sensitive to cloxacillin (5%) and ampicillin as well as streptomycin (27%).

coliform organisms were most sensitive to ciprofloxacin (89%) followed by meriquine (88%) cephotaxime (86%) gentamicin (74%) and chloramphenicol (73%). These organisms were least sensitive to cephalixin (4%), erythromycin (13%) kanamycin (17%). Ampicillin and cloxacillin were almost resistant to coliform organisms.

Non coliform gram-ve bacilli were mostly sensitive to meriquine (100%) followed by gentamicin (86%), ciprofloxacin (81%) and cephotaxime (60%). These bacilli were least sensitive to amoxycillin (71%) and streptomycin (135). Non coliform organisms were completely resistant to ampicillin, cloxacillin and cephalixin.

Corynebacterium spp were 100% sensitive to gentamicin, meriquine streptomycin and cephotaxime while resistant to amoxycillin, ampicillin, cephalixin and cloxacillin.

Mixed bacterial infections were mostly sensitive to meriquine (100%) followed by chloramphenicol and ciprofloxacin (85%), cephotaxime (67%) and gentamicin (60%) and gentamicin (60%). The least sensitive antibiotics for mixed infection were amoxcillin and ampicillin (3%). Cloxacillin and cephalixin were completely resistant.

Efficacy of antibiotics against clinical mastitis

Efficacy of different intramammary antibiotics against clinical mastitis in buffaloes is presented in Table 7.

The efficacy rate of gentamicin against *Staphylococcus* spp was highest (72%) followed by meriquine and kanamycin (60%) and ciprofloxacin (50%). Similarly intramammary infusions with ciprofloxacin and cephotaxime against *Streptococcus* spp was highest (66% each) in comparison to gentamicin (62%).

The cure rate of gentamicin and ciprofloxacin against coliform organisms was found highest (83%) followed by ciprofloxacin and cephotaxime (66% each) and meriquine (60%).

Table 6 : Antibigram of bacteriologically positive milk samples collected from buffaloes with clinical mastitis.

Organisms	Percent sensitivity												
	No. tested	AC	AP	C	CF	CX	CP	E	G	K	ST	CE	En
<i>Staphylococcus</i> spp.	45	60	24	75	65	6	28	51	90	63	29	53	94
<i>Streptococcus</i> spp.	20	66	27	100	100	5	71	57	88	58	66	88	100
Coliforms	52	23	R	73	89	R	4	13	74	17	52	86	88
Other Gram-ve bacilli	22	7	R	50	81	R	R	40	86	25	13	60	100
<i>Corynebacterium</i> spp.	3	R	R	-	-	R	R	R	100	-	100	100	100
Mixed infection	30	3	36	85	85	R	36	60	24	24	34	67	100

AC = Amoxycillin, AP = Ampicillin, C=Chloramphenicol, CF= Ciprofloxacin, CX=Cloxacillin, CP= Cephalexin, E= Erythromycin, AP = Ampicillin, CE=Cephotaxime, G=Gentamicin, K=Kanamycin, ST=Streptomycin, ST=Streptomycin, R = REsistant and En= Enrofloxacin.

Table 7: Efficacy of different antibiotics against clinical mastitis in buffaloes.

Organisms	Ciprobid			Gentim			Kancin			Taxim			Meriquine		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
<i>Staphylococcus</i> spp.	10	5	50	25	20	72	10	6	60	-	-	-	5	2	60
<i>Streptococcus</i> spp.	6	4	66	8	5	62	-	-	-	6	4	66	4	2	50
Coliforms	15	11	73	15	11	73	7	2	28	15	10	66	6	4	66
Other Gram-ve bacilli	6	4	66	6	5	83	4	1	25	6	4	66	5	3	60
<i>Corynebacterium</i> spp.	3	-	-	2	1	50	-	-	-	1	1	100	-	-	-
Mixed infection	10	6	60	10	7	70	-	-	-	10	7	70	4	3	75

1- Quarters treated, 2= Quarters cured and 3=Percentage.

Meriquine treatment eliminated 75% of quarters affected with mixed bacterial infections followed by gentamicin and cephotaxime (75%). Ciprofloxacin eliminated only 60% of the quarters affected with mixed infections.

DISCUSSION

Present work have shown that maximum number of animals were affected with clinical mastitis at 1st lactation followed by 4th, 2nd and 3rd lactation buffaloes. However, Rao and Naidu (1969); Kapur *et al* (1978) and Chaudhary *et al* (1982) reported highest incidence of mastitis during the fourth lactation. Pal and Verma (1991), reported highest incidence at 3rd lactation. Earlier workers suggested that the incidence of mastitis was increased with lactation and age.

In this study maximum incidence of clinical mastitis was recorded within 2 months after calving. Present finding was similar with Yas *et al* (1983) who found that incidence of mastitis was higher during the first two months of lactation declining during subsequent months. However, Tai and Naidu (1969) reported that highest incidence of mastitis was found during 4 to 6 months after calving. In contrary to the present study, Kapur *et al.* (1978) reported that greater incidence of clinical mastitis at 4th month of lactation.

Result showed that 85 quarters (47%) out of 179 tested were found positive with CMT score 1,2 and 3. The possible reason for it may be due to the greater number of somatic cells in the milk. In this study, 28% quarter having CMT score 1,2 and 3 were found bacteriological negative. However, 69% quarters having CMT negative and trace reactions were found bacteriologically positive.

Coliform was the most frequently isolated organism from clinical mastitis in buffaloes. The other common organism in the order of frequency were *Staphylococcus* spp, non coliform gram negative bacilli and *Streptococcus* spp. Similar report has been cited by Craven (1987) who summarized that *E. coli* was the most common organism isolated from clinical mastitis followed by *Staphylococcus* spp, *Streptococcus* spp. and other pathogens. In this investigation, clinical mastitis was most prevalent during Summer (March to June) and monsoon (July to October) in comparison to winter season (December - February). However, Paranjape and Das (1986) reported that mastitis was more prevalent in monsoon season than in winter and summer seasons. *In-vitro* drug sensitivity test revealed that *Staphylococcus* spp was most sensitive to gentamicin followed by chloramphenicol, ciprofloxacin, kanamycin and amoxycillin. Kapur *et al.* (1979) reported that all seasons of *Staphylococcus* spp, were sensitive to gentamicin, chloramphenicol and kanamycin. *Streptococcus* spp was most sensitive to chloramphenicol and cephotaxime and cephalixin. Similar report has been reported by Jamkhedkar, (1969). Coliform organism was most sensitive to ciprofloxacin followed by cephotaxim, gentamicin and chloramphenicol.

Non coliform gram negative bacilli were mostly sensitive to gentamicin followed by ciprofloxacin and cephotaxime infection. However, Mc Donald *et al* (1977) reported that more than 90% of the culture from gram negative rods were sensitive to chloramphenicol and gentamicin. *Corynebacterium* spp were mostly sensitive to gentamicin, streptomycin and cephotaxime. Mixed bacterial infections were mostly sensitive to ciprofloxacin followed by cephotaxime and gentamicin.

Antibiogram of the isolates from buffalo mastitic milk samples revealed that gentamicin, chloramphenicol, meriquine, ciprofloxacin and cephotaxime were found mostly sensitive against the isolates. However, ampicillin and cloxacillin were resistant to these isolates. Similar results have been reported by Jha *et al.* (1994). Char *et al* (1993) reported that of the 595 bacterial isolates tested from clinical mastitis 90.08% were sensitive to gentamicin and chloramphenicol respectively. *Staphylococcus* was most predominated organisms followed by *Streptococcus* spp. Chudhary *et al* (1990) reported that the *in vitro* effectiveness in terms of inhibition of growth of the culture of the antibiotics was in descending order gentamicin (80%), kanamycin (60%), chloramphenicol (60%), streptomycin (44%) and erythromycin (24%). Gentamicin was shown to be the most effective antibiotic and therefore is recommended for the treatment of mastitis.

The results indicate that intramammary infusions commonly used in Nepal (ampicillin and cloxacillin) are almost ineffective for the treatment of clinical mastitis in buffaloes.

Gentamicin is one of the most recent antibiotics introduced into large animal practice. It is a broad spectrum antibiotic effective against many Gram positive and Gram negative pathogens. Intramammary injection of 100 mg of gentamycin twice a day was suggested for severe cases of

Colimastitis (Mercer and Teske, 1977). Ramesh *et al* (1993) reported that gentamicin at the rate 2 ml diluted with equal amount of distilled water intramammary infusion cured 90% of the affected animals. Tripathi and Sharma (1993) evaluated the efficacy of gentamicin at the rate of 1 ml intramammary in every 24 hrs. and found that gentamicin cured 69.70% acute mastitis and 58.3% chronic mastitis in buffaloes. Venkata Ramana *et al* (1992) mentioned that intramammary infusion of gentamicin 2 mg with 4 ml distilled water cured 91.7% animals and 95.2% quarters affected with clinical mastitis. However, in present investigation gentamicin 2.5 ml with 5 ml distilled water intramammary cured clinical mastitis caused by Gram positive and Gram negative organism.

Ciprobid injection contains ciprofloxacin. It is potent fluoroquinolone and is active against a broad spectrum of Gram negative and Gram positive bacteria including *Pseudomonas* spp., *Staphylococcus* spp., *Streptococcus* and enterobacteriaceae. It is effective against both replicating strains, and bacteria in stationary phase. It is also effective against intracellular bacteria. Ciprobid has been proved to be effective in the treatment of Coliform mastitis.

Khahra and Nauriyal (1993) reported that efficacy of kanamycin at the rate of 250 mg intramammary at 12 hrs. Interval for 4 days successfully cured bovine mastitis.

Taxim is an antibiotic of the cephalosporin group and has a bactericidal effect. It is active against Gram negative, Gram positive and selected anaerobic bacteria. It exhibits antibacterial activity against various bacteria including *Staphylococci*, *Streptococci*, *E. coli*, *Pseudomonas* spp etc. Different groups of cephalosporin were approved during the last 5 years for intramammary use in lactating and non lactating animals. Cephotaxime in this experiment has been proved to be of value in the treatment of coliform mastitis.

Enrofloxacin (Meriquine) is a synthetic substance from the group of compounds, known as quinoline carboxylic acid derivatives of the nalidixic acid type. The antibacterial activity of meriquine encompasses on wide spectrum of organism in Gram positive and Gram negative range. It possesses a high *in vitro* activity against many bacterial spp. Meriquine at the rate of 1 ml/20 kg body weight subcutaneous injection was found effective against coliform, non-coliform Gram negative bacilli, staphylococcal and streptococcal mastitis.

CONCLUSION

Various intramammary infusions commonly used at this locality has been found ineffective for the treatment of clinical mastitis in buffaloes. Antibigram of this study indicated that majority of the isolates are sensitive to gentamicin, enrofloxacin, chloramphenicol, ciprofloxacin and cephotaxime. Among these drugs gentamicin was found most useful followed by meriquine, ciprobid, taxim and kanamycin injections. However, ampicillin and cloxacillin preparations are almost resistant. This might be due to the frequent use of these antibiotics for which the bacterial strains have developed resistance. Further studies are required to compare the efficacy of intramammary verses systemic antibiotic preparations.

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STUDY OF BLOOD PROTOZOAN DISEASES WITH SPECIAL REFERENCE TO THEILERIOSIS IN EASTERN TERAI OF NEPAL

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ABSTRACT

An attempt was made to study the blood protozoan diseases in general and theileriosis in particular in cattle in the eastern Terai of Nepal. With the introduction of exotic cattle from India and continuing artificial breeding program launched since several years, small but significant population of exotic cattle population is found in eastern Terai region. Tropical theileriosis has been found to be an emerging disease problem amongst such cattle population. The incidence of disease has been found to be positively correlated with tick population. Most cases of tropical theileriosis were diagnosed during the warmer month of the year between April to September. A single injection of buparvaquone at the dose rate of 2.5 mg/kg was found to be effective in the majority of cases.

INTRODUCTION

Tropical theileriosis is a disease of cattle characterized by high fever, enlargement of peripheral lymph nodes, progressive emaciation, haemolytic anaemia and jaundice (Radostits, Blood and Gay, 1994). Tropical theileriosis caused by *Theileria annulata* has been reported from several Mediterranean countries and subtropical regions of Europe, Africa and Asia including India. Although several haemoprotezoan diseases have been reported from Nepal, there is paucity on the occurrence of tropical theileriosis. The objective of this study was therefore, to report clinical cases of tropical theileriosis in Eastern Terai Region (ETR) of Nepal. Field evaluation of the efficacy of buparvaquone against the clinical cases was another objective of this study.

MATERIALS AND METHODS

The report includes suspected cases of theileriosis in Morang, Sunsari and Jhapa districts of eastern Terai. Those animals which were sick with fever for at least a week despite repeated antihelminthic therapy but had no red urine were considered suspected cases of tropical theileriosis. For confirmation, Giemsa staining of thin blood smears and/or smears of lymph node biopsy material was carried out in the laboratory. For epidemiological observations, 29-months of data between May 1993 and October 1995 was cross-classified according to districts and also according to the species of blood protozoa diagnosed and registered at Regional Veterinary Laboratory (RVL), Biratnagar. Since major concern of this study was to report cases of tropical theileriosis, an attempt was made to observe if such cases occurred more frequently during certain months of the year. A regression analysis was also applied if the seasonal occurrence of clinical theileriosis (Y_i) could be predicted on the basis of mean monthly maximum temperature (X_i). An average of mean monthly temperatures of 1993 and 1994 was used to calculate 12 monthly observation on X_i . Observations regarding blood and overall field efficiency of buparvaquone (Butalex) in treating theileriosis was also recorded.

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RESULTS

During the study period, 148 suspected cases of blood protozoan diseases were reported to RVL, Biratnagar. Results of laboratory examinations are shown in Table 1.

Table 1. Diagnosis of blood protozoan parasites from three districts of eastern Terai

District	<i>Theileria</i> spp (No. of cases)	<i>Babesia</i> spp (No. of cases)	<i>Anaplasma</i> spp (No. of cases)	Negatives (No. of cases)	Total
Morang	33	17	3	51	104
Sunsari	11	1	1	9	22
Jhapa	11	1	1	9	22
Total	55	19	5	69	148

Of the 148 suspected animals examined for the presence of blood protozoan parasites 55 (37.2%) were positive for theileriosis, 19 (12.8%) were positive for babesiosis and 5 (3.4%) were positive for anaplasmosis. None of the diagnosed cases of clinical theileriosis belonged to the local breeds of cattle.

Seasonal trend of tropical theileriosis is shown in figure 1. It can be seen from the figure that no cases of tropical theileriosis was recorded during the month of January which is the coolest month of the year in ETR. Most cases of tropical theileriosis was diagnosed during the summers months of the year between April to September. Number of tropical theileriosis case also declined as the months turned cooler after September.

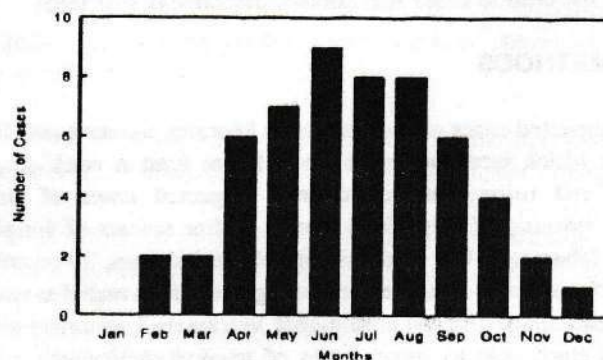


Figure 1: Monthly distribution of tropical theileriosis diagnosed at RVL, Biratnagar between May 1993-October 1995.

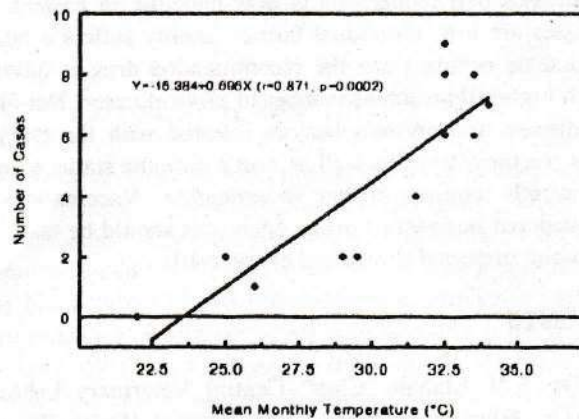


Figure 2: Scatter plot and regression line showing relationship between mean monthly maximum temperature and occurrence of clinical theileriosis in eastern Terai of Nepal.

Regression of number of cases against mean monthly maximum temperature showed that mean monthly temperature had a very high predictive-value in the occurrence of clinical theileriosis in eastern Terai (Figure-2). The value for X intercept (i.e. X when Y=0) was 23.54 which indicates that no clinical theileriosis would occur during the month if mean maximum temperature is 23.54°C or lower than this.

After laboratory confirmation of tropical theileriosis, the farmers were advised to treat their animals with a single dose of buparvaquone (Butalex) injection at a dose rate of 2.5 mg. per kilogram body weight (Radostitis *et al.*, 1994). A total of 50 animals were treated, of which 47 (94%) recovered. Animals that were already comatose or in a very advanced stage of the disease failed to recover. Hence buparvaquone was found to be highly effective in treating clinically sick animals.

DISCUSSION

Local animals were not reported to suffer from clinical form of theileriosis possibly because they possess fair amount of resistance to the disease and also to the vector (Radostitis *et al.*, 1994). Field observations also show that while exotic animals are usually heavily infested with ticks, local cattle are only moderately infested and buffaloes are even less susceptible to tick infestation. Thus buffaloes may be least prone to the clinical form of the disease.

Most cases of theileriosis occurred during hot months. Since the disease is dependent on the activity of ticks, it appears that as the number of ticks peak in cattle in hot and humid months, risk of clinical theileriosis also increases. Flatch and Ouhelli (1992) observed that clinical form of tropical theileriosis usually occurs during summer months in Morocco. They also observed that not all cases

infected with *T. annulata* develop into a clinical form of the disease in cattle. In Israel, the disease is usually controlled by vaccinating cattle with a live attenuated schizonts vaccine successfully (Pipano, 1989).

The present study indicates that theileriosis is now endemic in eastern Terai of Nepal. Although number of reported cases are low, individual farmer usually suffers a heavy economic burden once clinical form of the disease occurs since the recommended drug is quite expensive. Prevalence of infection may be much higher than actual number of clinical cases. Not all infected animals develop clinical form of the disease and animals heavily infested with the ticks may not carry infection. Environmental factors, vector activity as well as host's immune status seem to determine the clinical form of the disease which requires further investigation. Vaccination of the susceptible exotic animals should be considered in endemic areas. Measures should be taken to minimize losses due to tropical theileriosis among imported or stressed exotic cattle.

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THE NEED AND THE STRATEGIES FOR GASTROINTESTINAL NEMATODE CONTROL IN THE SHEEP AND GOAT POPULATION OF NEPAL

B R. Joshi¹

ABSTRACT

Sheep and goat raising is an important component of subsistence farming system in Nepal, contributing meat, wool, farm manure and cash. Among the various factors responsible for limiting the productivity of these animals, gastrointestinal nematodes have been regarded as the important cause. In a series of field studies, sub-clinical parasitism was found to be common in both sheep and goats reared either under the sedentary or migratory management. This infection was responsible for the reduction in body weight gain by 57-114 percent in sheep and 93-160 percent in goats and the mortality up to 33 percent in sedentary lambs. The main period of pasture infection was confined to the wet summer months between April-October with a very low level of infection during rest of the year. Trichostrongylus spp. were the most prevalent species followed by Ostertagia spp. in the migratory and Haemonchus contortus in the sedentary animals. The flocking places and the alpine pastures constituted the main foci of infection in the migratory animals whereas, the community grazing areas were the source of infection for the sedentary animals. Considering the epidemiological pattern of infection, the control strategy for gastrointestinal nematodes should be the protection of susceptible growing lambs and kids during wet summer months and the treatment of adults and yearlings in both species by late autumn or early winter, so that the animals could be maintained worm free or with minimum level of infection during the winter and dry summer months.

INTRODUCTION

The small ruminant population of Nepal has been estimated to be 5.4 million goats and 0.9 million sheep raised either under the migratory or sedentary systems (DFAMS, 1991). These animals are raised mainly for meat and wool production but they are also important for their manure and as a source of cash generation. Goat meat and mutton contribute about 23 percent of meat supply of the country (LMP, 1993) amounting to about 32,000 mt. during 1980/90 (DFAMS, 1991) or 80 millions US \$ at the current market and exchange rates (Rs. 125/kg of meat, 1 US \$= 50 NCR). In addition, an estimated 700 mt of coarse wool produced annually is utilized for making traditional rugs. The economic value of sheep and goat manure has been estimated to about four million US \$ at 1992 prices (Ghimire, 1992).

The overall productivity of the animals is generally low, principally due to poor nutrition and diseases and high mortality has been reported in the sedentary and migratory animals. In the migratory system mortality of lambs and adult sheep is about 32 and 20 percent respectively (Pradhan, 1979), while in the sedentary system, it is about 9.6% in sheep and 4% in goats (Oli, 1987). Karki (1985) also suggested that in the migratory system, 36 percent of the total mortality was due to diseases.

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Gastrointestinal nematodes are regarded to be the most important problem in both sedentary and migratory systems (Karki, 1987; Anon, 1991). Shrestha *et al* (1990) reported 60 percent higher weight gain in anthelmintic treated goats than controls and Joshi (1991, 1994) recorded high mortality due to helminth infection in sheep and goats under stallfed management in the mid and low hill regions of west Nepal. These studies although demonstrated the need and response of anthelmintic treatment were not able to provide information on the epidemiological pattern of infection, which depends upon the climatic factors and grazing management of the animals (Gordon, 1953; Michel, 1969). This information is essential for the formulation of strategic control strategies, in absence of which the approach adopted at present against parasitic gastroenteritis has been the treatment of sick animals as and when required without any consideration on the preventive strategy. Hence although a considerable sum is being spent on the anthelmintic treatment of the animals, it has not been able to reduce either the infection level or the losses due to infection, because the sub-clinical infection is generally unrecognised and considerable loss has already occurred by the time clinical symptoms are obvious.

The studies reported here were thus aimed to understand the epidemiology of the nematode infection and their significance in the productivity of the animals under the prevailing environments and management systems of the hills of Nepal so that the information obtained could be utilised for the formulation of effective control strategies against parasitic gastroenteritis of small ruminants.

MATERIALS AND METHODS

These studies were conducted for a period of one year (February, 1993 to January, 1994) in the sedentary flocks of Bharat Pokhari village (850m asl) and in a migratory flock of Ghandruk village (2100m asl) representing the sedentary and migratory management adapted at the low and high altitude regions of western Nepal.

Determination of Productivity Losses

Five sub sets of lambs and kids pair matched for body weight, age and sex were allocated to either treatment or control groups. The animals in treatment group were maintained worm free by regular treatments with broad spectrum anthelmintics. Experimental details for the productivity studies is presented as Table 1.

Table 1: Experimental details for the productivity studies.

System	Animal species	Total number of animals	Age (months)	Study duration	Anthelmintics used for treatment group
Migratory	Sheep	20	4-6	Jun 93-May 94	Ivermectin ¹ 200 µg/kg s/c monthly
	Goats	14	4-6	Jun 93-May 94	Ivermectin ¹ 200 µg/kg s/c monthly
Sedentary	Sheep	12	5-7	Dec 93-Nov 94	Fenbendazole ² 5mg/kg orally, fortnightly
	Sheep	18	5-6	Jun 93-Nov 94	Albendazole ³ orally, 90 day intervals
	Goats	10	4-6	Feb 93-Aug 94	Fenbendazole ² 5mg/kg orally, fortnightly

¹ Ivomec: MSD; ² Panacur: Hoechst; ³ Proftril I/R bolus: SKB.

Though, fascioliasis was not recorded as major problem in the flocks, animals in both groups were treated with triclabendazole (Fasinex: Ciba Geigy) at the dose rate of 10 mg/kg body weight at monthly intervals, so that the recorded differences could be attributed solely to the effects of nematode infection. The productivity performance in terms of body weight gain and the efficacy of treatment provided was monitored at monthly intervals for the study period.

Seasonality of Pasture Infection

Tracer lambs study

The seasonality of pasture infection was determined by monitoring the worm burdens acquired by the successive batches of worm free tracer lambs grazed with the flocks for a period of one month during different months of the year. During the twelve month period worm counts of 18 and 14 tracer lambs were carried out for the migratory and sedentary systems respectively. To avoid the lambs picking up infection *en route*, these animals were carried to and from the flocks in bamboo baskets by porters. These animals were brought back to Lumle Agricultural Research Centre (LARC), reared indoors under worm free environment on tree leaves and concentrate feed for a period of three weeks and slaughtered humanely. Post mortem worm counts (including the inhibited larvae counts) were carried out according to MAFF (1986). Fifty male and 50 female worms from the abomasum and small intestine were picked randomly and identified according to the descriptions given in Soulsby (1965, 1982) and MAFF (1986). Inhibited larvae were identified according to descriptions given by Eysker (1980) and Thomas and Probert (1993). To confirm the accuracy of species identification, representative specimens were sent to CAB, International Institute of Parasitology, St. Albans, England.

Pasture larvae counts

Tracer lamb data were further supplemented by analysing the herbage samples at monthly intervals from June to November from the *en route* flocking places (*Kharkas*) of the migratory flock on the day of the visit and from the ungrazed areas of the alpine pastures shortly before the animals were moved to graze on it. A similar approach could not be adopted for the sedentary animals and for the winter grazing areas of migratory flock due to the undefined and wide scattered grazing areas. Herbage samples were analysed according to the method given in MAFF (1986) and L3 (infective larvae) recovered were enumerated on the basis of L3/kg dry matter of herbage.

Statistical Analysis

Treatment response on body weight gain was analysed by generalised linear model using treatment and season as two factors (Minitab Statistical Package, version 8). Significance at a particular time point was further analysed by student's t-test. Faecal egg counts data were analysed by non-parametric Mann-Whitney test.

RESULTS

Productivity Losses

In the sedentary system, a total of 33 and 25 percent of control lambs died during winter and summer months respectively with the signs of general debility and weakness.

Effectiveness of treatment regime

The nematode control regime adopted did not always protect the animals completely. This was particularly true for the monthly ivermectin treatment during the wet summer months for the migratory animals. Despite the monthly treatment, faecal egg counts (epg) of treated lambs and kids after a month was found to be 500 and 80 epg in July and 20 and 30 epg in August. This figure was however significantly lower ($P < 0.05$) than the respective control animals, where the values were

1500 and 200 epg in July and 460 and 80 epg in August. From September onward to the following April, faecal egg counts of the treated animals were always zero, while in the control lambs the value fluctuated between 500-1400 epg in lambs and between 50-200 epg in kids.

Faecal egg counts in the sedentary lambs and kids treated with fenbendazole at fortnightly intervals and with Proftril intraruminal bolus at three monthly intervals were always zero. The faecal egg counts of the animal in control groups, remained significantly higher ($P < 0.05$) than that of treated animals but fluctuated according to the seasons between 500-6500 epg in lambs and between 200-1700 epg in goat kids. Despite the relatively high faecal egg counts in control lambs during summer months the obvious clinical signs of gastrointestinal parasitism were not evident.

Body weight gain

The response in body weight gain of the treated and control animals varied according to the seasons and management systems. The total weight gain by the treated and control animals during the study period is presented as Table 2.

Table 2: Body weight gain in sheep and goats in the migratory and sedentary systems following gastrointestinal nematode control.

System	Species	Groups	Total weight gain		Percent weight over initial body weight		Weight gain per day (gm/day)	
							Summer	Winter
Migratory	Sheep	Treated	11.0		47.5		52.0	14.0
		Control	5.1		22.5		29.5	14.3
	Goats	Treated	9.1		56.4		28.4	24.4
		Control	5.0		29.2		15.1	14.0
Sedentary	Goats	Treated	9.0		60.5		51.4	
		Control	3.7		23.2		23.0	
	Sheep		Summer	Winter	Summer	Winter	-	-
		Treated	3.5	5.5	26.8	55.7	20.1	35.0
		Control	1.6	3.4	12.5	35	9.2	21.5

Despite the fact that, anthelmintic treatments did not protect the animals completely the body weight gains of the treated groups in all five studies were significantly higher ($p < 0.01$) than that in the control animals (under farmers traditional management). This difference ranged between 57 to 114% in sheep and 93 to 160% in goats depending upon the seasons and management systems.

Seasonality of Worm Infection

Worm acquisition by tracer lambs

Tracer lambs picked up some infection during all months in both systems. The level of infection increased during the rainy season and was higher in the migratory than in the sedentary system. The mean worm burdens and the proportion of hypobiotic larvae in each system during different seasons are presented as Figures 1 and 2.

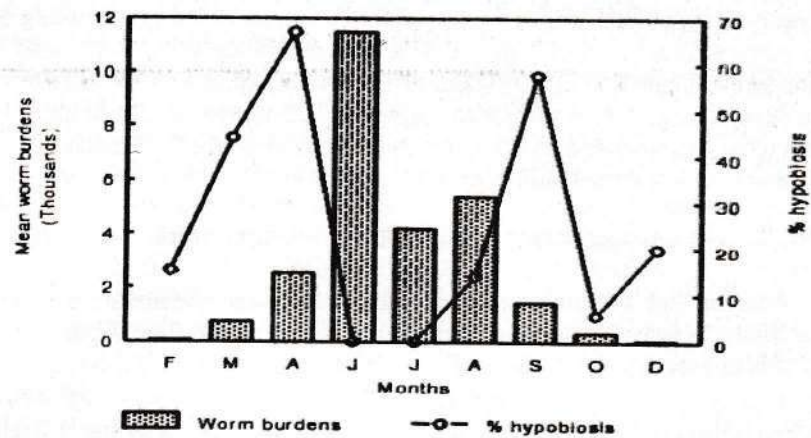


Figure 1: Mean worm burdens and percent hypobiosis in tracer lambs under migratory system

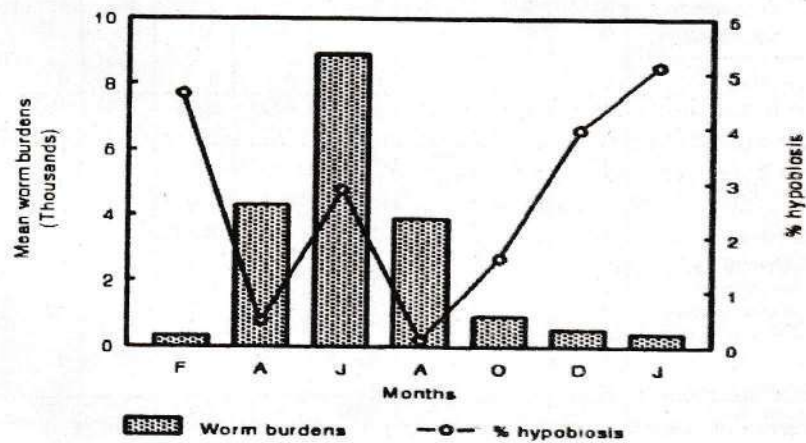


Figure 2. Mean worm burdens and percent hypobiosis in tracer lambs under sedentary system

The tracer lambs picked up highest numbers of worms during June in both systems with 11,460 and 8,900 worms in the migratory and sedentary flocks respectively, while for the migratory flocks at the alpine pastures, in July, August and September, tracer lambs acquired mean worm burdens of 4,405

5-400 and 1,470 respectively. Tracer lambs in the sedentary system acquired 3,885 worms in August. From the month of October, coinciding with the decline in rainfall, the infection rate decreased in both systems and remained low throughout the winter and spring.

The proportion of hypobiotic worms in the migratory flocks varied considerably according to the season and pasture area. Peaks of 70% and 59% occurred in April and September when the flocks were grazing in the jungle line (2500-3000m asl) below the alpine pasture. No arrested worms were recorded in June or July and 14 percent in August and 20 percent in December. The proportion of hypobiotic worms was very low in the tracer lambs grazed with the sedentary flocks. The highest recorded figure being five percent during the winter months.

Mean burdens and worm species composition in tracer lambs

Mean worm burdens and their composition acquired by tracer lambs during different months are presented in Table 3. In both systems, worm acquisition increased from April to September with a low level of infection during rest of the year.

Table 3: Mean population and species composition of worms acquired by tracer lambs each month.

System	Worm species	Mean worm burdens (No.)									
		Feb 93	Mar	Apr	Jun	Jul	Aug.	Sept	Oct	Dec	Jan 94
Migratory	<i>Haemonchus</i>	15	50	1395	0	0	0	0	0	0	
	<i>Ostertagia</i> and <i>Teladorsagia</i>	0	544	582	7530	3890	5225	970	140	15	
	<i>Trichostrongylus</i>	50	135	390	3540	315	175	100	110	60	
	<i>Cooperia</i>	0	0	0	200	0	0	0	0	0	
	<i>Bunostomum</i>	0	100	0	230	0	0	400	0	0	
	<i>Oesophagostomum</i>	0	0	0	0	00	0	0	100	0	
	<i>Trichuris</i>	0	0	150	0	0	0	0	0	0	
	Mean Total	65	735	2415	11500	4205	5400	1470	350	75	
Sedentary	<i>Haemonchus</i>	105		490	4740		2530		110	170	5
	<i>Ostertagia</i> and <i>Teladorsagia</i>	0		95	0		0		0	50	25
	<i>Trichostrongylus</i>	140		1745	2905		765		670	285	260
	<i>Cooperia</i>	70		1815	1005		110		100	0	0
	<i>Bunostomum</i>	0		0	0		5		0	0	0
	<i>Oesophagostomum</i>	0		150	200		200		50	0	0
	<i>Trichuris</i>	0		0	50		0		0	0	100
	<i>Strongyloides</i>	0		0	0		275		0	0	0
	Mean Total	320		4295	8900		3885		930	505	390

A total of 20 species of gastrointestinal nematodes were identified, the most prevalent were the *Trichostrongylus* spp. followed by *Ostertagia* and *Teladorsagia* spp. in the migratory and *Haemonchus contortus* in the sedentary system. *T. axei* and *T. colubriformis* were the commonest while, *T. vitrinus* and *T. orientalis* very infrequent. Similarly, *Ostertagia naianquingtanggulaensis* and *Teladorsagia circumcincta* were more common and *T. davitani*, *T. trifurcata* and *O. leptospicularis* were recorded only few times. *Grossipiculagia occidentalis*, *Bunostomum trigonocephalum*, *Cooperia punctata*, *Oesophagostomum asperum*, *Strongyloides papillosus*,

Trichuris ovis, *Skrjabinema ovis* and *Chabertia ovine* were recovered infrequently and in small numbers only.

Mean worm burdens and species composition acquired by tracer lambs during different months showed some definite trends with time. In the sedentary system, *H. contortus* dominated during the warmer summer months and *Trichostrongylus* spp. during the winter. A moderate number of *Cooperia* spp were recorded during spring and summer but not during the winter months. In the migratory system, *H. contortus* infection was recorded only up to the month of April, while the flock was grazing around the villages. When the flock started grazing on forestline below the alpine pasture, the *H. contortus* infection no longer occurred. The proportion of *Ostertagia* spp. increased from March with the upward migration of the flock to reach 97% in the alpine pasture during August. The level declined again towards the winter. Infection with *Trichostrongylus* spp. was largely confined to the early summer and was picked up only in low numbers at the alpine pasture and during winter. Some transmission of *Bunostomum* occurred when the flock was grazing around the village area and in the jungle line below the alpine pasture during early and late summer months.

Pasture larvae counts

Pasture larvae counts around the *kharkas* and from the alpine pastures are presented as Table 4.

Table 4: Larval numbers and composition at different places on the migratory route and at the alpine pastures.

Date	Place	Altitude masl	Mean L3/kg DM	Larval composition (%)			
				<i>Ostertagia</i>	<i>Trichostrongylus</i>	<i>Heamonchus</i>	<i>Oesophagostomum</i>
7/6/93	Rame kharka	2260	428	21.4	28.6	42.8	7.1
12/7/93	Bengla kharka	4040	182	88.4	11.0	0.0	0.0
12/8/93	Malamche kharka	4170	216	100.0	0.0	0.0	0.0
12/9/93	Plemleku kharka	3877	237	78.7	21.2	0.0	0.0
12/10/93	Phudu khara	3050	0	0.0	0.0	0.0	0.0
12/11/93	Rame kharka	2260	271	35.2	29.1	17.0	18.5

Infective larvae were recovered from all the kharkas except that from Phudu kharka, where the flock stayed only for a night. Infective larvae were recovered from all the alpine pastures and even at the altitude of 4170 masl. The larval recovery and their composition showed some distinct trend governed by the altitude range of the area. *Trichostrongylus* spp., *Ostertagia* spp. and *H. contortus* were recovered at lower altitudes (up to 2300m asl), followed by *Trichostrongylus* spp. *Ostertagia* spp. between 2300 to 4000m asl and only *Ostertagia* larvae above 4000m asl.

DISCUSSION

These studies confirm that infection of gastrointestinal nematodes in small ruminants is the cause of considerable loss in sheep and goat production in Nepal. This is true of animals reared under both the sedentary and migratory management system. While 33% and 25% of control sedentary lambs died during the winter and summer month no deaths were recorded in pair matched treatment groups. Although, there is no direct evidence to prove that these mortalities were due to the parasites, no obvious indication of other disease processes were detected and it can be suggested that parasite infection might be responsible for this mortality. Parasite associated mortalities in nutritionally

stressed sheep have also been reported in other tropical (Ostesile *et al.*, 1982) and temperate countries (Gulland, 1991).

The significant improvements in body weight recorded in animals under parasite control regime over the pair matched animals reared under farmer's managements clearly demonstrated the losses due to gastrointestinal parasitism. However, the weight gain differences between treated and control animals depended upon the season and managerial systems. The body weight gain in the treated animals was higher while the nutritional status on the animals was better, possibly reflecting parasite nutrition interactions. For example, body weight gain per day in migratory lambs was considerably better during the summer than during the winter months, while the weight gain in goats was higher during the winter than during the wet summer months. In case of the sedentary lambs, although the weight gain of treated lambs was higher during the summer season than the controls, the mean daily weight gain of both the treated and the controls was higher during the winter month than during the summer. Despite the fact that faecal egg counts in the control goat kids were at low level, never exceeding 1700 epg, the weight gain response in treated kids was about three times than the untreated controls which suggests the greater susceptibility of goats to gastrointestinal nematode infections as reported by Rickard (1990). These estimates of subclinical losses are probably conservative as it was apparent that the full benefit of parasite control could only be expressed in animals on an adequate plane of nutrition. Thus less response was obtained in, for example, undernourished sedentary lambs during the summer, even though they were adequately protected from the high level of parasite challenge at this time.

Extrapolating the weight gain responses obtained in this study to the small ruminant population in the hills of Nepal, an annual loss of some 3,700 MT meat could be estimated to be due to subclinical nematode infection. This equates to a loss of US \$ 9.2 million, at the current price and exchange rates (NCR 125/kg meat and 1 US \$= 50 NCR). The true losses would be much higher as this calculation does not consider effects on the body weight of adult animals or on milk, wool or fertility. The available literature in other countries suggest that these losses could be significant and equally important (Steel *et al.*, 1982; Thomas and Ali, 1983; Anderson, 1992). It is also important to note that although the level of infection was sub clinical in both lambs and kids and the animals were under sub optimal nutritional status during some periods of the year, the body weight gain was significantly higher in treated lambs and kids. Thus it can be anticipated that the responses to nematode control would be considerably higher if the nutrition of the animals could be improved during lean seasons. This aspect needs further investigation in the field conditions.

Considering the extent of productivity losses from gastrointestinal nematode infection in the small ruminant population, it is necessary to formulate the strategy for their strategic control, which should be based on disease epidemiology. The findings of tracer lamb study and pasture larvae counts indicated that the main period of infection in the animals was during the wet summer months from April/May to September/October in both sedentary and migratory systems, while the infection during rest of the year was low. In the migratory system, the highest level of infection were recorded during upward migration and at the alpine pastures; with the *kharkas* and the alpine pastures constituting the major foci of infection. Whereas, the communal grazing areas were the source of infection for the sedentary animals. Survival of infective larvae has also been reported from the Swiss Alps (Eckert and Hertzberg, 1994) and the recovery of *Trichostrongylus* and *Ostertagia* larvae in the pasture samples above 2300m asl suggests the ability of these parasites to survive under extreme cold conditions recorded at the alpine pastures.

Based on the epidemiological pattern of infection, it is clear that, the animals should be protected during the wet summer month. Under the Nepalese conditions, the only possible approach would be

the strategic and rational use of anthelmintics. This is because of the undefined and uncontrollable grazing areas and the defined seasonal pattern of infection. The most important aspect of this strategy would be to prevent the growing lambs and kids from the high level of infection during the wet summer months. However the anthelmintic application would need to be incorporated with nutrition improvement of the animals because the productivity responses in animals under poor nutritional conditions would not be cost effective. With the advent of slow releasing boluses, it has become possible to protect the animals for 3 months with one treatment which might be particularly suitable for the migratory flocks. For the lambs to be marketed during September/October, a second treatment with a broad spectrum anthelmintics might not be necessary because of the lowered level of pasture infection by September except for the lambs to be retained in the flock. From October onward, the low infection acquired from the pasture, would not affect the productivity of the animals and might be of some importance to prime the immune system of animals for the greater challenge to be acquired during wet summer months. The cost effectiveness of this strategy, however, needs to be evaluated against the background of current farming economics.

The strategy of worm control for the migratory adult sheep and goats could be different than that for the lambs and kids. Although the pasture infectivity is high during the wet summer months, the nutritional status of the animals during this period is of high standard. Thus the immunocompetent animals under adequate nutritional conditions would be able to withstand the effect of infection and the animals would not need to be treated during this period. However it would be necessary to clear up the infection acquired during the wet summer months before the lean winter season so that body weight loss could be minimised during this period, which has been reported to be about 10 percent of body weight in the lactating ewes (Karki, 1987). This treatment would also be useful to remove the hypobiotic larvae present in the animals, which resume their development by late winter/early spring and contaminate the pasture with the onset of pre-monsoon rains (Joshi, 1995). The reduction in body weight loss in lactating ewes during winter would be of great significance as it will lead to increased milk production, higher lamb growth, earlier mating and an overall increase in flock productivity. It would be advantageous if all lambing be completed by the end of October. This allows the lambs to develop a useful level of immunity to nematode infection before they are exposed to heavy larval challenge in the rainy season.

The weight gain response to nematode control in the sedentary sheep flocks during summer months was not very encouraging probably due to their poor nutrition. A frequent use of anthelmintics is prohibitive not only from the economic point of view, but also to avoid the development of anthelmintic resistance. Under these circumstances, the nematode control programmes would only be significant, if the nutritional status of the animals is also improved simultaneously. Anthelmintic application in this system would need to be given over the summer months in a feed based or mineral block based formulation. The other possible option would be to change the management system and rear the animals under stall fed system during the summer months which would not only avoid the nematode infection but would also provide better nutrition to the animals and increase productivity.

The response of sedentary goats to nematode control during summer months was very significant and thus an evidence for the importance of worm control in this species during this period. The ideal approach would be the use of slow release intraruminal bolus during June and a further treatment with broad spectrum anthelmintic during late September. The other option is to treat the animals at monthly intervals from June to September or the use of feed or mineral based anthelmintic preparation throughout the wet summer months. Considering the higher susceptibility of goats, it is important that they should be included in the control programmes irrespective of their lower faecal egg counts than in sheep. This is particularly true if the decisions on control programmes are based on faecal egg counts and both sheep and goats are managed together.

In conclusion, it can be said that, subclinical infection of gastrointestinal nematodes is most prevalent in the small ruminant population of the country and it is responsible for a considerable loss in the productivity of the animals raised both under the sedentary and migratory managements. Despite the sub-clinical infection, the effects were exhibited in terms of reduced weight gain, mortality and reduced overall performance of the animals. Hence it is necessary to control the worm infection of the animals strategically in such a way that the losses could be minimised and the development of anthelmintic resistance in the parasites could be avoided. It must however also be emphasised that, the expected benefits from anthelmintic treatment can only be obtained if the treatment is carried out at the proper time with accurate dosing. Hence, it is essential that the treatment (drenching) campaigns should be organised at a time when it will yield maximum benefits. The ad-hoc treatments carried out according to the targets rather than strategically are thus only a drain on resources without any significant contribution to the nematode control of the animals. The proper strategy would be essential to protect goats (adult and young), and lambs throughout the wet summer months followed by a treatment of both sheep and goats with broad spectrum anthelmintics by late autumn. Various preparations and approaches are available however each strategy and options would need to be evaluated under the farmer's conditions so that the strategy with highest economic return could be adopted. Moreover any technological possibility would need to be weighed against the prevailing farming conditions and potential return from investment.

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pneumoniae (19.3%), *Strep. viridans* (5.2%), *Staphylococcus aureus* (21.0%), *Staph. epidermidis* (8.7%), *Escherichia coli* (19.3%), *Pasteurella haemolytica* (5.2%) and *Klebsiella pneumoniae* (5.2%). Apart from *Pasteurella haemolytica* the bacterial species isolated from the pneumonic lung samples are not considered major causes of pneumonia. Rather their role may be secondary. This indicates that actual cause of respiratory disease in goats in the eastern hills is yet to be identified. There may be involvement of mycoplasmas in causing respiratory diseases in goats. Referring to the above problem and the possibility of involvement of mycoplasmas in respiratory diseases in goats, an attempt was made to isolate mycoplasmas from the respiratory tract of goats.

MATERIALS AND METHODS

In collaboration with the Federal Institute for Health Protection of Consumers and Veterinary Medicine (FIHPCVM), Jena, Germany, an attempt was made to isolate mycoplasmas from the goats of the PAC livestock farm and nearby villages. One hundred and thirty-six nasal swabs from goats (109 from PAC and 27 from villages of Dhankuta district) having purulent/serous nasal discharge and nine lungs and pericardial fluid samples from postmortem cases of PAC livestock farm were collected in mycoplasma broth. All the samples were subjected to mycoplasma isolation at the PAC Veterinary laboratory. The mycoplasma broth and agar media used was Medium B (modified Hayflick medium). This media was prepared by using heart infusion broth or agar, horse serum, 25% extract of fresh yeast, 0.2% calf thymus DNA, 1% thallium acetate solution and dipotassium phosphate (1M). The pH of the prepared media was adjusted to 7.8. For primary isolation 1250 IU/ml penicillin was added to the prepared media.

The samples collected in the mycoplasma broth were incubated at 37°C. The broth cultures were examined daily up to 5 days for evidence of growth, colour change and the appearance of floccular material. The cultures which showed turbidity were filtered using 0.45µm membrane filter before subculture. Broth cultures were subcultured by inoculation of fresh broth medium with 4 drops of the cultures. The broth cultures were also subcultured on mycoplasma agar medium plates. Plate cultures were incubated at 37°C in a candle jar with moisture source. The plate cultures were examined after 3 to 7 days of incubation using a stereomicroscope. Subculture of suspected mycoplasma colonies on mycoplasma agar was carried out by the transfer of excised agar blocks bearing isolated colonies. Colonies suspected of being mycoplasmas were subcultured in both mycoplasma broth and agar. For identification of mycoplasmas, the digitonin sensitivity test, growth inhibition test and immunofluorescence test were performed at PAC Veterinary Laboratory. For further confirmation and species identification the mycoplasma positive samples were sent to FIHPCVM, Jena, Germany.

RESULTS AND DISCUSSION

The results of this investigation revealed that out of 145 samples examined, 39 (26.9%) samples (5 nasal swabs from village goats and 30 nasal swabs, 4 lungs and pericardial fluid samples from PAC livestock farm) were positive for mycoplasma. So far the confirmatory results of 8 mycoplasma samples isolated from PAC goats have been received from FIHPCVM, Jena, Germany (Table 1) and the remaining samples are in the process of being identified.

Table 1: Confirmatory results of 8 mycoplasma samples isolated from PAC goats.

Type of sample	IFT Result
Nasal swab	<i>Acholeplasma laidlawii</i>
Nasal swab	<i>Acholeplasma laidlawii</i>
Nasal swab	<i>Acholeplasma laidlawii</i>
Nasal swab	<i>Acholeplasma laidlawii</i>
Nasal swab	<i>Acholeplasma laidlawii</i>
Nasal swab	<i>Acholeplasma laidlawii</i>
Pericardial fluid	<i>Mycoplasma mycoides subspecies mycoides (LC)</i>
Nasal swab	<i>Mycoplasma arginini</i> (based on ribosomal gene analysis)

According to Jones (1989) the *Mycoplasma mycoides subspecies mycoides (LC)* causes contagious caprine pleuropneumonia-like disease in sheep and goats. Perreau (1979) found that 30% of kids died from septicaemia during an outbreak of infection with *Mycoplasma mycoides subspecies mycoides (LC)*. According to Lefevre, Jones and Ojo (1987) *Mycoplasma arginini* is mainly located in the respiratory tract of small ruminants and may be involved in causing various pneumopathies. *Acholeplasma laidlawii* has been considered as the part of the microflora of mucus membranes in goats.

Although the different species of mycoplasma prevalent in the goats of eastern hills are in the process of being identified, it is quite important to note that the existence of mycoplasmas in the surveyed population has been proved. The results of this investigation give an indication that mycoplasmas may be causing the respiratory problems in goats in the eastern hills. The pathogenic characteristics of *Mycoplasma mycoides subspecies mycoides (LC)* in causing respiratory disease in goats is already proven. However the role of *Mycoplasma arginini* needs to be verified.

Major signs observed in the goats with respiratory problems are purulent/serous nasal discharge, respiratory distress, coughing with some cases of high fever and some with normal body temperature. More subclinical respiratory cases have been identified compared to the clinical cases. High mortality in kids has been observed compared to adults.

Existing goat rearing practices in the eastern hills may contribute to respiratory diseases. The microclimate conditions as in the PAC farm and low ventilation and the long storage of dung below goat pens in villages may be predisposing factors for the occurrence of respiratory cases.

The aetiology and incidence of respiratory diseases in goats vary with the geographical location and management system. Many bacteria, viruses and helminth parasites are known to cause respiratory disease in goats. Generally, respiratory disease is considered to be of multifactorial aetiology and it becomes difficult to determine the precise roles of viruses, mycoplasma and/or bacteria. In the eastern hills of Nepal there may be involvement of other causal agents such as *Haemophilus spp.*, *Pasteurella spp.*, *Chlamydia spp.* and viruses in respiratory problems in goats. Therefore, a detailed investigation of the actual causes of respiratory problems and their epidemiological aspects needs to be carried out. Special attention should be given to mycoplasma because this is considered as a major cause of respiratory disease in goats in many tropical countries. A study on the relationship between respiratory problems in goats and existing management systems in the eastern hills is also of paramount importance.

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PRELIMINARY OBSERVATION ON EFFECTIVENESS OF SODIUM THIOSULPHATE AGAINST ACONITE POISONING IN MIGRATORY SHEEP AND GOATS

H.K. Shrestha¹

ABSTRACT

A field study on aconite poisoning in migratory sheep and goats and the effectiveness of sodium thiosulphate in its treatment was carried out in the alpine pastures of Kaski District during August, 1994. Cases of natural poisoning in 16 flocks of Kaski and West Lamjung inspected during footrot campaign were recorded. The poisoned animals were randomly allocated to four different treatment groups. The poisoning cases were found to be 3.22 and 2.17% in sheep and goats respectively and the difference was significant ($P < 0.05$). Age and sex had significant influence on poisoning ($P < 0.05$). Young sheep and goats (<1 year of age) were poisoned more often than the young adults (1-2 years of age) and the adults (>2 years of age). Similarly, male sheep and goats were poisoned more often than the female. The percentage of natural recovery without any treatment was found to be 41% in sheep and 58% in goats. In sheep, 30ml of 5% sodium thiosulphate (I/V) and 10g of sodium thiosulphate oral gave 100% recovery ($P < 0.001$), but in goats, both 10g and 5g of sodium thiosulphate oral gave lower response (87% and 67% respectively). On logistic regression analysis, the recovery rate was found to have been influenced by treatments ($P = 0.005$), but not by species, age or sex of the animal. Further study on experimentally poisoned sheep and goats with lethal doses of aconite is recommended to verify these treatment responses.

INTRODUCTION

Sheep and goats are important livestock species which play a significant role in the subsistent agricultural system in the hills of Nepal. They provide not only meat wool and to some extent milk, but also act as source of cash income and contribute to maintaining the soil fertility in the hills. Out of the total population of sheep and goats in the country, which is 833 thousands and 5125 thousands respectively (FAO, 1988) 65% of sheep and 35% of goat population is reared as mixed flocks of sheep and goats under the transhumance management system. Among the various constraints of transhumance system of raising sheep and goat, animals mortality is a major one. Plant poisoning is one of the important causes of animal losses in these migratory system of rearing sheep and goats. Poisoning due to aconite plants belonging to the genus *Aconitum* has been reported to account for 6% of total lamb mortality (LRARC, 1990). These plants grow in the alpine pastures (3000-5000 meters above sea level) and in the under forest just below the treeline.

Thirty three species of aconite plants locally known as "bikh" meaning poison have been reported in Himalayan alpine pasture of Nepal (Featherstone, 1989) and most of these plants are suspected to be poisonous. One of the most commonly found species is *Aconitum spicatum*. The toxic principle of the plant is an alkaloid, "aconite", which causes irritation of the gastrointestinal tract, paralysis of the

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respiratory system and complex direct effect on the heart (Clarke *et al.*, 1981). All parts of the plant contain the toxic alkaloid but the tubers are said to contain the highest concentration.

The migratory flocks of sheep and goats reach the alpine pasture in July and remain there for about two months during monsoon season. When sheep and goats are grazing to the alpine pastures and in the forest below treeline, aconite plants are usually avoided by the grazing animals but the leaves of small plants and the petals of the flowers are accidentally grazed resulting poisoning. The clinical signs of poisoning are initial restlessness, followed by depression and dullness, anorexia, frothy salivation, grinding of teeth, incoordination and staggering, recumbency and in some cases regurgitation and bloat, dyspnoea, dilation of pupils and ultimately death. Death is usually due to respiratory failure.

No specific antidote is known against the aconite poisoning (Clarke *et al.*, 1981), but symptomatic treatments with cardiac and respiratory stimulants have been used with limited success (Frohne and Pfander, 1984). A number of traditional herbal medicines are employed by the shepherds for the treatment of aconite poisoning in Nepal. Some of them are Niramasi (*Aconitum orochryseum*) Satuwa (*Paris folyphylla*), rhubarb (*Rheum rhaponticum*), boiled lemon and lime juices and cloves (Featherstone, 1989). However, their efficacy is doubtful (LARC, 1987; LRARC, 1990). Initial studies carried out at Lumle Agricultural Research Centre (LARC) and in alpine pasture to identify the antidote against aconite poisoning has shown some indication that sodium thiosulphate might be the most promising amongst others (LARC, 1987; LRARC, 1990). Therefore this study was conducted to evaluate the effectiveness of sodium thiosulphate against natural cases of aconite poisoning, and to identify the most suitable dose and the route of administration of the drug for the treatment of sheep and goats poisoned naturally with aconite.

The present paper reports the findings of a field experiment on effectiveness of sodium thiosulphate against natural cases of aconite poisoning.

MATERIALS AND METHODS

Study Area and the Flocks

The study was carried out in 16 flocks of migratory sheep and goats of Kaski and Lamjung districts in the alpine pastures of Kaski district from 20th August to 6th September 1994. Naturally poisoned sheep and goats in these migratory flocks constituted the experimental animals for this study. As these flock were also inspected and recorded simultaneously for footrot infection, the total number of sheep and goats in each flock and the number of male and female young (<1 year of age), young adult (1-2 years of age) and adult (>2 years of age) were recorded from the footrot observation sheet. The descriptions on age and sex of poisoned sheep and goats were obtained from the interview of the shepherds and these information were recorded on a record sheet.

Treatment methodology

The shepherds of flocks of Kaski and Lamjung Districts were provided with sodium thiosulphate granules during their upward migration (i.e. first week of July, 1994) to alpine pastures through the forest. Only twelve flocks were visited at that time and the shepherds were given sachets of 5g (Group B) and 10g (Group C) of sodium thiosulphate alternately. The shepherds were asked to prepare an aqueous solution of the drug provided by mixing the content to one sachet with about 100ml (1/4 of a Mana) of drinking water and drench the poisoned animals as soon as possible. They were also asked to readminister the drug in cases where there is no improvement after 3-4 hours of

first medication. Four more flocks which could not be visited during July, 1994 formed the control group (Group D). All these sixteen flocks were monitored during August/September, 1994 to record the treatment responses. Animals found poisoned during this monitoring were given 30ml of 5% sodium thiosulphate solution intravenous slowly (Group A)

Poisoned animals were those which were showing obvious signs of poisoning like frothy salivation, grinding of teeth, dullness and incoordination and were easily identified by the shepherds.

The treatment responses were obtained retrospectively through interview of the shepherds and were recorded on a sheet.

Analysis

The incidence of aconite poisoning in sheep and goats were calculated as the percentage of their respective population. Similarly, the percentages of aconite poisoning in different age groups and sexes of sheep and goats were also calculated. Chi-square test was used to find the significance of difference in poisoning between sheep and goats and among different age groups and sex of sheep and goats.

Mortality in sheep and goats poisoned naturally by aconite plant was obtained from the untreated group (Group D). Mortality in sheep and goats and in different age groups and sex was also calculated as above. Chi-square test was used to find any significant difference among them.

Efficacy of the treatment in different groups was compared by Chi-square test. Fishers' exact test were used to determine p-values in cases where the cells in the chi-square table were with zero count or more than 20% of cells with expected values less than 5. Logistic regression analysis was performed to identify the most effective dose of sodium thiosulphate for the treatment of aconite poisoning.

RESULTS

Incidence of poisoning in sheep and goats

The overall incidence of poisoning from aconite in migratory sheep and goat flocks was found to be 2.83%. Out of 2,639 sheep and 1,562 goats of 16 flocks, 85 sheep (3.22%) and 34 goats (2.17%) were found poisoned (Table 1). There was a significant difference in the rate of aconite poisoning between sheep and goats ($P < 0.05$). In both species, males were found more frequently poisoned than females (6.33% vs 2.43% in sheep and 5.79% vs 1.27% in goat) (Table 1) and these differences were highly significant ($P < 0.001$).

Table 1 - Incidence of aconite poisoning in sheep and goats in migratory flocks during 1994

Species	Male animal			Female animal			Total number	Total poisoned	Poisoning
	In the flocks	Poisoned	%	In the flocks	Poisoned	%			
Sheep	537	34	6.33	2,102	51	2.43	2,639	85	3.22
Goat	311	18	5.79	1,251	16	1.27	1,562	34	2.17
Total	848	52	6.13	3,353	67	2.00	4,201	119	2.83

Young animals (below 1 year of age) were found to be more susceptible than young adults (1-2 years of age) and adult animals (more than 2 years of age) (19.8% vs 1.69% and 1.9% in sheep and 8.3% vs 1.95% and 0.79% in goats) and the differences were highly significant ($P < 0.001$) (Table 2).

Table 2 - Incidence of aconite poisoning in different age groups of sheep and goats in migratory flocks during 1994.

Species	Young (<1 year)			Young Adult (1-2 years)			Adult (>2 years)		
	In the flocks	Poisoned	%	In the flocks	Poisoned	%	In the flocks	Poisoned	%
Sheep	202	40	19.8	708	12	1.69	1729	33	1.9
Goat	240	20	8.3	307	6	1.95	1015	8	0.79
Total	442	60	13.6	1015	18	1.77	2744	41	1.49

The mortality rate due to aconite poisoning among untreated sheep and goats were found to be 59% and 42% respectively but the difference was not significant ($P > 0.05$). Similarly, there was no significant difference in mortality between different sexes and age groups within a species ($P > 0.05$).

Effectiveness of different treatments against aconite poisoning

The treatments were given at different stages of poisoning. The response to different treatments against aconite poisoning was found variable (Table 3).

Table 3 - Effectiveness of different dose rates and routes of sodium thiosulphate against aconite poisoning in sheep and goats during 1994

Species	Group	Poisoned animals	Recovery percentage in		Recovery Percentage (Total)
			Single administration	Double Administration	
Sheep	A (30ml of 5% solution i/v)	7	100 (7)	-	100 (7)
	B (5g oral)	24	63 (12)	80 (4)	67 (16)
	C (10g oral)	37	100 (30)	100 (7)	100 (37)
	D (Control)	17	-	-	41 (7)
Goat	B (5g oral)	6	75 (3)	50 (1)	67 (4)
	C (10g oral)	16	83 (5)	90 (9)	88 (14)
	D (Control)	12	-	-	58 (7)

Note. The number in percentage are total number of cases recovered. The drug was readministered only in those cases in which first dose of the drug did not respond well in 2-3 hours.

Among the different treatments, 30ml of intravenous 5% sodium thiosulphate solution and 10 g of oral sodium thiosulphate appeared to be most effective in sheep where 100% recovery was found (Table 3). In goats 10g of oral sodium thiosulphate appeared most effective with 88% recovery rate (Table 3). The treatment response was significant in sheep ($P < 0.001$; Exact Test) but not in goats ($P = 0.2656$; Exact Test). The overall recovery of naturally poisoned sheep and goats following treatments were highly significant ($P = 0.0005$) when compared for different species and treatment groups. On logistic regression analysis, the treatment responses were not found to be influenced by the sex and age of the animals and the treatments were found effective in the following order - 30ml of 5% sodium thiosulphate (I/V), 10 g of sodium thiosulphate oral and 5g of sodium thiosulphate oral.

DISCUSSION

A mortality rate of 3% was reported in migratory flocks of sheep and goats due to aconite poisoning (Pradbidhi Sangalo 1989). If we assume a 50% mortality rate among the naturally poisoned animals as observed in the present study, the incidence of aconite poisoning would have been 6% in those flocks. The incidence of poisoning in the present study was found to be 2.83% which is lower than the earlier. Shepherds also expressed their view that the poisoning was less in this year compared to the previous years. In this year the flocks arrived late at alpine pastures. In their experience, poisoning is less when the flock arrives alpine pasture late i.e. late July when most of the aconite plants are mature.

The concentration of toxic principle in the aconite plant varies with stage of maturation, i.e. the plants have maximum concentration of toxin just before flowering stage (Clarke *et al.*, 1981) and as the plant matures the concentration of toxin (aconite) is reduced (Featherstone, 1989). This means larger amount of the poison materials have to be consumed to get poisoning effects of the plants. However the chances of consumption of the larger amount of the poison material is less as they are generally avoided by the animals. It has also been reported by the shepherds of Ghandruk, Kaski District that the small plants with only one (*Ekpate*) or two leaves (*Duipate*) remaining at the ground levels are often grazed by the animals accidentally and that these plants are responsible for most of the poisoning cases. These small plants were not reported by Lamjung shepherds. Another reason for having lower incidence of aconite poisoning could be the source of data which were recorded from retrospect information from the shepherds as it may be possible that some of the poisoning cases were not recorded especially in flocks with many cases of poisoning. This might also have reduced the actual number of poisoned cases, and hence the incidence.

On this study, a significant difference ($P < 0.05$) in the incidence of poisoning in sheep (3.22%) and goats (2.17%) was recorded which might have been due to the difference in the susceptibility to aconite poisoning between the two species. This inference is drawn from the fact that at the alpine pasture where poisoning occurs there is only the grazing vegetation and both sheep and goats utilize the same vegetation and pasture. As the goats are more selective feeders tending to nibble at the higher levels of plants than sheep, they might have been able to avoid aconite plants while grazing. It is difficult to draw a conclusive answer from this study. A further study on pharmacokinetics and pharmacodynamics of the alkaloid, susceptibility of these two species to the aconite poisoning and an observational study on the feeding habits of sheep and goats in alpine pastures would probably provide a conclusive answer.

Young lambs and kids were found to have poisoned more often than adult and young adult animals. Similarly, incidence of poisoning was more in male animals than in female in both the species. The higher incidence in young lambs and kids may be due to the unselective grazing, where as the adult animals may have avoided some of the poisonous plants. However, it is also possible that young lambs or kids were exposed to the alpine pasture, and to the aconite plants for the first time in their life and might have been poisoned by smaller amount of the plant materials (1 or 2 leaves) where as the adult animals required larger amount; for example 13 leaves (5 gm) of aconite caused sublethal poisoning in adult sheep weighing 25-30 kg (LARC, 1987).

It may be possible that the adult animals might have developed some kind of resistance and are less susceptible to aconite poisoning. Generally shepherds have experienced that a well nourished and fat animals are affected most by aconite poisoning. But almost all the animals in alpine pastures are in better body condition. Hence, this factor might not have played significant role in the susceptibility of

animals though percentage lean body mass might have affected the lipid solubility of the toxic alkaloid (Featherstone, 1989).

The mortality rate due to aconite poisoning was about 52% in untreated sheep and goats and there was no significant difference in mortality rate between the two species. According to shepherds, mortality is highest in older female sheep (Featherstone, 1989), but in this study, sex and age factors were not found to influence the mortality rates.

Earlier studies carried out at LARC indicated that sodium thiosulphate could be used for the treatment of aconite poisoning in sheep and goats. It was reported that 3.5-4 g of oral sodium thiosulphate gave most satisfactory results (LARC, 1987) in which all six poisoned sheep were cured. But in contrary to this, 5 g of oral sodium thiosulphate gave only 67% recovery rate in this study. The difference in the recovery rate with similar dose and routes of administration of sodium thiosulphate in these two studies could probably be due to the variation in the amount of the aconite plant consumed by the animals and/or due to the difference in body weight of animals. In both the studies, there were no control over the amount of aconite plants consumed. Some animals might have consumed less (sub-lethal) amount whereas the others might have consumed lethal amount. This is also evident from the fact that there was a higher rate of recovery (about 48% in both the species) without any treatment under natural cases of poisoning.

The present study showed 30 ml of 5% sodium thiosulphate solution I/V as the most effective treatment for the naturally poisoned cases. In sheep, all 7 poisoned animals (100%) were cured by this dose rate, but the response of intravenous injection of sodium thiosulphate against aconite poisoning in goats could not be assessed because of lack of poisoned goats in field at the time of monitoring. In an on-station study, administration of 30 ml of 10% sodium thiosulphate intravenously was not found effective when treatment was attempted at the later stage of poisoning i.e. when animal reached the stage of recumbency. This indicated that treatment need to be attempted at an early stage of poisoning. Though the response of intravenous injection of sodium thiosulphate was good, it is not possible to recommend this method of treatment in the field. Administration of sodium thiosulphate solution intravenously is difficult and requires skills and can be performed by the trained personnel only, and requires special training to the shepherds. The oral sodium thiosulphate (10 g) produced better results in sheep with readministration of the drug in 19% of cases, but in goats only 88% of poisoned animals recovered with readministration of drug in 56% of cases which was still not significantly different from that of natural recovery. This indicate probably a higher dose of sodium thiosulphate is required to get better recovery rate in goats.

Several factors might have been limiting the validity of results of this field trial including variations in the amount of aconite plants consumed, severity of poisoning, time lapsed between poisoning and administration of the drug, readministration of the drug, recording of treatment responses based on recalling power of the shepherds, individual variations among the animals and smaller sample size (particularly of goats). And it was not possible to have control over them in the field. Therefore, an on-station trial on experimentally poisoned sheep and goats (lethal dose) to identify the correct dose of sodium thiosulphate (oral) and continuation of observational work in the field is necessary.

Estimation of the correct dose of sodium thiosulphate can be done by identifying the lethal dose of aconite plant material in sheep goats and then treating the experimentally poisoned animals (lethal dose) with the drug at different dose rates. Earlier works on identification of lethal dose of aconite plant carried out at LARC were not conclusive. In one study, 10 g of aconite (fresh leaves with 2 g of tuber) was reported to be lethal to a sheep weighing 25-30 kg (LARC, 1987), whereas in another, a range of 1.9-4.16 g per kg body weight (i.e., 50-100g per adult sheep) on fresh weight basis was

reported to be lethal (LRARC, 1990). These studies were carried out in the field and the variation could have been due to lack of control over the consumption of aconite plant materials prior to the experiment. Similar study has been initiated at LARC, and lots of variation has been observed in lethal dose itself. This indicate variation between individual animals.

As the results of this field trial were not conclusive due to the different reasons discussed above further studies on the effectiveness of sodium thiosulphate in the treatment of experimentally poisoned (lethal dose) sheep and goats and continuation of observational studies in the field is necessary to verify the treatment responses observed in the present study.

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THE EPIDEMIOLOGICAL STUDY OF ANIMAL RABIES IN KASSEL DISTRICT OF GERMANY DURING THE PERIOD OF 1981 - 1995¹

G.N. Gongal² and K. Wagner³

ABSTRACT

A retrospective study of laboratory confirmed rabies cases and analysis of the Oral Immunization Programme(OIP) in Kassel district during the period of 1981-1995 was carried out to provide overall picture of rabies situation. Sylvatic rabies was the major epidemiological pattern of the disease. Wild animals contributed 81 per cent of the total animal rabies cases recorded during the study period. Rabies in wild animal populations appeared in cyclic pattern which was greatly influenced by the epidemiological trend of rabies in fox population. The rabies epizootic in fox population follows a clear seasonal pattern. Domestic animals contributed 19 per cent of total rabies cases. Cattle represented 46 per cent of total rabies cases recorded in domestic animal populations. The incidence of rabies in dogs was 6 times lower than in cats. Animal rabies was brought under control in 1992 as a result of successful implementation of oral immunization of foxes in the study area which was started in 1985. The disappearance of rabies in domestic as well as wildlife populations after the immunization of foxes prove the fact that foxes were the principle reservoir and vector of rabies.

INTRODUCTION

Even today, rabies is a major zoonotic disease of public health importance in different parts of the world. The control of rabies is a matter of concern in animal health as well as public health programmes. Information on the epidemiology of the disease is of prime importance for a control programme to be successful (Wandeler *et al.*, 1988).

The post-war European experience points very clearly to the red fox being the most important factor in the epidemiology of rabies on the Continent (Steck and Wandeler, 1980). The red fox of central Europe is one of the most susceptible species to the rabies virus (Wachendörfer and Frost, 1990). In particular, the federal state of Hesse with the highest percentage of forest among the federal states of Germany offers optimal habitats for the fox in most districts (Scharf, 1990). A number of scientific reports indicate that red foxes have been responsible for the maintenance of sylvatic rabies in Nordhessen since 1953.

Fox population control and immunization of domestic animals against rabies were major tools of rabies control programme in Nordhessen for more than two decades. Earlier attempts to control fox rabies through population control (hunting, poisoning) were unable to suppress epizootic cycle due to the dispersion of young foxes in large territories and changing behavior of the vixens which whelped

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more and more in emergency shelters (Scharf, 1990). To some extent, these methods were useful to reduce the number of rabies cases. It was realised that the reduction of fox population could neither break the cyclic pattern of sylvatic rabies nor eradicate it.

MATERIALS AND METHODS

A retrospective study of laboratory confirmed rabies cases and analysis of the oral immunization of foxes in Nordhessen during the period of 1981-1995 was carried out to provide an overall picture of rabies situation. During the course of our study, the distribution of rabies cases, their incidence and time of appearance were evaluated in view of the overall epidemiological situation, the role of the different species in the perpetuation of rabies in the study area.

The incidence of rabies in different animal species was calculated on the basis of rabies investigation carried out in the State Medical, Food and Veterinary Laboratory of Nordhessen. Since fox population was not known, the incidence of fox rabies was calculated per 100 km². The whole study period was divided into three parts for

1. Pre-vaccination period (1981-1985)
2. Oral vaccination period-Phase I (1986-1990)
3. Oral vaccination period-Phase II (1991-1995)

RESULTS AND DISCUSSION

A total of 30,119 samples was made available to the State Medical, Food and Veterinary Laboratory of Nordhessen for rabies investigation from 1981 to 1995. The number of fox samples was 10,973 which constituted one third of total samples.

Epidemiological situation of rabies in wildlife and domestic animal populations

Sylvatic rabies was the major epidemiological pattern of the disease in Nordhessen. Wild animals contributed 81 per cent of total animal rabies cases recorded during the study period. Rabies in wild animal populations appeared in cyclic pattern which was greatly influenced by the epidemiological trend of rabies in fox population (Fig. 1).

Among wild animals, eighty-one percent of total rabies cases were reported in foxes (Fig. 2). Wild animals like roe deer, stone marten and badger were mostly exposed to rabies during the epidemics of fox rabies and it seems that their role in intra-species rabies transmission was insignificant.

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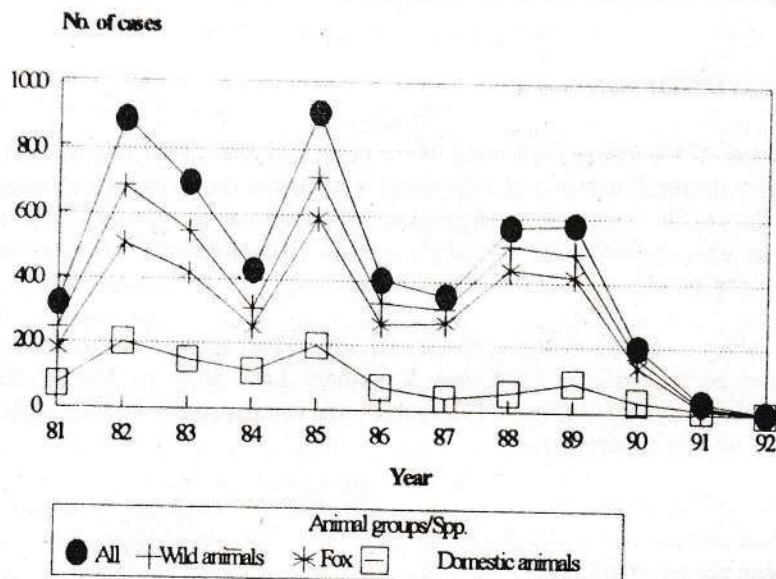


Figure 1: Distribution of animal rabies cases in Nordhessen by year 1981-1995.

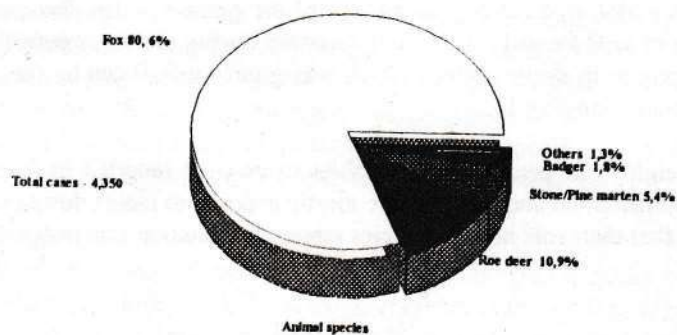


Figure 2 : Distribution of rabies cases among wild animals in Nordhessen, 1981-1995.

Domestic animals contributed 19 per cent of total rabies cases recorded in Nordhessen during the study period. Cattle represented 46 per cent of total rabies cases recorded in domestic animal populations (Fig.3).

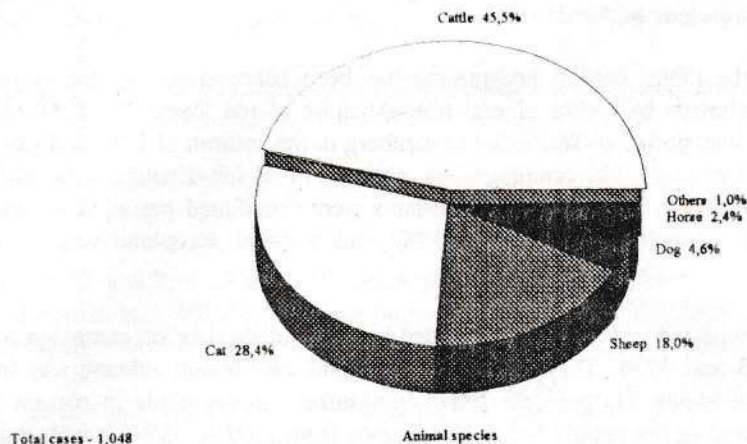


Figure 3 : Distribution of rabies among domestic animals in Nordhessen by year, 1981-1995

The incidence of rabies in dogs was 6 times lower than in cats. Last rabies cases among domestic animals were recorded in 1991.

Major rabies epidemics in fox populations were observed in 1982 and 1985 in the pre-vaccination period. High incidence of fox rabies was reported in 1988 and 1989 during the first phase of oral vaccination campaign in Nordhessen.

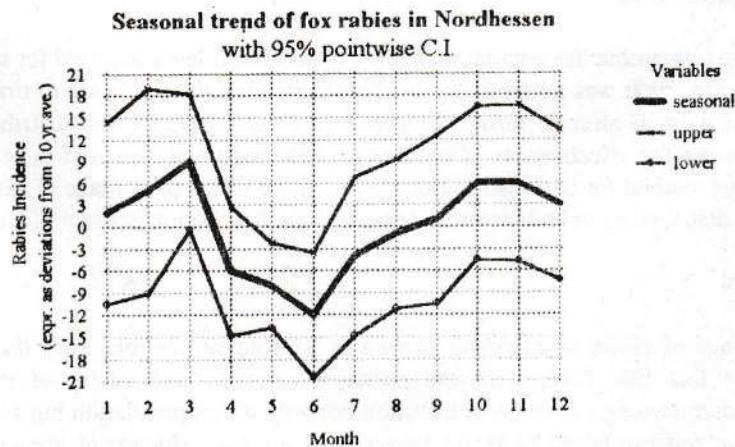


Figure 4 : Seasonal trend of fox rabies in Nordhessen

As can be seen from figure 4, the rabies epizootic in fox population follows a clear seasonal pattern. Two peaks can be discerned. The spring peak should be a consequence of the mating period with its high contact rate. The shallower peak in autumn seems to be due to dispersal of sub-adult populations. High incidence of rabies was observed in young fox population during the third quarter

of the year. Most probably, young foxes were infected with rabies during the time of dispersal. Although adult foxes were vulnerable to rabies all the year round, majority of them were rabid in the first quarter of the year.

Oral immunization campaigns in Nordhessen

Since October 1985, the rabies control programme has been concentrated on the elimination of sylvatic rabies in Nordhessen by means of oral immunization of red foxes. The field trial of oral immunization of foxes was started in Waldeck-Frankenberg in the autumn of 1985 and extended to 4 sub-districts in subsequent years. The campaign was extended to all sub-districts of Nordhessen only in the autumn of 1990. On an average, 16-18 oral-baits were distributed per sq. km. twice a year. Baits were distributed manually from 1985 to 1989 and a small aeroplane was used for bait distribution since 1990.

Last rabies cases were reported in 1992. It was decided to carry out vaccination campaign once a year in the autumn of 1993 and 1994. The main aim of residual vaccination scheme was to increase vaccination coverage of young fox population and immunize residual herds in certain areas. No rabies cases were reported in fox population in Nordhessen from 1993 to 1994. It was assumed that rabies does not exist in local fox population and rabies may only be introduced in Nordhessen if rabid foxes will enter Nordhessen from the infected areas of neighbouring federal states. Therefore, vaccination campaign was carried out in limited areas of Waldeck-Frankenberg and Fulda in the autumn of 1995 to prevent re-introduction of rabies from neighbouring federal states where rabies is still a problem in the local fox population.

In fact, the strategy of vaccination campaign and the method of bait distribution greatly influenced the success rate of the immunization programme in Nordhessen. Although manual distribution of oral baits was very effective at the initial stage of vaccination campaign, it was difficult to get same result in subsequent years.

Reduction of the susceptible fox population below the threshold level required for the maintenance of rabies transmission cycle was possible due to continuous and massive scale of oral bait distribution with the help of a small aircraft during the period of 1990 - 1992. Aerial distribution of oral baits ultimately enhanced the effectiveness of vaccination campaign and it proved to be the most efficient and cost-effective method for bait distribution. With regard to the percentage of marked and immune foxes the aerial distribution of baits is superior to the bait distribution per hand (Mueller, 1994).

CONCLUSION

The disappearance of rabies in domestic as well as wildlife populations after the immunization of foxes prove the fact that foxes were the principle reservoir and vector of rabies which were responsible for maintaining the chain of infection not only in fox population but also in other animal populations. The self-limitation of rabies epizootic is a clear evidence of absence of the efficient transmitter of rabies other than fox.

Although oral immunization campaigns launched in Nordhessen took a long time to produce a desired result, it is important that these results are satisfactory and promising. The main aim of the oral vaccination campaign was to get rid of rabies problem in wild and domestic animal populations with minimum financial burden.

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IN VITRO CULTIVATION OF NEOPLASTIC CELL OF THE CARCINOMA ARISING FROM ETHMOID MUCOSA OF DOMESTIC ANIMALS¹

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ABSTRACT

In vitro propagation of the cells of ethmoid carcinoma was attempted to study the biological behaviour of the neoplastic cells and their relationship with the host system. The tumour cells were obtained from nine cows and three goats. Hank's balanced salt solution (HBSS), TC-199 and Dulbecco's modified Eagle's medium supplemented with 10 to 20 percent calf serum and antibiotic was used for seeding the cells in tissue culture bottles, milk diluting bottles and test tubes. No growth was observed in cells from tumour tissue of cows whereas in cultures made from that of two goats, growth in monolayer was observed which could be maintained for nine days and thereafter the cells started dying out, even the sub cultivation and change of media did not rescue the cells. No difference in growth was observed in different media employed and insulin supplementation also did not bring about any significant difference. Absence of certain unknown factors required by the neoplastic cells for growth was considered to be responsible for failure of the cells to grow.

INTRODUCTION

Carcinoma of the mucosa of ethmoid region in domestic animals has assumed an endemic form in India particularly the southern states. Though, the condition was first observed by Moussu (1906) in Sweden, the incidence has no longer been encountered in Scandinavian countries. Muthappa (1930) reported for the first time in India. Subsequently reports of similar outbreaks appeared from almost all the southern states of India.

An understanding of the nature and behaviour of the neoplastic cell is essential to understand the mechanism for its effective management. Of the various measures being adopted in the study of cancer cytology, *In vitro* propagation of tumour cells has contributed significantly in the assessment of biological behaviour of the tumour cells thus providing an opportunity to clarify the effect of chemotherapeutic agents. Attempts made by Jayaraman *et al.* (1979), Sulochana (1980) and Pospischil *et al.* (1982) to propagate this tumour in artificial media were not successful. However, Sulochana (1980) was able to get growth in some cases for the first week but subsequently the cells died. Contrary, the cells derived from bovine ocular squamous cell carcinoma (Sykes *et al.*, 1959, 1961, Kleinschuster *et al.*, 1979 and Heeney *et al.*, 1983); ovine carcinomas arising at different sites (Yonemichi *et al.*, 1978 and Al-Yaman and Willenborg 1983) have been grown successfully in artificial media. In the present study, efforts were made to cultivate the ethmoid carcinoma cells in order to establish a cell line to form a basis for determining the responsible agent for inducing this carcinoma.

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MATERIALS AND METHODS

The study was carried out in the College of Veterinary and Animal Sciences Trichur, Kerala, India. Nine tumour bearing cows, were brought after obtaining information from different Veterinarian clinics. The tumour bearing goats were obtained from All India Co-ordinated Research Project (AICRP) on goats, Trichur, Kerala.

New born calf serum was prepared from unsuckled male calves, obtained from University Livestock Farm, Trichur and bled aseptically. The serum was separated and sterilised by using Seitz filter. It was then inactivated by heating at 56°C for 30 min, dispensed in small aliquot and stored at -20°C.

All the procedures were carried out under sterile conditions. To prevent infection, the tumour bearing animals were administered with Dicrysticine® (Sarabhai) one vial intramuscularly daily for three days before collecting the tumour tissue. The animals were exsanguinated and the head was cut open. The healthy tumour tissue was harvested aseptically into a beaker containing sterile Hank's Balance Salt Solution (HBSS) supplemented with antibiotics (Penicillin 200 iu/ml, Streptomycin 100 µg/ml, Mycostatin 100 iu/ml, Gentamycin 50 iu/ml). Retropharyngeal lymph node with metastatic lesion was collected separately in HBSS from two cows. The tumour tissue was also collected through excision biopsy from three cows. The tissue was washed several times with HBSS and the suitable mass was fragmented into small pieces. A few cubes of the tissue were transferred to a flask containing 100 ml of HBSS with 0.25 percent trypsin (Difco) and antibiotics for primary dissociation of the tissue by using magnetic stirrer. After stirring for ten minutes, the supernatant was poured off and replaced with 100 ml of fresh solution of HBSS and stirred for 45 minutes. This fraction of stirring was employed to avoid possibility for the presence of any cytotoxic factors in the tissue.

Trypsin was inactivated after 45 minutes of stirring, by adding a little quantity (5%) of serum to the flask to prevent adverse effect on cell population. The suspension was sieved through a double layer of muslin cloth and centrifuged at 1000 rpm for 5 minutes. The supernatant was poured off and centrifuged in fresh solution of HBSS at 1000 rpm for 5 minutes. The procedure was repeated once again. Finally the dissociated cells were suspended in TC-199, HBSS and Eagle's media supplemented with 10% calf serum and antibiotics in such a way that each ml of the suspension contains approximately 10^7 cells. The pH was adjusted to 7.2-7.4. In addition, insulin (Boots, India) was added in two experiments at the rate of 0.1 iu/ml of media to facilitate glucose transport by the cells. The suspension was seeded into 100 ml tissue culture bottles, milk diluting bottles and test tubes at the rate of 10 ml, 10-12 ml and 1-1.5 ml each respectively and incubated at 37°C.

The "Vero" and "WISH" cell lines obtained from Amala Cancer Hospital and Research Centre, Trichur were maintained as control cultures. All the bottles from experiment and control groups were examined daily under the microscope from 48 hours of initial incubation. The coverslips from test tubes were fixed in acetic acid alcohol solution (1:3), stained in haematoxylin, mounted in DPX and examined at 48, 72, 96 and 120 hours post inoculation.

RESULTS

On observation, the tumour cells obtained from cows did not show active monolayer formation though, the cells were seen adhering to the glass surface for the first 48 hours. A viable cell count made by employing dye exclusion technique using trypan blue, showed increased number of dead cells. Addition of insulin in two experiments did not show any improvement on mitotic activity of the cells. No significant difference was found in growth and survival of the cells on the use of different media. Cells could not be rescued even on replacement of fresh media after 48 hours of seeding.

Bacterial and fungal contamination was seen in a few instances (Table 1) in spite of using antibiotics at the maximum permissible level.

Table 1 :Details of cell culture

Expt. No	Source of Tissue	Media used	Calf Serum %	Insulin per ml	Number of seeded		Growth observed	Contamination	
					Bottles	Tubes		Bacterial	Fungal
1	Cow	HBSS	15	-	1	20	-	8t	1 b, 3 t
2	Cow	TC-199	20	-	1	16	-	16 t, 1 b	-
3	Goat	TC-199	15	-	3	15	15t	-	-
4	Cow	TC-199	10	-	3	18	-	-	1 b
5	Cow	TC-199	10	-	5	10	-	-	1 b
6	Cow	Eagle's HBSS	10	-	5	-	-	-	-
		HBSS	10	-	-	10	-	-	-
7	Cow	Eagle's HBSS	10	-	-	16	-	-	-
		HBSS	10	-	5	-	-	-	-
8	Cow	Eagle's	10	0.1 iu	5	12	-	-	-
9	Cow	Eagle's	10	0.1 iu	5	5	-	-	-
10	Cow	Eagle's	10	-	3	16	-	-	-
11	Goat	HBSS	10	0.1 iu	4	5	4 b, 5t	4 b	-
		TC-199	10	-	3	-	3 b	3 b	-
12	Goat	TC-199	10	-	6	5	-	-	-

Growth was observed in two cultures of goat tumour tissue for nine days. The growing sheets had well defined polygonal cells with distinct cytoplasm and ovoid or round nucleus (Figures 1 and 2) showing marked mitotic activity. Some of the cells showed rounding and grouping with a few cytoplasmic vacuoles and increased cytoplasmic granulation from 72 hours onwards. At this stage cells started shrinking and detached from glass surface. Change of fresh media or sub-cultivation on fourth day did not show any improvement. Bacterial contamination appeared in eight culture bottles on ninth day. There was no any significant difference on growth of the cells either in HBSS or in TC-199 media.

A parallel control of established cell lines "Vero", derived from African Green Monkey kidney cells and "WISH" derived from human amnion tissue, was maintained in TC-199 media, supplemented with 10% calf serum and antibiotics. The "Vero" cells grew well in monolayer showing fibroblast like morphology with spindle shaped fibres. The "WISH" cells produced monolayer on glass surface with epithelial like morphology (Fig 3), forming continuous mosaic like sheets of polygonal cells with very little intercellular substance, the morphological features being normal for the type of both of the cell lines. There was no evidence of growth inhibition or contamination even after four successive passages at an interval of three days for each passage.

DISCUSSION

It was not possible to grow the cancer cells from cows in artificial media successfully. Although, the cells adhered to the glass surface, they did not show any evidence of proliferation. The cells disintegrated by 24 to 48 hours after inoculation. This was observed in all cases. Similar attempts of earlier workers (Jayaraman *et al.*, 1979; Sulochana, 1980 and Pospischil *et al.* 1982) were not successful. It might be due to the fact that the tumour is located in the paranasal sinuses which has frequent access to the air that is inhaled and exhaled, thus the tissue often gets contaminated with microbes.

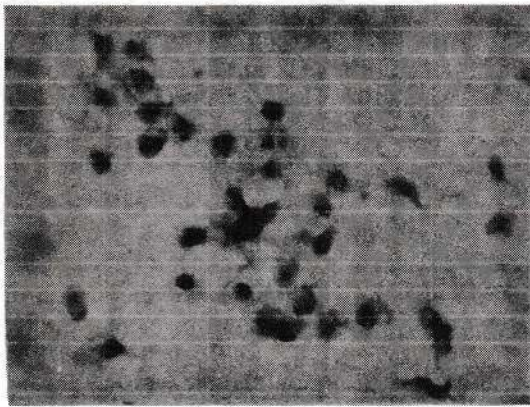


Figure 1: Tumour cells-Goat-72 hours after culture in HBSS-proliferating cells are seen in groups-Harri's haematoxylin x400

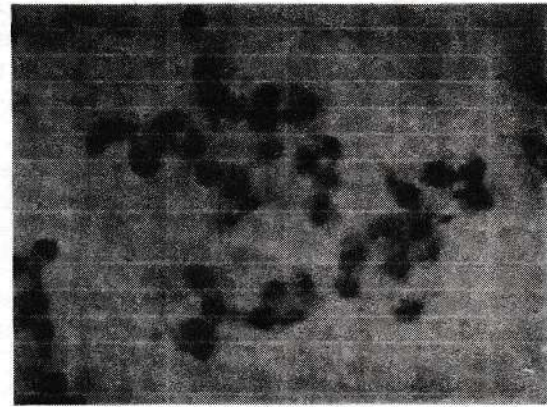


Figure 2: Tumor cells-goat-72 hours after culture in HBSS-Neoplastic cells in isolated groups, dividing cells also seen- Harri's haematoxylin x 400

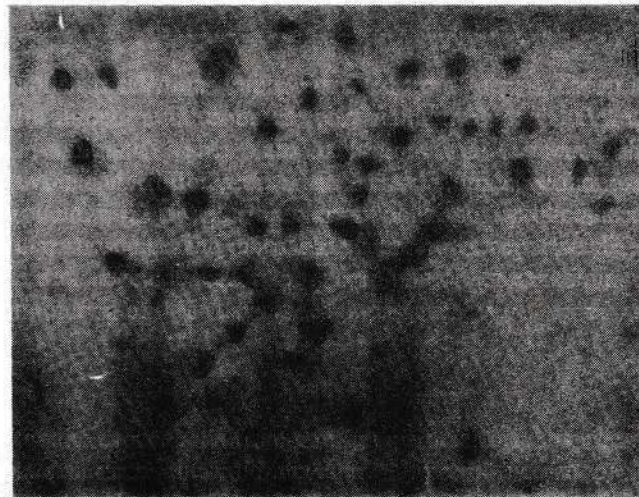


Figure 3: WISH cells - cover slip culture in Eagle's medium - mosaic - like sheets of polygonal cells with little intercellular substance - Harri's haematoxylin x 400.

Therefore, heavy dose of antibiotics had to be used to prevent the contamination. This perhaps would have interfered the growth of the cancer cells. Sulochana (1980) attributed the failure of *in-vitro* growth of the cells of ethmoid carcinoma due to absence of certain unknown essential factors required by the tumour cells for growth. It might be the reason that these factors are present only in the primary host. The Condition of the tissue taken for culture should have also contributed to the death of cells because the disease is diagnosed at a late stage and by this time most of the tumour tissue would have undergone necrosis. This might perhaps liberate certain substances toxic to the viable cells causing their death. However, the tendency of the cells to adhere on the glass surface seen at 48 hours indicates the presence of viable cells and their ability to multiply. All the common media were used but none of them supported the growth. A parallel culture of the established cell lines was carried out in the same media under similar conditions to test whether the media was deficient, this yielded excellent growth. This observation perforce leads to the conclusion that ethmoid cancer cells might require certain essential nutrient factors for growth. Insulin was shown to have a growth stimulatory effect (Gey and Thalhimer, 1924) and increase in nucleic acid synthesis (Leslie *et al.* 1957) when added in growth media. On three occasions insulin was incorporated in the media but the cells did not show any improvement in the growth potentials. Unlike carcinoma of ethmoid, bovine ocular squamous cell carcinoma have been grown successfully in cultures using Eagle's minimum essential media (Sykes *et al.*, 1959, 1961 and Cleaver *et al.*, 1972). Since eye cancer is a superficially placed tumour, its diagnosis is early and tissue can be taken for culture at an early stage when the cells are active. Duncan *et al.* (1967) reported failure of *in-vitro* propagation of the cells of neoplasm of nasal mucosa of sheep where as Jun *et al.* (1978) cultivated epithelial cells from ovine squamous cell carcinoma located at different sites of sheep. Yonemichi *et al.* (1978) cultured cells from tumours of the ethmoid-olfactory mucosa of sheep successfully. Al-Yaman and Willenborg (1983) cultured cells from naturally occurring squamous cell carcinoma of sheep in dulbecco's modified Eagle's medium and found the establishment of culture most successful when the tumour tissue was explanted rather than treated enzymatically. Sulochana (1980) also applied this technique using HBSS and TC-199 media but did not succeed. Similarly, in present study, use of this media could not bring significant difference in either adhering property to the glass surface or mitotic activity. of the calls. Though, on two occasions, tumour cells obtained from goats were cultivated and maintained for nine days.

Death of the cells after ninth day accompanied by bacterial contamination was observed in one case which suggests pre-existing bacterial flora in the tumour tissue. Although, contamination was not a problem, rounding and clumping of some of the cells indicated cytopathic effect due to some infection. This observation would suggest the possibility of the tumour cells harbouring some endogenous infective agents. In spite of taking every effort to locate the case at an early stage, it was not possible to get the tumour bearing animals at this stage. If the diagnosis is made early and cells are cultured at this stage, it may provide successful results.

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स्तरीय सन्तुलित दाना
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सपथ मोलमा अनि
उत्कृष्ट र फलानि
तपाईंहरूका सेवामा
एकमात्र अग्रणी

भ्याली कोल्ड स्टोर

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COMMON DISEASES OF LIVESTOCK AT PATHIVARA VDC OF SANKHUWASHAVA

I.P. Dhakal¹, R. Jha¹ and H. B. Basnet¹

ABSTRACT

This study was conducted during June and July, 1995 to evaluate the livestock heads per household, prevalence of internal parasites, blood protozoa and common diseases of livestock at Pathivara VDC. The number of cattle, goats, sheep, buffaloes and pigs per household were 3.65, 2.71, 2.61, 1.55, and 1.07 respectively. Prevalence of parasitic infections were higher in sheep (100%), goats (85%) and pigs (80%) than cattle (68%) and buffalo (72%). Nearly 6% of cattle and 1% of buffaloes were found positive for babesiosis. Highest calf mortality was recorded during summer and rainy season (45%) in comparison to winter (37%) and spring (12%). Majority of the calf mortality was due to ascariasis, diarrhoea, dysentery and poisoning. In case of cattle and buffaloes, liver fluke and Foot and Mouth Disease (FMD) were the most common diseases followed by non-specific disease like diarrhoea and dysentery. In sheep, foot lesions were the most common followed by liver fluke, gid and pneumonia whereas in goats liver fluke was the most common disease followed by gid and pneumonia. In pigs, swine fever was most common followed by mange and ascariasis. In case of poultry, most serious problem was Sindure (red mites) and bacillary white diarrhoea (BWD). Field visit of Pathivara VDC by the expert team felt that there should be a strong linkage between Department of Livestock Services, (HMG) and Makalu Barun Conservation Project (MBCB) for implementing any new programs.

INTRODUCTION

Livestock plays an important role in Nepal's agricultural economy. The contribution of livestock to the Nepalese economy has been estimated to be about 21% of the total agricultural output and 16.6% of the gross domestic product (NARS, 1989). Lohani and Rasali (1991) reported that animal diseases causes an economic loss of about 845 million rupees annually in the country.

In Sankhuwasava district, livestock farming ranks second position in occupation, the agriculture being first. Productivity of livestock are very low. Among various constraints animals disease are one of the most important, which reduce the productivity of the animals. Systematic animal health program is essential to obtain high livestock productivity. Unfortunately there is little knowledge about the occurrence of livestock disease in this area. Therefore, this study was conducted to at the Pathivara VDC of Sankhuwasava district.

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MATERIALS AND METHODS

A research grant for the project entitled "Epidemiological investigation of common disease and parasites of livestock in the lower belt of MBCP" was obtained from MBCP. An expert team comprised of a veterinary epidemiologist, a veterinary clinician and a veterinary student were involved to conduct this study at the Pathivara Village Development Committee (VDC), keeping the base camp at Hedangana. The group collected faecal and blood samples for laboratory analysis and interviewed the farmer for getting information about the occurrence of different livestock disease in that locality.

Study Site

Pathivara VDC is located at 1000 to 2000 m above the sea level. Arun river is presented in the eastern, western, and southern side whereas Makalu VDC and Hātiya VDC in the Northern side. The number of household in this VDC were 574. Agriculture is the major occupation in this VDC, and livestock rearing is the second major occupation. Cattle, buffaloes, sheep, goats, pigs, rabbits, chickens and ducks are major animals and birds reared in this locality. The total population of livestock and birds in this VDC is 47634 comprised of 10655 cattle, 1086 buffaloes, 9608 goats, 10500 sheep, 15550 chicken, 165 ducks, 400 pigs and 36 rabbits.

Household Survey

A total of 196 farmers from different wards were interviewed at Pathivara VDC using questionnaires. The junior technicians of ilaka agricultural service centre, Hedangana were involved for the preparation of epidemiological profile of the livestock diseases. The expert team interviewed the farmers.

Laboratory Investigation

About 10 gm of faecal samples from 470 livestock were collected directly from the rectum. The samples preserved in 10 % formalin were brought at the veterinary teaching hospital of the Institute of Agriculture and Animal Science, Rampur. Differential centrifugal floatation technique was used for the detection of the eggs, larvae and oocyst.

A total of 93 blood samples were collected from the ear vein of the bullock, cows and buffalo. A fish tail smear was prepared in a clean slide and stained with Leishman or Giemsa stain for examination of protozoan diseases.

RESULTS

Livestock Population

The major livestock reared at Pathivara VDC were cattle (3.65/household) followed by goat (2.71/household) and sheep (2.61/household) of which bullock was preferred for draft and manure. Buffaloes and pigs were less frequent (1.55 and 1.07/household respectively). Few leading farmers had just started rabbit farming on trial basis. Although poultry was the largest holdings (7.45/household), they were kept under traditional management system.

Parasitic Diseases

Table 1 presents the results of faecal examination. The prevalence of helminth and protozoal (one or another species) infection was higher in sheep followed by goats, pigs and buffaloes. Though the cattle was the least affected species (68%), the figure was not small enough to be risk free.

Table 1. Results of faecal examination of livestock at Pathivara VDC.

Species	No. of faecal samples examined	No. of +ve faecal samples	% positive
Cattle	197	135	68.5
Buffalo	47	34	72.3
Goat	181	155	85.6
Sheep	5	5	100.0
Pig	40	32	80.0
Total	470	361	

Details of helminth identification are given in table 2. Among the species of helminth and protozoa found in cattle, *Fasciola* spp. and *Paramphistomum* spp. were most common followed by *Ascaris*. The other species frequently found were *Balantidium coli*, *Strongyloides*, *Strongylus*, *Moniezia*, *Trichuris*, *Eimeria*, *Trichostrongylus*, *Haemonchus* spp. etc. The major problems of helminth parasites in buffaloes were infections of *Fasciola* spp, followed by *Paramphistomum* spp, *Haemonchus* spp., *Strongylus* spp., *Trichuris* spp. etc.

In goats, *Strongyloides* was the predominant species followed by *Haemonchus*, *Trichostrongylus*, *Strongylus*, *Eimeria*, *Oesophagostomum* and *Bunostomum* species. *Strongyloides*, *Trichostrongylus* and *Strongylus* were the main endoparasite of sheep.

The predominant helminths infecting pig were *Metastrongylus* and *Trichuris* species.

Table 2: Identification of parasites in different species of livestock.

Species of animals	Species of parasites
Cattle	<i>Fasciola</i> spp., <i>Paramphistomum</i> spp, <i>strongyloides</i> spp., <i>Moniezia</i> , <i>Trichuris</i> spp., <i>Neoascaris</i> spp., <i>Oesophagostomum</i> spp., <i>Trichostrongylus</i> spp., <i>Haemonchus</i> spp., <i>Eimeria</i> spp. etc.
Buffaloes	<i>Fasciola</i> spp., <i>Strongyloides</i> spp., <i>Paramphistomum</i> spp., <i>Haemonchus</i> spp., <i>Strongylus</i> spp., <i>Trichuris</i> spp., <i>Moniezia</i> spp.
Goats	<i>Strongylus</i> spp., <i>Trichostrongylus</i> spp., <i>Haemonchus</i> spp <i>Bunostomum</i> spp., <i>Eimeria</i> spp., <i>Oesophagostomum</i> spp., <i>Trichuris</i> spp., <i>Moniezia</i> spp.
Sheep	<i>Strongylus</i> spp., <i>Trichostrongylus</i> spp., <i>Oesophagostomum</i> spp etc.
Pig	<i>Metastrongylus</i> spp, <i>Trichuris</i> spp, <i>Ascaris</i> spp <i>Oesophagostomum</i> spp., <i>Strongyloides</i> spp., <i>Globocephalus</i> spp.

Out of 97 blood smear collected from the cattle and buffaloes, 6.45% of the cattle and 1.07% of the buffalo were found positive for *Babesia* spp.

Calf Mortality

Maximum percentage of calf mortality of both male and female was recorded during summer/rainy season (35% and 45%) which was followed by winter (33% and 37%); spring (16% and 12%) and autumn (13%) and 5%) respectively. The mortality in case of male calf was higher (56%) in comparison to females (43%).

Majority of the calves were found to die due to ascariasis (40%) followed by diarrhoea and dysentery (24%), coughing (5%) and poisoning (5%). Some of the calves were found to die due to cystitis, mange, pneumonia, epilepsy, tetanus, dermatitis and nasal leech infection.

Results of Household Questionnaire Survey

Diseases of cattle and buffaloes

Diarrhoea and dysentery were the most common non specific diseases followed by haematuria, coughing, tympany, cystitis, pyrexia etc. The major parasites affecting cattle were ticks, liverfluke and lice. Haemorrhagic septicaemia and foot and mouth disease (FMD) were found most common infectious diseases prevalent in cattle. Yoke gall was also common occurrence in bullock.

The most common parasitic diseases in buffaloes were liverfluke, mite and external parasite infections. Several cases of haemorrhagic septicaemia was also reported.

Diseases of sheep and goats

Farmers reported that foot lesions were the most common problem in sheep followed by gid and pneumonia. In goats liverfluke, gid, enterotoxaemia, pneumonia, foot lesions, haemorrhagic septicaemia and opacity of cornea were reported.

Diseases of pigs and poultry

Swine fever was the most common disease in pig followed by mange, ascariasis, tape worm infection, pneumonia etc. In poultry *Sindure* (red mite infection) was the most common parasitic infection followed by coccidiosis and ascariasis. Other diseases encountered in poultry were BWD, CRD, fowl pox and infectious bronchitis.

Livestock Health Care

Survey revealed that 58% of the households had received primary animal health care from the Livestock Services Sub-centre situated at Hedangana. Only 12% of the household had the opportunity for vaccination of their animals against haemorrhagic septicaemia and black quarter. However, nearly 80% of the families were interested to vaccinate their animals. At least 26% of the farmers reported that they drench their animals against internal parasites. Technical advice had been offered by Agriculture Development Bank (ADB), Small Farmers' Development Project and Livestock Services Sub-centre to the 43% of households interviewed.

Use of Indigenous Herb for Treating Animals

Chiraito, Khanappa, Pangra seed, Bhakyamlo, Timur, root of Kagate, root of Moilahara, Khajuro, Lakuri, Asare, Jyamir Junar etc. are the common indigenous herbs used by the farmers for treating the ailments of their animals.

Livestock Problems

Major livestock health and husbandry problems are given in Table 3.

Table 3: Livestock health and husbandry related problems.

S. No.	Categorisation of problems	Household response (Number)
1	Inadequate grass and fodder trees	121
2	Wild predator	54
3	Lack of drinking water	46
4	Lack of grazing land	46
5	Lack of veterinary facility	39
6	Diseases and parasites	23
7	Financial constraints	18
8	Lack of manpower to look after livestock	11
9	Infertility in livestock	4
10	Marketing of livestock products	4
11	Lack of <i>kharka</i> facility	4
12	Lack of improved breeds of animals	3
13	Control of MBCP	3
14	Procuring salts from Hile and Dhankuta	1
15	Poisonous plant	1
16	No problems	1

DISCUSSION

The present study showed that parasitism is the most common problem. *Lahumute* (passing of red urine) was found to be very common in cattle. Although 6.45 % (n=92) cattle were found positive for *Babesia*, majority of *Lahumute* cases could be due to other reasons such as chronic bracken fern poisoning (enzootic bovine haematuria).

Farmers use indigenous herbs to treat animals suffering from various diseases, however these are not effective in majority of diseases. Most of the farmers are interested in modern drugs and vaccines to treat and control diseases in animals however they do not have veterinary medical support. Majority of the people still believe on superstition. Therefore extension and training to raise awareness about animal health and husbandry practices is urgently required. There is a need to have an animal health worker in every village. Regular drenching of animals during February and August is recommended to reduce stress due to helminth burdens. There should be a strong linkage between Department of Livestock Services and MBCP for organising a joint package program for solving day to day problems of the farmers. Further studies are required for identification of medicinal plants and their evaluation for the treatment of livestock and poultry diseases.

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OUTBREAK OF NEWCASTLE DISEASE IN COMMERCIAL CHICKEN IN NEPAL

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ABSTRACT

An out-break of Newcastle disease in commercial poultry farms in Chitwan valley was investigated. The outbreak affected an estimated population of 0.4 to 0.5 millions of commercial chickens. The morbidity and mortality were estimated to be more than 75% and 51% respectively. Chickens of all breeds were found to be affected but mortality was seen only in younger birds. Broiler chickens were found to be most affected.

Based on haemagglutination inhibition (HI) test and challenge trial, the isolate was confirmed to be velogenic viscerotropic strain of Newcastle disease virus (VVNDV). This was the first isolate for the year 1996 but second isolate of Nepal. The isolate was designated as NDV-NP1/96 for identification.

INTRODUCTION

A suspected outbreak of Newcastle disease (ND) in commercial chicken with high mortality was reported from Chitwan valley, a major poultry pocket of the Kingdom. The outbreak spread rapidly and caused enormous economic loss to poultry farmers. Field investigation was carried in the most affected area. Information about outbreak were collected from potential professional practitioner, hatchery man and poultry farmers. The affected flocks were visited to collect relevant specimens for laboratory confirmation. This report is to summarise the results of the investigation of the outbreak.

MATERIALS AND METHODS

Field Investigation

Government veterinarians, private veterinary practitioners, poultry farmers, hatchery men, feed and poultry dealers at Chitwan district were contacted for collection of information about the outbreak. Altogether 222 flocks of commercial chickens were visited. The chickens in affected flocks were clinically examined. Clinical signs and gross lesions were recorded. Mortality rate was calculated on the data collected from 20 randomly selected flocks.

Laboratory Investigation

Virus Isolation

The tissue samples such as, trachea, brain, piece of lungs, spleen and intestines collected during necropsy examination were homogenised with freshly prepared sterile physiological saline using

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mortar and pestle. The homogenate was centrifuged at 3000 g for 10 minutes. 1000 µg of streptopenicillin per ml was added to the homogenate before being inoculated into embryonated chicken eggs. After candling, 0.1 ml of the supernatant was inoculated into allantoic cavity of twenty eight, eleven days embryonated eggs and then these were incubated at 37° C for 72 hours.

The presence of NDV in allantoic fluids of the embryos was determined by using Iph test (agglutination of the virus with 1% washed chicken rbc's). For further confirmation, microhaemagglutination inhibition (HI) test as described by OIE (1992) was performed.

Pen challenge trial

Six, 5 weeks old chickens vaccinated orally in water twice with F strain and six vaccinated at the interval of 3 weeks with NDV₄HR strain of NDV were utilized for the challenge trial. The third group of 13 unvaccinated chickens were used as control.

These three groups were housed separately in three different pens. They were challenged with the virus isolated 4 weeks ago from the present outbreak. Inoculum was placed through conjunctival route using undiluted allantoic fluid by a sterile cotton swab. These chickens were regularly monitored for the presence of clinical disease.

RESULTS

Epidemiological Findings

The outbreak was sudden and reported from Makawanpur, Chitwan, Nawalparasi and part of Gorkha districts, however the investigation was carried out in Chiwan district only.

Mean age of the chickens in the affected flock was 32.7 days. Mortality was observed to be 58.12% in broilers and 38.36% in layers. No outbreak was recorded in the birds under 16 days of age.

The outbreak was observed in flocks of Hubbard, Arbor acres and Vencobb breeds of broiler and Hyline, Tetra SL and Babcock breeds of layers.

Clinical Findings

There was severe depression in affected birds. Green and white coloured loose droppings were seen generally in affected flocks. Affected birds were reluctant to move. Most of the affected birds were off feed and water for several days. Larger proportion of severely affected birds died of acute infection with diarrhoea and dehydration. Small proportion of birds in affected flocks survived of infection showing the nervous signs such as paralysis of wings, neck and legs, abnormal position of head, and severe respiratory signs.

Pathological Findings

In 50 percent of birds examined during the post mortem examinations had swollen proventriculus and gizzards with haemorrhages over the mucosal surfaces whilst 50 percent birds did not exhibit haemorrhages over the mucosal surfaces of these two organs. Haemorrhages on caecal tonsils was also not uncommon. There was green coloured ingesta into the gizzards and upper half of the intestine. Necrotic ulcerative lesions were observed at ileocolic regions of small intestine. The liver was swollen and congested. Congestion was also seen in the kidneys. The gall bladder was engorged. Congestion of the trachea and lungs was observed only in few cases. In layers, wasting of muscles was relatively severe than broilers. Haemorrhagic streaks were also observed on the inner surface of bursa.

Laboratory Findings

The embryos found dead 24 hours post inoculation were discarded. Sixteen embryos died at 48 hours and 8 died at 72 hours. Allantoic fluid of eggs found dead 48 and 72 hours post inoculation was harvested. The presence of virus was determined by exhibition of typical agglutination reaction with 1 percent washed chicken red blood cells.

The presence of ND virus was further confirmed by using HI test. The NDV specific antisera inhibited the haemagglutination by the virus indicating that the NDV was involved in the present outbreak. The isolate designated as ND-NPI/96 is stored at Animal Health Research Division (AHRD), Tripureswor at -20°C.

Pen challenge trial

The chickens in unvaccinated group exhibited clinical signs typical to NDV. Similar signs were observed in the field outbreak reported earlier in this report. The signs were very mild in the vaccinated groups to the challenge infection. In unvaccinated group, mortality was observed to be 65 percent but no mortality was seen in the vaccinated groups. Post-mortem examination revealed haemorrhages over the mucosal surface of proventriculus, congestion of the liver and spleen, and enteritis with necrotic ulceration of the intestines. These results of pen challenge further confirmed that the present outbreaks in chicken in Chitwan and near by area were caused by the field strain of NDV.

DISCUSSION

Nepal is an endemic country for ND. Outbreaks of ND are reported every year in village chicken production system. However this is the first time we have experienced such a massive outbreaks in commercial flocks.

There could be several factors responsible for occurring such a wide spread outbreak of NDV in commercial flocks. During the visit of affected flocks in Chitwan district, broiler flocks appeared to be mostly affected although infection was recorded in layer flocks mainly at young age. Irregular vaccination practice among broiler raisers compounded and created a population completely susceptible to NDV. Poor biosecurity measures and none restricted movement of diseased birds into markets have contributed to rapid spread of disease in chickens of wider areas. System for monitoring potency of vaccine, seroconversion in vaccinated birds and passive immunity in baby chicks exist nowhere in Nepal. Furthermore, another group of domesticated birds exist in large

numbers in the country which are generally ignored as a potential source of ND (Alexander 1994). These all factors might have compounded for the present outbreak of ND in commercial chickens.

During the investigation following features of the outbreaks were noticed:

The pathological changes varied greatly from birds to birds and flocks to flocks and secondly the readily recognizable changes were seldom found especially in those birds that have died of severe forms of the disease.

Newcastle disease is economically important viral disease of poultry everywhere including Nepal. The losses from ND in commercial poultry under intensive production system can only be prevented through improved management and by application of biosecurity measures. The following underlined principles are considered important for NDV control in the future:

Vaccine and vaccination

- Infections Bursal Disease (IBD) virus and Marek's Disease (MD) virus generally infect chicken at early age and usually damage the immune system of the birds, leading to NDV vaccination failure. Thus MD and IBD vaccination must be incorporated to NDV control program.
- Broiler chicken primed by F1 strain vaccine also be boosted by Lasota or FI (Asiatic) strain vaccine, twice at 3 weeks interval.
- In case of layer flocks re-vaccination with M strain or R2B strain must be considered at 9 to 11 weeks of age and a booster dose by killed vaccine 2 weeks before onset of laying.
- Immune status be monitored time to time to ensure the adequate level of protection against NDV.
- Quality of vaccine be checked before the use.
- Maintenance of cold chain during storage and transportation of vaccine is very important.
- Parent stock be immunized by the killed vaccines.

Biosecurity measures

- Hatcheries and feed mills be established faraway from butcher and fresh chicken meat sale counter.
- Restriction on movement of unwanted persons and visitors into the farm
- Attention must be given for changing footwear and dresses before entering into the chicken house, feed store and water supply units.
- There should be restriction on movement of unnecessary vehicles and equipment into the farm.
- No direct entry of chick box, egg trays and unsold chicks should be allowed from market into the farm.

- Maintain as much gap as possible between removal of old flocks and entry of new birds in a chicken rearing shade.
- Use effective viral disinfectants for the floor, feeding and watering equipment before reuse them for each new flocks.
- Seven to ten days gap between two vaccination be maintained.

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PLASTIC BAGS AS AN EMERGING ENVIRONMENTAL HEALTH HAZARD TO LIVESTOCK OF KATHMANDU VALLEY

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ABSTRACT

Plastic carrypack bags have been considered as an emerging health hazard specially to the domestic animals as well as wild life of Kathmandu valley. Present paper deals with the clinical findings, treatment and necropsy of three cases of plastic engorgement in cattle. The health hazard caused by plastic in pet, domestic, wildlife and birds are discussed and necessary curative as well as preventive measures recommended.

INTRODUCTION

Plastic bags are being used extensively as carrypack from market as well as domestic waste disposal bag in Kathmandu valley. In this valley, cattle are raised under semi-intensive system having free access to scavenge on the heaps of waste and garbage littered on the street, roadside and elsewhere in the valley. Because of the habit of allothrophagia, they tend to ingest plastic bags and papers along with the kitchen waste and garbage. Similarly, dogs ingest plastic bags in which meat and meat products or other foods were wrapped, while the wild life and wild birds in zoo and national parks ingest plastics mostly left by picnic part and visitors. The ingested plastic materials remain undigested in the rumen of ruminants and stomach as well as intestinal tract of other animals causing blockage of the digestive canal resulting in to various disorders such as indigestion, recurrent tympany, impaction, peritonitis and death.

This paper is aimed to discuss the hazards of plastic bags in cattle. Three cases of cattle with plastic material in rumen were studied.

Case History and Treatment

First case

A one and half year old Jersey-cross female calf from Bhaktapur district was admitted to Central Veterinary Hospital, Tripureswor with a history of ruptured abdomen due to an accident made by a vehicle. Clinical examination revealed depression, anaemia, and a fracture of last two ribs with a deep wound of left flank. The ruminal content was oozing out of the rumen through the wound.

The ruptured abdominal wound was cleared and the ruminal content which included 215 pieces of plastic carrypacks and milk pouches were evacuated under general anaesthesia using xylazine/ketamin combination. The calf appeared normal on the following day.

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Second Case

An eight year old Jersey-cross cow from Swoyambhu area suffering from chronic anorexia, debility, poor general health condition, decreased milk production, distended abdomen and poor response to conventional treatment over a period of one year, was reported to the Central Veterinary Hospital when the cow was completely recumbent. The case was advised for rumenotomy, but it died on the same night. Postmortem examination revealed cachexia, debility and a huge pile of plastic bags in the rumen.

Third Case

A nine year old Holstein-Friesian-Jersey-cross cow of Chhetrapati Kathmandu area suffering from chronic anorexia, gradual loss of condition and milk yield, recurrent tympany and non-response to treatment since five months, was brought to Central Veterinary Hospital. Clinical examination revealed anaemia, bottle jaw, brisket edema, severe debility, diarrhoea, ruminal impaction and dehydration. Faecal examination revealed the eggs of *Fasciola* spp. *Paramphistomum* spp. and *Strongylus*.

The animal was treated with Bloatosil[®] (Wockhardt), Albomar[®] (Glaxo) and studied for a week. There was slight improvement in general health condition. However, the ruminal distention was persistent.

On 8th day, rumenotomy was performed and around 500 pieces of plastic bags, plastic milk sachets, nylon rope pieces, nails, hairpins, safety pin, etc. were recovered from the rumen. The wound was closed as per rumenotomy procedure and the cow recovered fully after 7 days.

DISCUSSION

Plastic bags, littered every where, have now become a potential environmental health hazard to the cattle of Kathmandu valley (Ghimire, 1996). Analysis of Out Patient Registration Record of 1000 cases of cattle and buffaloes treated at Central Veterinary Hospital during the year 1995 revealed a prevalence of around 4% of hospital cases diagnosed as plastic engorgement (Annon, 1995), where a poor response to medical treatment but a good response to rumenotomy was also recorded.

The farmers have tendency to report the cases at the last stage so that the plastic engorgement for a long period involves a heavy economic loss in terms of long course of treatment, loss of production and death of animals.

Plastic bags have also become a serious health hazard to the pet dogs of Kathmandu valley. During the year 1994/95, out of 12 cases of enterotomy and enterectomy of pet dogs performed in Kathmandu Veterinary Clinic Maharajgung, Kathmandu, five cases revealed plastic bags in their intestine causing valvulus, obstruction, multiple perforations and peritonitis (Annon, 1994/95).

Plastic has also become a serious problem of wild life in Nepal. Deer and Emu birds died at Central Zoo Jawalakhel were diagnosed as plastic engorgement at necropsy (Shrestha 1996, Gaihre 1996). During the year 1979/80 a huge quantity of plastic bags, milk pouches, biscuit wrappers and plastic packs of picnic were recovered from rumen of an adult deer of Gokarna National Park, Kathmandu and the cause of death was diagnosed as plastic engorgement only after necropsy. The deer might have ingested the plastic materials along with the left over packed in plastic by the picnic parties.

Thus it can be concluded that plastic materials have now become a serious environmental health hazard of domestic as well as wild life of Kathmandu valley. This suggests a further detailed study in other parts of the country. A judicious use and disposal of plastic materials in daily, domestic, marketing, recreational and other purpose has also been recommended.

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PREVALENCE OF FASCIOSIS AND EFFICACY OF VARIOUS ANTHELMINTICS IN BUFFALOES OF RURAL KATHMANDU

N.P. Ghimire¹ and N.P.S. Karki²

ABSTRACT

Coprological examination revealed a high prevalence of fasciolosis in the adult buffalo population of rice belt area (82.0-94.0%) of Nanglebhare and Lapsophedi VDCs of Kathmandu district. An evaluation showed that the efficacy of available anthelmintics was in the order of rafoxanide (67%), oxyclozanide (65%), triclabendazole (52%) and albendazole (48%) against fasciolosis in buffaloes.

INTRODUCTION.

Nanglebhare and Lapsophedi village development committees (VDCs) are the remote areas of Kathmandu district, having a human population of about 5000 people belonging mostly to Brahmin and Tamang communities. The principle occupation of the people of this area is traditional agriculture in which livestock rearing is an integral part. Buffaloes, goats and cattle are the three main livestock species in this area. The buffalo raising has been the major source of income generation for the farmers.

On an average three buffaloes per household are raised mainly for milk production, and for meat in Tamang community. On an average, the daily collection of buffalo milk from five milk collection centres located in this area is about 1000 litres.

Buffaloes are stallfed especially in rice belt area with rice straw as a major forage throughout the year supplemented with crop by-products and tree fodder

Farmers of this area frequently visit Central Veterinary Hospital Tripureswor when a proper diagnosis and veterinary service is required. External and internal parasite infections (especially fasciolosis), infertility, dystocia, retained placenta, pneumonia, digestive disorders haemorrhagic septicaemia and foot and mouth disease are the major diseases and disorders, of this area. Fasciolosis has been found as the most important disease of buffalo of this area (Anon, 1992).

In Nepal, four types of drugs namely oxyclozanide, rafoxanide, triclabendazole and albendazole under various patent name are used to treat fasciolosis in animals. Some of the chemicals are already indicated as ineffective in action and some of the pharmaceutical products are questionable for their efficacy.

Hence, this simple trial was conducted to evaluate the prevalence of fasciolosis in buffaloes and efficacy of commonly available anthelmintics against it.

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MATERIALS AND METHODS

A total of 799 fresh faecal samples from buffaloes and cattle were collected randomly from 612 household and were subjected to standard sedimentation technique to detect the ova of *Fasciola* spp. The results were further grouped to find the association of the prevalence of fasciolosis with altitude, rice cultivation practice and age of buffalo.

The buffaloes positive for fasciola eggs were randomly allocated to 10 groups comprising 35 animals in each group irrespective of age and sex. Each group of buffaloes were drenched with one particular anthelmintic at the dose rate recommended by the manufacturer. Faecal sample were recollected on 10th and 30th day of first drenching and the results were recorded for further analysis.

RESULTS

The prevalence of fasciolosis based upon the coprological examination is given in table 1. It was also recorded that prevalence of fasciolosis in buffalo was higher (68.26%) than that of cattle (48.88%) population of this area.

Table 1: Prevalence of fasciolosis in cattle and buffalo

Description	Cattle	Buffalo	Total
No. faecal sample tested	90	709	799
No. positive for fasciolosis	44	484	528
% positive for fasciolosis	48.9	68.3	66.1

The agroecological relation of fasciolosis in buffalo has been given in table 2. A higher prevalence (73.5%) of fasciolosis in buffalo was found in lowland area where rice is grown in comparison to 56.0% found in non irrigated upland area.

Table 2: Prevalence of fasciolosis in buffaloes in different agroecological zones

Description	Upland	Lowland	Total
No. faecal sample tested	211	498	709
No. positive for fasciolosis	118	366	484
Percentage positive	55.92	73.49	68.26

The prevalence of disease varied between different villages of the VDC as highest prevalence was recorded in Patap (89.0%) followed by Chhapa (78%) Bharegaor (76%) and Whalcalgaon (75%) of Nanglebhare VDC. The lowest prevalence rate of 50-60 % was found in various upland areas of Lapsophedi VDC.

The prevalence of fasciolosis in different age groups of buffaloes is given in table 3. A direct association between the age of buffalo and the prevalence of fasciolosis was also found. Fasciolosis was found highly prevalent in old buffaloes (94.31%) compared to heifers (54.16%) and calves (34.6% of low land area. A Similar trend of prevalence of fasciolosis in various age group of buffalo of upland area was also detected. Fasciola eggs were also detected in the faecal sample of a 3 month old buffalo calf.

Table 3: Prevalence of fasciolosis in different age group of buffaloes.

Age group	No. of sample examined	No. positive	% positive for fasciolosis		
			Total	Upland	Lowland
<2 Years	38	12	25.00	31.57	34.60
2-4 Years	199	95	37.97	47.73	54.16
<4 Years	237	107	45.00	-	-
5-9 Years	356	273	69.56	76.69	82.19
>10 Years	116	104	75.00	89.66	94.31
Total	709	484	68.26	55.92	73.49

Table 4: Prevalence of fasciolosis in different age groups of cattle

Age Group	No. of samples tested	No. positive	% positive
< 2 Years	12	2	16.66
2-4 Years	36	9	28.15
5-9 Years	42	28	66.66
> 10 years	10	5	50.00
Total	90	44	48.88

The efficacy of various groups of anthelmintics has been given in table 5. Out of ten different type of pharmaceutical products belonging to four major pharmacological groups, the efficacy was in order of rafoxanide (67%), oxyclozanide (65%) triclabendazole (52%) and albendazole (48%) against fasciolosis in buffaloes.

Table 5: Efficacy of anthelmintics against fasciolosis in buffalo.

S.No	Anthelmintics	No. of animal treated	Efficacy (%)
1.	<u>Rafoxanide</u> - Rafoxin (Concept) - Amfanide (Merind)	70	67
2.	<u>Oxyclozanide</u> - Clozan (Jeps Pharma) - Distodin (Pfizer) - Tolzan (Hoechst) - Chanamil	140	65
3.	<u>Triclabendazole</u> - Fasinex (Ciba-Geigy)	35	52
4.	<u>Albendazole</u> - Albendazole - Valbazene (Eskayef) - Endex - Eraworm (More)	140	48

DISCUSSION

Present study revealed a high prevalence of fasciolosis in buffaloes of the mid hills of Central Development Region of Nepal. A similar prevalence of fasciolosis has been recorded in the mid hills of Western (62.78%) (Rasali, 1996) and 50-70% in Eastern Region (Bhattarai *et al.*, 1993).

Present findings of the higher prevalence of fasciolosis in buffaloes of rice cultivable low area agrees with the earlier report that rice straw is a major source of transmission for fasciolosis in stall fed animals (Joshi, 1992). The most striking feature of this study was that fasciolosis was more prevalent in old buffaloes, where as the prevalence was much lower in similar age group of cattle raised in the same environment and condition which is in agreement with the finding of Mahato (1993). This could be considered either cattle are not fed with rice straw as buffaloes are or there exist a genetic factors to make cattle more resistant to the infection (Boray, 1969; Mahato, 1993).

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OUTBREAKS OF TRYPANOSOMOSIS IN EQUINES

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ABSTRACT

Outbreaks of trypanosomosis were recorded in equines affecting mules in Salyan district and horses in Kathmandu valley. Altogether 16 cases (11 mules and five horses) were studied. Clinical signs of progressive weakness, lethargy, gradual emaciation, rough hair coat, pale conjunctiva and anaemia were noticed in the affected animals. Laboratory examination of blood smears from the sick animals revealed presence of Trypanosoma evansi. Mules and horse were treated successfully with Berenil and Surramin respectively.

INTRODUCTION

Trypanosomosis is also called 'surra' in equines. It is caused by an extracellular blood protozoa which affects horses, mules, camels, cattle, buffaloes, pigs, sheep, goats, dogs and cats. This disease is transmitted mechanically by biting flies like tabanus and stomoxys (Soulsby, 1982). The clinical symptoms are manifested within 60 days after the organism gain entry into the body of the host. It is characterised by pyrexia, lethargy, gradual emaciation, petechial haemorrhages in the mucous membranes specially at the junction of eyelids, brisket and abdomen, alopecia and urticarial eruptions on the skin. Horses become anaemic, icteric and death occurs in two weeks in acute case and up to four months in chronic cases. Dogs occasionally exhibit nervous signs like rabies (Hungerford, 1990). This disease in dogs was reported in Kathmandu valley during the year 1988 (Gautam *et al.*, 1988). Similarly it was diagnosed in cattle of Kathmandu valley in 1993 (P. Manandhar, personal communication)

CASE HISTORY

In a herd of 70 mules, five mules were dead and six more were reported to be sick at Kalakhet, Salyan during the month of November 1995. The signs recorded were progressive weakness, rough hair coat, cachexia in spite of normal feeding, pale conjunctival mucous membrane and subnormal body temperature (94-97°F).

During the same period two out of five horses were found sick in a stable in Kathmandu valley. The signs recorded were anorexia, weakness, pale conjunctival mucous membrane with a high body temperature (104°F) which was persistent for two weeks unlike the mules.

Laboratory examination of Giemsa stained blood smears, both from mules and horses revealed *Trypanosoma evansi* parasites. Formol Gel test was conducted for serum samples from mules and were found positive. Faecal samples from the mules were found positive for strongyles ova whereas same from the horses were found positive both for strongyles and ascarids ova.

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TREATMENT

Mules were treated with Berenil (0.8gm./100kg body weight I/M), Panfungal (5mg/kg body weight) and Digetone (50gm/head for five days). Horses were treated with Suramin, Inferon (8ml/head IM) and Valbazen (7.5mg/kg body weight). The treated animals recovered successfully.

CONCLUSIONS

Trypanosoma evansi is prevalent in Nepal as it has been diagnosed in dogs and cattle previously and the present report has confirmed in equine species as well. Berenil and Surrmin were found to be 100% effective drugs against *Trypanosoma evansi* in mules and horses respectively. Trypanosomosis is transmitted through biting flies like tabanus and stomoxys. So prevalence of these flies should be investigated. Equine owners should be advised for control of external parasites to reduce disease transmission.

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MATERIALS AND METHODS

Veterinary Services and Research Center, Veterinary Clinic Chabahil was taken as a sample source for data collection. Case records of the Clinic for 1993/94-1995/96 were reviewed and raw data were extracted. These raw data were processed, tabulated, interpreted and discussed.

RESULTS AND DISCUSSION

Epidemiology and trend of canine diseases

The epidemiology of canine diseases/disorders for FY 1993/94 - 1995/96 has been presented in table 1. The data show that parasitic infestation was the most prevalent disease of dogs, representing 41.6 percent of the total. The intestinal parasitism was twice as many as the external parasitic case (e.g., mange).

Table 1. Epidemiology and trend of canine diseases/disorders, 1993/94-1995/96

Cases recorded & services requested	FY 1993/94		FY 1994/95		FY 1995/96		Total	
	No.	%	No.	%	No.	%	No.	%
Viral Diseases		28.5		27.0		22.6		26.1
Distemper	109		128		73		310	
Inf. Hepatitis	5		4		1		10	
Parvo	126		137		112		375	
Rabies	18		28		20		66	
Systemic Disorders		7.3		8.1		10.3		8.5
Eye & Ear	20		15		33		68	
Urinary	5		12		8		25	
Respiratory	41		62		53		156	
Parasitic Infestation		41.6		40.9		42.5		41.6
Ecto-parasite	119		109		154		382	
Endo-parasite	258		340		233		831	
Surgical cases		12.3		12.9		13.2		12.8
New surgery	71		79		66		216	
Wounds/Abscess	40		63		54		157	
Miscellaneous		10.4		11.0		11.3		10.9
Nutritional Disorders	49		75		56		180	
Poisoning	17		10		13		40	
Other	28		36		34		98	
TOTAL	906	100.0	1098	100.0	910	100.0	2914	100.0

Second on the epidemiological rank was the viral disease accounting for 26.1 percent. Among the viral diseases, canine distemper and parvo virus were much more prevalent than infectious hepatitis and rabies. Immunization of dogs against distemper and parvo is not as common as against rabies, which may explain the higher incidence of these diseases. Infectious hepatitis is apparently not common in Kathmandu valley.

Systemic canine disorders of unspecified origin, which included eye and ear infection, urinary system disorder and respiratory infection accounted for 8.5 percent of total cases. Miscellaneous disorders such as nutritional deficiency, poisoning, etc., were 10.9 percent of reported cases. Even though the number of cases recorded under nutritional deficiency is small, many more dogs brought to the clinic with other ailments, were also suffering from nutritional deficiency problem. The poisoning cases reported to the clinic were mainly due to the irresponsible use of agricultural insecticide as ectoparasiticide by the owners.

The surgical cases accounted for 12.8 percent of the total. Ovario-hysterectomy, castration and docking were the main surgical operation.

A very interesting picture presented by this data is the consistency of disease trend over three years period. It indicates that the epidemiology of canine disease in Kathmandu valley can be predicted with fair accuracy.

Incidence of clinical cases in different seasons

The number of clinical cases in different months of the year has been presented in table 2. The data suggest that during the months of Falgun through Asadh, more dogs get sick than in other months. The bigger number of new born puppies and the summer season could be a cause for this higher disease incidence. The number of clinical cases were low during the months of Kartik through Paush which could be related to moderate climatic conditions.

The data in table 2 also show that very few cases (4.4 percent) other than dog were reported at the clinic. While canine cases were 62.0 percent, the remaining one third were immunization, mainly dogs against rabies, distemper and parvo.

Table 2. Incidence of clinical cases (No.) in different months (1993/94-1995/96).

Cases/ services	Months												Total	%
	Sra	Bha	Ash	Kar	Man	Pau	Mag	Fal	Cha	Bai	Jes	Asa		
Dog	212	215	211	187	209	197	210	307	337	278	285	266	2914	62.0
Other species	18	25	17	21	18	11	16	13	12	19	22	15	207	4.4
Immunization	132	100	123	75	89	109	128	150	195	163	151	165	1580	33.6
Total No.	362	340	351	283	316	317	354	470	544	460	458	446	4701	100
%	7.7	7.2	7.5	6.0	6.7	6.7	7.5	10.0	12.0	9.8	9.7	9.5	100	

Sra=Shravan, Bha=Bhadra, Ash=Ashwin, Kar=Kartik, Man=Mangsir, Pau=Paush, Mag=Magha, Fal=Falgun, Cha=Chaitra, Bai=Baisakh, Jes=Jestha & Asa=Asadh

Number of veterinary clinics vs. number of clinical cases

Table 3 presents data on relationship between number of newly opened veterinary clinics in a radius of 3 km from Chabahil and the flow of clinical cases at the veterinary clinic, Chabahil. One may predict that opening of 6 new clinics in its catchment area would adversely affect the flow of cases. But the data did not substantiate this hypothesis. The number of clinical cases at the Chabahil Veterinary Clinic continued to be more or less constant. This may be explained by the fact that more people utilize services if conveniently available and therefore all the clinics are operating smoothly. Secondly, more people might have been owning dog for security reason, or hobby. There is also a possibility that the incidence of pet disease is increasing.

Table 3. Number of veterinary clinics vs. number of clinical cases, 1993/94-1995/96

Fiscal year	Additional new clinics at 3 Km. radius (Cumulative)	Number of cases at Vet. Clinic Chabahil
F.Y. 1993/94	1	1475
F. Y. 1994/95	4	1701
F. Y. 1995/96	6	1525

This relationship of constant number of clinical cases with increasing number of clinics can only be expected until a threshold level after which it will decrease.

CONCLUSION

The result of this study leads to the conclusion that there is a good trend in reported clinical cases and these information could safely be used for developing the working plans of veterinary clinics in Kathmandu valley.

TREATMENT OF BLACK PANTHER (*PANTHERA PARDUS*) IN CENTRAL ZOO

B.K. Jha¹, Larry Vogelnest² and Rosic Booth³

ABSTRACT

A female black panther (Panthera pardus) around 6 years of age was brought to the Central Zoo on 27 May, 1996 in injured state with deep injury on forehead and foreleg. The animal was kept under intensive veterinary treatment and care for 8 days. However, despite the treatment the animal succumbed to death on 8th day of treatment. This clinical report details the therapeutic procedure adopted for the treatment of black panther.

CASE HISTORY

Black panther (*Panthera pardus*) is an endangered species of the wild cats rarely seen in forest of Nepal. Despite its rarity, one such cat was trapped by local people of Aukharpauwa V.D.C of Nuwakot district and was badly injured. The female panther which was about 6 years old and with the body weight of about 40 kg was treated in a private veterinary clinic before being transferred to the Central Zoo on 27 May, 1996. It was in unconscious state with wounds on forelegs and forehead. The private clinic veterinarian had treated with dexamethasone; dextrose; calcium and anti inflammatory drugs. The panther was brought from private clinic to Central Zoo, Jawalakhel under big net in cage in a vehicle and adopted all precautions during transportation.

CLINICAL EXAMINATION

The black panther had regained some consciousness and restrained in a small wooden dog box in the private clinic. It was responsive but had apparent difficulty in moving hind quarters and head. It was restrained chemically with xylazine 100mg and ketamine 400 mg intramuscularly which induced deep anaesthesia in 5 minutes. Findings of clinical examination are given in table 1.

Table 1 : Results of the clinical examination of black panther

Time	Respiration (per minute)	Temperature (°C)	Heart rate (per minute)
3.35	Irregular	38.7	102
3.45	10	38.7	96
4.00	10	38.7	90
4.30	13	38.8	84

The panther was kept under intensive management and treatment inside the Zoo. It was observed that there was deep laceration with granulation tissue which indicated that the injury was 3 to 4 days old. Deep punctured wounds forming pockets under skin were observed on the forehead. The pockets were filled with pus and maggots. The hind quarter portion was inflamed and less responsive to

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POST MORTEM FINDINGS

There was deep head injury and deep snare on right leg. The frontal and occipital bones were encircled by putrefied mussels and pus with osteomyelitis. The ear was full of pus communicating with nasal cavity. The trachea was full of frothy fluids. Lower third of oesophagus was inflamed, infected and necrosed. There was pneumonia and part of the lung tissues were hepatised. The heart was full of coagulated blood. The liver was hard in consistency. The intestinal muscular lining was thickened but free of parasites. The kidneys were enlarged, 15 cm in length and 10 cm in width. The nasal sinuses were filled with foetid pus. There was congestion of menengial blood vessels.

DISCUSSION

The leopard (*Panthera pardus*) has the widest distribution. In the past, leopards were found throughout Africa, outside the central Sahara, Asia minor, Afghanistan, Turkestan, Iran, India, Ceylon, Java, China, Nepal, and the Amur ussuri region. Today the species have been eliminated in Northern Africa and the cape region, while conditions vary in different locations. The population elsewhere may be generally decreasing as the demand grow for its beautiful fur. One can only hope that the decision of the international furriers organisation to stop processing leopards pelts will reverse the trend. Until now, fashion demands have stimulated intense illegal hunting of leopards, exterminating some species and endangering numerous others.

In Asia there are 24 subspecies, Nepalese leopard is called *Panthera pardus pernigra*

The black panther, Indian leopard (*P.P. fusca*) which looks like Chinese leopard. Coloration and sport patterns vary from one individual to other and melanistic individuals (completely black ones, also called black panthers) are sometimes found. Even the melanistic leopards have spots, but they do not contract greatly with the dark background coloration. In case of Java leopard (*P.P. melas*) has small close set stops. Melanistic individuals are not unusual.

Melanis leopards - black panthera are found not only in Bengal and Java, They occasionally occur in other sub species. They are erroneously thought to be particularly wild. In truth their behaviour is the same as that of normally coloured leopards. We humans have a habit of ascribing tameness and gentleness to light coloured animals and wildness or danger to dark ones and this is the basis of the wildness of black panthers. A few light yellow leopards with yellow brown to reddish rosetts have been described in India, China. Once a pure white leopard was caught.

In the present case, traumatic injury was the predisposing cause of infection on the head region. Infections were all over the frontal and occipital bones and muscles around it. The cause of death was appeared to be septicaemia.

Despite continuous intensive care and treatment the animal was not out of danger and so prognosis was not good. Considerable involvement of the mouth cavity in such cases did not allow the feeding making the prognosis grave. However the animal survived for 10 days under intensive testament.

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RECOMENDATIONS OF THE FIFTH CONFERENCE OF NEPAL VETERINARY ASSOCIATION

(पांचौँ राष्ट्रिय भेटेरिनरी सम्मेलनबाट पारित सुझावहरू)

देशमा पशुपंक्षी विकासको माध्यमबाट गरीब ग्रामिण जनताको आयस्तर बढाउन, तिनीहरूलाई थप रोजगारीका अवसर प्रदान गर्न, तिनीहरूको पौष्टिक स्तरमा वृद्धि गर्न र त्यस अनुरूप देशको कुल गार्हस्थ उत्पादनमा यस क्षेत्रको योगदान बढाउन समेत श्री ५ को सरकारले तय गरेको २० वर्षे कृषि विकास कार्यक्रमले निर्दिष्ट गरेको नीति एवं कार्यनीति तथा सम्माननीय प्रधानमन्त्रिज्यू र माननीय कृषि राज्य मन्त्रिज्यू वाट यस सम्मेलनलाई प्रदान गरिएका मार्गदर्शन अनुरूप आगामी नवौँ पंचवर्षिय योजना तर्जुमा गर्नमा समेत सहयोग पुऱ्याउने गरी यस पांचौँ राष्ट्रिय भेटेरिनरी सम्मेलनले निम्नलिखित सुझावहरू प्रस्तुत गरेको छ ।

(क) जनशक्ति विकास

१. स्तरीय भेटेरिनरी जनशक्तिको उत्पादन तथा अनुसन्धान गर्न रामपुर क्याम्पसमा Collage of Veterinary Science and Animal Husbandry को स्थापना एवं संचालन गरिनु पर्ने । सोकोलागि त्रि.वि.द्वारा गठित Task Force ले September 1992 मा पेश गरेको Report लाई पुर्ण रूपमा लागु गरी Infrastructure Development एवं Faculty Development गरिनु पर्ने । तत्कालीन रूपमा BVSc & AH को कक्षाहरू सुचारु रूपले संचालन गर्नकोलागि आवश्यक पर्ने दरबन्दीको श्रृजना तुरुन्त हुनु पर्ने र पदपूर्ति गरी कक्षा संचालन गरिनु पर्ने ।
२. श्री ५ को सरकारको निकाय मार्फत प्रदान गरिने सेवाको गुणस्तर वृद्धि गर्न, अनुसन्धान क्षेत्रको क्षमता वृद्धि गर्न, निजी क्षेत्रको आवश्यकता अनुरूपको विशेषज्ञ र प्रविधि आपूर्ति गर्न समेतकोलागि श्री ५ को सरकारले भेटेरिनरी साइन्स विषयमा विशेषज्ञ तालिम, MVSc, PhD छात्रवृत्तिहरूको व्यवस्था गर्नु पर्ने ।
३. पशु विकास तथा पशु स्वास्थ्य सम्बन्धी मध्यम स्तरीय जनशक्तिको गुणस्तर उच्च राख्न तथा संख्यात्मक वृद्धि गर्न प्राविधिक शिक्षालय उत्तरपानीमा संचालीत कार्यक्रम जस्ता तालिमका कार्यक्रम अन्य प्राविधिक शिक्षालयहरूमा समेत विस्तार गरिनु पर्ने । ल्याबोरेटरी टेक्नीसियन स्तरका जनशक्ति उत्पादन गर्न थप तालिम कार्यक्रम संचालन गरिनु पर्ने ।

(ख) संगठनात्मक सुधारः

१. भविष्यमा पशु विकास क्षेत्रमा आउने चुनौतीको सामना गर्न अनुसन्धान पक्षलाई समयानुकूल विस्तार गर्दै लैजाने नीति अनुरूप राष्ट्रिय भेटेरिनरी तथा एनिमल साइन्स अनुसन्धान प्रतिष्ठानको स्थापना गरी May 7, 1996 मा Livestock and Fisheries Research Workshop ले प्रस्ताव गरेका सुझावहरूको अविलम्ब कार्यान्वयन गरिनु पर्ने ।

२. पशु पंक्षि उत्पादन एवं यस सम्बन्धि क्याकलापलाई क्रमशः व्यवसायीकरण गर्दै लगी देशको गार्हस्थ्य उत्पादनमा यो क्षेत्रको पूर्ण सम्भाव्यता (Potential) अनुरूपको प्रतिफल हासील गर्न, आवश्यक निरन्तर नीतिगत सुधार तथा परिचालन गर्न पशुपालन मन्त्रालयको छुट्टै स्थापना गरिनु पर्ने ।
३. पशुपंक्षी उत्पादन सामग्री, पशुपंक्षी एवं पशु पंक्षी जन्य उत्पादन, पशु पंक्षी स्वास्थ्य सम्बर्धन, अनुसन्धान, शिक्षा, भेटेरिनरी जनस्वास्थ्य, वन्यजन्तु संरक्षण, पर्यावरण सुधार आदीको गुणस्तर निर्धारण, नियन्त्रण सम्बन्धी ऐन नियम तथा श्री ५ को सरकारको नीति तर्जुमा एवं कार्यान्वयन गर्न एक नेपाल भेटेरिनरी काउन्सीलको अविलम्ब स्थापना गरिनु पर्ने ।
४. पशु पंक्षी पालन व्यवसायतर्फ बढ्दो जनचाहना अनुरूप विकास तथा व्यवसायीकरण गर्दै लैजान नवौ योजनामा तर्जुमा गरिने पशु पंक्षी सेवा विस्तार, शिक्षा, अनुसन्धान, नीजिकरण, व्यवसायीकरण, गुणस्तर वृद्धि आदि विविध पक्षका नीति र कार्यक्रम तर्जुमा गर्न एक कार्यदलको गठन गरीनु पर्ने । त्यसमा श्री ५ को सरकारका पदाधीकारीका साथै भेटेरिनरी एसोसिएशनका प्रतिनिधि, उद्योगपती, उद्यमी, कृषक, अनुसन्धान क्षेत्र र शिक्षा क्षेत्र समेतका प्रतिनिधीको सहभागीता गराइनु पर्ने ।
५. आठौ योजनामा प्रस्तावित भएको तर कार्यान्वयन हुन बाँकी हरेक निर्वाचन क्षेत्रमा सरकारी वा गैर सरकारी क्षेत्र मार्फत एक भेटेरिनरी हस्पिटलको स्थापना गरी कृषकहरूलाई विशेषज्ञद्वारा पशु स्वास्थ्य सेवा प्रदान गरीनु पर्ने । यसै गरी हरेक गा.वि.स.मा कम्तीमा एक सेवा केन्द्र/उपकेन्द्र स्थापना गरी सेवा उपलब्ध गराइनु पर्ने ।
६. गुणस्तरीय पशु पंक्षी स्वास्थ्य सेवाको बढ्दो माग तथा आवश्यकतालाई दृष्टिगत गरी मौजुदा केन्द्रीय तथा क्षेत्रीय भेटेरिनरी प्रयोगशालालाई सुदृढ गरी जिल्लास्तर तथा Potential Pocket हरूमा समेत उपयुक्त Diagnostic Laboratory को व्यवस्था गरिनु पर्ने ।
७. गुणस्तरीय पशु पंक्षि उत्पादन सामग्री, पशु पंक्षी तथा तिनका उत्पादनहरूको गुणस्तर अनुगमन, स्तर निर्धारण र नियन्त्रण गर्न एक भेटेरिनरी गुणस्तर नियन्त्रण शाखाको व्यवस्था गरिनु पर्ने ।

(ग) ऐन नियमको व्यवस्था

पशु पंक्षी क्षेत्रको समष्ठीगत विकासकोलागि तत्काल आवश्यक पर्ने निम्न लिखित एक्टहरूको अविलम्ब तर्जुमा गरी कार्यान्वयन गरिनु पर्ने

- भेटेरिनरी काउन्सील एक्ट
- भेटेरिनरी क्वारेन्टाइन एक्ट
- वधशाला तथा मिट इन्सपेक्सन एक्ट
- पशु पंक्षी उत्पादन सामग्री, औषधी, भ्याक्सीन, विषादी, पशु पंक्षी तथा तिनबाट उत्पादीत पदार्थको गुणस्तर नियन्त्रण ऐन
- पशु पंक्षी कल्याण ऐन
- भेटेरिनरी सर्भीसेज एण्ड इग एक्ट आदि

(घ) जनशक्ति व्यवस्थापन तथा परिचालन

१. मौजुदा भेटेरिनरी समुहलाई विषय विशेषज्ञताको आधारमा निजामती सेवामा निम्न लिखित उपसमूहमा वर्गीकरण गरीनु पर्ने,

- भेटेरिनरी एक्सटेन्सन सर्भीसेज उपसमूह
- भेटेरिनरी ल्याबोरेटरीज सर्भीसेज उपसमूह
- भेटेरिनरी जनस्वास्थ्य उपसमूह
- भेटेरिनरी वन्यजन्तु तथा वातावरण उपसमूह
- पाराभेटेरिनरी उपसमूह

२. तत्कालीन रूपमा कृषि विषयमा तालीम प्राप्त कृषि क्षेत्रका JT/JTA हरूबाट पशु पंक्षी सेवामा नकारात्मक असर परेकोले त्यस्ता प्राविधिकलाई सम्बन्धित कृषि क्षेत्रमा नै फिर्ता गरीनु पर्ने । पशु सेवा विषयमा कम्तीमा १ वर्ष तालिम प्राप्त जनशक्तिहरुबाट मात्र पशुपंक्षी सेवा उपलब्ध गराइनु पर्ने ।

३. पशु पंक्षी स्वास्थ्य सम्बन्धित नीति तथा कार्यक्रम तर्जुमा तथा संचान हुने राष्ट्रिय योजना आयोग, उद्योग मन्त्रालय, वातावरण तथा जनशक्ति मन्त्रालय, विज्ञान तथा प्रविधि मन्त्रालय, औषधी व्यवस्था विभाग जस्ता निकायहरु समेत विषय विशेषज्ञको रूपमा veterinarian को पद श्रृजना हुनु पर्ने ।

४. निजामती सेवामा कार्यरत पशु सेवाका कर्मचारीहरुको Time-bound promotion र Right Man on Right Place को सिद्धान्त कार्यान्वयन हुनु पर्ने ।

५. अधिकृत स्तरका पदहरुको नामाकरणमा हालै "सहायक" भएकोमा उक्त "सहायक" शब्द हटाई सम्बन्धित विषयको अधिकृत भनी नामाकरण गरीनु पर्ने। यसै गरी पशु सेवा तर्फका मध्यम स्तरीय पदहरुको नामाकरण पशु सेवा सहायक, नायब पशु सेवा सहायक, आदी हुनु पर्ने ।

६. पशु स्वास्थ्य सेवालाई आकस्मिक सेवा (Emergency Service) को पुर्ववत मान्यता दिई भेटेरिनरी डक्टरहरुलाई अन्य चिकित्सक सरह टेलीफोन लाईन लगायतका अन्य सरकारी सेवा सुविधा तथा सुहुलीयत उपलब्ध गराइनु पर्ने ।

७. कृषि विकास बैंक तथा अन्य वित्तीय संस्थाहरुमा पशु चिकित्सकको दरबन्दी श्रृजना गरी भेटेरिनरी विषयमा स्नातक डिग्री हासील गरेका सेवारत प्राविधिकहरुलाई तुरुन्त बढुवा गरीनु पर्ने अथवा श्री ५ को सरकारको सेवामा जान सहमति दिइनु पर्ने ।

ड०. नीजि क्षेत्र

१. नीजि क्षेत्रमा संचालन गरीने पशु पंक्षी उत्पादन प्रशोधन एवं वितरण मुलक उद्योग व्यवसायलाई अन्य वाली तथा फलफूल (उद्योग) व्यवसाय सरहको "कृषि दर्जा" (Agriculture Status) प्रदान गरी सो सरहको प्राथमिकता एवं सुहुलियत प्रदान गरिनु पर्ने ।

२. पशु पंक्षि व्यवसायमा संलग्न कृषकहरूको हक हितको सुरक्षा गर्न विदेशमा उत्पादित तथा न्यून गुणस्तरका पशु पंक्षि एवं पशु पंक्षि जन्य उत्पादनहरूको आयातलाई व्यवस्थित तथा नियन्त्रित (Regulation) गरीनु पर्ने ।
३. देशमा Poultry Sector को विकास विस्तार गर्न थप प्रयास पुर्याउन Poultry Development Board को स्थापना गरिनु पर्ने ।
४. श्री ५ को सरकारको पशु स्वास्थ्य सेवालाई नीजिकरणको व्यवस्था समेतबाट गुणस्तरीय सेवा विस्तार गर्न नीजिस्तरबाट पशु चिकित्सालय वा क्लिनिक खोल्न आवश्यक पर्ने सवारी साधन तथा उपकरण आयात गर्न भन्सार मुक्त (Duty free) सूविधा तथा लगानिकोलागि सहूलियत व्याजदरमा ऋण प्रदान गर्नु पर्ने ।

च. वातावरण:

पशु सेवाका कार्यक्रमहरूको तर्जुमा र कार्यान्वयन गर्दा वातावरणीय सन्तुलन कायम राख्ने अनिवार्य ध्यान पुर्याउनु पर्ने ।

अन्तमा, हाल भेटेरिनरी एशोसिएसनको आफ्नो भवन नभएकोले यसको कार्यक्रमलाई सहयोग पुर्याउन, श्री ५ को सरकार कृषि मन्त्रालयले श्री ५ को सरकारको स्वामित्वमा रहने गरि भेटेरिनरी कम्प्लेक्स, त्रिपुरेश्वरमा एक भवन उपलब्ध गराउनु पर्ने ।

नेपाल भेटेरिनरी एशोसिएसनको संसोधित विधान, २०५३

प्रस्तावना

मूलुकका समस्त पशु चिकित्सकहरूलाई एकताको सूत्रमा बाधी, उनीहरूको मान, मर्यादा, प्रतिष्ठा अभिवृद्धिको साथै पेशागत हक हितको संरक्षण गर्दै पशु चिकित्सा विज्ञान र सो संग सम्बन्धित विषयवस्तु, ज्ञान र शीपको विकास, सम्बर्धन र समुचित उपयोगद्वारा राष्ट्रिय विकासमा समर्पित हुने उद्देश्यले अभिप्रेरित भई,

सम्बत् २०२५ सालमा गठित नेपाल भेटेरिनरी एशोसिएसनलाई निरन्तरता दिदै समय सापेक्ष, गतिशील, क्रियाशील र अझ बढी व्यापक बनाउने अभिप्रायले,

यस एशोसिएसनको तत्कालिन विधानलाई प्रचलित ऐन, कानून प्रजातान्त्रिक अभ्यास अनुरूप परिमार्जित गर्न र यसै बमोजिम संचालन गर्न बान्छनीय भएकोले यो विधान तयार पारिएको छ ।

परिच्छेद -१

प्रारम्भिक

१. संक्षिप्त नाम र प्रारम्भ:

- (क) यस विधानको नाम "नेपाल भेटेरिनरी एशोसिएसनको विधान २०५३" रहेकोछ।
- (ख) यो विधान नेपाल भेटेरिनरी एशोसिएसनका सदस्यहरू तथा सम्बन्धित संस्थाहरूलाई समान रूपमा लागू हुनेछ ।
- (ग) यो विधान एशोसिएसनको साधारण सभाबाट पारित भई श्री ५ को सरकारले तोकेको कार्यालयबाट स्विकृत भएको मितिदेखि लागू हुने छ ।
- (घ) यो एशोसिएसन गैरराजनैतिक, विशुद्ध बैज्ञानिक, अविच्छिन्न उत्तराधिकारवाला स्वसासित, संगठित र पेशागत सामाजिक संस्था हुनेछ ।

२ परिभाषा:

विषय वा प्रसङ्गले अर्को अर्थ नलागेमा यस विधानमा -

- (क) "संस्था" भन्नाले नेपाल भेटेरिनरी एशोसिएसनलाई सम्झनु पर्दछ ।
- (ख) "विधान" भन्नाले नेपाल भेटेरिनरी एशोसिएसनको संसोधित विधान, २०५३ लाई सम्झनु पर्दछ।
- (ग) "नियमावली" भन्नाले यस विधान अन्तर्गत बनेका नियमावलीलाई सम्झनु पर्दछ ।
- (घ) "एशोसिएसन" भन्नाले नेपाल भेटेरिनरी एशोसिएसनलाई बुझाउदछ ।
- (ङ) "साधारण सभा" भन्नाले नेपाल भेटेरिनरी एशोसिएसनको साधारण सभालाई बुझाउदछ ।

- (च) "कार्यकारिणी समिति" भन्नाले नेपाल भेटेरिनरी एशोसिएसनको कार्यकारिणी समितिलाई बुझाउँदछ ।
- (छ) "सदस्य" भन्नाले नेपाल भेटेरिनरी एशोसिएसनको सम्पूर्ण सदस्यलाई बुझाउँदछ ।
- (ज) "भेटेरिनरी" भन्नाले आधुनिक वैज्ञानिक Veterinary Sciences को सरोकार, प्रयोग वा उपयोग हुने पशु पंक्षिको स्वास्थ्य, पशुपंक्षी पालन, उत्पादन, गुणस्तर निर्धारण, गुणस्तर नियन्त्रण, बजार, व्यवस्थापन र तत्सम्बन्धी प्रविधि संलग्न हुने सेवालाई बुझाउँदछ ।
- (झ) "एशोसिएसनको पदाधिकारी" भन्नाले यस विधानको धारा १४ मा उल्लेखित अध्यक्ष, उपाध्यक्ष, महासचिव, सहसचिव, कोषाध्यक्ष, प्रधान सम्पादक, सदस्य, क्षेत्रीय संयोजक र क्षेत्रीय सदस्य समेतलाई बुझाउँदछ ।
- (ञ) "स्थानिय अधिकारी" भन्नाले प्र. जि. अधिकारीलाई बुझ्नु पर्दछ

३. संस्थाको चिन्ह र छापः

यस संस्थाको छुट्टै छाप र अनुसुचि १ मा उल्लेख भए वमोजिमको लोगो हुने छ ।

४. संस्थाको कार्यालय :

यस संस्थाको कार्यालय काठमाडौं उपत्यकामा रहने छ र साधारण सभाको निर्णयबाट स्थानीय अधिकारीको सहमति लिई देशको अन्य भागमा सार्न सकिने छ ।

परिच्छेद - २

उद्देश्य

५ प्रचलित ऐन तथा श्री ५ को सरकारको नीति निर्देशनको अधिनमा रही संबन्धित निकायसंग समन्वय राखी कार्यक्रम संचालन गर्ने गरी यस संस्थाको उद्देश्य देहाय वमोजिम हुनेछ ।

- (क) भेटेरिनरी साइन्सको उच्चतम ज्ञान र प्रविधिको उपयोगद्वारा राष्ट्रको सर्वाङ्ग विकासकोलागि टेवा पुर्याउने ।
- (ख) भेटेरिनरी साइन्स सम्बन्धी अध्ययन, अनुसन्धान, प्रदर्शनी, सेमिनार, गोष्ठी, सम्मेलन आदि गर्ने गराउने ।
- (ग) एशोसिएसनको मूखपत्र (Official Organ) र अन्य आवश्यक प्रकाशनहरू गर्ने ।
- (घ) राष्ट्रिय पशुधन, वन्यजन्तु, बातावरण तथा जनस्वास्थ्यको संरक्षण, संवर्धन र विकास सम्बन्धी कार्यहरू गर्ने र सो सम्बन्धमा नीति निर्माण गर्ने कार्यमा सरकारी तथा गैह्र सरकारी निकायहरूलाई आवश्यक सहयोग गर्ने ।
- (ङ०) उच्च गुणस्तरका स्तरीय पशुजन्य उत्पादनहरू राष्ट्रलाई उपलब्ध गराउने कार्यमा टेवा पुर्याउने ।
- (च) भेटेरिनरी साइन्सका विविध क्षेत्रमा कार्यरत यस एशोसिएसनका सदस्यहरू बीचमा पेशागत एकता, सामन्जस्यता र सौहार्दपूर्ण वातावरणको विकास गर्दै रचनात्मक सहयोग गर्ने र गर्न लगाउने ।

- (छ) भेटेरिनरी साइन्स र सम्बन्धित अन्य वैज्ञानिक क्षेत्रमा राष्ट्रिय तथा अन्तराष्ट्रिय क्षेत्रमा अध्ययन र अनुसन्धानबाट भए गरेका उपलब्धीहरूलाई यस एशोसिएसनका सदस्यहरूका बीचमा र नेपाली समाजमा पुर्याई उन्नत प्रविधि संचार गर्ने ।
- (ज) आधुनिक भेटेरिनरी साइन्सको अध्ययन अनुसन्धान र विकास क्रममा सघाउ पुर्याउने ।
- (झ) राष्ट्रिय तथा अन्तराष्ट्रिय क्षेत्रका सम्बन्धित संघ संस्थादिसंग सम्बन्ध कायम गर्ने र समन्वयात्मक रूपमा सहयोग आदान प्रदान गर्ने लगाउने ।
- (ञ) पेशागत हक, हित र अधिकारको संरक्षण गर्दै भेटेरिनरी पेशालाई समाजमा मर्यादित रूपमा प्रतिस्थापन गर्ने ।
- (ट) मूलकमा आई पर्ने दैवी प्रकोप तथा महामारीको समयमा नेपाल भेटेरिनरी एशोसिएसनलाई परिचालन गरी राहत तथा सेवा पुर्याउने ।
- (ठ) पशुपंक्षीका रोग व्याधिको उपचार, रोकथाम, नियन्त्रण र उन्मुलन गर्ने कार्यमा सहयोग गर्ने र तत्सम्बन्धमा जनचेतना जगाउने र प्रचार प्रसार गर्ने ।
- (ड) पशु स्वास्थ्य सेवालाई जन साधारणमा सुलभ गराउन मद्दत गर्ने ।
- (ढ) पशुपंक्षी प्रति हुने निर्मम तथा दूर्व्यवहारलाई निरुत्साहित गर्न कार्यक्रमहरूको तर्जुमा गरी कार्यान्वयन गर्ने गराउने ।
- (ण) एशोसिएसनको हितलाई ध्यानमा राखी आवश्यक अन्य कार्यहरू गर्ने ।

परिच्छेद-३

सदस्यता

६ सदस्यताको योग्यता

साधारण सदस्यको लागि योग्यता पुगेको व्यक्तिलाई यस संस्थाको विधान बमोजिम सदस्यता प्रदान गर्न सकिने छ ।

७ सदस्यको प्रकार :

- (क) साधारण सदस्य: कुनै पनि मान्यता प्राप्त विश्वविद्यालय वा शिक्षण संस्थाबाट भेटेरिनरी साइन्स (Veterinary Science) मा स्नातक (Bachelor Level) तहको योग्यता प्राप्त व्यक्तिले यस विधानले तोकेका नियमावलीको अधिनमा रही नेपाल भेटेरिनरी एशोसिएसनको साधारण सदस्य बन्न सक्ने छ ।
- (ख) आजीवन सदस्य : साधारण सदस्य बन्न चाहिने योग्यता पुगेका कुनै पनि सदस्यले तोकिएको शर्त पूरा गरी आजीवन सदस्यता प्राप्त गर्न सक्ने छ ।
- (ग) मानार्थ सदस्य: नेपाल भेटेरिनरी एशोसिएसन वा भेटेरिनरी पेशाको विकासमा उल्लेखनिय योगदान पुर्याएका कुनै पनि स्वदेशी वा विदेशी व्यक्तित्वलाई यस एशोसिएसनको कार्यकारिणी समितिको सिफारिसमा साधारण सभाको बैठकले उपयुक्त ठहर गरेको खण्डमा यस एशोसिएसनको मानार्थ सदस्यता प्रदान गर्न सक्ने छ ।

८ सदस्यता शुल्क र सदस्यता प्रदान गर्ने विधि:

सदस्यताको लागि प्राप्त सबै निवेदनहरू महासचिव मार्फत कार्यकारिणी समितिमा पेश गरिने छ । त्यस्ता निवेदन माथि छलफल गरी यस विधानको अधिनमा रही सदस्यता दिने, नदिने नविकरण गर्ने आदी अधिकार कार्यकारिणी समितिको हुने छ ।

९ सदस्यताको लागि अयोग्यता :

देहायको अवस्थामा सदस्यता कायम रहने छैन :

स्वेच्छिक राजिनामा कार्यकारिणी समितिले स्वीकृत गरेमा, मृत्यु भएमा, तोकिए वमोजिमको सदस्यता शुल्क नबुझाएमा, कार्यकारिणी समितिको निर्णयले र एशोसिएसनको हित विपरित कार्य गरेको भन्ने साधारण सभाको बहुमतले पारित गरेमा सदस्यता समाप्त हुने छ ।

परिच्छेद-४

साधारण सभा तथा कार्यकारिणी समिति

१० साधारण सभाको गठन:

नेपाल भेटेरिनरी एशोसिएसनका साधारण तथ आजीवन सदस्यहरूको एउटा साधारण सभा हुने छ । साधारण सभा एशोसिएसनको सर्वोच्च निकायको रूपमा रहने छ ।

११ साधारण सभाको अधिवेशन :

- (क) साधारण सभाको अधिवेशन कम्तिमा वर्षको एक पटक बस्ने छ ।
- (ख) साधारण सभाको बैठक वस्तु कम्तिमा एक महिना अगावै छलफल हुने विषय सहितको सूचना सबै सदस्यहरूलाई दिइनेछ ।
- (ग) साधारण सभाका १।४ सदस्यले लिखित अनुरोध गरी आपतकालिन सभा बोलाउनु परेको विशेष अवस्थामा छलफलको विषय, स्थान र मिति तोकी १० दिनको सूचना दिएर पनि आकस्मिक अधिवेशन बोलाउन सकिने छ ।
- (घ) साधारण सभाको गणपूरक संख्या पहिलो पटक बोलाउदा ५०% हुनु पर्ने छ तर सो नभएमा १ महिनाको अवधि भित्र दोश्रो पटकमा बोलाउनु पर्ने छ र सो सभामा ४०% सदस्यको उपस्थिति हुनु पर्नेछ । सो पनि हुन नसकेमा ७ दिनको सूचना दिई तेस्रो पटक सभा बोलाउनु पर्नेछ र सो बैठकमा जे जति सदस्यको उपस्थिति हुन्छ सोही उपस्थितिको आधारमा भएको साधारण सभाको निर्णय मान्य हुने छ र त्यस्तो अवस्थामा कार्यकारिणी समितिको बहुमत हुनु अनिवार्य हुनेछ ।

१२ साधारण सभाको काम, कर्तव्य र अधिकार:

नेपाल भेटेरिनरी एशोसिएसनको साधारण सभाको काम, कर्तव्य र अधिकार देहाय वमोजिम हुनेछ ।

- (क) एशोसिएसनको नीति निर्माण गर्ने र कार्यान्वयनको लागि कार्यकारिणी समितिलाई आवश्यक निर्देशन दिने ।
- (ख) एशोसिएसनको वार्षिक कार्यक्रम निर्धारण गर्ने ।
- (ग) एशोसिएसनको वार्षिक आय व्यय (बजेट) निर्धारण तथा स्वीकृत गर्ने ।
- (घ) वार्षिक आय व्यय विवरणको लेखा परिक्षण गर्नको लागि कार्यकारिणी समिति नियुक्त लेखा परिक्षकको प्रतिवेदन मूल्यांकन तथा अनुमोदन गर्ने र वेरुजु फछ्यौट गर्न कार्यकारिणी समितिलाई निर्देशन दिने ।
- (ङ०) उपस्थित सदस्यको दुई तिहाई बहुमतले कार्यकारिणी समितिका कुनै वा सबै पदाधिकारीलाई निस्कासन वा सस्पेण्ड गर्ने।

१३ कार्यकारिणी समितिको गठन:

- (क) केन्द्रीय कार्यकारिणी समिति: साधारण सभाको साधारण तथा आजीवन सदस्यहरूले आफू मध्येबाट निर्वाचन गरेका देहायका तेह्र जना पदाधिकारीहरू रहेको एक केन्द्रीय कार्यकारिणी समिति रहने छ।

१	अध्यक्ष	१(एक)
२	उपाध्यक्ष:	१(एक)
३	महासचिव:	१(एक)
४	सहसचिव:	१(एक)
५	कोषाध्यक्ष:	१(एक)
६	प्रधानसम्पादक:	१(एक)
७	सदस्य	२(दुई)
८	क्षेत्रीय संयोजक	५(पाँच)नेपाल अधिराज्यका पाँचै विकास क्षेत्रको प्रतिनिधित्व हुने गरी प्रत्येक विकास क्षेत्र अन्तर्गतका सदस्यहरूले आफू मध्येबाट निर्वाचित एक एक जनाका दरले पाँच जना)

जम्मा : १३ (तेह्र)

(ख) क्षेत्रीय कार्यकारिणी समिति:

- (१) नेपाल अधिराज्यका प्रत्येक विकास क्षेत्रमा एक जना संयोजक र चार जना सदस्य भएको एक नै भए क्षेत्रीय कार्यकारिणी समिति रहने छ । त्यस्ता क्षेत्रीय समितिको नाम सम्बन्धित विकास क्षेत्रको नाम अनुरूप नै हुने छ ।
- (२) क्षेत्रीय साधारण सभा: प्रत्येक विकास क्षेत्र अन्तर्गत कार्यरत वा बसोबास गर्दै आएका नै भए का दोहोरो नपर्ने गरी सबै आजीवन र साधारण सदस्यहरू भएको एक क्षेत्रीय साधारण सभाको गठन हुनेछ ।
- (३) प्रत्येक क्षेत्रीय साधारण सभाका सदस्यहरूले आफू मध्येबाट निर्वाचन गरी देहाय बमोजिमको एक क्षेत्रीय कार्यकारिणी समितिको गठन हुने छ ।
- | | |
|--------|--------|
| संयोजक | १(एक) |
| सदस्य | ४(चार) |

केन्द्रीय कार्यकारिणी समितिका पाँच जना क्षेत्रीय सदस्यहरू सम्बन्धित क्षेत्रका पदेन क्षेत्रीय संयोजक हुनेछन् ।

(ग) स्थानीय समिति तथा शाखा कार्यालयहरू यस विधान तथा अन्तरगतको नियमावलीमा तोके वमोजिमको व्यवस्था हुने गरी एशोसिएसनको स्थानीय समिति तथा शाखा कार्यालयको स्थापना गर्न सकिने छ ।

(घ) क्षेत्रीय कार्यकारिणी समिति: केन्द्रीय तथा क्षेत्रीय कार्यकारिणी समितिका सदस्यहरूको पदावधि निर्वाचन भएका मितिले दुई वर्षको हुनेछ ।

१४. केन्द्रीय तथा क्षेत्रीय कार्यकारिणी समितिको बैठक:

(क) कार्यकारिणी समितिको बैठक कम्तिमा दुई महिनामा एक पटक र आवश्यकतानुसार जति पटक पनि बस्न सक्नेछ ।

(ख) यस्तो बैठकको सूचना कार्यकारिणी समितिका महासचिवले वा क्षेत्रीय संयोजकले कम्तिमा ५ दिन अगावै सबै सदस्यहरूलाई दिनु पर्नेछ ।

(ग) कार्यकारिणी समितिका सम्पूर्ण सदस्य संख्याको पचास प्रतिशत भन्दा बढी उपस्थितिलाई गणपूरक संख्या मानिने छ ।

परिच्छेद-५

१५. कार्य समितिहरूको काम, कर्तव्य र अधिकार :

केन्द्रीय कार्यकारिणी समितिको काम, कर्तव्य र अधिकार

(क) यस विधानको अधिनमा रही एशोसिएसनका सम्पूर्ण प्रशासनिक, आर्थिक तथा प्राविधिक कार्यहरू गर्ने ।

(ख) साधारण सभाले निर्धारण गरेको वार्षिक कार्यक्रम कार्यान्वयन गर्ने, गराउने ।

(ग) एशोसिएसनको कार्यालयमा आवश्यक कर्मचारी नियुक्ति, बर्खासी तथा दैनिक र परी आएका अन्य कार्यहरू गर्ने

(घ) एशोसिएसनको उद्देश्यसंग मेल खाने राष्ट्रिय तथा अन्तर्राष्ट्रिय संघ संस्थाहरूसंग आवश्यक सम्बन्ध र समन्वय कायम गर्ने

(ङ) एशोसिएसनको लागि आवश्यक आर्थिक श्रोत जुटाउने ।

(च) एशोसिएसनको उद्देश्य परिपूर्तिकालागि आवश्यक नीति नियमको तर्जुमा गरि साधारण सभाबाट स्वीकृत भए वमोजिम गर्ने ।

(छ) विधान अन्तर्गत रही साधारण सभाको सामान्य निर्देशन, नीतिको पालना र परि आएका सबै कार्यहरू गर्ने र एशोसिएसनको तर्फबाट उत्तरदायित्व बहन गर्ने ।

(ज) विशेष उद्देश्य प्राप्तिका लागि कार्यकारिणी समिति भित्रै वा अन्य सदस्य समेत समावेश गरी कार्यकारिणीको बहुमतबाट आवश्यक समिति वा उपसमितिहरू गठन गर्ने र आवश्यकतानुसार अधिकार प्रत्यायोजन गर्ने ।

(झ) क्षेत्रीय कार्यकारिणी समितिलाई कार्य संचालन गर्न सहयोग गर्ने र कार्य तथा खर्चको अनुगमन गर्ने ।

(ञ) विधान अनुरूप सदस्यता प्रदान, नविकरण, पुनर्वहाली वा खारेजी गर्ने ।

- (ट) वैज्ञानिक प्रवचन, गोष्ठी, सेमिनार, सेवा शिविर, कन्फरेन्स, तालिम आदि सन्चालन गर्ने गराउने ।
- (ठ) सदस्यहरूले उठाएका कुनै समस्या उपर छलफल गरी समस्याको निव्वयौल गर्ने ।
- (ड) एशोसिएसनका आवश्यक प्रकाशनहरू नियमित रूपमा प्रकाशन र वितरण गर्ने गराउने ।
- (ढ) वार्षिक कार्य प्रगति र आयव्यय विवरणको प्रतिवेदन तयार गरी साधारण सभामा पेश गर्ने
- (ण) लेखा परीक्षण गराई सो को प्रतिवेदन साधारण सभाबाट अनुमोदन गराउने ।
- (त) भेटेरिनरी कन्फरेन्स गर्ने: वर्षमा एक पटक वार्षिक साधारण सभाको बैठक बस्नुका अतिरिक्त प्रत्येक दुई वर्षमा एक पटक कार्यकारिणी समितिको निर्णयले तोकेको समय र स्थानमा नेपाल भेटेरिनरी एशोसिएसनको कन्फरेन्स गर्ने । यस्तो कन्फरेन्सको सूचना महासचिवले सवै सदस्यलाई कम्तिमा ३ महिना अगावै दिनु पर्ने छ ।

१५. क्षेत्रीय कार्यकारिणी समितिको काम, कर्तव्य र अधिकार:

- (क) केन्द्रीय कार्यकारिणी समितिको निर्णयहरू कार्यान्वयन गर्ने ।
- (ख) एशोसिएसनको उद्देश्य अनुरूपका कार्यमूलक कार्यहरू केन्द्रीय कार्यकारिणी समितिसंग समन्वय राखी कार्यान्वयन गर्ने गराउने ।
- (ग) क्षेत्रीय स्तरका पेशागत प्रविधि सञ्चारमूलक कार्यक्रमहरूको आयोजना र सञ्चालन गर्ने ।
- (घ) आफ्नो क्षेत्रमा जम्मा गरेको रकमको केन्द्रीय समितिलाई जानकारी गराई २५%सम्म खर्च गर्न सक्ने र विशेष उद्देश्यकोलागी सो भन्दा बढी खर्च गर्नु परेमा केन्द्रीय कार्यकारिणी समितिको स्विकृतले खर्च गरी विवरण पेश गर्ने ।

१६ पदाधिकारीहरूको काम, कर्तव्य र अधिकार:

कार्यकारिणी समितिका पदाधिकारीहरूको काम, कर्तव्य र अधिकार देहाय बमोजिम हुने छ ।

(क) अध्यक्षको काम, कर्तव्य र अधिकार:

१. एशोसिएसनको हित चिताई यसको उद्देश्य पूरा गर्न सक्रिय रहने, अरुलाई पनि सक्रिय गराउने, साधारण वा असाधारण सभाको सभापतित्व गर्ने र कार्यकारिणी समितिको बैठकको अध्यक्षता गर्ने ।
२. सभा वा बैठकमा मत बराबर भएमा निर्णायक मत दिने ।
३. अध्यक्षले कार्यकारिणी समितिको बैठक आफै वा महासचिव मार्फत बोलाउने छ ।
४. साधारणतया एशोसिएसनको प्रतिनिधित्व अध्यक्षले नै गर्ने छ तर कुनै खास विषयसंग सम्बन्धित कार्यक्रममा सम्बन्धित विषयको ज्ञाता कार्यकारिणी समितिको अन्य सदस्य वा अन्य सदस्यहरूबाट पनि एशोसिएसनको प्रतिनिधित्व गराउन सकिने छ ।
५. एशोसिएसनको चल अचल सम्पत्तिको संरक्षण गर्ने ।
६. यस विधानको अधिनमा रही एशोसिएसनको उद्देश्य पूरा गर्न कार्यकारिणी प्रमुख भई काम गर्ने ।

(ख) उपाध्यक्षको काम, कर्तव्य र अधिकारी :

१. अध्यक्षको सवै अधिकार र कर्तव्य निजको अनुपस्थितिमा पालन तथा प्रयोग गर्ने र निजको उपस्थितिमा निजलाई कार्य सम्पादनमा सहयोग गर्ने ।
२. कार्यकारिणी समितिले दिएको जिम्मेवारी वा निर्णयको पालना गर्ने ।

(ग) महासचिवको काम, कर्तव्य र अधिकार :

१. अध्यक्षकोस्विकृति लिई कार्यकारिणी तथा साधारण वा असाधारण सभाको बैठक बोलाई संचालन गर्ने ।
२. कार्यकारिणी वा साधारण वा असाधारण सभामा पेश गर्न आवश्यक देखिएका विषयवस्तु तयार गरी पेश गर्ने ।
३. सबै बैठकका एजेण्डा र निर्णयहरूको अभिलेख राख्ने र सोको कार्यान्वयन गर्ने, गराउने र तदनुरूप भए गरेको प्रगति अर्को बैठकमा पेश गर्ने ।
४. एशोसिएसनको बिधान, नीति र निर्णय अनुसार आवश्यक कार्य तथा लेखापढी गर्ने ।
५. एशोसिएसनका कर्मचारीहरूको रेखदेश, नियन्त्रण र निर्देशन गर्ने ।
६. एशोसिएसनको हितलाई ध्यानमा राखी अध्यक्षले तोकेको वा निजको अनुमति लिई अन्य आवश्यक कार्य गर्ने ।
७. सम्मेलन, सेमिनार, गोष्ठी, प्रबचन र तालिम जस्ता कार्यक्रमहरूको आयोजना र प्रवन्ध गर्ने ।
८. समय समयमा समितिले तोके बमोजिमको कार्य गर्ने ।

(घ) सहसचिवको काम, कर्तव्य र अधिकार

१. महासचिवको सवै अधिकार र कर्तव्य निजको अनुपस्थितिमा पालन तथा प्रयोग गर्ने र निजको उपस्थितिमा निजलाई कार्य सम्पादनमा सहयोग गर्ने ।
२. सम्पूर्ण सदस्यहरूको अध्यावधिक अभिलेख, बैठकको माईन्यूट र पत्राचार रजिष्टर राख्ने ।
३. कार्यकारिणी समितिले समय समयमा तोके बमोजिमको काम गर्ने ।

(ङ) कोषाध्यक्षको काम, कर्तव्य र अधिकार:

१. एशोसिएसनको आर्थिक कारोबार सम्बन्धि सम्पूर्ण कार्यको जिम्मेवारी कोषाध्यक्षको हुने छ ।
२. कोषको हिसाब किताबको श्रेस्ता ठीक दुरुस्त गरी राख्ने
३. साधारण सभामा वार्षिक आयव्यय विवरण तयार गरी पेश गर्ने ।
४. एशोसिएसनको कोषको आर्थिक प्रशासनलाई कानूनी रूपले व्यवस्थित गरी राख्ने ।
५. कार्यकारिणी समितिले दिएको अन्य जिम्मेवारी बहन गर्ने ।
६. लेखा परिक्षक मार्फत आयव्यय विवरणको लेखा परीक्षण गराई साधारण सभामा पेश गर्ने ।

(च) प्रधान सम्पादकको काम कर्तव्य र अधिकार:

१. एशोसिएसनको मुख पत्र ((official organ) तथा अन्य प्रकाशन गर्ने, गराउने सम्बन्धी सम्पूर्ण जिम्मेवारी प्रधान सम्पादकको हुनेछ ।

२. प्रकाशन कार्यमा सहयोग गर्न आफ्नो संयोजकत्वमा सदस्यहरूमध्यबाट प्रकाशन समिति वा सम्पादक मण्डल गठन गर्ने ।
३. प्रकाशनकोलागि प्राप्त हुने लेख, रचना आदिको सम्पादन गर्ने तथा यस्ता लेख रचनाहरू प्रकाशनकोलागि स्वीकार वा अस्वीकार गर्ने ।
४. एशोसिएसनका गतिविधिहरू प्रचार प्रसारमा कार्यकारिणी समितिलाई सहयोग गर्ने ।
५. साधारण सभा वा कार्यकारीणी समितिले तोकेको अन्य काम हरू गर्ने ।

(ख) क्षेत्रीय संयोजक र कार्यकारिणी सदस्यको काम, कर्तव्य र अधिकार:

१. कार्यकारिणी समितिको निर्णय लागू गर्नमा सहयोग पुर्याउने ।
२. एशोसिएसनको उद्देश्य अनुरूप लक्ष्यमा पुग्न परिचालित हुने
३. क्षेत्रीय संयोजक आफ्नाफ्नो क्षेत्रको क्षेत्रीय कार्यकारिणी समितिको संयोजक भई कार्य गर्ने
४. एशोसिएसनका उद्देश्य हासिल गर्न यस विधानको अधिनमा रही तोकिएका अन्य कार्यहरू गर्ने ।

(ज) सदस्यको काम, कर्तव्य र अधिकार

१. एशोसिएसन र पेशाको हितको निमित्त आवश्यक सहयोग पुर्याउने ।
२. आवश्यकतानुसार कार्यकारिणी समितिबाट पारित कार्यक्रमहरू कार्यान्वयन गर्ने ।
३. आ-आफ्नो व्यवसायिक कर्तव्य पालनको शिलशिलामा विधानको परिधि भित्र रही राय सल्लाह दिने, पेशाको शुद्धता कायम राखेर एशोसिएसनको प्रतिष्ठा बढाउने, एशोसिएसनले तोके बमोजिमका काम गर्ने, कार्यक्रमहरूमा सहभागी हुने र सुझाव दिने ।
४. कार्यकारिणी समितिले सुम्पेका अन्य जिम्मेवारीहरू पूरा गर्ने ।
५. पेशागत आचरण शुद्ध राखी कुनै प्रकारको विकृती वा असुद्धता आउन नदिने र पेशागत प्रतिष्ठामा अभिवृद्धि गराउन सदा सचेत रहने ।
६. एशोसिएसनद्वारा प्रकाशित प्रकाशनहरू तोकिए बमोजिम न्यूनतम शुल्क वा निशुल्क प्राप्त गर्ने ।
७. सदस्यहरूको मनोबल, मान, मर्यादा र सम्मानको अभिवृद्धि गर्ने ।

परिच्छेद-६

आर्थिक व्यवस्था

१७ आर्थिक श्रोत

यस एशोसिएसनका आर्थिक श्रोतहरू निम्नानुसार हुनेछन् ।

- (क) सदस्यता शुल्कबाट प्राप्त रकम ।
- (ख) एशोसिएसनका कृयाकलापबाट उपार्जन गरेको रकम ।
- (ग) एशोसिएसनलाई आन्तरिक श्रोतबाट प्राप्त हुने रकम ।
- (घ) कुनै स्वदेशी वा विदेशी व्यक्ति वा संघ संस्था आदिबाट प्राप्त दान, दातव्य, सहयोग, पुरस्कार वा अन्य चल अचल सम्पत्ति ।

१८ चल अचल सम्पत्तिको विवरण:

एशोसिएसनको चल अचल सम्पत्तिको विवरण तोकिएको ढांचामा राखिने छ ।

१९ कोष:

- (क) एशोसिएसनको एउटा कोष हुने छ जसमा धारा २१ को सवै रकम रहने छ ।
- (ख) कोषको सञ्चालन कोषाध्यक्ष र अध्यक्ष वा निजले तोकेको कार्यकारिणी समितिको व्यक्तिको संयुक्त दस्तखतबाट हुने छ तर क्षेत्रीय कार्यकारिणी समितिको हकमा क्षेत्रीय समितिले नै निर्णय गरे बमोजिम हुने छ ।

२०. लेखा परीक्षण:

- (क) एशोसिएसनको सम्पत्ति र आयव्ययको वार्षिक विवरण तोकिएको ढांचामा तयार पारी राखिने छ।
- (ख) प्रत्येक वर्ष साधारण सभाबाट तोकिएको लेखा परीक्षकबाट लेखा परीक्षण गराउनु पर्ने छ र यस्तो हिसाव किताबको विवरण कार्यकारिणी समितिले साधारण सभामा पेश गर्ने छ ।
- (ग) सो को प्रतिवेदन प्रत्येक वर्ष स्थानिय अधिकारी र सम्बन्धित अन्य निकाय समक्ष पेश गरिने छ ।
- (घ) यस एशोसिएसनको सम्पूर्ण नगद कार्यकारिणी समितिले तोके बमोजिम बैंकमा खाता खोली दाखिला गरिने छ ।

परिच्छेद-७

विविध

२१. निर्वाचन सम्बन्धि व्यवस्था :

- (क) एशोसिएसनका पदाधिकारीहरूको निर्वाचन साधारण सभाका आजिवन र साधारण सदस्यहरूको गोप्य मतदानबाट हुने छ।
- (ख) निर्वाचन सञ्चालन गर्न कार्यकारिणी समितिले निर्वाचन हुने मिति भन्दा तीन महिना अगावै सदस्यहरू मध्येबाट एउटा निर्वाचन समिति गठन गर्ने छ । तर सो समितिका सदस्यले निर्वाचनमा उम्मेदवारी दिन पाउने छैनन् र प्रमुख निर्वाचन आयुक्तले भोट दिन पनि पाउने छैनन् । कार्य सकिए पछि सो समिति स्वतः विघटन भएको मानिने छ ।
- (ग) यसरी गठीत निर्वाचन समितिलाई निर्वाचन सम्बन्धि सम्पूर्ण अधिकार रहने छ
- (घ) एक जना उम्मेदवारले एउटै मात्र पदमा उम्मेदवारी दिन सक्ने छ र उम्मेदवारी दिँदा कम्तिमा एक जना प्रस्तावक र एक जना समर्थक हुनु पर्ने छ ।
- (ङ०) कुनै प्रस्तावक वा समर्थकले एउटै पदमा एकाधिक व्यक्तिलाई प्रस्ताव गर्न वा समर्थन गर्न पाउने छैन ।
- (च) गैर नेपाली नागरिकले यस विधान बमोजिम गरिने कुनै पनि निर्वाचना भाग लिन पाउने छैन ।
- (छ) मत वरावर भएमा गोला प्रथाबाट तय गरिने छ ।

- (ज) संस्था दर्ता भएको ६ महिना भित्र विधान अनुसार पहिलो निर्वाचन गराई सो को जानकारी स्थानीय अधिकारी समक्ष दिईने छ । तर पहिलो पटकको लागि निर्वाचन दत्तर्ष समिति यसै विधान बमोजिम गठन भएको मानिने छ र सो को जानकारी एशोसिएसनले स्थानिय अधिकारीलाई दिने छ ।

२२ अविश्वासको प्रस्ताव:

- (क) कार्यकारिणी समितिका कुनै पदाधिकारीबाट एशोसिएसनको विधान तथा उद्देश्य विपरित कार्य गरी हित विरुद्ध काम भएको छ वा संतोषजनक कार्य सम्पादन गरेको छैन भनी एशोसिएसनको कूल सदस्य संख्याको एक तिहाई वा सो भन्दा बढी साधारण र आजिवन सदस्यहरूले हस्ताक्षर गरी लिखित निवेदन कार्य समितिमा दर्ता गराउनु पर्दछ ।
- (ख) यस्तो सदस्यलाई साधारण वा असाधारण सभाको बैठकमा उपस्थित सदस्यको दुई तिहाई बहुमतबाट हटाउन सकिने छ तर यस्तो अभियोग लागेका पदाधिकारीलाई सफाई पेश गर्ने मौकाबाट बञ्चित गरिने छैन ।
- (ग) साधारण सभा नवोलाईएको अवस्थामा उपधारा (क) बमोजिमको कार्यकोलागि कार्यकारिणी समितिले ३५ दिन भित्र असाधारण सभा बोलाउनु पर्ने छ ।
- (घ) अध्यक्षको विरुद्ध अविश्वासको मतदान गर्नु परेमा सो सभाको अध्यक्षता उपाध्यक्षले गर्ने छ

२२ उम्मेदवार हुन योग्यता:

उम्मेदवारको लागि देहायको योग्यता पुगेको सदस्य योग्य हुने छ ।

- (क) एशोसिएसनको साधारण वा आजिवन सदस्य हुनु पर्ने ।
- (ख) नैतिक पतन वा फौजदारी अभियोग नलागेको ।
- (ग) मगज नविग्रीएको ।

२४ रिक्तस्थानको पूर्ति:

केन्द्रिय वा क्षेत्रीय कार्यकारिणी समितिको कुनै सदस्यकोपद कुनै कारणवस रिक्त हुन आएमा सम्बन्धित कार्यकारिणी समितिले मनोनयन गरिएको साधारण वा आजिवन सदस्यबाट पूर्ति हुनेछ तर अध्यक्षको पद रिक्त हुन आएमा भने उपाध्यक्षले कार्यवाहक अध्यक्षको रुपमा अर्को निर्वाचन नभएसम्मकालागि कार्यभार सम्हाल्नेछ ।

२५ विधान संशोधन

यस विधानमा उल्लेखित कुनै वा सबै कुरा संशोधन गर्नु परेमा कार्यकारिणी समितिको सिफारिसमा साधारण सभाको दुई तिहाई मतबाट पारित गरे पछि संशोधित विधान स्थानिय अधिकारीको स्विकृत लिई लागु गरिने छ ।

२६ विनियम बनाउने

यस एशोसिएसनको कार्यकारिणी समितिले आवश्यकतानुसार विधान सम्मत बनाएका नियमहरू साधारण सभाको बहुमतबरा पारित गराई लागू गर्न सक्नेछ ।

२७ एशोसिएसनको बिघटन:

विधान अनुसार संस्था संचालन हुन नसकि वा अन्य कुनै कारणवस एशोसिएसन बिघटन हुन गएमा यसको सम्पूर्ण चल अचल सम्पत्ति श्री ५ को सरकारमा स्वतहः सर्ने छ ।

२८ निस्कृतता :

- (क) "नेपाल भेटेरिनरी एशोसिएसनको विधान २०२५ " खारेज गरिएको छ । यस अघि उक्त विधान अनुसार भए गरेका कार्यहरु यसै विधान अनुसार भए गरेको मानिने छ।
- (ख) यस विधानमा जे सुकै लेखिएको भएता पनि प्रचलित ऐन कानूनसंग बाझिएमा बाझिएको हदसम्म स्वतः निस्कृत हुने छ ।

****समाप्त****

अनुसूची १

नेपाल भेटेरिनरी एशोसिएसनको लोगो विवरण:

- १. पृष्ठभूमिमा पशुपतिनाथको मन्दिर।
- २. मन्दिरको बीचमा गोलाकार वृत्त भित्र अंग्रेजी अक्षरमा भी (V) लेखिएको
- ३. अंग्रेजी अक्षर "भी" को बीचमा दुईगोटा सर्पले बेरिएको दण्ड
- ४. गोलाकार वृत्तको तल्लो भागमा धानको बाला र २०२५ लेखिएको ।
- ५. गोलावृत्तको तल्लो पट्टिको अर्ध भागमा "नेपाल भेटेरिनरी एशोसिएसन" लेखिएको ।

यो संसोधित विधान श्री ५ को सरकार, जिल्ला प्रशासन कार्यालय, ललितपुरमा मिति २०५४ जेष्ठ २९ गते रोज ४ मा दर्ता भई (स.द.नं.७६८।०५३।५४) स्विकृत भैसकेको छ ।

महा-सचिव
नेपाल भेटेरिनरी एशोसिएसन