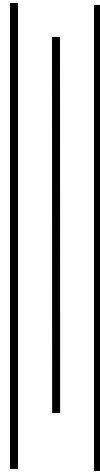


Final Report
Ministry of Agriculture, Food Technology and Land Management
Lumbini Province
Butwal, Nepal



STUDY REPORT ON
Study of Strengthening and Genetic Improvement of Buffalo in
Southern Part of Lumbini Province

Submitted by
Siddhartha Institute of Research and Consultancy Service Pvt.Ltd.
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ACKNOWLEDGEMENTS

The main objective of this study was to increase milk production and productivity through indigenous crossbreed buffalo strengthening and genetic improvement in the southern part of Lumbini Province by making breeder herds and multiplayer herds with strategic action plan for coming ten years. To achieve this objective; primary data have been collected through FGD, KII and Interaction with stakeholders. Secondary data such as government policies, guidelines and different researches of related field were also used in this study.

In these regards, SIRACS Nepal would like to acknowledge all those direct and indirect helping hands making this survey a grand successful. Special thanks goes to Ministry of Agriculture, Food Technology and Land Management office team members for selecting us for this assignment. I sincerely acknowledge the secretary of the ministry, Mr. Yam Narayan Devkota and all Division chief of the ministry. I sincerely appreciate and gratefully acknowledge Mr Tulsiram Bhandari, the division chief of the ministry for technical support at all stages of the study. Furthermore, I acknowledge tremendous helps received from Mr. Lok Raj Bhusal, officer of livestock component and Mr. Humakant Pandey, officer of livestock division for their valuable suggestions and support in data collection and coordination, questionnaire design, study process and documentation. Likewise, all supporting hands of the ministry, Director of Livestock, Dr. Prawej Aalam, Prof..Thaneshwar Pandey and Dr.Shambhu Shah of Paklihawa Campus, Chief of Agriculture Knowledge Centre, Vet- staff of six districts, entrepreneurs of Dairy Sectors, participants of FGD, Key Informants for in-depth interview and all the participants of interaction program who provide valuable information and suggestions are also highly acknowledged. I also appreciate the leading buffalo rearing farmers, who are the main source of information for this study.

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Sincerely,

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Study for Genetic Improvement and Strengthening of Buffalo in the Southern Part of Lumbini Province of Nepal

Executive Summary

Background

Livestock is the major part of Nepalese farming system and plays significant role in Nepalese economy. The livestock sector contributes about 11.5 % of the total GDP whereas buffalo farming is one of the significant sector for contributing it. However, the productivity of buffalo is lower in Nepal as compare to the neighboring countries. There is a high possibility of genetic improvement and strengthening the buffalo enterprise if appropriate measures are applied. The study proposed by Lumbini Province for the strengthening and genetic improvement of Buffalo in the southern part of Lumbini Province with major objectives of assessing buffalo production status and developing genetic improvement strategies is a timely and pertinent initiative.

Approach and Methodology

Six districts of Lumbini Province (Nawalparasi west, Rupandehi, Kapilvastu, Dang, Banke and Bardiya) were covered for the study especially focusing on southern parts of these districts and in the vicinity of Hulaki Lokmarg from Susta to Rajapur, Bardiya. All the stakeholders in the buffalo value chain including the buffalo farmers, local to provincial authorities contacted and their views, feedback, suggestions and constructive comments were incorporated while preparing the final report. While doing so, important participatory rural appraisals (Focus group discussion, Key informant interview, interaction and discussion meeting etc) were made and the primary source of information were obtained.

Findings

The findings (from the sample farms) showed that the average buffalo size per household basis is 5.4 (including total animals at the farm), which ranges from 4.2 to 53 for individual farms. There are several organized farms too in the areas. The average size for groups and cooperatives are larger. The breed prevalent is Murrah cross and local. The average daily milk yield (from the sample farm) was 5.03 litres ranging from 2 to 10 litres. There is a wide variation based on primarily breed types and several environmental condition being provided to them. The lactation

periods range from 6 to 10 month. While during the visit to some selected areas, it was found that some of animals were found to be producing up to 12 litres a day.

The fodder situation at the areas showed that buffalo keepers are cultivating some kinds of forage (both winter and summer). The important ones were oats and berseem as winter fodder and maize, bajra, sudan and teosinte as summer fodders. The average cultivated for fodder production was 0.67 Kathas/animal ranging from 0.33 to 1.47 Kathas. The dry feeding situation was addressed using crop byproducts such as rice and wheat straw.

For mating buffaloes both artificial insemination (AI) and natural service (NS) was being used at the areas. It was found more use of bulls than AI for mating and use of local bulls was also common. These indicate the practices being used are not encouraging and will not contribute to enhanced milk productivity.

The most common diseases at the areas was HS, BQ, FMD and Mastitis. The vaccination against these diseases were done but not on regular basis. Similarly, drenching for parasites was not regular.

Milk was mostly sold as raw and in general milk products were not made at the areas. The cost of milk per litre ranged from NRs 50 to 80. The sale of live animals was made at the local market in general. Both male and females heifers are found being reared. The males used to be sold at an age of 2 to 3 years for meat but also for breeding. The female heifers are reared and made buffalo cows, which is very encouraging and appreciable job that the community has been doing.

In general the service providers at the areas were junior technicians (JT) and the animals served ranged from 1 to 12 per day. The technicians were not having refresher trainings and asking for this.

Issues and Challenges for Buffalo Improvement Program

Several issues and constraints at the areas for improved buffalo program observed are as follows; Improved bulls and buffaloes, provision of grant support, market problem, Veterinary Hospital provision having laboratory facility, technical service from senior/experts, regular vaccination, good quality semen, reliable and effective AI, insurance of animal based on cost, travis, support for improved shed, loan on subsidized rate, inadequate service delivery, buffalo resource centres,

organic farming, feed and community grazing limited, technical service from senior/experts, inadequate ponds, fodder seed, visit, training, grant based on production, collection centre, veterinary mobile health camps, soft loan at low rate and be based on production etc

Strategy with action plan for Strengthening Buffalo Improvement Program

There are eight strategies proposed as follows;

- Selection of high yielding animals (both males and females) in the areas with good genetic worth
- Improving existing animals through use of high quality semen (with good genetic worth) of Murrah bulls (imported from abroad with higher breeding value for milk yield)
- Improving existing animals through use of high quality Murrah bulls (imported from abroad with higher breeding value for milk yield)
- Improving fodder situation for animal feeding
- Improving health management of the animals
- Improving husbandry practices
- Promotion of good management practices
- Improving market

The action plans for addressing these 8 strategies are also suggested.

Action Plan 1.1: Identification of high yielding buffaloes

Action Plan 1.2: Use of high yielding buffaloes in the areas

Action Plan 1.3: Multiplication of these animal's progeny

Action Plan 1.4: Dissemination of these progenies to a wider areas within 6 districts

Action Plan 1.5: Monitoring of the progress

Similarly, 5 action plans each for strategy 2 and 3 are proposed. The action plans for strategy 4, 5, 6, 7 and 8 are 5,5,5,5 and 4 respectively.

Establishment/strengthening of Buffalo Breeder and Multiplier herds

In order to have better genotypes available at the areas for making genetic improvement, breeders and multiplier herds are proposed with their basis and minimum standard to be maintained. The breeder's herds and multiplier's herds will be used for producing better genotypes and disseminating to a wider population within 6 districts.

Observations and Recommendations

Some of the farms are cultivating fodders (both winter and summer) at their lands, which is encouraging and should be further promoted for enhanced buffalo production in the areas. Most of the farms are producing and keeping heifers (both male and female). Males are being sold and female heifers are kept and used for the replacement of their old buffalo cows. This approach should be promoted. However, the replacement of old buffaloes by heifers should be based on some sound (based on evidence) genetic principles using selection parameters. For this they should be supported and capacitated with required information.

AI should be made more effective and for this AI technicians should be promoted. Promotion of green mission with bio-gas should be made at the study areas. Community managed ponds at strategic locations should be established/strengthened at the areas.

Roadside grazing is common at some places where community managed grazing themselves. The forage available are not adequate and of good quality. Community/Local Government should promote the plantation of improved forage crops and fodder trees.

Use of silage is not found being used except few organized large farms. This is a good option for addressing dry season feeding and hence should be promoted. Use of crop bi-products, especially cereals straw/bhusha is being used at large scale but this needs inclusion of legumes (lentil/black gram etc). Simple treatment of these crop byproducts would be required. Feed by products in some cases [Wheat bran is expensive than wheat] are expensive and this requires some kind of effective regulation [Provincial Feed acts in pipelines should take due consideration].

Few Local Governments have allocated appreciable budgets for provision of livestock development services [For example Duduwa, Banke]. This should be promoted in other municipalities too

1. Introduction

Background

Agriculture contributes significantly to the national gross domestic production (GDP) in Nepal. Livestock is the integral sector of agriculture that contributes about 27% in agricultural GDP. This sector has not only the economic importance but also has the social, religious, cultural and environmental significance. Dairy is the most important subsector of livestock, which is considered as the second commodity after rice in the total agricultural system in Nepal due to its contribution. Considering its roles in national transformation, Government of Nepal (GoN) has taken dairy as the second important value chain out of the 15 selected value chains in the Agriculture Development Strategy (ADS, 2015-35). Buffalo is perceived as the first choice animal of the farmers in Nepal that contributes more than 57% and 36% in the total milk and meat production, respectively (AITC, 2022). Its values from milk to meat, manure to hides, hoof to horns and resistance to docileness are some of important attributes that contribute to consider the buffalo as the ‘Black Gold’ in the country and ‘Asian Animal’ globally. However, as compare to the neighboring countries, like India and Pakistan, production and productivity of buffalo is low in Nepal. There is a high possibility of genetic improvement and strengthening the buffalo enterprise if timely and appropriate interventions are made from the concerned authorities.

The Centre (AITC) and the Department of Livestock Services (DLS) has shown that there is a mere (around 3.3%) change in the total population of cattle and buffalo in last ten years (Buffalo: 4993650 in 2010 to 5159931 in 2020 and Cattle: 7226050 to 7466841 in 2020) (AITC, 2022). The milk production statistics clearly shows that there has been an increase of 28% and 137% in the case of buffalo and cattle milk, in the same period, respectively (DLS, 2021). Higher increase in milk production from cattle is, particularly, because of the improvement in the quality of breed due to the significant increase in the number of artificial insemination (AI). The overall increase of AI over the last 10 years is encouraging (181432 in 2010/11 and 701,433 in 2020/21). This was made possible because of launching the special programs like Dairy Cattle Improvement Program (DCIP) and AI mission in Nepal. However, in comparison to cattle, there has been lesser progress in AI in buffalo (Fig. 1).

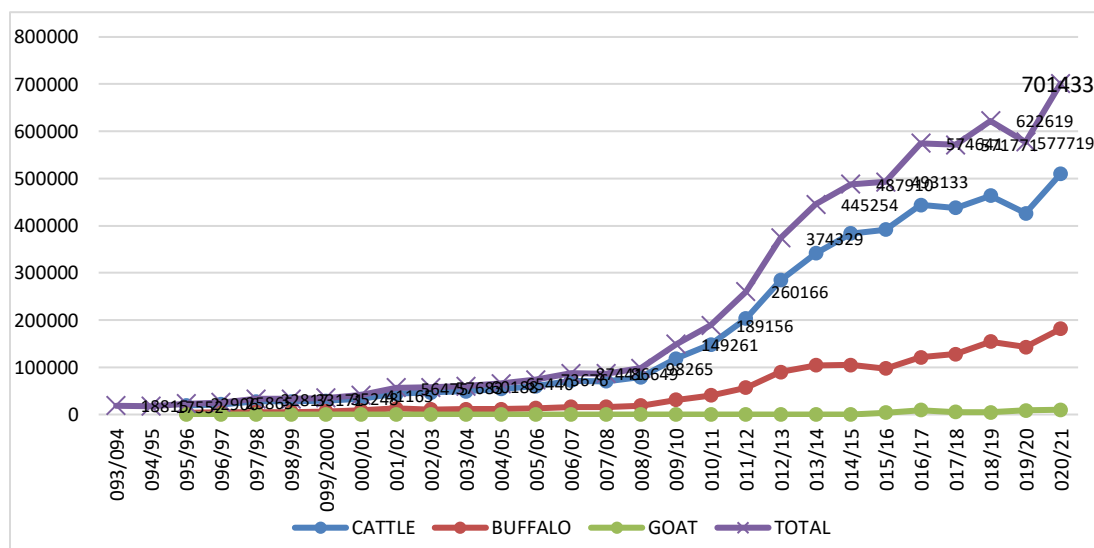


Fig. 1: Trend of artificial insemination (number of animal inseminated) in different species of livestock from 1993/94 to 2020/21 in Nepal.

Buffalo is an important enterprise in almost all 12 districts of Lumbini province. More specifically, the southern parts of six Terai districts, namely, Nawalparasi (west), Rupandehi, Kapilvastu, Dang, Banke and Bardiya, are more important than others for the buffalo farming. According to the statistical data of the provincial ministry of agriculture, food technology and land management (MoAFTLM), there are 11,42,331 buffaloes in the Lumbini province and among them a total of 7,43,450 buffaloes have been found in the six above mentioned districts of the province. This province, especially Gulmi, Arghakhanchi and Palpa districts are popular for the indigenous breeds, Lime and Parkote, of buffaloes where as Murrah crosses and non-descript type buffaloes are found in the Terai districts. While travelling from the Susta of Nawalparasi West to Rajapur of Bardiya district, anyone can observe the higher population of buffaloes than cattle and other domestic livestock designating the importance of the species from the farmers' perspectives. However, because of limited progress and access to the fields of modern farming technologies, farmers are deprived from receiving the expected benefit from buffalo farming. In this context, the study proposed by the MoAFTLM for the Strengthening and Genetic Improvement of Buffalo in the Southern Part of Lumbini Province is a timely and pertinent initiative.

Historical perspective of livestock development in Nepal

The history of livestock development dates back to 1917 B.S. when Rana Prime minister Jung Bahadur Rana initiated the import of exotic breeds of cows from the United Kingdom. For the organizational setup, Livestock Improvement Section was established in Kathmandu in 2008 B.S. Artificial Insemination program with liquid semen began in Tripureshwar, Kathmandu from 2017 where as Animal Breeding and Artificial Insemination section under the DLS was established in Khumaltar, Lalitpur in the fiscal year 2048/49. In restructuring the DLS in 2052/53 the program was renamed as National Livestock Breeding Center (NLBC) which was shifted to Livestock Farm, Pokhara, Kaski in 2058/59. The popular Dairy Cattle Improvement Program (DCIP) was launched under the technical and financial support of the Food and Agriculture Organization (FAO) of the United Nations (UN) in 14 districts of Nepal from 2065 to 2067. This program was a model collaborative program jointly launched by the Nepal Agriculture Research Council (NARC) and the DLS. After the phase-out of the DCIP in 2067, a new program, Food Security Promotion Project, started in 2068/69 for a period of 3 years which was implemented by the Central Cattle and Buffalo Promotion Program of the DLS from the financial support of the USAID. Under this project a new program with the name of Dairy Cattle and Buffalo Genetic Improvement Program (DCBGIP) was launched in 14 potential districts for dairy cattle and 10 potential districts for buffalo. Two districts (Nawalparasi and Rupandehi) were among the 14 selected districts for cattle and two (Nawalparasi and Kapilvastu) districts were selected among the 10 selected districts for the buffalo genetic improvement program in Lumbini province. The Pedigree Performance Recording Scheme (PPRS) was the main approach in both programs for breed improvement of cattle and buffaloes. The program was very popular, however it could not take the expected momentum after the phase-out of the program in 2071.

With the lesson learnt and very promising results of DCIP and BGIP, the AI mission program started in 2069 from 25 selected districts which was subsequently extended to 45 selected districts of Nepal. All the six southern districts of the Lumbini province were chosen in the AI mission program. Though the number of AI in cattle especially in Rupandehi and Nawalparasi districts was tremendously increased but the breed improvement program in the case of buffalo remained almost stagnant in all six districts of the province. After the amalgamation of the Livestock Development Farm and NLBC, a new office named as the National Livestock Breeding Office (NLBO) is

established in 2075. After the long and tireless efforts of all the stakeholders, the National Livestock Breeding Policy, 2078 and the National Infectious Disease Control Policy, 2078 have been approved from the Cabinet (Council of Ministers) in Poush, 2078 which has been taken as a remarkable achievement in the livestock sector of Nepal.

Despite of several programs, projects and schemes, the buffalo development program could not take momentum yet to achieve the tangible outputs in the aforesaid six districts of Lumbini province. Therefore, present study has been proposed by the provincial ministry with the clear objectives, methodologies and approaches to come up with the suggestions and recommendations for the buffalo sector development in the six southern districts of Lumbini Province.

2. Objectives of the Study

The overall objective of this study was to prepare a comprehensive report for the preparation of the appropriate policies, strategies, guidelines and programs to improve the livelihood of the farming communities by upgrading the indigenous and non-descript types of buffaloes using appropriate breeding principles for the genetic improvement along with the implication of modern tools and techniques to strengthen the buffalo production system for food and nutritional security, profit maximization, import substitution and export promotion of buffaloes and their products in six southern districts of Lumbini province.

The specific objectives of this study were

- To assess present status of buffalo farming, and suggest for the establishment of breeder herds, multiplier herds and/or community managed resource centers for the genetic improvement of buffaloes.
- To identify key and associated factors which are important for strengthening and genetic improvement of buffaloes in six southern districts of the Lumbini province.
- To review existing policies/strategies/ directives, guidelines and programs and suggest appropriate strategies and action plans to address the issues and challenges for strengthening the buffalo farming systems in a sustainable manner in the province.

3. Approach and Methodology

3.1 Study Approach

Following five steps were used as the approaches to complete the preparation of the report.

- Preliminary preparation for the assignment,
- Collection of data and information from different sources,
- Analysis of data and information, status report preparation and presentation, collection and incorporation of feedback and suggestions, submission of the draft report, and
- Interaction meeting for the validation of the draft report.
- Final report preparation and submission.

3.2 The overall methodology of the study and delivery scheme were as follows;

- Reviewed the relevant secondary data obtained from different sources (field to federal government level).
- Interacted with technical experts of livestock breeding, production, nutrition, health management and marketing to explore the new initiative and associated issues in buffalo production, breeder and multiplier herd management, product diversification and marketing.
- Prepared questionnaire and checklists to obtain information through observation, interviews, meetings, and discussions with all stakeholders from local to the province levels.
- Cross check and triangulated the obtained data and information for their validation.
- Discussion made with the livestock farmers' groups and cooperatives especially with those who are directly or indirectly involved in buffalo farming and to explore their interest and ability to manage breeder and multiplier herds and community managed breeding centers and/or resource centers.
- Conducted interaction meetings and consultation with relevant stakeholders (Local bodies, Veterinary Hospital and Livestock Services Expert Centers, Directorate of Livestock and Fishery Development and MoAFTLM).
- Analyzed and interpreted the data and information, and prepared a draft report addressing the objective of this assignment.

- Presented the report in pre-validation (status report) meeting and collected constructive comments, feedback and suggestions.
- Incorporated the comments, feedback and suggestions in consultation with the commercial buffalo farmers, Key Informants, higher level authority in the province and prepared a draft report.
- Conducted final validation workshop to collect the feedback and suggestions.
- Prepared final report incorporating the appropriate and valid comments, feedback and suggestions obtained in the validation workshop to submit it to the respective authority of the ministry.

3.3. Tools and Techniques

The report was prepared by using following tools:

- Desk review, consultation meeting, questionnaire and checklist preparation.
- Consultation of local stakeholders, organize the inception meeting and finalize the methodology.
- Field visits, stakeholders' meeting, focus groups discussion (FGD)/key informants interaction (KII) and strength, weakness, opportunity and threat (SWOT) analysis
- Discussion with buffalo rearing farmers, private agro-vets and Veterinary Hospital and Livestock Services Expert Centers, Directorate of Livestock and Fishery Development and MoAFTLM.
- Data entry, cleaning, coding, processing, statistical testing and tabulation.
- Results interpretation, draft of the technical report preparation, and submission to MoAFTLM.
- Status report, pre-validation meeting, final validation workshop and feedback collection
- Incorporation of feedback, report finalization and submission of final report to MoAFTLM.

3.4 Study location of project districts

Six districts of Lumbini Province, namely, Susta Nawalparasi west, Rupandehi, Kapilvastu, Dang, Banke and Bardiya, were covered for this study especially focusing on southern parts of these districts and in the vicinity of Hulaki Lokmarg from Susta of Nawalparasi West to Rajapur of Bardiya. All the representatives of the stakeholders in the buffalo value chain including the small holder farmers having 1-2 buffaloes to the commercial farmers with mechanized farming systems

were visited, local to provincial authorities were contacted and their views, feedbacks, suggestions and constructive comments were incorporated while preparing the final report.

3.5 Validation Workshop and Final Document Preparation

After the consultation workshop of draft report presentation (status report), one day validation workshop was organized for collection of the constructive comments and suggestions for the preparation of the final draft.. Suggestions, comments and feedback received from the workshop were incorporated while preparing the final document.

3.6 Schedule with Key Activities and Responsible Person

Siddhartha Institute of Research and Consultancy Pvt. Limited (SIRAC) mobilized appropriate team members to perform the assigned work of the Study on Strengthening and Genetic Improvement of Buffalo in Southern Part of Lumbini Province as mentioned in ToR.

There were a team leader and other thematic experts in the groups. Team leader was responsible for overall coordination of the program and the quality assurance of the consultant team. The total time period proposed to complete this work was two months; field work was completed within one month as planned and next one month was used for status report preparation, validation meetings and workshops, reporting and documentation. The draft report was submitted to the authority of the MoAFTLM within 15 days after the completion of field work. The final report was prepared incorporating the feedback, comments and suggestions received from the validation workshop and submitted to MoAFTLM within the given time frame. The proposed work plan schedule was as given in table below,

Table 1: Detail Work Plan with Key Activities

SN	Particulars/Activities	Months 1				Month 2			
		W1	W 2	W3	W4	W1	W2	W3	W4
1	MOU Signing	Y	-	-	-				
2	Desk study and finalizing survey tools and documents	Y	Y	-	-				
3	Inception report preparation & submission	Y	Y	-	-				
4	Preparatory activities for the field work and mobilize the experts in the field for survey, key interview, FGD and meeting with farmers and entrepreneurs.	-	Y	Y	Y				
5	Data entry, coding, analysis and prepare draft report					Y	Y	-	-
6	Draft report presentation and validation workshop					-	Y	Y	-
7	Feedback collection and final report submission					-	-	-	Y

4. Findings

4.1 Status of Buffalo Production/Farming

4.1.1 Population status of buffalo in 6 southern areas

There appears a large population of buffaloes in 6 southern districts of Lumbini provinces. The Province has a total of 1.2 million buffaloes representing 23% of the total population in the country (AITC, 2022). Out of 1.2 million population in the province, 0.74 million buffaloes are found in these 6 districts. Among these population, about 70% (communication with ministry and related stakeholders) are located in these southern regions of 6 districts (Nawalparasi west, Rupandehi, Kapilbastu, Dang, Banke and Bardiya). Hence, the project area (Southern areas of the districts) has about 0.5 million buffaloes. The results from the study (from the sample HH) showed that the average number of buffalo per household basis is 5.4 (including total animals at the farm), which ranges from 4.2 to 53 for individual farms (Table 2). There are several organized farms too in the areas. The average number of buffalo in the groups and cooperatives are larger than in the case of

individual farmers. The breed types prevalent in the areas are Murrah cross and local non-descript buffaloes.

Table 2: Population status of buffalo in the southern districts of Lumbini province.

Districts	Size/HH(No)	Range	Lactating buffalo (%)	Breed types
Nawalparasi	363/59 = 6	1-19	31.7	Local + Murrah Cross
Rupandehi	164/39 = 4.2	1-20	52.4	Local + Murrah Cross
Kapilbastu	333/49 = 6.8	1-22	28.2	Local + Murrah Cross
Dang	138/11 = 12.5	4-65	28.3	Local + Murrah Cross
Banke	161/3 = 53	15-130	34.3	Local + Murrah Cross
Bardiya	179/18 = 9.9	3-39	25.1	Local + Murrah Cross
Overall	975/179 = 5.4	1-130	34.6	

4.1.2 Productivity level of buffalo

The overall production of buffaloes in the areas showed that average daily milk yield (from the sample HH) was 5.03 litres (Table 3). The value ranges from 2 to 10 litres. There is a wide variation primarily based on breed types and several environmental condition being provided to them. The lactation periods also range from 6 to 10 month. While during the visit to some selected areas, it was found that some of animals were found to be producing up to 12 litres a day.

Table 3: Production level of buffalo in the southern districts

Districts	Daily milk yield (Lit)	Range	Lactation length (days)
Nawalparasi	3-5	2-9	135-240
Rupandehi	4-6	3-10	150-270
Kapilbastu	4-5	3- 8	150-270
Dang	5-6	4.3-8.9	150-300
Banke	5-6	6.3-10	180-240
Bardiya	4-5	6.7-7.5	180-255
Overall	5.03	2- 10	157.5-262.5

4.1.3 Fodder situation in the areas

The fodder situation in the areas showed that buffalo keepers are cultivating at least some kinds of forage (both winter and summer). The important forages cultivated in the areas were found as oats and berseem in winter and maize, bajra, sudan and teosinte as summer fodders (Table 4). The average cultivated fodder production area was found as 0.67 Kathas/animal ranging from 0.33 to

1.47 Kathas. The dry season feeding was addressed using crop by-products such as rice and wheat straw.

Table 4: Fodder situation in the southern districts

District	Area covered by forage/animal (Katha)	Winter	Summer	Perennial	Feed during dry season	Use of straw treatment	Use of silage	Concentrate feed	Use of minerals
N/parasi	0.62	Oats, berseem	Bajra, grazing	Napier	Rice straw, wheat straw, grazing	No	No	Rarely [Feed supplementation]	No
R/dehi	1.47	Oats, berseem	Local, teosinte, grazing	Napier	Rice straw, wheat Straw, grazing	No	No	Rarely [Feed supplementation]	Rarely
K/bastu	0.33	Oats, berseem	Teosinte, bajra, sudan, local, grazing	Napier ,local ghans h	Rice straw, wheat straw, grazing	No	No	Rarely [Feed supplementation]	No
Dang	0.75	Oats, berseem	Jhilinga, sudan, teosinte	Napeir	Rice straw, wheat straw, grazing	No	Rarely	Rarely [Feed supplementation]	No
Banke	0.37	Oats, berseem	Teosenti, grazing	Ban ko Ghans h	Rice straw, wheat. straw, grazing	No	Rarely	Rarely [Feed supplementation]	No
Bardiya	0.50	Oats, berseem	Teosinte, sudan, grazing	Napeir	Rice straw, wheat. straw, grazing	No	Rarely	Rarely [Feed supplementation]	No
Overall	0.67								

4.1.4 Breeding management in the areas

Both artificial insemination (AI) as well as natural service (NS) were in practice for mating the buffaloes.(Table 5). It was found that NS was higher in use than AI. Use of community bulls for mating was also practiced in some areas indicating that limited care has been given for the selection and use of sires for breeding purpose. These practices discourage the government priorities for the breed improvement and productivity enhancement in buffaloes.

Table 5: Breeding management in the areas

Particulars/Items	Districts					
	Nawalparasi	Rupandehi	Kapilbastu	Dang	Banke	Bardiya
AI/NS	Both	Both	Both	Both	Both	Both
Bulls	8	6	5	4	2	Both
Cost for AI	500-1000/	500-1500	500	No AI	Free	2
Cost of NS	700- 1000/	Free for Branded	500-700	1000	Free	500
Infertility	Approx. 30%	Approx.25%	25%	8%	Approx 10%	25%
AFC	3.5-4.5 year	3.5-4.5 year	4-4.5 year	4-4.5 years	3-4.5 years	25%??
Inbreeding	Minimum	Maximum	Average	Average	Average	3-4.5 years
Travis	No	No	No	No	Yes	Minimum
Replacement of bulls	Yes	Yes	Yes	Yes	Yes	Yes
How long buffalo are kept?	5/6-9/10 lact	5/6-12 lact	4- 7 lact	5/6-6/7 lact	5/6-9/10 /12lact	5/6-12 lact
Basis of selection	Body structure, milk production, lactation, etc	Body structure, milk production, lactation, etc	Body structure, milk production, lactation, etc	Body structure, milk production, lactation etc	Body structure, milk production, lactation, etc	Body structure, milk production, lactation etc
How long bulls are kept?	2-4 years	4-9 years	2/3-5 years	2/3-5 years	2/3-5 years	4-6 years

4.1.5 Health management in the areas

The most common diseases in the areas were HS, BQ, FMD and Mastitis (Table 6). Though the vaccination against these diseases was in practice but it is not in regular basis. Similarly, drenching practice for parasites was also found not regular.

Table 6: Major diseases and their management practices

Particulars	Districts					
	Nawalparasi	Rupandehi	Kapilbastu	Dang	Banke	Bardiya
Major diseases	Prolapse, Mastitis,HS,FMD	Prolapse, Mastitis,HS, FMD	Prolapse, Mastitis,HS,FMD	Prolapse, Mastitis,HS,FMD	Prolapse, Mastitis,HS,FMD	Prolapse, Mastitis,HS,FMD
Vaccination	Occasionally	Occasionally	Occasionally	Occasionally	Occasionally	Occasionally
Drenching	Done, but not regular	Done, but not regular	Done, but not regular	Done, but not regular	Done, but not regular	Done, but not regular
Lab facility	Fecal test	Fecal test	Fecal test	Fecal test	Fecal test	Fecal test
Access to technical service	Less	Less	Less	Less	Less	Less
Technical service	Less	Less	Less	Less	Less	Less
Travis	No	No	No	No	No	No

4.1.6 Market situation for milk and milk products

Milk was mostly sold as raw and in general no milk products were made at the areas (Table 7).

The cost of milk per litre ranged from 50 to 80.

Table 7: Milk market in the areas

Districts	Milk sale	Medium of milk selling	Price of milk	Milk products	Utensils used for milk collection
Nawalparasi	Yes	Coop, Butwal, Agent	60 - 80	Paneer, Ghee, Khuwa, Curd	mostly silver but steel and plastic too
Rupandehi	Yes	India, Butwal, Collection centre, Agent	50 - 80	No	Steel, silver, plastic, mostly silver
Kapilbastu	Yes	India, Collection centre, Agent, Coop	50 - 80	Paneer, Ghee, Khuwa, Curd, sweets, Chhurpi in P. Dairy only	Steel, plastic, mostly silver
Dang	Yes	Private Dairy, Hotel, Agent	50 - 65	Paneer, Ghee, Khuwa, Curd in Private dairy	Steel, plastic, mostly silver
Banke	Yes	Private Dairy	60 - 65	Curd, Ghee	Steel, plastic, mostly silver
Bardiya	Yes	Coop, Private Dairy	65 - 80	No	Steel, plastic, mostly silver

4.1.7 Live animals market situation in the areas

The sale of live animals was made at the local market in general (Table 8). Both male and females heifers are found being reared. The males used to be sold at the age of 2 to 3 years for meat and for breeding purpose. It is a general practice that the female heifers are reared and used as buffalo cows in their farms, which is very encouraging and appreciable job that the communities have been doing in these areas.

Table 8: Live animals sale in the areas

Districts	Sale of live animals	Sale buffalo	Cost of female heifer	Cost of buffalo (NRs)	Market for male heifer (NRs)
Nawalparasi	Local market bazar	5,6 lactation	Generally not sold	50 -1,00,000	15 - 40,000
Rupandehi	Local, different districts of Nepal	5,6 lactation	Generally not sold	50 -1,00,000	15 - 40,000
Kapilbastu	Local, different districts of Nepal	5,6 lactation	Generally not sold	50 -1,00,000	15 - 40,000
Dang	Local	5,6 lactation	Generally not sold	50 -1,00,000	15 - 40,000
Banke	Local	5,6 lactation	Generally not sold	50 -1,00,000	15 - 40,000
Bardiya	Local	5,6 lactation	Generally not sold	50 -1,00,000	15 - 40,000

4.1.8 Livestock service providers in the areas

In general the service providers at the areas were Junior Technicians (JT) and the animals served ranged from 1 to 12 per day (Table 9). The technicians had not received any sort of refresher trainings but they were demanding for such trainings to make them more skillful and update their knowledge.

Table 9: Service providers (SP) in the areas

Districts	Types of SP	Service cases	Refresher training	Seeking for support
Nawalparasi	JT, JTA	3 - 12/ day/SP	Mostly not received	• AI Training • Refresher Training • Educational Visit • Accidental Insurance • Soft loan for vehicle
Rupandehi	JT, JTA	3 - 12/ day/SP	Mostly not received	
Kapilbastu	JT, JTA	3 - 12/ day/SP	Mostly not received	
Dang	JT, JTA	3 - 12/ day/SP	Mostly not received	
Banke	JT, JTA	3 - 12/ day/SP	Mostly not received	
Bardiya	JT, JTA	1- 4/day	Mostly not received	

4.2 Review of Existing Policies and Strategy

Review of existing policies, strategies and guidelines related to buffalo production systems in Nepal

- The guiding document for the establishment and implementation of the buffalo breeding system in Nepal is **National Livestock Breeding Policy, 2078** (NLBP, 2078) which was approved by the Council of Ministers (Cabinet) in 30th Poush, 2078. It has clearly mentioned about the buffalo breeding systems as follows;
- NLBP, 2078 in its objectives clearly stated about the production and productivity increment by applying appropriate measures for the genetic improvement of livestock. It has also stated about the establishment of breeding centers and resource centers stressing about their certification and regulation.
- Out of seven clearly stated policies of the NLBP, 2078 six policies are about breed improvement, sustainable increase in production and productivity; indigenous breed conservation, promotion and sustainable use; commercial and profitable animal breeding systems; collaboration and cooperation in three tiers of government for breed improvement in the areas of teaching, research and extension for the establishment of nucleus, resource centers, pockets, blocks and zones in all potential levels.

- In the breeding strategies stated in the NLBP, 2078, it has been clearly stated to establish the Pedigree Performance Recording Scheme (PPRS), selection of elite breeds of buffaloes and avail these elite sires in National Livestock Breeding Offices (NLBOs).
- The strategies has mentioned about the distribution of profit by using the elite animals in province, local levels, farmers groups, cooperative and entrepreneurs.
- It has been clearly mentioned in the strategy that the federal government shall provide elite sires for semen production; province level is responsible for semen production and distribution and local government to provide the services for AI.
- The strategies have also clearly stated (10.1.6) that 100% and 75% blood levels of Murrah will be used for the semen production for AI where as it is 100, 75 and 50% in the case of breed improvement in cattle.
- Provision of National Direction Committee led by the Federal Minister of Agriculture and Livestock Development in the NLBP is also a positive initiative for livestock breed improvement.
- The strategies also state about the establishment of **‘Community Livestock Breeding Centers’** and its capacity enhancement will be done by federal, province and local governments.
- Promotion of private, groups and cooperatives for breed conservation, promotion and use.
- Study and curriculum about AnGR in teaching institutions and universities.
- Provisions of Annex in the policy for breeding system to be applied in different livestock species in Nepal.
- Use of computer based software system in breed improvement.
- Global warming, climate change and breeding strategies are also mentioned in the policy and strategies.
- Human Resource development (HRD) for Embryo production, preservation and transfer, lab establishment and skill development are also there in the policy.
- Provision of technical committee in local levels for the coordination and collaboration for the implementation of the policy and strategies for the breed improvement in local level.
- AI training from the provincial livestock training centers is also a new approach clearly mentioned in the policy and strategies.

- Commercialization of pockets, blocks, zones and super-zones for breed improvement, conservation and utilization are also stated in the policy.
- Pockets, nucleus herds, resource centers establishment by using natural services as well as artificial insemination (10.5.3 and 10.5.4).
- Elite sire development, selection as in DCIP, BGIP by the involvement of federal, provincial and local levels.
- Regulation of export and import of improved sires, seeds, semen, embryos, GMOs, etc.
- The policy has clearly mentioned about the breeding scheme of Murrah buffaloes with the AnGR in Terai and hills in annex 1 of the policy.
- **The Pedigree Performance Recording Scheme (PPRS)** proposed by the NLSIP and DLS and approved by the ministry recently is also a remarkable achievement in the areas of buffalo genetic improvement in Nepal.
- **Agriculture and Livestock Development Programs implementation guidelines, 2078 of Lumbini province approved by the Hon. Minister level of the Ministry of Agriculture, Food Technology and Land Management in Marg 29, 2078** is also a remarkable work in the areas of breed improvement as well in the province. In addition to other clearly stated guidelines following points can be taken as important in the areas of buffalo breed improvement and its strengthening in the province.
- Resource center establishment, genetic improvement and extension support programs (4(3)): Breeder herds and multiplier herds establishment and supplying of needed sires (bulls) to be carried out by the appropriate provincial or local offices or in collaboration with the bilateral or multilateral agreements.
- Establishment of buffalo breeding herd with minimum 20 pure buffaloes, at least five years agreement, forage resources at least in 15 Kathas in Terai and 1 Ropani in hills, at least 7 years of continuity assurance, scientific recording scheme, mandatory provision of the animal insurance, vaccination, parasite control, etc. ((Annex-8).
- Multiplier herds with at least 50 Murrah buffaloes with strict following the provision as mentioned in the Annex 7 of the guideline.
- Pure bulls/ high quality semen distribution to the breeder and multiplier herds.
- Other important points included in the guidelines are,

- ❖ Resource centers development,
 - ❖ Cattle/buffalo promotion programs
 - ❖ Silage promotion programs
 - ❖ Door to door services for the breed improvement
 - ❖ FMD control and health certification program for the breeder and multiplier herds.
 - ❖ Subsidies for the quality milk production and distribution, e.g., 75% subsidies to milk canes, 50% to milk analysers and milk collection center establishment,
 - ❖ Biogas with shed improvement programs
 - ❖ Dairy processing and promotion centers,
 - ❖ Buffalo selection index as mentioned in Annex 7.
 - ❖ Agreement with VHLEC for the establishment and sustainable implementation of breed improvement programs,
 - ❖ Maintenance of herd book, breed record keeping and health related recording.
 - ❖ Bull selection criteria for the breeder and multiplier herds.
 - ❖ Provision for the mandatory preparation of business plans and agreement as mentioned in the annex 37.
- **Provincial Acts such as “Animal Health and Livestock Services Act, 2075”** which is already approved and Feed act and other livestock associated acts and regulations which are in pipelines are also in line with the genetic improvement and strengthening of buffalo farming system in Lumbini Province.

Most of the policies in the country considered livestock as an indispensable component of the agriculture and explained that the provision made for agriculture are also for livestock sector. In this connection, National Agriculture Policy 2004, Agribusiness Promotion Policy 2007, Agro-biodiversity Promotion Policy 2007, Dairy Development Policy 2021, Poultry Policy 2012, Rangeland Policy 2012, Land Use Policy 2013, National Cooperative Policy 2013, Climate Change Policy 2011, Science and Technology Policy 2004, Bio-technology Policy 2004 are also

for the development of livestock. However, there is no any policy which is made exclusively for livestock.

Within the legislative arrangements for Livestock Development, three major acts are in place They are i) Animal Health and Livestock Services Act, 2055 ii) Animal Slaughter House and Meat Inspection Ac, 2055 and iii) Nepal Veterinary Council Act, 2055.

Agriculture Development Strategy (ADS) and Road map of Ministry of Agriculture and Livestock Development (MoALD) for the transformation of agriculture and livestock sector and the approach paper for the 15th plan are the major recent policy document for the development of livestock sector.

The principal objective of the National Agriculture Policy and other related policies includes to increase the productivity of the agriculture produce including livestock products and conservation and utilization of plant and animal genetic resources.

The policies emphasize the use of the genetic and breeding to increase the productivity of the animals. Establishment of the resource centre of improved breeds of livestock, conservation of the indigenous breeds and their utilization, promotion for engagement of the private sector for livestock enterprises are the major policy intervention for livestock development.

Recently national animals breeding policy, 2078 has been endorsed and is made in effect. This is very important policy that has direct implication for buffalo genetic improvement program. This has clearly listed the strategies and action plan for the implementation of the policy.

Agriculture Development Strategy (ADS) highlighted four outcomes; governance, higher productivity, profitable commercialization and competitiveness. The ADS has identified the role of the animal to ensure the food and nutrition security through the economic access to the food security. In order to increase the productivity, animal genetic resource is identified as a valuable resources. ADS expects a significant efforts and investment for ensuring the supply of breeding animals, maintaining the quality of the animals' semen and other inputs (ADS, 2016).

ADS has taken a vision in line with the target set by the SDG, and brought strategies to make the agriculture sector commercial, competitive and diversified. It is necessary to design the program that makes the sector more competitive and commercial without harming the environment.

One of the major expected outcome of the ADS is to ensure the food and nutrition security. In order to ensure the food and nutrition security, the role of buffalo for economic access to food is appreciated. In this connection, Government of Nepal has implemented Multi sector Nutrition Plan (MSNP) and Zero Hunger Initiatives, these endeavors of the government put the buffalo enterprises.

Nepal has prepared a document "Sustainable Development Goals, Status and Roadmap 2016-2030. This roadmap highlights to double the productivity, make the farming system sustainable, and maintain the genetic diversity of crops and domesticated animals.

National Planning Commission of Nepal paved a pathway for the development of next five year in an Approach Paper of 15th Periodic Plan (2076/77- 2080/81 BS). In this approach paper, Nepal has set a target to make Nepal a medium income country in three years and then make it a prosperous country by 2100. It has been target to alleviate all forms of poverty by 2087. This approach paper highlighted that the federal institutions are responsible to prepare policy, plan and legislation of agricultural related sector in coordination with relevant stakeholders along with mechanisms for implementation (Approach Paper, NPC, 2075).

The progress of the 14th periodic plan has showed that Nepal is moving towards to be self- reliant in milk and meat in near future. The role of the buffalo farming is plausible to make the country self-reliant in milk and meat. This buffalo sector is holding challenges to be sustainable environmentally and able to meet the increasing demand of milk and meat.

4.3 Issues and Challenges for Buffalo Improvement Program in the study areas

The issues and challenges for buffalo production in the study areas as obtained through primary source of information are as follows;

- Difficult to obtain the improved bulls and buffaloes
- Very limited provision of grant support

- Market problem for milk and milk products.
- Limited technical human resources in the Veterinary Hospital and Livestock Expert Centers.
- Limited or no laboratory provision
- Very limited technical service from senior/experts
- No or very limited regular supply of vaccines for vaccination
- Questionable good quality semen, not reliable and effective AI,
- Lack of insurance of animal based on the real cost of the animals paid by the farmers.
- No or rarely found travis to restrain the animals from AI, vaccination and treatments.
- No or rare support for improved shed from the government side.
- No easily accessible loan on subsidized rate
- Most of the Local Government have given low priority for the livestock programs.
- Lack of improved breed to the farmers when in needs.
- Animals brought from India don't suit the breeding, feeding, health and management practices available in Nepal.
- Inadequate service delivery
- Buffalo resource centres: BH and MHs are not established yet.
- Organic farming is very attractive in the market but not yet practiced.
- Limited areas for fodder, pasture and d community grazing
- Bank doesn't support less than 5 lacks and Micro-finance charges high interest rate in livestock farming
- No regular technical services in the areas.
- Inadequate numbers of ponds in the areas for wallowing the buffaloes which are very important during the period of summer months.
- Lack of availability of proper chaff cutter machines to the commercial farmers.
- Lack of easy access to the improved fodder and forage seeds to the farmers.
- Farmers are compelled to pay the AI charges if the animals repeat
- Farmers do not have the opportunity to visit, training, observation tour, etc.
- Most of the farmers face feed and fodder problems in the areas.
- Limited or almost no provision of the grant based on production (output basis) which the felt need and high demand of the real farmers.

- No or very limited collection centers in the areas.
- High demand of shallow tube well for the fodder, pasture cultivation in the areas.
- Need of veterinary and AI mobile camps in the areas.

4.4 Strategy with action plan for Strengthening Buffalo Improvement Program

Strategies for Buffalo Genetic Improvement

- Selection of high yielding animals (both males and females) in the areas with good genetic worth
- Improving existing animals through use of high quality semen (with good genetic worth) of Murrah bulls (imported from abroad with higher breeding value for milk yield)
- Improving existing animals through use of high quality Murrah bulls (imported from abroad with higher breeding value for milk yield)
- Improving fodder situation for animal feeding
- Improving health management of the animals
- Improving husbandry practices
- Promotion of good management practices
- Improving market

Action plan for genetic improvement

This strategy will be implemented for 10 years. Ministry of Agriculture, Food Technology and Land Management, of the Province, and farmers and entrepreneurs will be the implementing agencies. This action plan includes action at the project level and further detail of the action is necessary.

SN	Action	Unit		Responsible organization	Duration (years)
A	Preparatory Work				
1	Formulation of Standard Operating Procedure for Community Managed Buffalo Breeding Program	Number	1	MoAFTLM/Local Gov	1
2	Selection of districts and municipalities and MoU for the Program	Number	1	Provincial Ministry/Local Gov	1
3	Formation of Nucleus herds/Breeder herds	Number	5-10	Provincial Ministry/ Local Gov/farmers association	1
4	Formation of Multiplier herds	Number	50	Provincial Ministry/ Local Gov/farmers association	1

5	Formation of breeding goal	Number	1	Provincial Ministry/Local Gov/ farmers association	1
6	Preparation of the selection criteria or guidelines	Number	1	Provincial Ministry/ Local Gov/farmers association	1
7	Training to farmers/communities/municipality staff	Number	1	Provincial Ministry/ Local Gov/Farmers association	5
8	Preparation of protocol for the selection program	Number	1	Provincial Ministry/ Local Gov/Farmers association Provincial	1
B	Genetic improvement program of buffalo	Number			
1	Selection of high yielding animals (both males and females) in the areas with good genetic worth	Districts and Municipalities	6+....	Municipality/ Provincial Ministry/DoLF/VHLECs/ Farmers Association	10
2	Improving existing animals through use of high yielding (imported from abroad with higher breeding value)	Districts and Municipalities	6+....	Municipality/ Provincial Ministry/ DoLF/VHLECs/Farmers Association	10
3	Improving existing animals through use of high quality Murrah bulls (imported from abroad with higher breeding value for milk yield)	Districts and Municipalities	6+..	Municipality/ Provincial Ministry/ DoLF/VHLECs/Farmers Association	10
4	Providing good environment (Good feed, better health and others)	Districts and Municipalities	6+	Municipality/ Provincial Ministry/ DoLF/VHLECs/Farmers Association	10
C	Buffalo database management		6+	Municipality/ Provincial Ministry/Farmers Association	10
D	Monitoring of the breeding program	Number	Years	Provincial Ministry/Local Gov/ Farmers Association	10

Strategy 1: Selection of high yielding animals (both males and females) in the areas with good genetic worth

Action Plans	Implementing agencies		Duration (Years)
	Main	Supporting	
Action Plan 1.1: Identification of high yielding buffaloes	MoAFTLM/Local Gov	DoLF/VHLECs/	1
Action Plan 1.2: Use of high yielding buffaloes in the areas	MoAFTLM/Local Gov	DoLF/VHLECs/	2
Action Plan 1.3: Multiplication of these animals progeny	MoAFTLM/Local Gov	DoLF/VHLECs/	5
Action Plan 1.4: Dissemination of these progenies to a wider areas within 6 districts	MoAFTLM/Local Gov	DoLF/VHLECs/	5

Action Plan 1.5: Monitoring of the progress	MoAFTLM/Local Gov		5
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Strategy 2: Improving existing animals through use of high quality semen (with good genetic worth) of Murrah bulls (imported from abroad with higher breeding value for milk yield)

Action Plans	Implementing agencies		Duration
	Main	Supporting	
Action Plan 2.1: Obtain high quality semen with good genetic worth for milk yield	MoAFTLM/Local Gov	Federal MoALD/DoLF/VHLECs/	1
Action Plan 2.2: Use of these semen for mating with buffaloes in the areas	MoAFTLM/Local Gov	DoLF/VHLECs/	1
Action Plan 2.3: Monitoring of the mating at least up to 2 year.	MoAFTLM/Local Gov	DoLF/VHLECs/	3
Action Plan 2.4: Rearing of these progenies and use them as buffalo cows and bulls	MoAFTLM/Local Gov	DoLF/VHLECs/	5-6
Action Plan 2.5: Monitoring of the progress	MoAFTLM/Local Gov	DoLF/VHLECs/	5-7

Strategy 3: Improving existing animals through use of high yielding Murrah bulls (imported from abroad with higher breeding value)

Action Plans	Implementing agencies		Duration
	Main	Supporting	
Action Plan 3.1: Obtain high quality bulls with good genetic worth for milk yield	MoAFTLM/Local Gov	Federal MoALD/DoLF/VHLECs/	1
Action Plan 3.2: Use of these bulls for mating buffaloes in the areas	MoAFTLM/Local Gov	DoLF/VHLECs/	1
Action Plan 3.3: Monitoring of the mating at least up to 2 year.	MoAFTLM/Local Gov	DoLF/VHLECs/	3
Action Plan 3.4: Rearing of these progenies and use them as buffalo cows and bulls	MoAFTLM/Local Gov	DoLF/VHLECs/	5-6
Action Plan 3.5: Monitoring of the progress	MoAFTLM/Local Gov	DoLF/VHLECs/	5-7

Strategy 4: Improving fodder situation for animal feeding

Action Plans	Implementing agencies		Duration
	Main	Supporting	
Action Plan 4.1: Fodder improvement at the areas (seasonal, annual and perennial)	MoAFTLM/Local Gov	DoLF/VHLECs/	Every years
Action Plan 4.2: Improve dry season feeding to the animals	MoAFTLM/Local Gov	DoLF/VHLECs/	Every years
Action Plan 4.3: Improvement of crop by products	MoAFTLM/Local Gov	DoLF/VHLECs/	Every years

Action Plan 4.4: Fodder conservation and use of them for animal feeding	MoAFTLM/Local Gov	DoLF/VHLECs/	Every years
Action Plan 4.5: Use of mineral feeding	MoAFTLM/Local Gov	DoLF/VHLECs/	Every years

Strategy 5: Improving health management of the animals

Action Plans	Implementing agencies		Duration
	Main	Supporting	
Action Plan 5.1: Provide health services to the animals at the areas	MoAFTLM/Local Gov	DoLF/VHLECs/	Every year
Action Plan 5.2: Make provision of technical experts at the areas	MoAFTLM/Local Gov	DoLF/VHLECs/	Every year
Action Plan 5.3: Improve laboratory facilities for effective animal treatment	MoAFTLM/Local Gov	DoLF/VHLECs/	2
Action Plan 5.4: Improve herd health	MoAFTLM/Local Gov	DoLF/VHLECs/	Every year
Action Plan 5.5: Follow the routine vaccination	MoAFTLM/Local Gov	DoLF/VHLECs/	Every year

Strategy 6: Improving husbandry practices

Action Plans	Implementing agencies		Duration
	Main	Supporting	
Action Plan 6.1: Shed improvement	MoAFTLM/Local Gov	DoLF/VHLECs/	2
Action Plan 6.2: Adoption of husbandry practices	MoAFTLM/Local Gov	DoLF/VHLECs/	2
Action Plan 6.3: Care and management of animals at different ages	MoAFTLM/Local Gov	DoLF/VHLECs/	1-3
Action Plan 6.4: Manure management	MoAFTLM/Local Gov	DoLF/VHLECs/	1
Action Plan 6.5: Management adverse conditions [Temperature etc], plantation, biosecurity maintenance, etc.	MoAFTLM/Local Gov	DoLF/VHLECs/	1-2

Strategy 7: Promotion of good management practices

Action Plans	Implementing agencies		Duration
	Main	Supporting	
Action Plan 7.1: Adoption of good management practices	MoAFTLM/Local Gov	DoLF/VHLECs/	1
Action Plan 7.2: Regulation for bad management practices including milk and milk products production, processing, handling and consumption	MoAFTLM/Local Gov	DoLF/VHLECs/	2
Action Plan 7.3: Addressing animal welfare issues in the farm	MoAFTLM/Local Gov	DoLF/VHLECs/	Every years

Action Plan 7.4: Addressing gender and inclusiveness issues	MoAFTLM/Local Gov	DoLF/VHLECs/	Every year
Action Plan 7.5: Maintenance bio-security	MoAFTLM/Local Gov	DoLF/VHLECs/	Every year

Strategy 8: Improving market

Action Plans	Implementing agencies		Duration (Years)
	Main	Supporting	
Action Plan 8.1: Assessment of appropriate market situation at the areas	MoAFTLM/Local Gov	DoLF/VHLECs/	1-2
Action Plan 8.2: Create/promote market networks (both public and private)	MoAFTLM/Local Gov	DoLF/VHLECs/	2-3
Action Plan 8.3: Communication and Networking for promoting market	MoAFTLM/Local Gov	DoLF/VHLECs/	2-3
Action Plan 8.4: Capacity buildings [Training, meeting, workshops, visits etc] especially in the areas of recent advancement in buffalo production	MoAFTLM/Local Gov	DoLF/VHLECs/	2-5
Action Plan 8.5: Follow of 4Ps of marketing in buffalo farming	MoAFTLM/Local Gov	DoLF/VHLECs/	2-5

4.5 Establishment/strengthening of Buffalo Breeder and Multiplier herds Buffalo Resource Centres

Nucleus Herds/Breeder Herds

Buffalo resource centers are very important entities that should be established and strengthened at the areas. There should be three tiers of structure for herds producing high quality inputs (live and semen) and made available to these structure. There should be nucleus/breeder herds at the top that contains high quality of both males (Bulls/semen) and females (buffalo cows). There should be the blood level of 100% in the case of sire/s and more than 75% in the case of dams so that the progeny will be of at least 87.5% blood level. However, the breeder herd has to keep in the mind that this herd should improve its quality every year so that to reach 100% purity as soon as possible. These breeder herds (BHs) should be maintained by well recognized commercial farmers who have enough knowledge, attitude and experiences in establishment, running and marketing of the animals produced in the nucleus/breeder herds. Depending upon the high quality/elite animals with the farmers, there could be one or more breeder herd/s in the districts. However, there cannot be the breeder herds more than 6 in total.

Multiplier Herds

Since demand of high quality semen and/or bulls to all the farmers of the province is not possible within a short period of time and all the farmers of the areas may not demand the high blood level Murrah buffalo (more than 75% blood level), there should have been the provision of multiplier herds where there would be sire and dams with at least of 75% blood level. These herds will get the breeding animals from the breeder/nucleus herd and multiply them to meet the demand of the commercial buffalo farmers of the areas as well as other districts of the province as well as districts from other provinces.

Production/Farmers Herds

These are the farmer's herds or the commercial herds, which are kept for milk and meat production. These herds are at the bottom of the triangle with higher population number. These herds shall receive the breeding animals either from the nucleus and/or from the multiplier herds.

Important genetic parameters/criteria for the Murrah Buffalo Resource Centre

Herds	Murrah blood level, purity (%)	
	Murrah Male	Murrah Male
Nucleus Herds	100	>75 [-100]
Multiplier Herds	>75 [-100]	>75 [-100]
Production Herds/Farmers Herds	Use of >75	Use of >50

Basis/Requirements for the establishment and continuation of Murrah Buffalo Resource Centres

Requirements	Nucleus	Multiplier
No of adult buffalo	>20 [Individual level]	5-10 [Individual level; 50 for group]
No of bulls	1 or 2	2 for group
No of sire lines from where the semen is obtained/procured	At least 5 lines	At least 4 lines
Herd recording	Mandatory	Mandatory
Vaccination	Mandatory	Mandatory
Drenching	Mandatory	Mandatory
Fodder/forage plantation	>15 Kathas/herd	>4 Kathas [Individual level]
Feeding practices	Standard	Standard
Good husbandry practices	Standard	Standard

5. Observations of the project sites and Recommendations

Some of the farmers are cultivating fodders/forages (both winter and summer) at their lands, which is encouraging, but not enough to meet the requirement and hence should be further promoted for enhanced buffalo production in the areas.

Most of the farms are producing heifers (both male and female) and selling male heifers at an age of 1-2 and even 3 years (in few cases) but keeping female heifers for the replacement of their old buffalo cows. This means they are continuing the buffalo production and would like to step in and will not go for step out from the farming. This approach of keeping female heifers is appreciated and should be promoted in other areas as well. The replacement of old buffaloes by young and maiden heifers should be based on some sound (based on evidence) genetic principles using selection basis/parameters. For this they should be motivated, supported and capacitated with required information, suggestions, techniques and infrastructures

Most of the farmers have not yet practiced the scientific manure management techniques. They have carelessly thrown the dung and urine out of the farmyards which is neither good for the environment nor maintains the nutrients of the organic manure. Such practices, unknowingly support the blame of increasing the methane gas production and helping to global warming by the livestock farming that has been frequently putting by the anti-livestock people. Because of ever rising prices of fossils fuel and inorganic fertilizers, promotion of green mission with bio-gas [Environmental and efficient energy] be made at the study areas which is the demand of present era in the project areas.

Community managed ponds at strategic locations is rarely found which has to be established/strengthened at the areas for buffalo wallowing and helping the environment a bit cool.

Roadside grazing is found common at some places where community managed grazing is practiced. The forage available in these areas are not adequate and not of good quality. Local Government and/or community should promote the plantation of improved forage crops and fodder trees in such areas as soon as possible.

Use of Silage is not found except in few organized large farms. This is a good option for addressing dry season feeding and hence should be promoted.

Use of crop bi-products, especially cereals straws/*bhusha* is being used at large scale but this needs appropriate treatments along with the inclusion of legumes (lentil/black gram, etc]

Simple treatment of these crop by-products would be required to enhance the nutrient availability and digestibility.

AI should be made more effective, efficient and easily accessible to the farmers. For this, AI technicians be trained, refreshed with modern technology and promoted.

Feed by products in some cases (wheat bran is expensive than wheat] are very expensive and this requires some kind of effective regulation. Provincial feed act which is in pipelines should take due consideration on such issues.

During the study period, it has been observed that few of the Local Governments have allocated appreciable budgets for the provision of livestock development services (For example Duduwa, Banke). This should be promoted in other municipalities too.

Some of the highly commercial buffalo farms in Rupandehi district have been found with high yielding buffaloes, elite bulls and good infra structures. They can be converted to the breeder herds with some guidelines and mandatory provisions that have to be strictly followed. If such breeder herds are developed in this province, this can be a cornerstone and an exemplary work for the buffalo genetic improvement program of the nation as well.

6. Annexes:

Annex 1: Breedable animals, AI and conception rate in cattle and buffalo in Nepal (2019/20)

Species	Breedable animals	AI done (No)	Conception rate (%)	AI coverage (%)
Buffalo	1381845	143114	48	10.4
Cattle	1038326	426178	56.1	41.0
Goat	2456750	8427	50	0.3

Annex 2: AI in Six districts of Lumbini Province (2019/20)

Districts	Buffalo	Cattle	Total
Nawalparasi west	3542	4509	8051
Rupandehi	15596	27256	42852
Kapilbastu	2554	4237	6791
Dang	1033	1750	2783
Banke	1850	2262	4112
Bardiya	1561	2216	3777
Total	26136	42230	68366
Total of 12 districts of Lumbini province	31750	48637	80387

Annex 3: Livestock population Statistics of Nepal

SN	Species	Years				Change over 10 years (%)
		2020	2019	2018	2010	
1	Buffalo	5159931	5257591	5308664	4993650	3.33
2	Cattle	7466841	7458885	7385035	7226050	3.33
3	Goat	13442614	12811953	12283752	9186440	46.3

Annex 4: Milk production statistics of Nepal

SN	Species	Years				Change over 10 years (%)
		2020	2019	2018	2010	
1	Buffalo	1419413	1380600	1372905	1109325	28.0
2	Cattle	1060487	920400	795530	447185	137.1
3	Total	2479900	2301000	2168435	1556510	59.3

Annex 5: Meat production statistics in Nepal

SN	Species	Years				Change over 10 years (%)
		2020	2019	2018	2010	
1	Buffalo	188172	189517	188574	167868	12.1
2	Mutton/sheep	2964	2735	2763	2722	8.9
3	Chevon/Goat	70755	75023	73914	52809	34.0
4	Pork	31450	29493	28579	17923	75.5
5	Chicken	226959	255001	62899	36085	529.0
6	Duck	442	387	353	218	102.8
7	Total	520742	552156	357082	277625	87.6

Annex 6: Population status of buffalo in the six southern districts of Lumbini province

Districts	Size/HH(No)	Range	Lactating animals (%)	Breed type
Nawalparasi	363/59 =6	1-19	31.7	More Local + Few Murrah Cross
Rupandehi	164/39 =4.2	1-20	52.4	More Local + Few Murrah Cross
Kapilbastu	333/49 = 6.8	1-22	28.2	More Local + Few Murrah Cross
Dang	138/11= 12.5	4-65	28.3	More Local + Few Murrah Cross
Banke	161/3 = 53	15-130	34.3	More Local + Few Murrah Cross
Bardiya	179/18= 9.9	3-39	25.1	More Local + Few Murrah Cross
Overall Total	975/179 = 5.4	1- 130	34.6	

Annex 7: Production level of buffalo in the southern six districts of Lumbini province

Districts	Daily milk yield (Lit)	Range per Buffalo	Lactation length (days)
Nawalparasi	3-5	2-9	135-240 days
Rupandehi	4-6	3-10	150-270 days
Kapilbastu	4-5	3- 8	150-270 days
Dang	5-6	4.3-8.9	150-300 days
Banke	5-6	6.3-10	180-240 days
Bardiya	4-5	6.7-7.5	180-255 days
Overall	5.03	2-10	135 - 300 days

Annex 8: Fodder production situation in the southern six districts of Lumbini province

Districts	Area Covered by Fodder forage/Animal	Winter forage	Summer forage	Perennial forage	Forage during dry season	Straw treatment	Use of silage	Concentrate feed	Use of minerals
Nawalparasi	0.62 Kattha	Oats, berseem	Bajra, grazing	Napier	Rice straw, wheat straw, grazing	No	No	Rarely [Feed supplementation]	No
Rupandehi	1.47 Kattha	Oats, berseem	Local, teosinte, grazing	Napier	Rice straw, wheat straw, grazing	No	Rarely	Rarely [Feed supplementation]	Rarely
Kapilbastu	0.33 Kattha	Oats, berseem	Teosinte, bajra, sudan, local, grazing	Napier, local	Rice straw, wheat straw, grazing	No	No	Rarely [Feed supplementation]	No
Dang	0.75 Kattha	Oats, berseem	Jhilinga, sudan, teosinte	Napier	Rice straw, wheat straw, grazing	No	Rarely	Rarely [Feed supplementation]	No
Banke	0.37 Kattha	Oats, berseem	Teosinte, grazing	Napier, local	Rice straw, wheat. straw, grazing	No	Rarely	Rarely [Feed supplementation]	No
Bardiya	0.50 Kattha	Oats, berseem	Teosinte, Sudan, grazing	Napier	Rice straw, wheat straw, grazing	No	Rarely	Rarely [Feed supplementation]	No
Overall	0.67 Kattha	Oats, berseem	Teosinte, bajra, local, grazing	Napier	Rice straw, wheat straw, grazing	No	Rarely	Rarely (Feed supplementation)	No

Annex 9: Breeding management in the study areas

Particulars	Districts					
	Nawalparasi	Rupandehi	Kapilbastu	Dang	Banke	Bardiya
AI/NS	Both	Both	Both	Both	Both	Both
Cost for AI (NRs)	500-1000	500-1500	500	No AI	Free	500
Cost for NS (NRs)	700- 1000	Free for branded (Chhoduwa)	500-700	1000	Free	1000
Infertility	Approx. 30%	Approx.25%	25%	8%	Approx 10%	25%
Age at first calving	3.5-4.5 year	3.5-4.5 year	4-4.5 year	4-4.5 years	3-4.5 years	3-4.5 years
Inbreeding	Minimum	Maximum	Average	Average	Average	Minimum
Availability of travis	No	No	No	No	Yes	No
Replacement of buffalo by own farm heifer	yes	yes	yes	yes	yes	yes
Buffalo keeping period	5/6-9/10 Lactation period	5/6-12 Lactation period	4- 7 Lactation period	5/6-6/7 Lactation period	5/6-9/10 /12Lactation period	5/6- 12Lactation period
Basis of selection of animals	Body structure, milk production, lactation, etc	Body structure, milk production, lactation, etc	Body structure, milk production, lactation, etc	Body structure, milk production, lactation, etc	Body structure, milk production, lactation, etc	Body structure, milk production, lactation, etc
Bulls in use for breeding	2-4 years	4-9 years	2/3-5 years	2/3-5 years	2/3-5 years	2-4 years

Annex 10: Health management in the study areas

Districts	Major diseases	Vaccination	Drenching	Lab facility	Access to technical service	Availability of traxis
Nawalparasi	Prolapse, Mastitis, HS, FMD	Occasionally	Not regular	Fecal test	Less	No
Rupandehi	HS, FMD, Degnalla, Surra,	Occasionally	Not regular	Fecal test	less	No
Kapilbastu	HS, FMD, Degnala, EF	Occasionally	Not regular	Fecal test	Less	No
Dang	HS, FMD, BQ, DCS	Regular	Regular	Fecal test	Less	No
Banke	HS, FMD	Regular	Regular	Yes	Available	Yes
Bardiya	MF, HS, FMD, Mastitis, BQ	Occasionally	Not regular	Fecal test	Less	No

Annex 11: Milk market in the study areas

Districts	Milk sale	Medium for milk selling	Price of milk/liter (NRs)	Milk products	Utensils used for milk collection
Nawalparasi	Yes	Cooperative, Butwal, Agent	60 - 80	Paneer, Ghee, Khuwa, Curd	Mostly silver, somewhere steel and plastic
Rupandehi	Yes	India, Butwal, Collection centre, Agent	50 - 80	No	Mostly silver, somewhere steel and plastic
Kapilbastu	Yes	India, Collection centre, Agent, Coop	50 - 80	Paneer, Ghee, Khuwa, Curd, sweets, Chhurpi in Private Dairy only	Mostly silver, somewhere steel and plastic
Dang	Yes	Private Dairy, Hotel, Agent	50 - 65	Paneer, Ghee, Khuwa, Curd in Private dairy	Mostly silver, somewhere steel and plastic
Banke	Yes	Private Dairy	60 - 65	Curd, Ghee	Mostly silver, somewhere steel and plastic

Bardiya	Yes	Coop, Private Dairy	65 - 80	No	Mostly silver, somewhere steel and plastic
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Annex 12: Live animals sale in the study areas

Districts	Sale of live animals	Sale of buffalo	Cost of female heifer	Cost of buffalo (NRs)	Cost of male heifer (NRs)	Remarks
Nawalparasi	Local market bazar	5,6 lactation	Generally not sold	50 -1,00,000	15 - 40,000	Purchasing cost of milking buffalo - 1 lakh - 2 lakh. Heifer buffaloes are generally not sold but kept in the farm to increase the herd size
Rupandehi	Local and other districts of Nepal	5,6 lactation	Generally not sold	50 -1,00,000	15 - 40,000	
Kapilbastu	Local and other districts of Nepal	5,6 lactation	Generally not sold	50 -1,00,000	15 - 40,000	
Dang	Local	5,6 lactation	Generally not sold	50 -1,00,000	15 - 40,000	
Banke	Local	5,6 lactation	Generally not sold	50 -1,00,000	15 - 40,000	
Bardiya	Local	5,6 lactation	Generally not sold	50 -1,00,000	15 - 40,000	

Annex 13: Livestock service providers (SP) in the study areas

Districts	Types of SP	Service cases	Refresher training	Seeking for support by the SP	Remarks
Nawalparasi	JT, JTA	3 - 10,12/ day/SP	Mostly not received	1. AI Training 2. Refresher Training 3. Educational Visit 4. Accidental Insurance 5. Soft loan for vehicle	
Rupandehi	JT, JTA	3 - 10,12/ day/SP	Mostly not received		
Kapilbastu	JT, JTA	3 - 10,12/ day/SP	Mostly not received		
Dang	JT, JTA	3 - 10,12/ day/SP	Mostly not received		
Banke	JT, JTA	3 - 10,12/ day/SP	Mostly not received		

Bardiya	JT, JTA	1,2 - 3,4/day	Mostly not received		
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Annex 14: Issues, constraints and challenges in the study areas

Districts	Issues and constraints	Challenges
Nawalparasi west	1. Lack of purchasing capacity of feed 2. Lack of knowledge of buffalo farming 3. Less motivation to organic farming 4. Lack of regular health checkup of buffaloes 5. No access of improved sheds 6. Lack of travis 7. Lack of improved bulls and buffaloes 8. Farmers are not getting money from agents in time 9. Problems of irrigation for forage farming 10. Lack of Laboratory facilities and regular training for buffalo farmers 11. Problems because of inappropriate milk pricing 12. Provision of regular services from local level technicians 13. Irregular supply of Vaccines 14. Limited grants and incentives based on the outputs 15. Limited programs in genetic improvement of buffaloes	1. Limited access of the farmers on soft loan from the banks 2. High interest rate of micro- finance 3. Agricultural development Bank does not grant the loan below 5 Lakhs 4. Marketing problems 5. Limited provision of dairy co-operatives 6. Inappropriate rate of selling buffaloes for meat purpose 7. No provision of fixing the price of buffaloes on real cost basis for their insurance. 8. Electricity facilities along with the provision of transformers for the use of Deep Boring for forage cultivation 9. Less success of AI in buffaloes (only 60%) 10. No guarantee on the supply of quality semen 10. Genetic improvement of buffaloes is a long term goal. Not easy and possible in short duration.
Rupandehi	1. Ponds are not available for buffalo 2. Machines are not available for grass cutting 3. No access of improved sheds	1. Farmers are far from the access of receiving soft loan from Banks 2. High interest rate of micro- finance

	4.Problems of importing buffalo from India 5. Feed is expensive and lack of obtaining seed of forage 6. The problem of paying fee of AI when the buffalo repeats 7.There should be 1 travis for 1 village 8. The provision of Sallow tube well for irrigation 9. Production based grant should be managed by the government	3 Problems of paying insurance cost according to the cost price of buffalo according to policy 4. Genetic improvement is necessary 5.Production based grant should be managed by the government
Kapilbastu	1.Soft loan should be provided through local level not from Banks because farmer are far from the access of banks 2. No access of improved sheds 3. Lack of Travis 4. Lack of Improved bulls and buffaloes 5. Farmers are not obtaining money from agents in time 6. Feed is expensive and lack of obtaining seed of forage 7. Production based grant should be managed by the government 8, Genetic Improvement is necessary 9. Diversity in lacto fat in different dairies 10. Necessary of buffalo farming training 11. Regular vaccine should be managed 12. Provision of farmers tours in best buffalo herds	1.Genetic improvement is necessary but not easy 2. Lack of genetic quality in semen 3.Production based grant should be managed by the government 4. Marketing problems should be solved by the government. It is going to be confrontation between dairy cooperatives and private dairies in near future 5. Not easy for receiving especial medicine in Vet shops and quality of buffalo semen 6. Challenge for controlling to receive government grant by big farmers due to their connection
Dang	1.Lack of purchasing capacity of feed 2.Lack of knowledge of buffalo farming	1. .Genetic improvement is necessary but not easy

	3. Because of lack of knowledge, farmers are not motivated to organic farming 4. Lack of regular health check- up of buffaloes 5. No access of improved sheds 6. Lack of travis 7. Lack of improved bulls and buffaloes 8. Provision of laboratory and regular training for buffalo farmers 9. Provision of appropriate rate of milk 10. Provision of regular services from local level technicians 11. Vaccines should be available regularly 12. Production based grant should be managed by the government 13. Genetic improvement is necessary 14. Small sized silage machine should be provided by the government	2. Lack of genetic quality in semen 3. Production based grant should be managed by the government 4. Problems of paying insurance cost according to the cost price of Buffalo according to policy 5. Not easy for obtaining especial medicine in Vet shops and quality of buffalo semen 6. Challenge for controlling to receive government grant by big farmers due to their connection
Banke	1. Production based grant should be managed by the government 2. Genetic improvement is necessary 3. Lack of purchasing capacity of feed 4. Lack of knowledge of buffalo farming 5. Because of lack of knowledge, farmers are not motivated to organic farming 6. Lack of regular health checkup of buffaloes 7. No access of improved sheds 8. Lack of travis 9. Lack of Improved bulls and buffaloes	1. .Genetic improvement is necessary but not easy because it is difficult to import good quality buffalo from India 2. Lack of genetic quality in semen 3. Production based grant should be managed by the government 4. Problems of paying insurance cost according to the cost price of buffalo according to policy 5. Not easy for obtaining especial medicine in Vet shops and quality of buffalo semen 6. Challenge for controlling to receive government grant by big farmers due to their connection

	10. Provision of laboratory and regular training for buffalo farmers 11. The rate of milk is less than the rate of cost price 12. Need of expert Vet Doctors 13. Technical service should be provided as in the past 5 years from local level government	
Bardiya	1. Modern technology is necessary for buffalo farming. It does not go well through traditional farming system. No one farmers are not uplifted their life standard through buffalo farming 2. Production based grant should be managed by the government 3. Genetic improvement is necessary 4. Lack of purchasing capacity of feed. Rice per kg and quality of feed rate is same 4. Lack of knowledge of buffalo farming 5. Because of lack of knowledge, farmers are not motivated to organic farming 6. Lack of regular health checkup of buffaloes. Vet technician is not available for farmers. 7. No access of improved sheds 8. Lack of travis 9. Lack of Improved bulls and buffaloes 10. Provision of laboratory and regular training for buffalo farmers 11. The rate of milk is less than the rate of cost price 12. Need of expert Vet Doctors	1. .Genetic improvement is necessary but not easy because it is difficult to import good quality buffalo from India 2. Lack of genetic quality in semen 3. Production based grant should be managed by the government 4. Problems of paying insurance cost according to the cost price of buffalo according to policy 5. Not easy for obtaining especial medicine in Vet shops and quality of buffalo semen 6. Challenge for controlling to receive government grant by big farmers due to their connections

Annex 15: Information from Nawalparasi District

SN	Items	Location 1	Location 2	Location 3
		Mili Juli Gai Bhaisi Krishak Samuh	Pratappur Aguwa Bhaisipalak Kisanharu (group)	Baikha Dugdha Utpadan Sahkari Sanstha
1	Population status: No. of buffaloes/HH Lactating buffaloes Major breed	3.5 52% Murrah Cross	80 51% Murrah cross	50 52% Local and Murrah cross
2	Production status (daily milk yield, litre)	6-7	4	5
3	Fodder situation: Winter fodder Summer Perennial Dry season Use of straw treatment Concentrate feeding Use of minerals	Oat, berseem Sudan Napier Straw, stover etc No 0.5 kg/kg milk [Bran, cake, maize flour etc] No mineral	Oat, berseem Maize, bajra Napier Straw, wheat and lentil stover No 0.5 kg /1 lit milk [Chapat, maize/wheat bran etc] No minerals	Oat, berseem Maize, bajra Napier Straw, wheat and lentil stover etc No 2-3 kg /day [Chapat, maize/wheat bran etc] Cons: 37/kg No minerals

4	Breeding management AI and NS Types of bulls used for NS Cost for AI Infertility cases Post partum heat Age at first calving, Inbreeding Availability of travis Replacement of bulls by heifer Basis of selection Duration of keeping buffaloes	Both AI and NS Local bulls 500 for AI 500 for NS Infertility: High 2-8 M 4 years No idea No travis Yes Good breed 5-6 lact	Both AI and NS Local bulls 500 for AI and 300 for repeat 700 for NS Infertility: Yes but not reported 2-8 M 4 years No idea No travis Yes Milk, good body 10 lact	Both AI and NS Murrah cross bulls 500 for AI 500- 700 for NS Yes 6-7 M 4-5 years No idea No travis Yes Milk, horn, good body 5-6 lact
5	Health management .	Prolapse, Mastitis, FMD, HS No vaccination for HS/BQ/FMD Drenching: Yes No lab facility Tech service: 6 Km Tech service: From private	Mastitis, FMD, HS, EF, Tympany, Drenching: Yes No lab facility Tech service: Nawalparasi Tech service: From private From Public:	Mastitis, FMD, HS, EF, Tympany, Drenching: Partially Lab Test: fecal only Tech service: Yes including medicine

		From Public: No medicines		
6	Milk market	Milk sale: Almost through middle man If any surplus home consumption 50/lit (water added) 70/li (No water) No any milk products made Milk to Cooperative: Plastic bucket	Milk sale: almost Private dairy 60-80 /lit (Lacto reading) Some sale in India: 70/li No any milk products made Milk to Butwal: Plastic bucket	Milk sale: Almost to dairy 60-80 /lit DDC: No regular collection, Sale to private Payment: Timely Silver bucket
7	Live animals marketing	Male sale: 1 to 2 year Buffalo: after dry Cost of heifer: 20 thousands Buffalo sale: 40 to 60 thousands Male heifer: For meat	Male sale: 1 to 2 year Buffalo: after dry Cost of heifer:10 - 20 thousands Buffalo sale: 40 to 50 thousands Male heifer: For meat	Male sale: 1 to 1.5 year Cost of heifer:20 - 30 thousands Buffalo sale: 1 to 1.2 Lacks Male heifer: For meat
8	Service providers	Vet JTA Service: 5 to 6 animals/day	Vet JTA Service: 25 to 30 animals/day Refresher training: Yes but needs for refresher training regularly, visit, Vet surgeon	Vet JTA Service: 4 to 5 animals/day

		Refresher training: No Asked for this, insurance etc	service, training, insurance etc	Refresher training: No and needs for refresher training regularly, visit,
9	Issues, constraints and challenges	Need of improved buffalo and bulls, Provision of grant support, Market problem, Vet hosp provision, Lab provision, Tech service from senior/experts, Regular vaccination, Good quality semen, reliable AI, Insurance of animal based on real cost, travis, support for shed, soft and easy access to the loan	Local Gov should implement the program, Improved breed be provided, Animals brought from India don't suit, Inadequate service delivery, AI not effective, Buffalo Resource centres: BH and MHs be established, Organic farming,	Feed and charan area limited, Loan on subsidized rate, Bank doesn't support less than 5 lacks and Micro-finance charge high interest rate, Improved buffalo/bulls, Regular service

Annex 16: Information from Rupandehi Districts

SN	Items	Location 1	Location 2	Location 3
		Tikuligadh dugdha utpadak Sahkari Sanstha	Marchabarimai Pashupalan Samuh	Samaymai gai/bhaishi palan krishak samuh
1	Pop status			
	No/HH	3.5	80	6
	Lact:Total	52%	51%	57%

	Breed	Murrah Cross	Murrah cross	Murrah cross
2	Prod status DMY	6-7 lit	4 lit	6 lit
3	Fodder situation Winter fodder Summer Perennial Dry season Use of straw treatment Conc feeding Use of minerals	Oat, berseem Sudan Napier Straw, stover etc No 0.5 kg/kg milk [Bran, cake, maize flour etc] No mineral	Oat, berseem Sudan Napier Straw, stover etc No 0.5 kg/kg milk [Bran, cake, maize flour etc] No mineral	Oat, berseem, Maize, teosinte, sudan Napier Straw, stover etc No 3 katha/HH for fodder 2-4 kg/day [Bran, cake, maize flour] No mineral
4	Breeding mgmt. AI/NS Bulls Cost for AI Infertility AFC Inbreeding Travis Replacement of bulls by heifer Basis of selection	Both AI and NS Bulls: Murrah cross 500 Yes 4-5 years No idea No Yes Milk	Both AI/NS Bulls: Murrah 500 and 500 for repeat, Yes 4-5 years No idea NO Yes Body status	Both AI/NS Bulls: Murrah 500 AI and 500 for repeat, NS free Yes 3-4 years No idea NO Yes

	How long buffalo kept?	6-7 lactation	5-6 lact	Body status 5-6 lact
5	Health mgmt.	Prolapse, Mastitis, FMD, HS No vaccination for HS/BQ/FMD Drenching: Yes No lab facility Tech service: 6 Km Tech service: From private From Public: No medicines	HS, FMD No regular vaccination NO regular drenching	FMD, HS, EF, Degnella Vaccination: Yes for HS/BQ/FMD Drenching: Yes Lab facility: Fecal test Tech service: Near Tech service: Yes
6	Milk market	Milk sale: almost through middle man If any surplus home consumption 50/lit (water added) 70/lit (No water) No any milk products made Milk to Cooperative: Plastic bucket	Milk sale: almost Through middle man	Milk sale: Almost though private dairy If any surplus home consumption 60-80/lit (Lacto) No any milk products made Milk to Butwal Plastic bucket
7	Live animals	Male sale: 1 to 2 year Buffalo: after dry	Male sale: 1 to 2 year Buffalo: after dry	Male sale: 1 to 2 year Buffalo: after dry

		Cost of heifer: 20 thousands Buffalo sale: 40 to 60 thousands Male heifer: For meat	Cost of heifer: 20 thousand Buffalo sale: 40 to 60 thousand Male heifer: For meat	Cost of heifer: 20 thousands Buffalo sale: 40 to 50 thousands Male heifer: For meat
8	Service providers	Vet JTA Service: 5 to 6 animals Refresher training: No Asked for this, insurance etc	Vet JTA Service: 5 to 6 animals Refresher training: No Asked for this, insurance etc	Vet JTA Service: 5 to 6 animals Refresher training: No Asked for this, insurance etc
9	Issues, constraints and challenges	Improved buffalo and bulls, Provision of grant support, Market problem, Vet hosp provision, Lab provision, Tech service from senior/experts, Regular vaccination, Good quality semen, Not reliable AI, Insurance of animal based on cost, Travis, Support for shed, Loan on subsidized rate	Local Gov should implement the program, Improved breed be provided, Inadequate service delivery, AI not effective, Buff Res centre: BH and MHs be established, Organic farming,	Improved buffalo and bulls, Fodder seed, Insurance, Grant based on production

Annex 17: Information from Kapilbastu Districts

SN	Items	Location 1	Location 2	Location 3
		Dhankauli Bhaishi palan Krishak Samuh	Gaugoresh Bhaishipalan Krishak Samuh	Harnampur Krishi sahkari sanstha
1	Pop status			

	No/HH	115	143	5-6
	Lact:Total	57%	49%	39%
	Breed	Local and Murrah Cross	Local and Murrah cross	Murrah cross
2	Prod status	3.5 to 6.5 lit	4-5 lit	6.5
	DMY			
3	Fodder situation			
	Winter fodder	Oat, berseem	Berseem,	Berseem
	Summer	Teosinte, Sudan	Teosinte, sudan, bajra,	Maize
	Perennial	Napier, Local	Local grass	Ban ko Ghansh
	Dry season	Straw, stover etc.	Straw	Straw
	Use of straw treatment	No	No	No
	Conc feeding	1.5 to 3 kg/day [Local to improved]	2 kg/animal	1-2 kg/animal
		[Bran, dalia, cake, maize flour etc.]		
	Use of minerals	No mineral		
4	Breeding mgmt.			
	AI/NS	Both AI and NS	More NS and less AI	AI 500
	Bulls	Murrah cross : 2	AI: 800; NS:500-800	NS 500-700
	Cost for AI	600 for AI	Local bulls	
		600 for Repeat		
		NS: 1000 for improved and 400 for local		

	Infertility AFC Inbreeding Travis Replacement of bulls by heifer Basis of selection How long bulls kept?	Infertility: High 4-5 years Inbreeding: No idea Travis: No Post partem heat: 4 m-1 yr Yes Good breed 4-5 lact	Less 4-4.5 years No travis 4-10 months Yes Breed, horns, body size 5-7 lact	Less 4-5 years No inbreeding idea No travis Yes Milk 4-5 lact
5	Health mgmt. .	FMD, HS, Degnella Vaccination for HS/BQ/FMD not regular Drenching: Yes but not regular Lab facility: Fecal test Tech service: 8 Km	HS, FMD, Tympany Irregular vaccination and drenching	HS, FMD, Degnella, Vaccination: No regular Drenching: No regular
6	Milk market	Milk sale: almost through Hotel, Private, dairy etc If any surplus ghee and dahi 50-60/lit ; 70/li (For private dairy)	Milk sale 60-100/lit	Bhairahawa, Butwal 60-80 /lit

		No any milk products made Milk to Mahalaxmi dairy Emiliya: Plastic, silver bucket	Steel/silver/plastic	
7	Live animals	Male sale: 2 to 4 year Buffalo: after dry Cost of heifer: 30-50 thousands Buffalo sale: 40 to 60 thousands Male heifer: For meat	2-3 years 15-30 thousands 5-6 lactation 60-65 thousands	2-3 years male heifers: 25-40 thousands
8	Service providers	Vet JTA Service: 10 to 15 animals Refresher training: No Asked for refresher training, visit, insurance etc.	15-25 animals/day Vet JTA, No refresher training Refresher training, visits, tour AI accessories access	10-12 animals/day,
9	Issues, constraints and challenges	Improved buffalo and bulls, Improved shed, Market problem, Technical service Travis, Loan on subsidized rate,	Shed improved, Improved buffalo//bulls, Shallow tube well, Fodder seed, Farmers training, Regular vaccination, Establishment of Cooperative, Grant based on production, Silage machine, Observation tours	Technicians, Grant based on production, Improved buffaloes/bulls, Fodder seed and saplings, Training, Regular vaccinations, Insurance

Annex 18: Information from Dang Districts

SN	Items	Location 1	Location 2
		Bhaisi Shrotkendra Samiti Ko Karyalay Rajpur, Dulaiya	Bhairab ekikrit krishi farm, Gadwa
1	Pop status No/HH Lact:Total Breed	73 37% Local, Murrah Cross	35 62% Local , Murrah cross
2	Prod status DMY (Lit)	3-5	6-7
3	Fodder situation Winter fodder Summer Perennial Dry season Use of straw treatment Conc feeding Use of minerals	Oat, berseem Teosinte, Maize, Sudan Napier,Fodder cultivation: 2 Biggah 3 Kathas; 4.3 Kathas/HH Straw, stover, Maize stover etc. No treatment 1-1.5 kg/day [Bran, cake, maize flour etc.] No mineral	Oat, berseem Teosinte, sudan Napier 3 biggah/samuh Straw No treatment 1.5-3 kg/day No minerals
4	Breeding mgmt. AI/NS	NS	No AI, NS: 1000

	Bulls Cost for AI Infertility AFC Inbreeding Travis Replacement of bulls by heifer Basis of selection How long buffalo kept?	Murrah cross : 3 - Infertility: High AFC: 4-5 years Inbreeding: No idea Travis: No Yes Milk 5-6 lact Post partem heat: 4 m-1 yr	Murrah cross - No infertility AFC: 4-5 years No idea of inbreeding No travis Yes Milk 5-6 lact Post; 3-6 months
5	Health mgmt.	HS, FMD, BQ, EF, Tympany, Vaccination for HS/BQ/FMD but not regular Drenching: No regular Lab facility: Fecal test Technical service: Far	FMD, Calf scours, No vaccination Drenching Yes but not regular Tech service: 4-5 Km
6	Milk market	Milk sale: Sale and home consumption Private, Hotel 50-55/lit No any milk products made Milk to Cooperative: Payment lately Plastic and Steel bucket	Milk sale through Private dairy

7	Live animals	Male sale: 1 to 1.5 year Buffalo: After dry Cost of heifer: 16-20 thousands Buffalo sale: 80 to 90 thousands Male heifer: For meat	Male sale: 3- 4 years Buffalo: 1.25 to 1.5 Lacks
8	Service providers	Diploma Service: 4 to 5 animals/day Refresher training: No Asked for refresher training, insurance, Observation tour	Vet JTA
9	Issues, constraints and challenges	Improved technology, Improved buffalo/ bulls, Feed and fodder problem, Market problem, Grant based on production, Insurance, Collection centre, Shallow tube well, Vet mobile health camps, Soft loan at low rate and be based on production, Training and observation tour	Improved buffalo/bulls, Improved shed, Fodder seed and saplings, Insurance

Annex 19: Information from Banke Districts

SN	Items	Location 1	Location 2
		Budhathoki Baishi Farm, Padampur, Duduwa	Mimti Bhaishi Farm, Duduwa
1	Pop status		
	No/HH	16	12
	Lact:Total	43%	33%

	Breed	Local and Murrah Cross	Local and Murrah cross
2	Prod status DMY (litres)	8	10
3	Fodder situation Winter fodder Summer Perennial Dry season Use of straw treatment Conc feeding Use of minerals	Berseem Maize, teosinte, Banko ghansh, Straw, stover etc. No 3-4 kg/day [Bran, cake, maize flour etc.] No mineral	Oat Maize Banko ghans Straw No Yes [Bran, police, flour, cake] No mineral
4	Breeding mgmt. AI/NS Bulls Cost for AI Infertility Inbreeding Travis Replacement of bulls by heifer AFC	Both AI and NS Murrah cross : 2 AI: Free Infertility: Low Inbreeding: No idea Travis: Yes Yes AFC: 4-5 years	AI and NS: Free Bulls :2 Murrah cross Free Infertility less Inbreeding: No idea No Travis Yes AFC: 4-5 years

	Basis of selection How long buffalo kept?	Good animals 9-10 lact Post partem heat: 3 6 months	Milk 6-7 lact
5	Health mgmt. .	HS, FMD, Vaccination for HS/BQ/FMD Drenching: No regular Lab facility: Free	HS, FMD Vaccination: No regular Drenching: Yes
6	Milk market	Milk sale: Almost through private collection centre 60-65 /lit No any milk products made Steel bucket	Sale to Cooperative 50-60/lit No products Steel utensil
7	Live animals	Male sale: 1 to 1.5 year Cost of heifer: 15-35 thousands Buffalo sale: 50 to 90 thousands Male heifer: For meat	1-1.5 year sale 15-35 thousands
8	Service providers	JT/JTA	JT/JTA
9	Issues, constraints and challenges	Improved buffalo and bulls, Provision of grant support, Improved fodder seed,	Improved fodder, Grant in production. Improved buffalo and bulls, Technical service be continued, Vet Doc service

		Observational tour to the farmers, Regular service from Experts,	
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Annex 20: Information from Bardiya Districts

SN	Items	Location 1	Location 2
		Bhagbati Dugdhta Utpadak Sahkari Sanstha	Mankamana Bhaishi palan farm, Bhasgadhi
1	Pop status		
	No/HH	8	27
	Lact:Total	50%	42%
	Breed	Local and Murrah Cross	Murrah cross
2	Prod status	7	7-8
	DMY (litres)		
3	Fodder situation		
	Winter fodder	Oat, berseem,	Oat, berseem
	Summer	Teosinte, sudan	Maize, teosinte
	Perennial	Napier	Local grass
	Dry season	Straw, stover etc.	Straw
	Use of straw treatment	No	No
	Conc feeding	2-3 kg/day [Bran, cake, maize flour etc.]	3 kg/day [Maize and wheat flour, bran, rice police etc]
	Use of minerals	No mineral	No mineral

4	Breeding management. AI/NS Bulls Cost for AI Infertility AFC Inbreeding Travis Replacement of bulls by heifer Basis of selection How long bulls kept?	Both AI and NS but more NS Murrah cross : 2 AI: 500 and 55 for repeat NS: 1000 Infertility: Low AFC: 4-5 years Inbreeding: Controlled Travis: Yes Yes Good animals 5-6 lact Post partem heat: 3 12 months	NS: Local bulls, 1000 No AI No infertility AFC: 4 year No idea of inbreeding No travis Yes Body structure, mammary gland, 5 lact
5	Health mgmt. .	HS, FMD, Skin problems, Mastitis, Prolapse, BQ Vaccination for HS/BQ/FMD Drenching: No regular but given if infected Lab facility: Fecal test Technical service: Private	Milk fever No vaccination No regular drenching
6	Milk market	Milk sale: Almost	Milk sale

		through Cooperative 65-70 /lit, 55 to 80/lit (Lacto) Dahi, Paneer, Ghee, Khowa Silver and Steel bucket	70/lit
7	Live animals	Male sale: 1 to 3 years Cost of heifer: 20 -30 thousands Buffalo sale: 40 to 60 thousands Male heifer: For meat	>1 year heifer 20 thousands
8	Service providers	JT/JTA	JT 8-10 animals/day No refresher training, Training, visit, Loan at subsidized interest rate
9	Issues, constraints and challenges	Improved bulls from India, Improved buffalo, Provision of grant support based on production, Market problem, Insurance of animal, Improved shed, Fodder seed Loan on subsidized rate	Insurance, Laboratory facilities, Data collection, Training

Annex 21: Performance Records to be maintained at Breeders and Multiplier Herds

	Records	BHs	MHs	Remarks
A: Pedigree	ID, Sire, Dam, Grand sire, Grand dam	Mandatory	ID, Sire, Dam	
B: Weight Traits	Birth weight, Weaning weight, 1 year weight, 2 year weight, 3 year weight	Mandatory	Birth weight, weaning weight and 1 year weight	
C: Reproductive Traits	Age at first mating, Age at first calving, Lactation length (Days), Post partem heat (months)	Mandatory	Mandatory	
D: Production Traits	Daily milk yield, lactation milk yield, Fat%	Mandatory Milk yield of animals and their dams yield	Mandatory	Milk yield of animals and their dams yield

Annex 22: Feeding Standards at Breeders and Multiplier Herds

Particulars	BHs	MHs	Remarks
A: Concentrate/Supplement	Commercial feed/feed supplement	Feed supplement	Good quality feed
	: Meeting the requirement of maintenance, production and reproduction	Meeting the requirement of maintenance, production and reproduction	
B: Green forage	Annual and or perennial forage [Oat, berseem, maize, bajra, sudan, napier, local, fodder trees etc] Silage	Annual and or perennial forage [Oat, berseem, maize, bajra, sudan, napier, local, fodder trees etc] Silage	Non legumes and legumes combination Silage can replace amount of green fodder
C: Dry forage	Crop byproducts [Rice straw/wheat straw, maize stover, millet stover etc]	Crop byproducts [Rice straw/wheat straw, maize stover, millet stover etc]	Crop by-products be treated with chaffing etc

D: Other additives	Minerals [Mixture or block]	Minerals [Mixture or block]	
E: Water	Fresh, clean water ad libitum	Fresh, clean water ad libitum	

Annex 21: List of the Participants at the Status Paper Presentation and Interaction

आज मिति २०७५/०३/१० का दिन कृषि, रवाय-प्रविधी तथा भूमी व्यवस्थापन मन्त्रालयको लगानीमा सिद्धार्थ इन्स्टिट्यूट अफ रिचर्च एण्ड कन्सल्टेन्सी प्रा.ली, तिलोत्तमा-३ जानकीनगरको परामर्शकारी कार्यलयमा दिइएको "A Study on Strengthening Buffalo Genetic Improvement in Southern part of Lumbini Province" तथ्यको Status paper presentation को सिलसिलामा निम्नानुसारको उपस्थिति रह्यो।

स्थान:- न्यू ईरा हटेल, गुरवला

अध्यक्ष:- डा. परमेश आलम ज्यू निर्देशक पशुपक्षी तथा महत्त्व नि-
कार्य निर्देशनालय

(१) विशेष अतिथी: श्रीयामनारायण देवकोटा:- कृषि, रवाय-प्रविधी तथा भूमी व्यवस्था मन्त्रालयका सचिव ज्यू,

(२) महाआचार्य प्रमुख:- श्री तुलसीराम मण्डारी

(३) श्री लोकेश मुखर्जी - पशु चिकित्सक

(४) श्री दुमकान्त पाण्डेय - पशु विकास अधिकृत

(५) डा. श्रीराम प्रसाद नेडपावे:- Team leader (विषय विश)

(६) डा. लोकनाथ पौडेल - विषय विश

(७) डा. लक्ष्मण धिमरे - " "

(८) डा. प्रदिप शर्मा पौडेल - " "

(९) डा. शम्भु शर्मा विषय विश (Animal Reproduction) एम

११ कैशरी शर्मा आधिकृत पशुपक्षी तथा महत्त्व विकास नि.

(१२) प्रकाश कोइराला पशुपक्षीको व संघ लुम्बिनी प्रदेश सरकार

१३. दिनेश्वर शर्मा पशुपक्षी तथा महत्त्व विकास नि. कोष

१४. अमर कोइराला वि.सं. ज्योतीकावे पशुपालन पक्ष

१५. विष्णु शर्मा अग्रवाल नरेला सहित उपदेही

१६. मोहन कार्की सींगी कार्डर कर्पोरेशन प्रा.ली. ०२१११४

१७. रैलेस जेष्ठ अनुभाषण एगो फार्म सा.वि.देवदह

१८. आनन्द कार्की यादव आनन्द फुड्स एण्ड कार्डर एगो फार्म

१९. लक्ष्मण शर्मा शैली दे. देवदह

२०. लक्ष्मण पाण्डेय जिल्ला दुध उ.न.क.वि. अध्ययन उपदेही

२१. यशमणि रत्नल पशुपालन सञ्जल (पथरहा)

२२. रेशम रत्नल कृषि व्यवसायी

२३. डा. शिव लाल मुखर्जी MSLIP, गुरवला

२४. कृष्ण प्रसाद शर्मा रवाय विकास नि.

२५. तेज कुमार पाण्डे अध्यक्ष उद्योग वि.सं. देवदह

Annex 22: List of Participants at the Validation Workshop

7. PHOTOS



Plate 1: FGD at the community in Rupandehi



Plate 2: FGD at the community



Plate 3: Interaction with the stakeholder in Kapilvastu



Plate 4: Buffaloes grazing at the community land in Dang



Plate 5: Interaction with the community by the study team in Bardiya



Plate 6: Buffaloes for potential breeder herd in Rupandehi



Plates7: Buffaloes for potential breeder herd in Rupandehi



Plate 8: Road side grazing in Rupandehi



Plate 9: Road side grazing in Rupandehi



Plate 10: Photo with Secretary after status report presentation in Butwal



Plates11: Interaction with the community in Rupandehi where roadside grazing is a common feature after wheat harvest



Plate 12: FGD at the community in Kapilvastu



Plate 13: FGD at the community in Kapilvastu





Plates 14 and 15: FGD at the community in Nawalparasi



Plate 16: FGD at the community in Nawalparasi



Plates17:Validation workshop in Butwal



Plate 18: Team with Secretary at a farmer's herds in Rupandehi



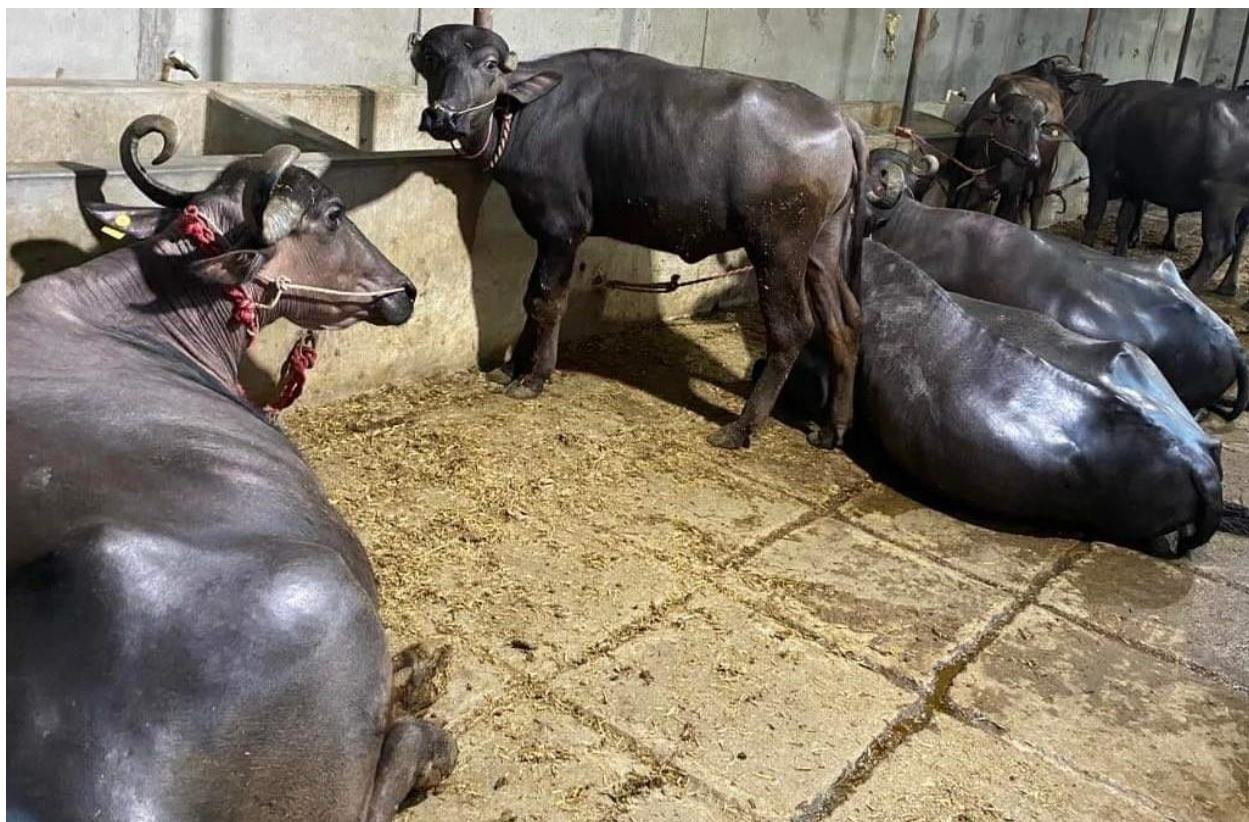
Plates 19 and 20: Farms adopting silage feeding in Rupandehi



Plate 21: Team with Secretary at a farmer's herds in Rupandehi



Plate 22: Status Presentation workshop in Butwal



Plates 23 and 24: Potential Buffalo Breeder herds in Rupandehi



Plate 25: Buffaloes grazing at the open field in Rupandehi



Plate 26: Potential Buffalo Breeder herds in Rupandehi



Plate 27: Study team with potential Buffalo Breeder Herds in Belbase, Rupandehi



Plate 28: Stover stored at the community



Plate 29: Presentation in the validation workshop in presence of the Secretary and other officials at the ministry meeting hall, Butwal.



Plate 30 and 31: Murrah buffalo farm in Belbas, Rupandehi where we see pure Murrah bulls and buffaloes indicating the possibility of establishment of Breeder herd in Lumbini province.



Plate 32: With the Secretary and study team members in one of the commercial farms in Rupandehi



Plate 33: Discussion with the Director of Livestock and Fisheries in a group consultation meeting in Lumbini Sanskritik Municipality-2, Rupandehi