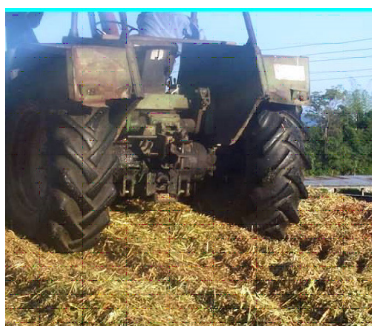


**ANNUAL TECHNICAL REPORT**  
**NATIONAL LIVESTOCK BREEDING OFFICE, POKHARA**  
**(Fiscal Year 2078/79)**



**Government of Nepal**  
**Ministry of Agriculture and Livestock Development**  
**Department of Livestock Services**  
**National Livestock Breeding Office**  
**Lampatan, Pokhara-14, Kaski**  
**Tel: 061-430489/430373/430540/505389**

## PREFACE

In the fiscal year 2020/21, the agriculture, industry and service sectors of Nepal grew by 2.6% and 5% and 4.4% respectively. Similarly, the contribution of agriculture, industry, and the service sector to the GDP of the country was 25.8%, 13.1% and 61.1% respectively. Economy of Nepal, which has been stagnant for 2 consecutive years due to the Corona epidemic, has started to recover only from last year. Nonetheless, COVID-19 disrupted the economic and social life of Nepal to some extent even in the last year. However, as in the previous year, Agriculture sector remained least affected in comparison to other sectors of goods and services by this pandemic during the last fiscal year as well. All this indicates the importance of this sector in our country. From the viewpoint of GDP, employment and income generation, agriculture sector has long been the major sector of Nepalese economy. Yet, it provides employment (including full time as well as part time opportunities) to 60 percent of the total population and contributes about 27 percent to the GDP (Contribution of Industries & Services Sector to the GDP being around 13% & 50% respectively). Similarly, share of livestock & fishery sub sector in GDP is estimated to be around 13%. Thus, livestock subsector is important not only to farm families but to national economy as well. Recently, everyone seems to have accepted this even more.

National Livestock Breeding Office, Pokhara, with 56 permanent staff under the leadership of Chief Livestock Development Officer, is one of the major resource centers of superior genetic materials under Department of Livestock Services (DLS). The office was created by the union of the then Livestock Development farm, Pokhara and the then National Livestock Breeding Center, Pokhara in the fiscal year 2074/75. Before the union of these two offices, they had been contributing to the livestock development sector in the country by their own separate activities. These two separate offices have now been united to provide the services like semen production and distribution, liquid nitrogen production and distribution and other services required for artificial insemination, livestock breed improvement and as a resource center of superior genetic materials as well.

While bearing the responsibility or mandate given to this office for breed improvement at farmers as well as national level, we have purchased and reared some meritious breeding bulls in the fiscal Year 2078/79 as well. Out of them, 4 Jersey & 2 Holstein Bulls were imported from the USA by NLSIP Project and were provided to us. Realizing the fact that importance of livestock is not just limited to income and employment but is very important from the perspective of food and nutrition security, many governmental as well as non governmental organizations and stakeholders have continuously been keeping an eye on this office activities as well. All this has also inspired us to be even more responsible than before.

In Nepal, per-capita availability of milk, meat and egg is far below in comparison to FAO recommendation and per capita consumption in many developed countries all over the world. Milk, meat and egg production thus needs to be increased through increased livestock productivity. Artificial Insemination (AI) is one of the most important tools of animal breeding for genetic improvement and has also been given a top priority programme of the Department of Livestock Services. National Livestock Breeding Office (NLBO),

Pokhara has been bearing the responsibility of running/supporting AI program throughout the country.

This annual report provides the last 29 years information about the AI programs, achievements, relevant issues and other technical information of National Livestock Development Office, Pokhara. Also, it incorporates all the major activities of NLBO, Pokhara that relates to the fiscal year 2078/79. The issue of Annual Report of National Livestock Breeding Office, Pokhara contains details of what the relevant office, despite many challenges, had been able to achieve in the fiscal year 2078/79. The interested readers will also find information on technical performance and strengths and opportunities of different units of NLBO, Pokhara.

Similar to other offices under Department of Livestock Services, National Livestock Breeding Office, Pokhara also has been facing challenges of encroachment, shortage of resources and inadequate facilities to run the nucleus farms, laboratory and AI services efficiently. The most significant issue in recent years affecting the performance is increased price of inputs and inadequate funds even for routine farm and semen collection operations & Human Resource Development. Despite all this, we have put our continuous efforts to achieve our goals. Genetic superiority and environmental factors together determine production potential of an animal and NLBO has been trying its best bearing its responsibility of producing different genetic materials of high merit. In this situation, recently established **Bull Mother Farm** under NLBO, Pokhara, as an additional unit of this office, can be considered a milestone for the breed improvement programs in the country.

I would like to express my sincere gratitude to Dr. Deepak Kumar Kharal, Secretary, Ministry of Agriculture and Livestock Development, Dr. Samjhana Kumari Kafle, DG, Department of Livestock Services and all former secretary of the ministry the visitors from MoALD, DLS and other organizations for their valuable advice and support rendered to NLBO during the last and current fiscal year in their tenure.

Also, I would like to express my sincere gratitude to Senior Livestock Development Officers, Livestock Development Officers, account and administrative staff, Livestock Service Technicians, Junior Livestock Service Technicians and all the other staff and workers, who are actively involved for the successful implementation of assigned work or activities during the period. Also, I would like to thank Mr. Bharat Raj Gautam, Livestock Development Officer of NLBO, Pokhara for his special efforts in bringing this precious gift to all of us.

**Dr. Jagadish Pandeya**  
**Chief Livestock Development Officer**  
**National Livestock Breeding Office, Pokhara**

### **Note to the Readers:**

The then NLBC & LDF, Pokhara make present National Livestock Breeding Office, Pokhara & the then LBO, Lahan & LBO, Nepalgunj have been converted into present NLBO, Lahan & NLBO, Nepalgunj respectively. Accordingly, readers are requested to infer that NLBC stands for the then National Livestock Breeding Center, LBO stands for Livestock Breeding Office & LDF, Pokhara stands for Livestock Development Farm, Pokhara in this report.

## ACRONYMS

1	ABAI	Animal Breeding & Artificial Insemination Section
2	ABD	Animal Breeding Division
3	ADB	Asian Development Bank
4	AHD	Animal Health Directorate
5	AI	Artificial Insemination
6	AFC	Age at First Calving
7	AFF	Age at First Farrowing
8	AS	Australorp
9	BS	Bikram Sambat
10	CI	Calving Interval
11	C0-4	Coimbatore-4
12	CLDP	Community Livestock Development Project
13	CV	Cultivar
14	DCIP	Dairy Cattle Improvement Program
15	DDG	Deputy Director General
16	DG	Director General
17	DLS	Department of Livestock Services
18	D	Duroc
19	DLC	Duroc Landrace Cross
20	DOC	Day Old Chicks
21	DTMS	Double Track Management System
22	ET	Embryo Transfer
23	F	Female
24	FA	Field Assistant
25	FCalves	Female Calves
26	FMD	Foot & Mouth Disease
27	FY	Fiscal Year
28	FAO	Food and Agriculture Organization
29	GADP	Gandaki Anchal Agriculture Development Project
30	GP	Gestation Period
31	GTZ	German Assistance for Technical Cooperation



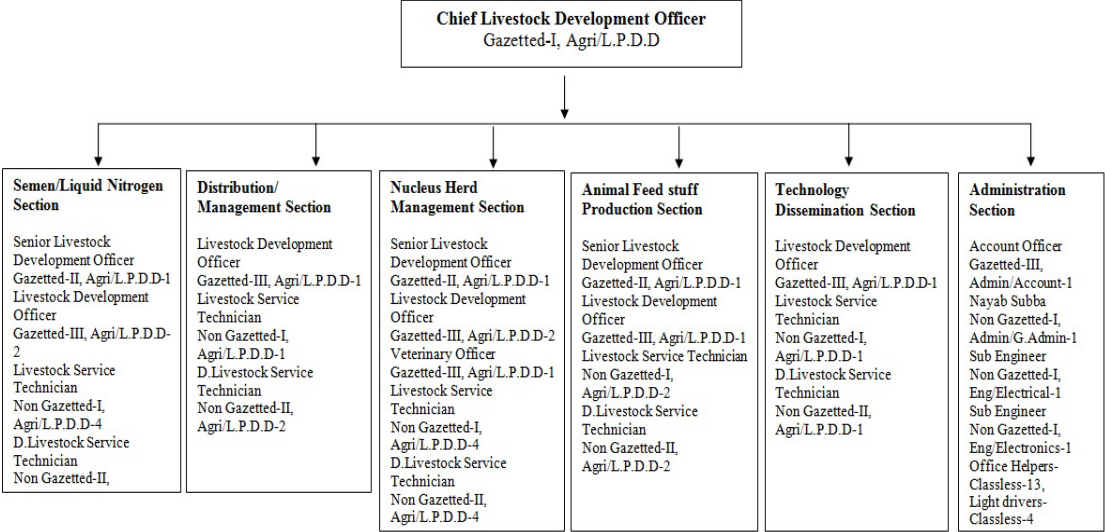
32	Ha	Hectare
33	HCP	Herd Calving Percent
34	JICA	Japan International Cooperation Agency
35	JLST	Junior Livestock Service Technician
36	JOCV	Japan Overseas Country Volunteer
37	L	Landrace
38	LDF	Livestock Development Farm
39	LDO	Livestock Development Officer
40	LL	Lactation Length
41	LSBA	Litter Size Born Alive
42	LST	Livestock Service Technician
43	LY	Lactation Yield
44	LY305	Lactation Yield in 305 days
45	LYC	Landrace Yorkshire Cross
46	LBO	Livestock Breeding Office
47	LIAJ	Livestock Improvement Association Japan
48	LN2	Liquid Nitrogen
49	LPD	Livestock Production Directorate
50	M	Male
51	MCalves	Male Calves
52	MALD	Ministry of Agriculture and Livestock Development
53	Mt	Metric ton
54	NARC	Nepal Agriculture Research Council
55	NB	Napier Bajra Hybrid
56	NH	New Hampshire
57	NLBC	National Livestock Breeding Centre
58	NLBO	National Livestock Breeding Office
59	PJ	Pokhara Jersey
60	PLBP	Promotion of Livestock Breeding Project
61	PM	Pokhara Murrah
62	RH	Relative Humidity
63	SD	Standard Deviation

64	SF	Swine Fever
65	TLDP	Third Livestock Development Project
66	VAHW	Village Animal Health Worker
67	W/W	Weight by weight
68	Y	Yorkshire
69	YBulls	Young Bulls

# 1. Organizational Chart of NLBO, Pokhara

After the union of the then Livestock Development Farm, Pokhara & the then National Livestock Breeding Center, Pokhara, in 2074/75, Following organizational chart had been proposed and accepted for the newly formed National Animal Breeding Office, Pokhara. The Office has 56 Staff under the leadership of Chief Livestock Development Officer.

National Livestock Breeding Office, Pokhara (Organizational Structure)





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## 1. INTRODUCTION:

### 1.1) Historical Background:

Livestock development in Nepal is considered to have been initiated, with import of cows from UK, way back in 1917 B.S. by the then prime minister Jung Bahadur Rana. Since then, the high ranking officials and ruling elites gradually started bringing exotic cows from India, and number of exotic cows in Kathmandu valley increased, as people close to ruling families followed them.

Livestock Improvement Section, with main objective of increasing genetic potentialities of indigenous cows was officially established in 2008 BS (1952 AD), and exotic breeds such as Red Sindhi, Sahiwaal, Jersey and Brown Swiss were used for "grading-up" of native cattle. As there were only small number of crossbred cows in Kathmandu valley, artificial insemination (AI) program with liquid semen was started in 2017/18 (1961/62). Thus, use of Red Sindhi, Sahiwaal, Jersey, Holstein and Brown Swiss liquid semen to up-grade native cattle came into practice, in the year 2018/19 (1962/63).

An *Artificial Insemination Project* was started at Tripureswor, Kathmandu in B.S. 2025/26 (1969/70), and AI program received further momentum after establishment of Liquid Nitrogen (LN<sub>2</sub>) Plant in the year 2037/38 (1980/81). The Project was renamed as *Animal Breeding Division* (ABD) and was shifted to Khumaltar in the year 2041/42 (1985/86). The ABD initiated breeding activities in cattle, buffalo, sheep, goat, pig, and poultry with main emphasis on AI in cattle and buffalos. In 2046, when ABD became a part of Nepal Agriculture Research and Services Center (NARSC), the Department of Livestock Services (DLS) started AI program naming it *Artificial Insemination Services*. The Artificial Insemination Services was renamed *Animal Breeding and Artificial Insemination Program* in 2048/49 (1991/92) and was made a part of the Department of Agriculture Development (DoAD). With restructuring of the Agricultural Ministry and re-establishment of DLS in 2052/53 (1995/96) and the program was named as *Animal Breeding and Artificial Insemination Section*. The section was relocated to Lampatan, Pokhara in the year 2058/59 BS (2001/02 AD) with same name as *Animal Breeding and Artificial Insemination Section* and renamed *National Livestock Breeding Center* in 2061/62 (2004/05).

*National Livestock Breeding Center* (NLBC), located in Khumaltar, Lalitpur since last 18 years was relocated to Lampatan, Pokhara in the year 2058/59 BS (2001/02 AD), and has been functioning to achieve and meet its vision, goal and objectives. Recently, after the country entered into the federal system, the office has been functioning as National Animal Breeding Office since 2075/76 B.S.(2019 A.D.) with the mandate of overall "Animal Breed Improvement & Breeding Policy Formulation" under the Department of Livestock Services which also integrates the then Livestock Development Farm, Pokhara to achieve the common Goal of Breed Improvement in the country.

On the other hand, the then Livestock Development Farm, Pokhara (locally popular as **Bhedi Farm**) was established in 1960 (2017/2018 BS) as Sheep Breeding Farm with the help of New Zealand Government. The project started crossbreeding Local Baruwāl with exotic Polworth breed of sheep, but discontinued the practice as Baruwāl from high hills could not thrive well at Lampatan, Pokhara. Then, Kage, another native breed of sheep was chosen for upgrading and attempts to improve quality and yield of its fleece and body weight were made. The New Zealand assistance ended in 1964.

In 1969, buffalo, pig, goat and poultry production units were initiated in addition to the sheep production unit and the farm was renamed Livestock Development Farm, Pokhara. The farm continues all the units, though the goat production unit was discontinued for a long period after few years. A financial and technical support by GTZ (German agency for technical co-operation) was provided through GADP (Gandaki Anchal Agriculture Development Project) for a period of six years from 1975 to 1980. All existing major farm facilities were developed during this period. The project helped to construct farm infrastructures and import farm machines, tillage equipment and exotic breeding animals from overseas. Objective of the farm then was research on production and production technologies and production and supply of improved genetic resources of livestock and forage planting materials.

The farm remained a research farm under NARC (Nepal Agriculture Research Council) administration since 1987 to 1989 and was brought back under the Department of Livestock Services (DLS) as a production as well as resource farm in 1990. The farm received financial support from GTZ again through PLBP (Promotion of Livestock Breeding Project) from 1990 to 1994 and during this period renovation of sheds and buildings was carried out and some of the farm machineries and animal resources were procured from abroad during this period.

This is the largest farm out of ten government farms under the Department of Livestock Services & different states all over the country. This farm produces buffalo bulls, piglets, day old poultry chicks, Boar goat and forage planting materials and supplies to farmers through Local Governments and Veterinary Hospital and Livestock Services Centers all over the country. Though the command area of the farm was initially supposed to be neighbouring districts and western region, the farm produced genetic resources are supplied to other parts of the country as well. The main activities of the farm are production and distribution of Murrah buffalo bulls, native Kage rams, weaner piglets, day old poultry chicks, Boer Bucks and forage planting materials. In addition to this, the farm has been providing Dairy trainings to the mini dairy plants owner and the aspiring dairy entrepreneurs and technical support and services to Pig Breeder Farmers Group of Pokhara in producing high quality weaner piglets being supplied to various districts of Nepal.

## **1.2 Vision**

As Nepal is rich in domestic animal diversity, genetic potentialities of indigenous livestock, in terms of disease resistance and adaptability should be conserved and utilized with or without proper induction of exotic blood to the defined or optimum level. At the same time, low producing, nondescript domestic animals should be upgraded through artificial and natural breeding with exotic breeds-suitable for country's different eco-zones and suitable new breeds of livestock should be developed using native and exotic blood.

As happened in the recent years, productivity of domestic animals and birds will be continuously increased to meet domestic demand and the top priority will be given to milk and meat production in coming years. As slaughtering of cattle is prohibited in the country, cattle has been reared for milk by most of the the modern farms and buffalo has been the choice of animal both for milk and meat production. Therefore, buffalo should also be promoted and propagated in the country. However, as buffalo alone cannot meet the national demand for milk and draft power, upgrading the nondescript & crossbred cattle with exotic breeds to the defined blood level by the breeding policy will continue by means of artificial insemination and other techniques.

## **1.3 Objectives**

Following are the long-term and short-term objectives of NLBO, Pokhara

### **Long Term Objectives**

- a) Development of suitable breeds of cattle & buffalo for Hill and Terai belts in collaboration with Animal Breeding Division of Nepal Agriculture Research Council (NARC) and Agriculture and Forestry University.
- b) Conservation through utilization of domestic animal genetic resources, such as Yak, Lulu, and Achhamee cattle, Lime and Parkote buffalo, Bhyanglung, Baruwai, Kage, and Lampuchhre sheep, Chyangra, Sinhal and Khari goat, Chwanche and Hurrah Pig, and Ghantikhuile, Naked Neck and Sakini fowl through sustainable group breeding scheme and cryo-preservation through Gene Bank wherever applicable.
- c) Increase production and productivity of local and nondescript livestock breeds by supplying superior or quality seed animals and birds as a breeding stock for cross breeding through artificial and natural breeding.
- d) Develop and establish organized resource farms in private sector, for improved animal genetic resource supply, especially, through progeny testing program.
- e) Substitute import of milk and meat, by increasing domestic production.

- f) Formulating the draft of Breeding Policies and Plans for different livestock and poultry.
- g) Continuous Selection of Breeding Bulls for semen selection from PPRS- Pedigree Performance Recording Scheme under Dairy Cattle Improvement Program (DCIP) Programs.

### **Short and Medium-term objectives**

- a) Complete characterization, identification, selection, conservation and utilization of indigenous animal genetic resources, for better production and productivity.
- b) Increase the productivity of cattle and buffalo, through artificial insemination program in road approachable areas, and natural breeding in remote areas.
- c) Provide technical guidelines for the establishment of improved animal genetic resource (cattle, buffalo, goat, sheep, pig and poultry) centers in private sector.
- d) Select superior sires and dams of cattle and buffalo bulls to be used for frozen semen production.
- e) Introduce and practice Embryo Transfer Technology (ETT).
- f) Expand AI coverage through intensive AI program and privatization of AI service in potential areas.
- g) Introduce & Expand AI services in goat and Pig as well in all the potential districts.

### **1.4 Location & Soil Type:**

This integrated farm with nucleus herds and flock of many livestock species is located at Lampatan, Ward Number 14 of Pokhara Metropolitan City, Kaski district, Gandaki Province in Nepal. The farm is situated at an altitude ranging from 640 to 770 meters above sea level and at a distance of 200 km towards west from Kathmandu, nearby Pokhara International Regional Airport and three kilometers towards the south from Amar Singh Chowk, Pokhara. However, the semen production laboratory, breeding bull sheds and liquid nitrogen plant are located at five kilometers towards the south from Amar Singh Chowk.

The top soil layer of the farm land is very thin ranging from 6 to 9 inches with boulder stones in sub-soil layer. The soil is mostly silt loam and poor in organic matter content with PH ranging between 6.3 and 8.0.

## 2. Policies, Programs, Challenges & Achievements

### 2.1. Breeding Policy

Presented below is a brief account of livestock & poultry production situation in Nepal as well as the extract of recently passed **National Livestock Breeding Policy 2078**. The major objective, present scenario and the aspects of the livestock & poultry farming in Nepal and the vision & goal of the present livestock breeding policy has been summarized in some points below.

#### Present situation of Livestock Breed & Breeding

- Farmers are suffering from a very high cost of farm inputs which in turn, is increasing the cost of production of milk, meat, egg etc. every year due to so many technical, political and other reasons.
- Past breed improvement efforts as well as activities for conservation of local animal genetic resources were being conducted on the basis of "Livestock Breeding Policy (2055/56 B.S.)"
- Improvement of local breeds of Cattle and Buffalo is being done mainly by means of crossbreeding (Both by AI, natural mating & very rarely by ET ) non descript, crossbred and local breeds with exotic breeds like Jersey, Holstein and Murrah as per their suitability.
- Artificial Insemination program mostly through frozen semen of Jersey, Holstein, Murrah & Boer buck has been continued and seems more effective than other programs for milk and meat production.
- In-Situ & Ex-Situ conservation of certain identified indigenous breeds of local livestock and poultry is also being done in certain locations of some districts with limited efforts.
- Out of total population of livestock, relatively more productive cattle & buffalo population (in terms of daily milk production) is about 13% and 28% respectively. Regarding goat & poultry, roughly 50% of the population is of indigenous breeds and the remaining 50% is more productive in terms of meat and egg production. Similarly, the reliable number of exotic pig population has not been estimated recently. Almost all the country's sheep population is indigeneous.
- Nonetheless, indigeneous breeds have been found more promising for sustainable production of meat, milk, egg, wool and other livestock products despite their low outputs on short term basis. Nepal is rich in livestock and poultry biodiversity. Unfortunately, some of the indigenous breeds are already either extinct or endangered to be extinct. Therefore, the conservation and utilization of ANGR also is equally important.
- Hence there is an extreme need of breed improvement in livestock and poultry either by crosssbreeding or by selection.



## **Major Problems & Challenges**

- Commercialization of livestock and poultry farm industries is still in crawling or snail's pace due to many factors including political as well as non political ones.
- Due to inadequate efforts to conserve ANGR, Siri cow is almost extinct and the population of some other local breeds is continuously decreasing thereby threatening their possible extinction in coming years or decades.
- Due to negligence, there is even import of frozen semen of unnecessary breeds of animals. There is no strong regulatory function of import of such unsuitable semen due to weak implementation of the existing policy.
- Even identified breeds of animals are being bred with other unsuitable breeds which may cause the loss of breed characters or purity of certain animals due to unawareness/negligence of farmers as well as junior level technicians .
- Threats of inbreeding depression is still considered one of the major problems.

## **Need of National Livestock Breeding Policy 2078**

- To implement the Agreements of New Earth Summit 1992 on livestock genetic resource conservation and their improvement.
- To implement Agreement of biodiversity article 6, 1993 in which every country has to develop the policy and strategy of conservation and improvement of indigenous livestock genetic resources.
- To develop and improve suitable/appropriate breeds of livestock, accepted by the Nepalese environment and management of Nepalese farmers and to stop the import of unsuitable/inappropriate and livestock breeds.
- To findout & recommend the appropriate blood level of different breeds of livestock to different eco-zones of Nepal.
- Identification, Conservation and utilization of suitable indigenous livestock breeds for different regions of the country.

## **National Livestock Breeding Policy 2078 -at a Glance**

### **Vision:**

Develop an animal breeding system that maximizes the use, protection and promotion of genetic resource potential in order to be able to transform the livestock sector in an environment-friendly, qualitative, competitive, modern and commercially viable sector of the country.

### **Goal:**

To increase the productivity of milk, fish, meat, pashmina and eggs by protecting, using and developing the genetic potential of different breeds and species of animals.

**Major Objectives:**

1. Application of appropriate livestock & poultry breeding system for increasing livestock products as well as productivity to address the increasing trend of animal based products
2. Establishment & regulation of animal genetic resources & breeding centers with in the country to make the country self dependent on such appropriate animal genetic resources
3. Create an ideal environment for conservation & sustainable utilization of indigenous animal genetic resources & livestock biodiversity.

**2.2 Infrastructures/facilities:**

The then NLBC was shifted from Khumaltar, Lalitpur to Lampatan, Pokhara-14, in the year 2058/59 (2001/02). Since then, It has been using approximately 9 hectares (Plot no: 17, 25 and 26) of land owned by the then Livestock Development Farm, Pokhara, and following facilities had been developed by Government of Nepal and ADB funded Third Livestock Development Project financial resources. Purchased Machineries have also been included in the list & some of the infrastrucutes/facilities have been shared by the nucleus herd & Double Track units of the office as well.

**1) Facilities Developed by the resources of Government of Nepal**

SN	Item	Detail	Cost of Construction (Rs)
1	Staff Quarter I	Plinth area: 1705 sq. ft. Two floors, 4 families' quarter constructed in 2059.	1800833.00
2	Staff Quarter II	Plinth area: 1705 sq. ft. Two floors, Four families quarter constructed in 2059.	1798115.00
3	Stockman Quarter	Plinth area: sq. ft. Single floor, Four families' quarter constructed in 2058.	1600000.00
4	Feed Store House	Plinth area: 1144.8 sq.ft. Single floor, Five Rooms constructed in 2058.	644000.00
5	Bull Shed II	For twelve bulls with open area: Constructed in 2059.	1495751.00
6	Generator House and Other Facilities	Improvement of collection yard, sheds etc.	1800000.00

7	Bull Exerciser	Providing exercise to bulls for semen collection	149857.70
8	Hay Store	Store Paddy straw for feed as whole year. Constructed in 2064.	400000.00
9	Vehicle Garage	For standing bike and vehicles. Constructed in 2066	4900000.00
10	Bull Shed III	For 12 Bulls with open area: Constructed in 2066.	150000.00
11	Biosecurity gate	To prevent outside animals and diseases	350000.00
12	Biosecurity Post	To prevent zoonotic diseases. Constructed in 2067	150000.00
13	Isolation Shed	To keep diseased animal until cured. Constructed in 2067	150000.00
14	Watchman House	With two rooms, Constructed in 2067	275000.00
15	Office Chief Quarter	Constructed in 2068	4000000.00
16	ET Laboratory	Constructed in 2069 and 2017, 12 rooms	85,00,000.00
17	Bull Shed IV	Constructed in 2069, Capacity 8 bulls	30,00,000.00
18	Buck Shed	Constructed in 2070, Capacity 4 bucks	5,00,000.00
19	Communication Center/Training Hall	Construction Started from 2075/76	1,47,00,000.00
20	Bull Mother Shed	Constructed in the year 2076/77	80,00,000.00
21	New Goat Shed	Constructed in the year 2076/77	70,00,000.00
22	Free Range Poultry Shed and Fence	Constructed in the year 2076/77	30,00,000.00
23	Platform Balance(For the measurement of Bull weight)	Constructed in the year 2076/77	10,00,000.00
24	Building for Feed Mill and Feed Store	Constructed in the year 2076/77	80,11,000.00

25	Baloonhouse for Biogas	Constructed in the year 2076/77	43,70,000.00
26	Pig Shed (New)	Completed in 2077.78	98,50,000.00
27	Goat Shed (New) & Open Shed(New)	Completed in 2077.78	65,00,000.00
28	New Office Building	Completed in 2077.78	70,00,000.00
29	Pig Mating Yard	Completed in 2077.78	5,00,000.00
30	Bull Section's Staff Qtr for Biosecurity	Completed in 2077.78	45,00,000.00
31	Air Shower for lab	Completed in 2077.78	35,00,000.00
32	Dynamic Pass Box	Completed in 2077.78	10,00,000.00
33	Low Presser AV Sterilizer	Completed in 2077.78	10,00,000.00
34	Road Access to Lower Trace	Completed in 2077.78	30,00,000.00
35	Labour Quarter	Completed in 2078.79	45,00,000.00
36	Semen Storage & Management Building	Completed in 2078.79	50,00,000.00
37	Purchase of Nitrogen Transfer Device	Purchased in 2078.79	500,000.00
38	Purchase of Sensing Gun Device for Smile Software	Purchased in 2078.79	1,800,000.00
39	Irrigation Canal (40m)	Completed in 2078.79	40,00,000.00
40	Overhead Tank (100000 litres)	Completed in 2078.79	90,00,000.00
41	Farm Quarantine Shed	Completed in 2078.79	30,00,000.00

42	Completed Bull Mother Shed with Store, Compound wall & Recording Room	Completed in 2078.79	85,000,000.00
	<b>Total</b>		<b>Rs.19,88,94,557.00</b>

## **2) Facilities Developed by TLDP Resources**

<b>SN</b>	<b>Item</b>	<b>Detail</b>	<b>Cost of Construction</b>
1	Officer Quarter	Plinth area: 173.864 sq.m. Two floors; Four familie's quarter constructed in 2058.	Rs. 3498656.26
2	Bull Shed I	Plinth area: 360.36 sq.m. Good for five Bulls; Constructed in 2059.	Rs. 2129889.90
3	Office cum Semen lab	Plinth area: 297. 30 sq.m. Two Floors; Constructed in 2058 and addition of storey in 2059/60.	Rs. 3526300.26 Rs. 2385000.00
4	Deep Boring & High Tension Line	Completed in 2061/62	Rs. 3518000.00
	<b>Total</b>		<b>Rs.1,50,57,846.42</b>

## **3) Facilities Developed by JICA & JICA Senior Volunteer**

<b>SN</b>	<b>Item</b>	<b>Detail</b>	<b>Cost</b>
1	Horizontal Autoclave	Company- Yorco India or Other Indian Model- YSU-405 or Other. Size- 400mmx1100mm in diameter and depth (or 500mm x 900mm). Electric load- 9kw. Power supply- 220volt or 440 volt, 3 phase, 50Hz, AC supply	Rs. 590000.00

2	Semen Mother Container/ Refri (5 pieces)	Company- Inox India, Capacity- 47 litre with more than 6 canisters. Canister capacity may be 2 semen goblet, Evaporation rate-0.5 lit./day or less.	Rs. 140000.00
3	Water Bath	Company Yorco India or Other Indian. Model- YSI-413. Size-455 x 300 x 150mm for 6 racks Power supply- 220 volt, single phase, 50Hz, AC supply.	Rs. 68000.00
4	Steri-clean pass box	Company Yorco India or Other Indian Size- 24" x 24" x 24" with double door open single at a time	Rs. 120000.00
5	Multimedia set	Multimedia set having four in one function (Printer, Scanner, Photocopy & fax)	Rs. 100000.00
6	IMV IS-4	Hi- tech semen filling, sealing and printing machine	-
7	Programmable bio-freezer	Hi- tech Programmable bio-freezer	-
8	Laminar Air Flow Cabinet	Hi- tech Laminar Air Flow Cabinet	-
9	Generator-i	25 KVA Capacity	Rs. 700000.00
10	Generator-ii	25 KVA Capacity	Rs. 700000.00
11	Bicycle	-	Rs. 6000.00

#### **4) Facilities Developed by KUBK**

SN	Item	Detail	Cost
1	Water Purifier	Siemens Company, Germany	Rs. 6,10,200.00
2	Deep Freeze	RQVD 200 -40°C	Rs. 4,50,870.00
3	Vertical Laminar Air Flow	China	Rs. 4,04,540.00
4	Overhead Water Tank	40,000 litres capacity	4954783.00



SN	Item	Detail	Cost
5	Collection Yard	Embryo transfer lab	967838.00
6	Compound wall around LN2 plant	Liquid Nitrogen plant	947431.00
7	Laptop, printer	Canon, HP	130001.00
8	Shed for goat	Capacity 60 goats	953627.00
<b>Total</b>			<b>Rs. 94,19,290.00</b>

#### 5) Facilities Developed by the then Directorate of Livestock Production

SN	Item	Detail	Cost
1	Liquid Nitrogen Plant House	Nitrogen Plant Installed	Rs. 45,00,000.00
Total			Rs. 45,00,000.00

#### 6) Land use by the then NLBC

Out of the 9 hectares of land under use, the then NLBC currently has been using as below:

- Building and sheds: 3 ha. (Plot: 26)
- Seasonal Forage Cultivation : 3 ha. (Plot: 25).
- Perennial Forage Cultivation : 3 ha. (Plot: 23).

#### 2.3 Contribution of External Experts/Volunteers

Contribution of JICA experts/ volunteers has been very significant in strengthening NLBC laboratory and AI program. The NLBC laboratory has been benefited from the services of following experts/volunteers.

*Mr. Sugiura* was the first JOCV to serve this office from July 1985 to July 1988, during his tenure; he demonstrated an excellent ability for the efficient AI in cow. He also worked in the laboratory for production of frozen semen.

*Mr. Matsumoto* was the Second JOCV to work in the AI program from July 1989 to July 1991. He efficiently worked in the laboratory for processing and storage of frozen semen. He also trained AI technicians for efficient artificial insemination in cattle.

*Mr. Shimomura* was the third JOCV who worked in this office from April 1992. He along with Mr. Matsumoto, in addition to his main job of collection, processing and storage of semen, managed to construct a trainer's cow shed (18 cow capacity) with the financial help of JOCV/JICA.

*Dr. Yoichiro FUJIKI* served this office section as a JOCV from 6 April, 1994 to 7 April 1996. During his stay in Nepal, he managed to bring a plastic cow model for training, 38 liquid nitrogen containers, 23 semen refrigerators from JOCV/JICA.

*Mr. Nobuhisa YAMANE* worked in this Section from July 1998 to June 2000. He worked mainly for improvement of frozen semen.

*Mr. Tsutomu ISHIMURA*, JICA Expert in animal breeding and reproductive disorder worked from 4<sup>th</sup> March 1999 to March 2001. During his tenure, he was exclusively engaged in correcting reproductive disorders in cattle and buffalo through Moxa cauterization.

*Dr. Kyoko KAWAHATA*, is the first JICA Senior Volunteer in this Center. She is expert in Frozen Semen Production and was worked in this center as Senior Volunteer since 9<sup>th</sup> February 2009 to December 12, 2010.

The office is thankful to JICA for Senior Expert.

## 2.4 SOURCE OF GENETIC IMPROVEMENT

### 1. Frozen Semen Import

Frozen semen from the bulls & Bucks of high genetic merit is the main source of genetic improvement for low producing cattle and buffalo. Up to now 305328 doses of cattle frozen semen have been imported from countries, namely USA, New Zealand, Finland, Germany, Canada, France, Japan, Italy and India (First Table). Similarly, 66690 doses of buffalo frozen semen also have been imported from India (Second Table) in the previous years. The roles of agencies like GTZ, FAO, LIAJ, Second and Third Livestock Development Projects and Embassies have been very significant in strengthening AI program. No frozen semen was imported last year.

#### Detail of Cattle Bull Semen Import

S.N.	DATE	COUNTRY	BREED	SEMEN DOSE	SOURCE
Jersey					
1	12/17/1985	Australia	Jersey	6000	-
2	2/22/1988	Canada	Jersey	1000	-
3	12/12/1989	Denmark	Jersey	3000	FAO
4	6/5/1991	New Zealand	Jersey	5000	GTZ
5	10/24/1991	USA	Jersey	15000	SLDP
6	11/16/1991	-	Jersey	15000	SLDP
7	11/10/1992	New Zealand	Jersey	7000	GTZ
8	10/22/1992	New Zealand	Jersey	10000	GTZ
9	11/1/1999	India	Jersey	12510	ABAI
10	10/4/2000	India	Jersey	15000	TLDP
11	4/14/2000	India	Jersey	5007	TLDP
12	5/5/2000	India	Jersey	1000	TLDP
13	7/13/2001	India	Jersey	7000	ABAI
14	2003 April	India	Jersey	30000	ABAI
15	2005 July	India	Jersey	28350	TLDP
16	2007 January	New Zealand	Jersey	5000	DCIP
17	2009 January	India	Jersey	5000	Chitawon Milk

18	2011 July	USA	Jersey	2500	DCIP
19	2012 Jun	USA	Jersey	2500	USAID
20	2012 Jun	USA	Sex Semen	2300	Practical Action
21	2013 Jun	USA	Sex Semen	150	US Embassy
22	2015 Sept	USA	Jersey	6000	KUBK
23	Jul-17	USA	Jersey	3000	KUBK
24	2018/2019	USA	Jersey	4025	NLBO
25	2019/2020	Canada	Jersey	4000	NLBO
26	2020/21	Canada	Jersey	5500	NLBO
Total				200,842	
Brown Swiss					
26	11/15/1985	Switzerland	<i>B. Swiss</i>	2000	-
27	2/14/1986	Switzerland	<i>B. Swiss</i>	2000	-
28	5/18/1988	Germany	<i>B. Swiss</i>	10786	-
29	10/14/1991	USA	<i>B. Swiss</i>	1000	SLDP
30	11/16/1991	-	<i>B. Swiss</i>	1000	SLDP
31	5/2/1994	USA	<i>B. Swiss</i>	5000	SLDP
Total				21786	
Holstein & Holstein Freisan					
32	12/16/1985	Finland	HF	5000	-
33	10/29/1987	USA	HF	4000	-
34	2/18/1988	Canada	HF	2000	-
35	6/5/1991	New Zealand	HF	5000	GTZ
36	10/24/1991	USA	HF	8000	SLDP
37	11/16/1991	-	HF	8000	SLDP
38	3/3/1992	France	HF	340	French IMV
39	1992/11/10	New Zealand	HF	3000	GTZ
40	3/25/1997	Japan	HF	5000	LIAJ
41	12/22/1998	Japan	HF	4000	LIAJ
42	2009/Jan	New Zealand	HF	5000	DCIP
43	2010 Jan	India	HF	5000	Chitawan Milk

44	2011 July	USA		HF	2500	DCIP
45	2012 Jun	USA		HF	2500	USAID
46	2012 Jun	USA		Sexed Semen	2300	Praction Action
47	2013 Jun	USA		Sexed semen	150	US Embassy
48	2018/19	USA		HF	3410	NLBO
49	2019/20	USA		Holstein	2500	NLBO
50	2020/21	USA		Holstein	5000	NLBO
Total					72700	
Ayrshire						
50	12/16/1985	Finland		Ayrshire	1000	-
52	2/22/1988	Canada		Ayrshire	1000	-
Total					2000	
Others						
53	3/3/1992	France		Tarentaise	1380	French IMV
Total					1380	
54	7/15/2008	India		Haryana	5000	Government
Total					5000	
Sexed Semen						
55	2015	USA		Holstein Freisan	4000	NDDB
56	2015	USA		Jersey	4000	NDDB
57	2015	USA		Jersey	1000	KUBK
Total					9000	
Boer Buck						
58	2015		USA	Boer	3000	KUBK
59	2017		USA	Boer	1500	KUBK
Total					4500	

**Details of Murrah Buffalo Bull Semen Import**

SN	DATE	COUNTRY	BREED	SEMEN DOSE	SOURCE
1	11/19/1991	India	Murrah	16000	SLDP
2	10/23/1992	India	Murrah	5000	GTZ
3	7/7/1993	India	Murrah	16000	SLDP
4	11/1/1999	India	Murrah	7440	NLBC
5	1/5/2000	India	Murrah	4950	TLDP
6	2005 June	India	Murrah	3900	TLDP
7	2010 Jan	India	Murrah	5000	Chitawan Milk
8	2012 Jan	India	Murrah	8400	BGIP/USAID
9	Jul-2017	India	Murrah	3000	KUBK
Total of Murrah semen import till the end of FY 2077/78				69690	
<b>Total of Cattle Bull, Murrah Bull and Buck semen import till the end of FY 2077/78 (2020/2021)</b>				<b>385518</b>	

**2. Frozen Semen Production**

In addition to import, NLBO has been producing frozen semen in its laboratory. Table below shows semen production in NLBO Lab during 2078/79 (2021/22). Due to the limited no of Bulls, NLBO, Pokhara has produced 519,413 doses of frozen semen in this year and this, as shown in Figure below, is relatively lower than the previous year.

**2.1) Bull & Species wise Frozen Semen Production in 2078/79 by NLBO, Pokhara****2.1.1) Bull wise Frozen Semen Production in 2078/79 by NLBO, Pokhara**

Bull Name	PJ 67	PJ 69	PJ 71	PJ 73	PJ 75	PJ 76	PJ 78	PJ 79	PJ 80	PJ 81	PJ 82	ET 6	HF 28	HF 30	ET 7	PM 61	PM 64	PM 69	PM 70	PM 101	PM 102	PM 103	PM 104	PM 105	PM 106	PM 107	PM 109	PM 108	Grand Total



Semen Produced	16919	4265	36660	35215	24665	36037	16890	27692	26840	12688	11085	31267	25540	7735	37950	8892	10037	17245	3842	11820	22647	17485	1502	5045	15232	12112	2690	13701	493698
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### 2.1.2) Species wise Frozen Semen Production in 2078/79 by NLBO, Pokhara

Bull Name	Jersey	Holstein	Murrah	Grand Total
Semen Produced	280223	71225	142250	493698

### 2.2) Buckwise Semen Production in 2078.79

BAT	DATE	PG 005	PG 06	PG 09	PG 10	PG 12	PG 13	PG 15	PG 16	Total	Monthly
1	२०७८।०४।०५	0	0	0	0	0	0	0		0	2700
2	२०७८।०४।०८	40	70	50	45	140	25	60		430	
3	२०७८।०४।११	65	45	35	110	30	35	50		370	
4	२०७८।०४।१४	120	75	65	100	60	10	60		490	
5	२०७८।०४।१८	55	55	20	60	30	30	65		315	
6	२०७८।०४।२१	0	0	60	0	35	0	0		95	
7	२०७८।०४।२५	100	60	50	70	55	60	70		465	
8	२०७८।०४।२८	140	50	55	90	90	50	60		535	
9	२०७८।०४।३२	110	65	75	125	50	25	45		495	2366
10	२०७८।०५।०३	0	0	0	0	0	0	0		0	
11	२०७८।०५।१०	125	60	30	145	120	30	70		580	
12	२०७८।०५।१५	0	60	60	115	95	20	85		435	
13	२०७८।०५।१८	0	0	0	0	0	0	0		0	
14	२०७८।०५।२१	0	40	50	25	70	66	20		271	
15	२०७८।०५।२५	45	45	0	85	90	35	70		370	
16	२०७८।०५।२८	0	25	55	60	55	0	20		215	

17	२०७८।०५।३१	155	20	50	85	70	20	100		500	<b>3077</b>
18	2078-06-04	115	25	15	80	15	10	35		295	
19	2078-06-08	0	0	45	45	50	30	15		185	
20	2078-06-12	195	40	100	105	50	40	95		625	
21	2078-06-15	115	32	45	45	105	5	55		402	
22	2078-06-18	70	45	40	70	70	0	45		340	
23	2078-07-08	60	20	40	40	85	20	90	35	390	
24	2078-07-11	0	60	20	115	45	65	35	0	340	
25	2078-07-16	100	70	105	80	115	35	70	0	575	
26	2078-07-23	120	55	35	95	110	25	90	0	530	
27	2078-07-26	100	30	100	90	60	65	75	0	520	<b>2392</b>
28	2078-07-29	205	45	35	65	105	40	45	30	570	
29	2078-08-02	170	45	0	0	65	40	0	0	320	
30	2078-08-06	5	40	45	60	25	50	110	0	335	
31	2078-08-09	0	35	36	45	51	0	25	0	192	
32	2078-08-13	0	0	0	0	0	0	0	0	0	
33	2078-08-16	0	80	120	95	125	35	0	0	455	
34	2078-08-20	55	60	60	95	95	40	110	0	515	<b>3030</b>
35	2078-08-23	35	50	75	95	75	15	0	0	345	
36	2078-08-27	80	85	70	65	155	30	140	0	625	
37	2078-09-01	50	80	115	70	85	35	55	40	530	
38	2078-09-05	75	0	130	110	155	25	70	15	580	
39	2078-09-08	10	55	115	80	90	50	35	0	435	
40	2078-09-12	0	35	0	50	0	0	35	0	120	<b>3730</b>
41	2078-09-15	155	60	110	80	50	60	55	15	585	
42	2078-09-19	170	40	100	55	70	55	35	35	560	
43	2078-09-22	50	70	65	70	60	10	30	20	375	
44	2078-09-26	60	45	55	95	60	35	90	0	440	
45	2078-09-29	70	50	20	80	80	20	50	0	370	
46	2078-10-10	0	0	0	0	0	0	0	0	0	
47	2078-10-13	205	25	125	150	130	25	85	15	760	
48	2078-10-17	130	50	0	120	140	45	15	20	520	

49	2078-10-20	0	0	0	0	0	0	0	0	0	1895
50	2078-10-24	120	0	95	25	170	0	0	5	415	
51	2078-10-27	55	155	70	140	95	15	115	0	645	
52	2078-11-02	0	0	0	0	0	0	0	0	0	
53	2078-11-05	125	90	0	130	0	55	0	30	430	
54	2078-11-09	0	65	70	55	140	35	0	40	405	
55	2078-11-12	0	0	0	0	0	0	0	0	0	2060
56	2078-11-16	0	0	0	0	0	0	0	0	0	
57	2078-11-19	0	0	0	130	0	15	0	55	200	
58	2078-11-23	0	135	0	100	120	30	125	0	510	
59	2078-11-26	0	0	0	0	0	0	0	0	0	
60	2078-11-30	105	20	45	75	0	30	95	0	370	
61	2078-12-07	200	65	0	100	170	0	0	0	535	
62	2078-12-10	0	60	35	95	165	90	0	0	445	
63	2078-12-14	0	0	0	0	0	0	0	0	0	810
64	2078-12-17	0	0	0	0	0	0	0	0	0	
65	2078-12-21	115	0	65	125	0	40	0	0	345	
66	2078-12-24	0	50	80	135	95	25	0	0	385	
67	2078-12-29	0	30	0	0	0	50	0	0	80	
68	2079-01-05	0	0	0	0	0	0	0	0	0	
69	2079-01-08	0	0	0	0	0	0	0	0	0	
70	2079-01-12	0	0	0	0	0	0	0	0	0	
71	2079-01-15	0	0	0	0	0	0	0	0	0	
72	2079-01-19	0	0	0	0	0	0	0	0	0	
73	2079-01-26	0	0	0	0	0	0	0	0	0	1310
74	2079-02-06	0	75	0	115	70	75	125	25	485	
75	2079-02-10	0	60	105	40	155	15	120	0	495	
76	2079-02-13	0	0	0	0	0	0	0	0	0	
77	2079-02-20	0	35	0	0	150	70	0	75	330	
78	2079-02-23	60	0	30	25	0	0	0	40	155	
79	2079-03-02	0	65	0	0	80	25	60	0	230	
80	2079-03-06	100	40	45	50	10	55	60	0	360	
81	2079-03-09	0	0	0	0	0	0	0	0	0	
82	2079-03-13	0	0	0	0	0	0	0	0	0	
83	2079-03-16	0	0	0	0	0	0	0	0	0	

84	2079-03-20	0	45	50	130	60	65	145	0	495	
85	2079-03-24	0	0	0	0	0	0	0	0	0	
86	2079-03-30	0	0	0	0	0	0	0	0	0	
		4235	2987	3166	4830	4791	2001	3210	495	25715	

### 3. Frozen Semen Quality

In continuous attempt to improve quality of frozen semen, NLBO in the past has brought about many changes in laboratory practices and will continue to improve further in future also. Following are the major changes introduced in the laboratory with an aim of improving the semen quality.

#### 3.1) Bull Rearing:

- Screening of bulls against diseases (Brucellosis, TB, Leptospirosis, Campylobacter etc).
- Maintaining health and hygiene of the bulls.
- Regular drenching of bulls against external and internal parasites.
- Regular exercise of the bulls for the fitness in Bull Exerciser.

#### 3.2) Semen Collection

- Use of bull apron to prevent contamination.
- Collecting semen from a bull twice a week and only two ejaculations with an interval of minimum thirty minutes on the day of semen collection.
- Maintaining hygiene at collection yard.

#### 3.3) Extender

- Use of double distilled rain water instead of single distilled tap water.
- Use of water purifier to sterilize rain water.
- Use of readymade non animal origin soyabased semen extender (made in Germany & France) since 2012/13 alongwith egg-yolk base extender.
- Change of buffer from tri-sodium citrate to tris in manual process.
- Addition of egg-yolk and antibiotics in the morning of collection day instead of evening in manual process.

#### 3.4) Semen Evaluation

- Regular use of latest spectrophotometer of Minitube (for Buck semen anaysis) and IMV Company(for Bull semen anaysis) to determine sperm concentration.
- Reduction of sperms per dose of semen from 40000000 to 20000000 (total sperm count with more than 70% Motile sperm before processing) in 0.25 ml straw capacity because of improved quality of sperm.

- Evaluation of semen from the initial dilution stage to the time of dispatch.

### 3.5) Semen Processing

- Single step extension instead of phased extension.
- Use of masks, gloves etc and increased laboratory sanitation.
- Filling, Sealing and Printing of semen straws by IS-4(IMV Company, France), and Quattro automatic filling, sealing & printing machine (Minitube Company, Germany) which is a great change for this lab.
- Use of SMILE Software to reduce data recording error and to set integrated laboratory environment & use of CASA system for semen evaluation which is also a milestone for the upgrading of the lab.
- Processing method of buck semen has also been upgraded to remove the phospholipase enzyme from the semen through centrifugation method for the better quality semen for higher conception rate.

### 3.6) Quality Control

- Checking post thaw semen motility 48 hrs after freezing before storage.
- Periodic checking of post thaw viability.
- Checking of bacterial load in laboratory and semen.
- Periodic Hypo-osmotic Swelling test to check sperm cell integrity.
- Periodic Live-dead count of frozen semen.
- Acrosomal Integrity Test.
- Fumigation of Lab from Auto fumigator.

### 3.7) Storage

- Use of separate mother referees for storing individual bull semen.
- Counting of semen straws in LN<sub>2</sub> while transferring.

### 3.8) Distribution

- Counting semen straw in LN<sub>2</sub> during distribution.
- Allotment and rotation of bulls for different regions according to distribution plan to prevent inbreeding.

3.9) Renovation of Lab Structures for Biosecurity and standardisation as well as ISO accreditation process has begun from the fiscal year 2075.76.

### 3.9) Summary of semen quality control: 2078/79 (2021/22)

Presented in the table below is summary of quality control tests conducted at NLBO lab in the year 2078/79.

**Summary of semen quality control-2078/79**

S.N.	Test	Standard	At NLBO		Average
			Lowest	Best	
1	Microbial Load in-				
	Laboratory air (different locations)	Maximum 10 colonies	50	6	
	Working solution	0	0	0	0
	Pooled Frozen Semen	0	0	0	0
2	Post-thaw Motility	40 %	45 %	60 %	48%
3	Post-thaw Viability of Semen	10 % after 3 <sup>rd</sup> hour	10 % after 2 <sup>nd</sup> hour	30 % after 3 <sup>rd</sup> hour	
4	Hypo-osmotic Swelling	60-70 % +ve	55 % +ve	65 + ve	60.59%
5	Live Sperms %		45 %	70 %	55%
6	Abnormal Sperms	Up to 20 %	19.59 %	3.56%	11.57%
7	Sperm Concentration/ dose (million)	15-30	18.40	22.51	20.45

**Semen Quality Parameters of Jersey Bulls of NLBC, Pokhara -2078/79**

S. N.	Bull Number	Post Thaw Motility %	Post Thaw Viability 1 hr (%)	Post Thaw Viability 2 hr (%)	Post Thaw Viability 3 hr (%)	HOS Responsive Cells (%)	Sperm concentration per ml (x10 <sup>9</sup> )
1	PJ 67	49.38	33.44	21.88	11.56	63.63	1.15
2	PJ 68	48.75	32.81	18.44	10.47	64.38	.887
3	PJ 69	48.28	32.5	20.31	10.47	63.53	1.52
Average		48.80	32.91	20.21	10.83	63.84	1.18

All these practices have helped improve semen quality and made the laboratory able to produce and distribute quality semen with a minimum of 45% motility and 20000000 sperms per dose helping improve conception rate.



#### 4) Trend of Semen & Liquid Nitrogen Production, Distribution & AI

##### 4.1) Semen Production Trends

Following table shows the species wise semen production in the year 2078/79 from NLBOs.

S.N.	Species/Breed	Semen produced(dose)
1	Cattle/Holstein	210016
2	Cattle/Hariyana	7835
3	Cattle/Jersey	364995
4	Buffalo/Murrah	191666
5	Goat/Boer	26697
<b>6</b>	<b>Total</b>	<b>801209</b>
	Overall Growth	2.26%

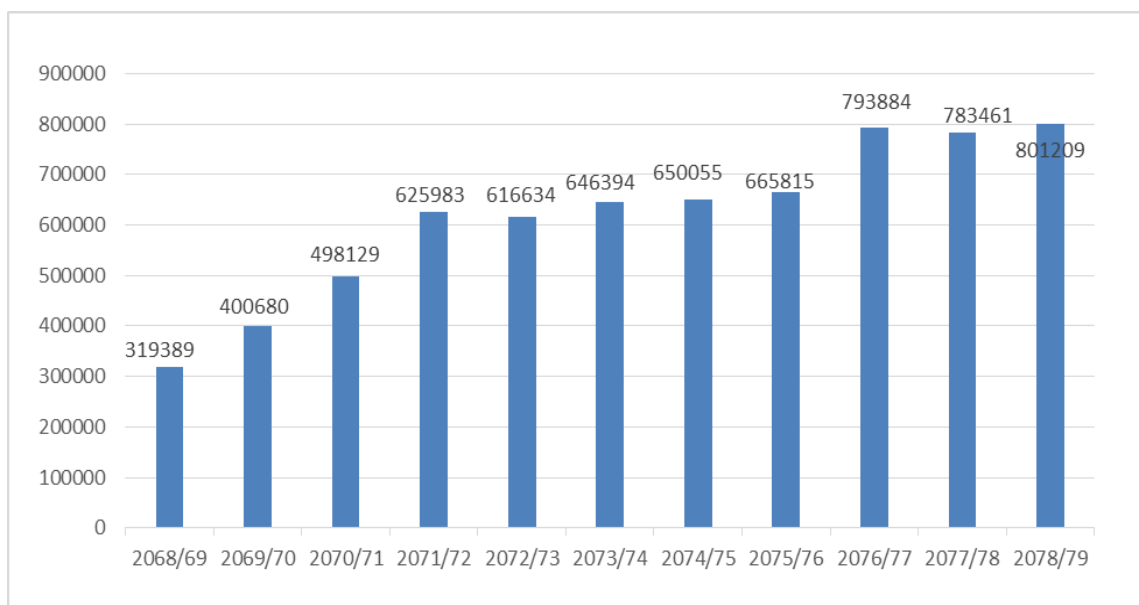
##### 4.2) Trend of Semen Production, Liquid nitrogen production, Distribution & AI

Following table compiles the production & distribution of semen & liquid nitrogen in relation to AI from the year 2050/51 to the year 2078/79 & the growth trend as well.

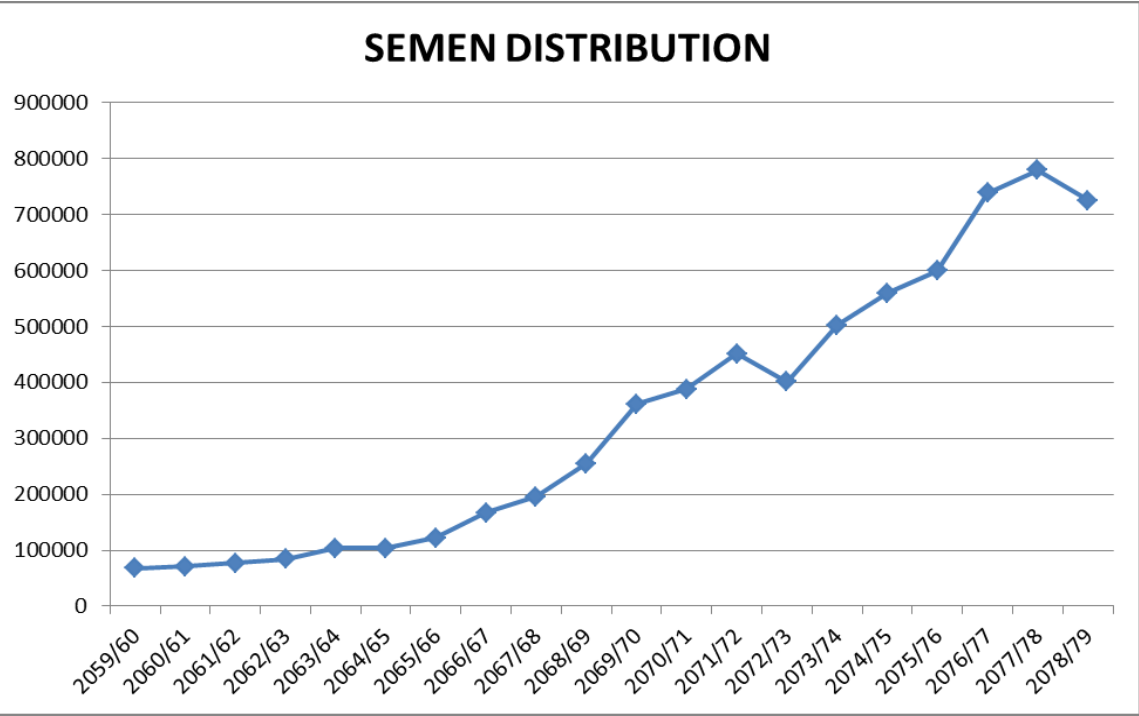
NFY	Semen Production	Increment	Semen Distribution	Increment	LN <sub>2</sub> Distribution / Consumption	Increment	AI Progress	Growth	LN <sub>2</sub> /AI	Semen/AI	AI/Lit LN <sub>2</sub>
2050/51	15115	-	22448	-	23431	-	18815	-	1.25	1.19	0.80
2051/52	13705	-9.33	29007	29.22	25917	10.61	17552	-6.71	1.48	1.65	0.68
2052/53	22797	66.34	32702	12.74	23124	-10.78	22906	30.50	1.01	1.43	0.99
2053/54	18329	-19.60	35083	7.28	33768	46.03	25865	12.92	1.31	1.36	0.77
2054/55	27586	50.50	47935	36.63	43107	27.66	32817	26.88	1.31	1.46	0.76
2055/56	27297	-1.05	50856	6.09	28802	-33.18	32637	-0.55	0.88	1.56	1.13
2056/57	18480	-32.30	40332	-20.69	28239	-1.95	35248	8.00	0.80	1.14	1.25
2057/58	24373	31.89	49675	23.17	37908	34.24	41165	16.79	0.92	1.21	1.09
2058/59	32298	32.52	64122	29.08	48601	28.21	56439	37.10	0.86	1.14	1.16
2059/60	52174	61.54	68311	6.53	56186	15.61	57683	2.20	0.97	1.18	1.03
2060/61	65460	25.46	71273	4.34	54088	-3.73	60206	4.37	0.90	1.18	1.11
2061/62	70051	7.01	76937	7.95	54749	1.22	65440	8.69	0.84	1.18	1.20
2062/63	101182	44.44	84564	9.91	54812	0.12	73676	12.59	0.74	1.15	1.34

2063/64	117687	16.31	103875	22.84	54907	0.17	87441	18.68	0.63	1.19	1.59
2064/65	122932	4.46	103766	-0.10	51541	-6.13	86649	-0.91	0.59	1.20	1.68
2065/66	139063	13.12	122483	18.04	57059	10.71	98265	13.41	0.58	1.25	1.72
2066/67	161322	16.01	167233	36.54	75808	32.86	149261	51.90	0.51	1.12	1.97
2067/68	250460	55.25	195501	16.90	79717	5.16	195501	30.98	0.41	1.00	2.45
2068/69	319389	27.52	254481	30.17	99908	25.33	260166	33.08	0.38	0.98	2.60
2069/70	400680	25.45	361711	42.14	106008	6.11	374329	43.88	0.28	0.97	3.53
2070/71	498129	24.32	387644	7.17	152407	43.77	445254	18.95	0.34	0.87	2.92
2071/72	625983	25.67	451312	16.42	170852	12.10	487886	9.57	0.35	0.93	2.86
2072/73	616634	-1.49	400964	-11.16	120293	-29.59	493133	1.08	0.24	0.81	4.10
2073/74	646394	4.83	502719	25.38	173558	44.28	574641	16.53	0.30	0.87	3.31
2074/75	650055	0.57	559126	11.22	110721	-36.21	571771	-0.50	0.19	0.98	5.16
2075/76	665815	2.42	599036	7.14	190336	71.91	622619	8.89	0.31	0.96	3.27
2076/77	793884	19.23	738564	23.29	225909	18.69	577719	-7.21	0.39	1.28	2.56
2077/78	783461	-1.31	778721	5.44	275507	21.95	701433	21.41	0.393	1.11	2.55
2078/79	801209	2.27	724610	-6.95	313470	13.78	718653	2.45	0.44	1.01	2.29

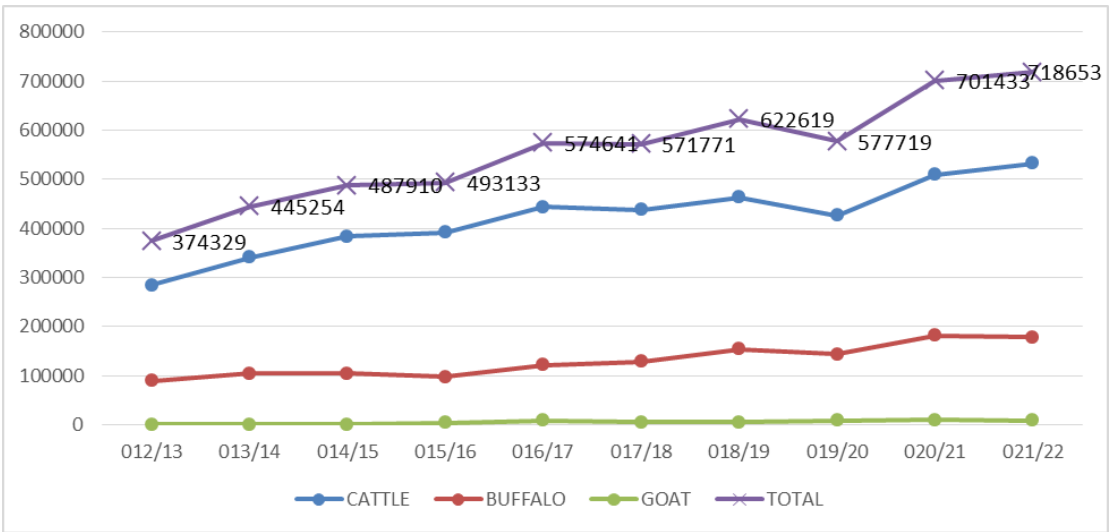
### Trend of Semen Production in the Last Decade (Semen Production in Doses)

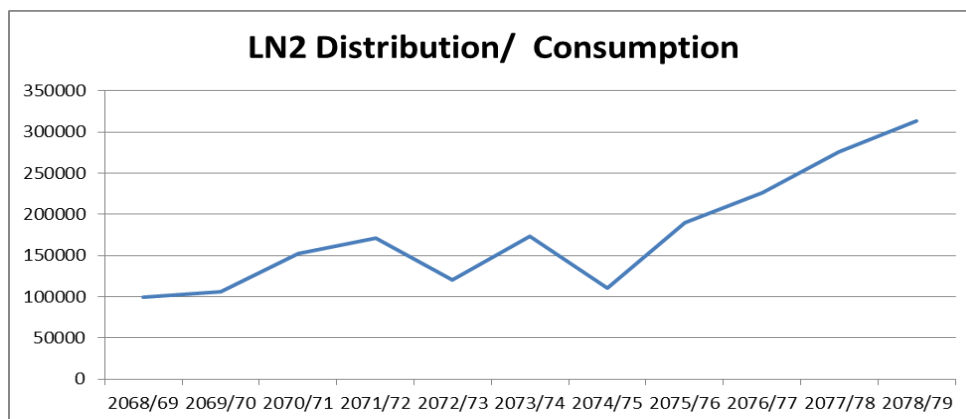


Trend of Semen Distribution (Semen Distribution in Doses)



Trend of Artificial Insemination in the Last Decade (AI in number)



Trend of Liquid Nitrogen Distribution/Consumption in the Last Decade(Liquid Nitrogen Distribution in litres)**4.3) Cost of Semen Production: 2078/79 (2021/22)**

Production cost per dose of straw on the basis of all the direct costs in the year 2078/79 (2021/22) is estimated to be Rs. 29.05. This cost does not include depreciation and or salary of the staff involved and is calculated according to the Table below.

**Cost of Semen Production- 2078/79**

SN	Expenses	Amount (Rs)	% of total cost
1	Laboratory operation (Chemicals, Glass wares, AV, Liner, Servicing, LN2, Electricity etc)	6681646	44.29
2	Bull management Cost, Screening Test etc	7016605	46.51
3	Semen Straw Cost (558000 straws in Rs. 2.49)	1389420	9.21
4	LN2 Cost (Included in laboratory operation)	0	0.00
	Total cost excluding fixed costs and staff salary	15087671	100.00
	Total no of semen doses produced	519413	
	Production cost/dose	29.05	

**4.4) Import of Embryo in the Fiscal Year: 2078/79**

S.N.	Breed	No. of Embryo imported	Country
1	Jersey	0	
2	Holstein	0	
	<b>Total</b>	<b>0</b>	

## 5) Pedigree of Bulls

The pedigree record of different bulls at NLBO, Pokhara is presented in Table below. As the records show, except ET born bulls & bulls imported from the USA last year, the bulls are either imported from India or selected locally. NLBO, Pokhara had not been able to import pedigree bulls due to resource constraint until the last year. Since, NLBO has already initiated Progeny Testing and Pedigree Performance Recording Scheme, some bulls were selected on the basis of breeding value and purchased from the farmers as per the PPRS program's norms. This year too, we are expecting some full blood bulls from the abroad.

### ***Breeding Bull and Buck with Pedigree Record as of 2079/03/31 (Closing Stock)***

#### ***Pedigree Record of the Bulls at NLBO, Pokhara (Jersey) as of 2079/03/31 (Closing Stock)***

Bull No.	Bull Name	Breed	Birth date	Received date	Sire No.	Sire's dam's milk production/Lact (Kg)	Dam ID	Dam's milk production/Lactation (Kg)	Source
PJ 71	Kapoor	Jersey	2070-04-13	2071-02-26	305054USA	8000	2642	3369.75	Jiri farm, Dholakha
PJ 73	Nare	Jersey	2071-07-03	2072-03-28	7JE859USA	8500	11107	4692	DCIP Selection (Gorkha)
PJ 75	Nakul	Jersey	2071-12-02	2072-03-28	7JE859USA	8500	2621	4377.2	Jiri farm, Dholakha
ET 6	Apar	Jersey	2074-01-06	2075-01-28	14DTE835	9000	1680 Surrogate	10000	NARC ET
PJ 76	Harka	Jersey	2073-10-06	2075-01-28	305054CFp181	7500	1832	4200	DCIP Chitwan
PJ 78	Avimat	Jersey	2074-11-23	2075-09-20	Sex Semen	10000	NA	4000	Argakhachi
PJ-79	Pralahd	Jersey	2076-04-10	2077-08-16	VJ Link 303327	7043	C 0935	4500	DCIP Selection (Kabhrepalanchok)
PJ-80	Damu	Jersey	2076-06-22	2077-08-16	Sex semen	7500	2190	4500	DCIP Selection jIRi farm, Dholakha
PJ-81	JIRU	Jersey	2076-05-25	2077-08-16	Sex semen	7500	22234	4000	DCIP Selection jIRi farm, Dholakha

PJ-82	PRADIP	Jersey	2077-07-17	2077-08-17	305054USA	8000	22320	4100	DCIP Selection Jiri Farm,Dholakha
PJ-83	GALLANTRY-ET	Jersey	2021-03-05	2022-03-01	551JE1762	9749	12092	9605	ST genetics, USA
PJ-84	CALLIBAN	Jersey	2020-12-05	2022-03-01	7JE1787	9471	10928	9420	ST genetics, USA
PJ-85	MOTOR	Jersey	2020-11-25	2022-03-01	200JE1162	9636	11233	9945	ST genetics, USA
PJ-86	FRANK	Jersey	2021-05-20	2022-03-01	97JE202	9229	309	9195	ST genetics, USA
PJ-87	NA	Jersey	2078-03-02	2078-06-10	ET-06	10000	5587	4800	NARC, Khumaltar
PJ-88	NA	Jersey	2077-12-02	2078-10-28	7JE920	7050	25069/550	4700	DCIP Selection, Laligurans Dairy Farm, Chitwan
PJ-89	NA	Jersey	2078-02-10	2078-10-28	7JE920	7050	25018/659	4565	DCIP Selection, Laligurans Dairy Farm, Chitwan
PJ-90	NA	Jersey	2078-03-18	2078-10-28	7JE1477	8675	368	4550	DCIP Selection, Laligurans Dairy Farm, Chitwan
PJ-91	NA	Jersey	2078-05-18	2078-10-28	7JE1477	8675	25174/865	4400	DCIP Selection, Laligurans Dairy Farm, Chitwan
PJ-92	NA	Jersey	2076-11-04	2078-11-07	7JE920	7050	22622	4000	DCIP Selection Jiri Farm,Dholakha
PJ-93	NA	Jersey	2076-11-05	2078-11-07	7JE920	7050	2843	3100	DCIP Selection Jiri Farm,Dholakha
PJ-94	NA	Jersey	2078-02-02	2078-11-07	7JE1477	8675	22215	3800	DCIP Selection Jiri Farm,Dholakha
PJ-95	NA	Jersey	2077-12-21	2078-012-20	ET-06	10000	DK1326	4800	DCIP Selection, Kavre

**Pedigree Record of the Bulls at NLBO, Pokhara (HF) as of 2079/03/31 (Closing Stock)**

Bull No.	Bull Name	Breed	Birth date	Received date	Sire No.	Sire's dam's milk production/Lact	Dam ID	Dam's milk production/Lactation	Source
ET 7	Dollar	Holstein	2074-02-07	2075-01-29	HOC8956379	10000	CHORUS	11000	Gorkha, Born from ET
PHF-28	RAJEEV	Holstein	2074-10-01	2077-08-03	14H07660	7000 lit	3060	5430	DCIP Selection Kamadhenu cow farm , Gorkha

PHF-30	Gerrard	Holstein	2076-02-06	2077-08-16	00200H00185	9000	26025	6050	DCIP Selection (Chitwan)
PHF-31	MAHESH	Holstein	2076-06-27	2078-03-15	7H013279	10660	13655	4800	DCIP Selection (Gorkha)
PHF-32	MAHADEV	Holstein	2076-05-10	2078-03-15	H07090	10885	9645	4620	DCIP Selection (Gorkha)
PHF-33	LANDMARK-ET	Holstein	2020-12-14	2022-03-01	7H015197	13150	H0840003204071939	13065	ST genetics, USA
PHF-34	METEOR-ET	Holstein	2021-02-01	2022-03-01	14H015067	13085	H0840003150675229	13208	ST genetics, USA
PHF-37	NA	Holstein	2077-08-19	2078-03-11	ABS,Brute 28H018391	11353	23270	4700	DCIP Selection (Rupandehi)
PHF-38	NA	Holstein	2077-09-15	2078-03-11	WWS,250H013449,USA (Allstar)	12104	23324	5110	DCIP Selection (Rupandehi)
PHF-39	NA	Holstein	2077-11-05	2078-06-10	14H07770	9000	23455	5500	DCIP Selection, NARC Khumaltar
PHF-40	NA	Holstein	2077-11-21	2078-10-28	14H07593	9531	12596	5370	DCIP Selection, National Cattle Research, Rampur
PHF-41	NA	Holstein	2076-04-10	2078-11-01	14H07760	8743	13297	4870	DCIP Selection, Yampaphat
PHF-42	NA	Holstein	2078-02-16	2078-10-17	14H07660	7000	2507	4600	NLBO, Pokhara
PHF-43	NA	Holstein	2078-03-26	2078-12-18	14H07600	7000	2510		NLBO, Pokhara
PHF-44	NA	Holstein	2078-03-26	2078-12-18	14H07600	7000	2510		NLBO, Pokhara

### **Pedigree Record of the Bulls at NLBO, Pokhara (Murrah) as of 2079/03/31 (Closing Stock)**

S.N	Bull No.	Bull Name	Breed	Birth date	Received date	Sire No.	Sire's dam's milk production/Lact	Dam ID	Dam's milk production/Lactation	Source
1	PM 69	Basanta	Murrah	2013-10-20	2019-03-03	HLDB-165	4260	RRP-162	3860	Imported from India
2	PM 101	Pratap	Murrah	2013-06-19	2019-06-07	HLDB-205	4200	RRP-68	3950	Imported from India
3	PM 102	Bipu	Murrah	2013-07-10	2019-06-07	HLDB-261	4230	RRP-82	3810	Imported from India
4	PM 103	Shambhu	Murrah	2013-11-26	2019-06-07	HLDB-151	4180	RRP-150	3740	Imported from India
5	PM 106	Rishi	Murrah	2014-01-25	2019-06-07	HLDB-221	4250	RRP-75	3895	Imported from India
6	PM 107	Prem	Murrah	2074-01-16	2076-03-25	6299	3800	N214	3100	NLBO Farm
7	PM-108	Thaneshwar	Murrah	2071-12-17	2078-08-16	Yubaraj	3800	D314	3700	Rupandehi
8	PM-109	RAHUL	Murrah	2076-06-17	2078-08-16	Yubaraj	4000	2127	3400	Lachok, Pokhara
9	PM-110	GYANENDRA	Murrah	2076-07-01	2078-08-16	5647	3200	N214	4200 lit	NLBO, Pokhara
10	PM-111	SANDEEP	Murrah	2076-04-14	2078-08-16	5647	3100	280	2900 lit	NLBO, Pokhara
11	PM-112	PARAS	Murrah	2076-05-23	2078-08-16	5647	3000	N174	3750 lit	NLBO, Pokhara
12	PM-113	NA	Murrah	2077-05-20	2079-01-12	PC11622	3100	D243	3200	Rupandehi
13	PM-114	NA	Murrah	2077-06-30	2079-01-12	M2924	3200	223	3350	Rupandehi
14	PM-115	NA	Murrah	2077-07-05	2079-01-12	PC275	3150	N335	3200	Rupandehi
15	PM-116	NA	Murrah	2076-11-26	2078-07-06	5647	3150	N336	3200	NLBO, Pokhara
16	PM-117	NA	Murrah	2075-12-11	2078-07-06	5647	3150	N337	3200	NLBO, Pokhara

**Note:** NA- Not available      PJ- Pokhara Jersey, PM- Pokhara Murrah, PJE- Pokhara Jersey born by Embryo Transfer, PHF- Pokhara Holstein Frisian

### **Pedigree Record of the Bucks and Doe at Semen Collection Station of NLBO, Pokhara (Boer) as of 2079/03/31 (Closing Stock)**

S.N	Buck No.	Smile id	Buck name	Breed	Birth Date	Received Date	Sire No.	Dam ID	Source
1	55615	PB-05	Mission	Boer	2074-09-26	2075-10-21	FL-89	B0084/55601	LDF, Pokhara (brought from Bandhipur)
2	55620	PB-06	Rajak	Boer	2074-10-03	2075-10-21	FL-75	B023	LDF, Pokhara (brought from Budhitola)



3	B15		Doe	Boer	2073-04-09	2075-10-21			LDF,Pokhara(brought from khajura)
4	18-167	PB-09	Lokman	Boer	2018-09-19	2076-08-22	PFAFM0014	PFAFMO288	KUBK
5	18-104	PB-10	Lokendra	Boer	2018-09-21	2076-08-22	PFAFMO100	PFAFJO215	KUBK
6	JA-291	PB-12	Jagatpur	Boer(African)	2075-12-26	2076-12-18	KLE128	101	Jagatpur
7	55947	PB-13	Bhanu	Boer	2076-09-26	2977-04-01	SPB3114(AI)	55635	NLBO, pokhara
8	55968	PB-15	Sandy	Boer	2077-01-11	2077-08-14	55640	55611	NLBO, pokhara
9	104720	PB-16	Bandhu	Boer	2077-09-10	2078-03-18	JA265	55965	NLBO, pokhara

## 2.5 ARTIFICIAL INSEMINATION

### 1. Organization and Manpower

Though, AI was introduced in the country about 57 years back, networks for providing service to farming community and skilled manpower to render the service, are yet to be developed. Production of semen and supply of LN<sub>2</sub> to the program districts is responsibility of NLBOs, while the Local Governments and Veterinary Hospital and Livestock Service Expert Service Centers run the actual field program. Agencies and organizations involved in running AI program last FY were:-

For Semen production,

- National Livestock Breeding Offices, Pokhara & Lahan

For LN<sub>2</sub> Procurement and Production,

- Procurement and Production: National Livestock Breeding Office, Pokhara
- Procurement and Production: National Livestock Breeding Office, Lahan
- Procurement and Production: National Livestock Breeding Office, Nepalgunj

For Semen and LN<sub>2</sub> distribution

- National Livestock Breeding Office, Pokhara. (Districts of Bagmati & Gandaki and some other districts of Lumbini Province that are covered by NLBO Nepalgunj, 34 districts, 289 Local Governments).
- National Livestock Breeding Office, Lahan. (Districts of Province number 1 & 2, 15 districts, 110 Local Governments).
- National Livestock Breeding Office, Nepalgunj. (Districts of Province number 6 & 7 and some districts of Province no 5, 20 districts, 71 Local Governments).

### 2. Providing AI Service

Following is the present scenario of AI Service in Nepal.

1. Districts with AI Service: 70
2. Districts with Regular AI Service: 58
3. Districts with Casual/Seasonal AI Service: 12
4. No. of Total Inseminators: 2674 (Actively working inseminators=1952)
5. No. of AI Private Inseminators: 1557
6. No. of Government Inseminators: 722
7. No. of Inseminators in Community Livestock Breeding Center: 395
8. No. of Inseminators Recorded in the Inseminator's Diary: 2674

AI Services in Nepal as of 2079.3.32, an overview

**Species-wise AI Services in Nepal upto B.S. 2078/79**

YEAR	CATTLE	BUFFALO	GOAT	TOTAL
095/96	19361	3545	0	22906
096/97	21387	4478	0	25865
097/98	27430	5387	0	32817
098/99	27702	5469	0	33171
099/2000	28769	6479	0	35248
000/01	32857	8308	0	41165
001/02	43980	12495	0	56475
002/03	46684	10999	0	57683
003/04	49068	11120	0	60188
004/05	54012	11428	0	65440
005/06	60184	13492	0	73676
006/07	71597	15844	0	87441
007/08	70503	16146	0	86649
008/09	79305	18960	0	98265
009/10	118492	30769	0	149261
010/11	148467	40689	0	189156
011/12	203288	56878	0	260166
012/13	284505	89824	0	374329
013/14	341334	103920	0	445254
014/15	383301	104609	0	487910
015/16	391709	97650	3774	493133
016/17	444149	121460	9032	574641
017/18	438144	128093	5534	571771
018/19	463707	154413	4499	622619
019/20	426178	143114	8427	577719
020/21	509896	181432	10105	701433
021/22	532297	177990	8366	718653

**3. Overall AI When Compared to Last Year**

Despite some constraints to collect all the AI reporting from the inseminators all over the country(As the reporting body the then District Livestock Services Offices were no longer in existence) due to inadequate coordination of the stakeholders at district & local level, the total number of AI has remained significant in comparison to the total number of AI of

the previous year as shown in the table below.

**AI in the year 2078/79 in comparison to AI in previous year.**

2077/78			Total	2078/79			Total	Growth %
Cattle	Buff	goat		Cattle	Buff	goat		
509896	181432	10105	701433	532297	177990	8366	718653	2.45

**4. Province wise AI Report**

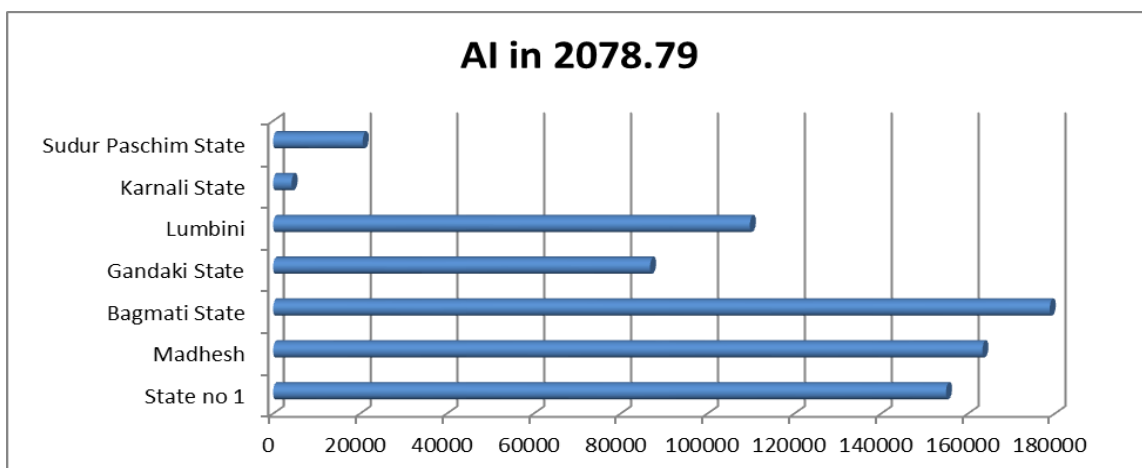
Distribution of AI number according to the Seven states in the year 2078/79 in comparison to the same in previous year has been presented in the tables below.

**Province wise AI in the year 2078/79**

**Province wise AI Progress- In Comparison to Last year's Progress**

S.N.	Provinces	AI in 2077.78	AI in 2078.79	Increment in AI (%)
1	Province no 1	158344	154959	-2.13
2	Madhesh	172755	163345	-5.44
3	Bagmati Province	184766	178840	-3.21
4	Gandaki Province	65266	86815	33.02
5	Lumbini	95085	109797	15.47
6	Karnali Province	3960	4252	7.37
7	Sudur Paschim Province	21257	20645	-2.88
	<b>GRAND TOTAL</b>	<b>701433</b>	<b>718653</b>	<b>2.45</b>

**Province wise AI Report in Graph**



**4.1) AI in Province No 1**

S.N.	Districts	Phone No.	AI in 2077.78	AI in 2078.79			
				Sub Total	Cow	Buff	Goat
1	Taplejung	024-460176	1655	483	389	94	0
2	Ilam	027-521335	15519	14955	14312	523	120
3	Pachthar	024-520127, 469	3115	1749	1350	355	44
4	Jhapa	023- 521161	54780	45702	42222	2321	1159
5	Dhankuta	026-520283, 280	1579	1949	1524	425	0
6	Morang with Madan smriti	021-471958	40281	47471	43215	3714	542
7	Sunsari	025-560162	30827	28402	25241	2834	327
8	Udayapur	035-420129	10155	13684	7433	5732	519
9	Solukhumbu	038- 520103	17	0	0	0	0
10	Terathum	026-460127	127	354	224	130	0
11	Khotang	036420107	0	0	0	0	0
12	Bhojpur	029420129	7	0	0	0	0
13	Okhaldhunga	037520210	0	0	0	0	0
14	Sankhuwasabha	029560159	282	210	164	46	0
	<b>Total</b>	<b>TOTAL</b>	<b>158344</b>	<b>154959</b>	<b>136074</b>	<b>16174</b>	<b>2711</b>

**4.2) AI in Madhesh Province**

S.N.	Districts	Phone No.	AI in 2077.78	AI in 2078.79			
				Sub Total	Cow	Buff	Goat
8	Saptari	031-520308, 142	13504	11592	7620	3897	75
9	Siraha with NLBO	033- 520008, 560273	20106	19384	10905	8408	71
10	Dhanusa	041-520179	22197	29733	16764	12890	79
11	Mahottari	044-520073	22954	24934	16217	8649	68
12	Sarlahi with Ranjitpur Farm	046-520145	29257	23909	14846	8983	80
13	Rautahat	055-520125	20809	18763	11426	7281	56

14	Bara	053-550041	22986	17031	12263	4667	101
15	Parsa (without Bara)	051-522551, 9855035252	20942	17999	11705	6227	67
	<b>Total</b>		<b>172755</b>	<b>163345</b>	<b>101746</b>	<b>61002</b>	<b>597</b>

#### 4.3) AI in Bagmati Province

S.N.	Districts	Phone No.	AI in 2077.78	AI in 2078.79			
				Total	Cow	Buff	Goat
23	Sindhuli	047-520185,9843481500	8417	3353	2228	1085	40
24	Sindhupalchok	011-620115, 9841026327,9841753137	243	486	243	243	0
25	Kavre	011-490266,9851164594	31617	33637	27685	5792	160
26	Lalitpur	01-5547377,9851137970	13344	13577	9998	3471	108
27	Bhaktapur	016-610022	8244	9200	8635	444	121
28	Kathmandu	01-4032201,137	25304	27265	24722	1797	746
29	Rasuwa (Uttarganga & Kalika)	010-540129	1276	1282	764	518	0
30	Nuwakot	010-560012, 9849159785	3929	4034	2719	1262	53
31	Dhading	010-520107	2065	2113	1536	521	56
32	Makawanpur	057412828/9864021707	31040	24535	19080	5345	110
33	Chitwan	056-525097,520176	56643	58676	54189	4150	337
34	Dolakha with Jiri Farm	049- 421115	651	281	141	111	29
35	Ramechhap	048- 540032, 9854040032	1993	401	222	147	32
	<b>Total</b>		<b>184766</b>	184766	153925	28652	2189

#### 4.4) AI in Gandaki Province

S.N.	Districts	Phone No.	AI in 2077.78	AI in 2078.79			
				Sub Total	Cow	Buffalo	Goat

36	Gorkha	064411251, 9846039308h	1682	2125	747	1271	107
37	Lamjung	066-521231,20131	2236	2360	1140	1199	21
38	Tanahun with Bandipur Farm	065-560205	6945	10715	5953	4674	88
39	Syangja	063- 420108,9846052191s	3366	3115	1217	1835	63
40	Kaski	061-152082	29752	29706	16149	13315	242
41	Manang		0	0	0	0	0
42	Mustang	069-440121	0	7	7	0	0
43	Myagdi	069-520121	297	273	143	130	0
44	Parbat	067- 420123,9857630855	1646	1310	872	438	0
45	Baglung	068-520121	2054	1976	1201	775	0
46	Nawalparasi-East From Bardaghat	078-520149, 9847297834	17288	35228	27183	7718	327
	<b>Total</b>		<b>65266</b>	<b>86815</b>	<b>54612</b>	<b>31355</b>	<b>848</b>

#### 4.5) AI in Lumbini Province

S.N.	Districts	Phone No.	AI in 2077.78	AI in 2078.79			
				Sub Total	Cow	Buffalo	Goat
47	Gulmi	079-52227	1486	3015	1380	1580	55
48	Arghakhachi	077-420062,9840493638	9391	13197	7123	5925	149
49	Palpa	075-520145\,9847067265	4327	4405	2247	2135	23
50	Nawalparasi- West from Bardaghat	078-520149, 9847297834	11943	12087	8869	3153	65
51	Rupandehi	071-520206/9851134786	44434	44876	32910	11609	357
52	Kapilbastu	076560021,9865242401	8602	16092	11033	4836	223
53	Pyuthan	086-420014	909	816	361	367	88
54	Rolpa	086-440056	519	445	130	284	31
55	E.Rukum	088-530010	13	0	0	0	0
56	Dang	082-5633604	3112	3741	2113	1461	167

57	Banke with NLBO & Gaughat	081-520254,521020, 621243,9857840068	5628	5721	3214	2479	28
58	Bardia	084-420229,9814553981	4721	5402	3208	1908	286
	<b>Total</b>		<b>95085</b>	<b>109797</b>	<b>72588</b>	<b>35737</b>	<b>1472</b>

#### 4.6) AI in Karnali Province

S.N.	Districts	Phone No.	AI in 2077.78	AI in 2078.79			
				Sub Total	Cow	Buffalo	Goat
59	Salyan	088-520062	283	229	121	63	45
60	W.Rukum	088-530010	213	442	97	251	94
61	Surkhet	083-520288, 9848038930	2449	2546	1413	1086	47
62	Dailekha	089-420148	661	618	272	309	37
63	Jajarkot	089430030	76	147	37	83	27
64	Jumla	087-520028	264	236	234	2	0
65	Dolpa		0	0	0	0	0
66	Kalikot		14	30	6	10	14
67	Mugu		0	4	4	0	0
68	Humla		0	0	0	0	0
	<b>Total</b>		<b>3960</b>	<b>4252</b>	<b>2184</b>	<b>1804</b>	<b>264</b>

#### 4.7) AI in Sudurpaschim Province

S.N.	Districts	Phone No.	AI in 2077.78	AI in 2078.79			
				Sub Total	Cow	Buffalo	Goat
69	Kailali wuth Budhitola farm	091-524867	8285	7281	4718	2066	497
70	Kanchanpur	099-521176 , 525657	11793	11797	7202	4488	107
71	Doti	094-420114	245	406	310	96	0
72	Dadeldhura	096-420114	492	694	376	258	60
73	Baitadi	095-529306	11	0	0	0	0
74	Bajhang	092421050	347	377	281	96	0
75	Achham	097620102	30	62	28	16	18
76	Darchula	093420104	0	17	10	7	0



77	Bajura	097541064	54	11	6	5	0
	<b>Total</b>		<b>21257</b>	<b>20645</b>	<b>12931</b>	<b>7032</b>	<b>682</b>
	<b>GRAND TOTAL</b>		<b>701433</b>	<b>718653</b>	<b>532297</b>	<b>177990</b>	<b>8366</b>

## 5. A.I. Coverage

Out of the total livestock population in the country, certain number are estimated to be breeding stock at a time. If the estimated number of breedable animals (Based on the data of Krishi Diary 2079) given below is assumed to be conceived as per the given estimated conception rate, AI coverage of cattle & buffaloes all over the country can be estimated as below. AI coverage in case of goat population is extremely limited.

**Table 10: AI Coverage: 2078/79**

S.N.	Breed	Total estimated No. of Breedable Animals	Total AI in FY 2078/79	Estimated Conception Rate (%)	AI Coverage (%)
1	Cattle	1209041	550093	56	25.48
2	Buffalo	1630642	180626	48	5.32
	<b>Total</b>	<b>2839683</b>	<b>730719</b>	<b>52</b>	<b>15.40</b>

## 6. Top 10 AI Districts

Name of 10 districts with highest number of inseminations are presented in the Table below. In the table below, the top ten districts in AI of the fiscal year 2078/79 has been presented with their respective position.

Districts	Number of AI in 2078.79				Position
	Cow	Buffalo	Goat	Sub total	
Chitwan	54189	4150	337	58676	1
Jhapa	53048	3161	1752	57961	2
Morang	42137	3685	554	46376	3
Rupandehi	32910	11609	357	44876	4
Nawalparasi East	27183	7718	327	35228	5
Kavre	27685	5792	160	33637	6
Dhanusha	16764	12890	79	29733	7
Kaski	16149	13315	242	29706	8

<b>Sunsari</b>	25297	2693	384	<b>28374</b>	<b>9</b>
<b>Kathmandu</b>	24722	1797	746	<b>27265</b>	<b>10</b>
<b>Total</b>	<b>320084</b>	<b>66810</b>	<b>4938</b>	<b>391832</b>	

## 7. Conception Rate

NLBOs monitored AI program in various districts and farms of the country and the calculated results have been presented in the Table & graph below, which shows conception rate of AI in cattle to be 56.12% and AI in buffalo is 48.02%. Recently, AI conception for the goat has been reported to be 50% in the recorded places of Jhapa district. As AI cards in many districts were not issued or were not available at the farm during monitoring, reports from some districts do not include exact AI numbers, thus number of AI for those districts have been assumed to be equal to the number of sample animals (monitored animals). For some districts the sample animals have been selected on random basis, but for the rest, the inseminated animals were monitored in certain pockets of concerned districts keeping individual monitoring record inseminator-wise. It can't be claimed that the results presented below could be error free but the data was calculated to be accurate to the extent possible from our side. Furthermore, we request all AI concerned officers and technicians to be more responsible in proper recording and regular and proper reporting of AI, so that we could have more effective AI service and reliable monitoring results. The conception rate of the fiscal year 2078.79 has been calculated on an average being based on the secondary data obtained from the AI progress reports sent to us by the inseminators from Terai and hilly districts.

*Conception Rate: Cattle & Buffalo from 2064/65(2007/08) – 2078/79(2021/22)*

Year Species	2007/08 (64/65)	2008/09 (65/66)	2009/10 (66/67)	2010/11 (67/68)	2011/12 (68/69)	2012/13 (69/70)	2013/14 (70/71)	2014/15 (71/72)	2015/16 (72/73)	2016/17 (73/74)	2017/18 (74/75)	2018/19 (75/76)	2018/19 (75/76)	2019/20 (76/77)	2020/21 (77/78)	2021/22 (78/79)
Cattle	56.03	54.69	56.15	56.65	56.45	56.12	56.05	55.75	56.00	55.85	56.12	56.15	56.15	57.11	56.12	56
Buffalo	54.93	48.0	46.76	48.28	48.34	48.04	48.00	48.5	48.00	47.64	48.02	48.05	48.05	50.01	48.02	48
Average	<b>55.48</b>	<b>51.34</b>	<b>51.15</b>	<b>52.46</b>	<b>52.39</b>	<b>52.08</b>	<b>52.02</b>	<b>52.12</b>	<b>52.00</b>	<b>51.75</b>	<b>51.78</b>	<b>52.1</b>	<b>52.1</b>	<b>52.12</b>	<b>53.91</b>	52

## 8. Private Sector in AI

Involvement of private sector in AI is in increasing trend. Mostly private practitioner's (mainly mid-level technicians) have come forward to embrace the job and most of them seem to be ready to invest also. Private AI practitioners who worked in close collaboration with the Province and Local Governments last FY has been presented below. Government job holders & retired govt. staff who work as inseminators might not have been associated with AI centres but are working as inseminators.

In total, there are around 3000 inseminators all over the country working today. All the Provincewise data of inseminators is verified by NLBO, Pokhara in every five years

and the verified data is published as an updated inventory of inseminators. Table below presents the data related to Artificial inseminators updated upto the fiscal year 2078/79.

### Contribution of Private Sector in A.I.

Particular	Insemination center	Inseminators	AI/Insemination Center	AI/Inseminator
Governments	373	722	728	359 (in the Year 2078.79)
Community	378	395		
Private	212	1557		
Total	963	2674 (Active inseminators 1952)		

### 9. Best Inseminators Reward Report (National Level) 2062/63 (2005/06) to 2070/71 (2013/14)

The then NLBC in order to motivate the inseminators has begun awarding best inseminators since FY 2062/63 (2005/06). For this, inseminators with more than 500 AI/Year in Terai and 250 AI/Year in Hills were selected for further evaluation and best four inseminators rewarded on the occasion of world food day celebration. Presented in the Table below is the list of best inseminators who were rewarded from FY 2062/063 (2005/06) to FY 2070/71 (2013/14).

### Best Inseminators Reward Report 2062/63 (2005/06)-2070/71 (2013/14)

S.N.	Name of the Inseminators	Designation	Office/District	Reward
Best Government Inseminators in FY 2062/63 (2005/06)				
1	Mr. Resham Pyakurel	LST	DLSO Kathmandu	First
2	Mr. Shalik Ram Poudel	LST	DLSO Chitwan	Second
3	Mr. Krishna Chandra Jha	JVST	DLSO Ilam	Third
Best Government Inseminators in FY 2063/64 (2006/07)				
1	Mr. Shalik Ram Poudel	LST	DLSO Chitwan	First
2	Mr. Digambar Chaudhari	JLST	DLSO Rupendehi	Second
3	Mr. Keshav Dhungana	JLST	DLSO Morang	Third
4	Mr. Shiva Ram Shrestha	LST	DLSO Kathmandu	Fourth

Best Government Inseminators in FY 2064/65 (2007/08)				
1	Mr. Devi Ghimire	LST	DLSO Rupendehi	First
2	Mr. Bishow Nath Yadav	JLST	DLSO Makawanpur	Second
3	Mr. Ram Bahadur Deuja	VST	DLSO Bhaktapur	Third
4	Mr. Raj Kumar Saha	VST	DLSO Mahotari	Fourth
Best Government Inseminators in FY 2065/66 (2008/09)				
1	Mr. Yuba Raj Poudel	JVST	DLSO Chitwan	First
2	Mr. Bikaru Yadav	JVST	DLSO Dhanusha	Second
3	Mr. Badri Prasad Baral	JVST	DLSO Morang	Third
4	Mr. Anirudra Pandey	JVST	DLSO Parsa	Fourth
Best Government Inseminators in FY 2066/67 (2009/10)				
1	Mr. Dhurba Chaudhary	JVST	DLSO Rupandehi	First
2	Mr. Thagendra Prasad Aryal	JVST	DLSO Kaski	Second
3	Mr. Dhuga Bahadur Shrestha	JVST	DLSO Sunsari	Third
4	Mr. Bipin Kumar Singh	JVST	DLSO Mahottari	Fourth
Best Government Inseminators in FY 2067/68 (2010/11)				
1	Mr. Bishow Nath Yadav	LST	DLSO Makawanpur	First
2	Mr. Dhuga Bahadur Shrestha	VST	DLSO Sunsari	Second
3	Mr. Thagendra Prasad Aryal	VST	DLSO Kaski	Third
4	Mr. Arjun Karki	JVST	DLSO Kanchanpur	Fourth
Best Private Inseminators in FY 2067/68 (2010/11)				
1	Mr. Chiranjibi Tripathi	Private Paravet	Chitwan	First
2	Mr. Ram Bahadur Basnet	Private Paravet	Chitwan	Second
3	Mr. Chet Narayan Ray	Private Paravet	Nawalparasi	Third
4	Mr. Madhu Poudel	Private Paravet	Bardiya	Fourth
Best Government Inseminators in FY 2068/69 (2011/12)				
1	Mr. Raj Karan Mahato	JLST	DLSO Sarlahi	First
2	Mr. Uttam Lal Das	JVST	DLSO Makawanpur	Second
3	Mr. Dev Raj Parajuli	LST	DLSO Kavre	Third
4	Mr. Ganesh Regmi	VST	DLSO Sunsari	Fourth
5	Mr. Nabin Shiladhar	JVST	DLSO Kailali	Fourth
6	Mr. Kaushal Kiahor Mahato	VST	DLSO Dang	Fourth

Best Private Inseminators in FY 2068/69 (2011/12)				
1	Mr. Tara Prasad Chapagai	Private Paravet	Rupandehi	First
2	Mr. Chet Narayan Ray	Private Paravet	Nawalparasi	Second
3	Mr. Kiran Raj Rijal	Private Paravet	Chitwan	Third
4	Mr. Ram Chandra Bharati	Private Paravet	Nawalparasi	Fourth
5	Mr. Ghan Shyam Tiwari	Private Paravet	Kailali	Fourth
6	Mr. Ram Lal Rokaya	Private Paravet	Banke	Fourth
Best Government Inseminators in FY 2069/70 (2012/13)				
1	Uttam Lal Das	VST	Makawanpur	First
2	Kulananda Yadav	LST	Morang	Second
3	Shankar Prasad Ghimire	LST	Kathmandu	Third
4	Krishna Dhami	JVST	Kailali	Fourth
5	Sattya Narayan Goiet	LST	Nawalparasi	Fourth
6	Bhoj Raj Ghimire	JVST	Rupandehi	Fourth
Best Private Inseminators in FY 2069/70 (2012/13)				
1	Chet Narayan Ray	Private Paravet	Nawalparasi	First
2	Birendra Prasad Yadav	Private Paravet	Rupandehi	Second
3	Ram Bahadur Basnet	Private Paravet	Chitwan	Third
4	Kim Lal Ranabhat	Private Paravet	Kaski	Fourth
Best Private Inseminators in FY 2070/71 (2013/14)				
Eastern Region (Government)				
1	Ganesh Prasad Regmi	VST	DLSO Sunsari	First
2	Kailash Prasad Singh	LST	DLSO Jhapa	Second
3	Bishnu Prasad Ghimire	VST	DLSO Sunsari	Third
4	Surya Man Tamang	VST	DLSO Jhapa	Fourth
Central Region (Government)				
1	Yubraj Poudel	VST	DLSO Chitwan	First
2	Resham Pyakurel	VST	DLSO Kathmandu	Second
3	Shalikram Poudel	VST	DLSO Chitwan	Third
4	Bipin Kumar Singh	VST	DLSO Mahottari	Fourth
Western Region (Government)				
1	Satya Narayan Gohit	VST	DLSO Nawalparasi	First
2	Buddhi Bahaadur Deuja	VST	DLSO Nawalparasi	Second

3	Bir Bahadur Chettri	VST	DLSO Rupandehi	Third
4	Sher Bahadur Sharu	JVST	DLSO Kaski	Fourth
Mid Western Region (Government)				
1	Mahanthi Yadav	LST	DLSO Bardiya	First
2	Govinda Rokaya	LST	DLSO Banke	Second
3	Ratna Bahadur Shahi	VST	DLSO Banke	Third
4	Dhruba Lal Shrestha	JVST	DLSO Bardiya	Fourth
Far Western Region (Government)				
1	Arjun Singh Karki	LST	DLSO Kanchanpur	First
2	Man Bahadur KC	LST	DLSO Kanchanpur	Second
3	Krishna Bahadur Dhami	JVST	DLSO Kailali	Third
4	Anita KC	JVST	DLSO Kanchanpur	Fourth
Eastern Region (Private)				
1	Rudra Bahadur Katuwal	Private Paravet	Madam MSP, Jhapa	First
2	Tulasi Niraula	Private Paravet	Madam MSP, Jhapa	Second
3	Lomash Khatiwada	Private Paravet	Morang	Third
4	Madan Khadka	Private Paravet	Jhapa	Fourth
Central Region (Private)				
1	Ishwari Prasad Acharya	Private Paravet	Chitwan	First
2	Ram Bahadur Basnet	Private Paravet	Chitwan	Second
3	Jhamka Bahadur Shrestha	Private Paravet	Chitwan	Third
4	Ishwari Badal	Private Paravet	Chitwan	Fourth
Western Region (Private)				
1	Birendra Prasad Yadav	Private Paravet	Rupandehi	First
2	Ram Chandra Bharati	Private Paravet	Nawalparasi	Second
3	Bhim Narayan Aryal	Private Paravet	Rupandehi	Third
4	Purna Chandra Gaire	Private Paravet	Kaski	Fourth
Mid Western Region (Private)				
1	Madhu Prasad Poudel	Private Paravet	Bardiya	First
2	Som Prasad Chaudhary	Private Paravet	Dang	Second
3	Nawal Kishor Pathak	Private Paravet	Banke	Third
4	Ram Kumar Tharu	Private Paravet	Bardiya	Fourth

Far Western Region (Private)				
1	Shankar Khadka	Private Paravet	Kailali	First
2	Dhaniram Chaudhary	Private Paravet	Kanchanpur	Second
3	Laxmi Prasad Baral	Private Paravet	Kanchanpur	Third
4	Anup Chaudhary	Private Paravet	Kanchanpur	Fourth

## 2.6 ANNUAL PROGRESS REPORT

### 1. Annual Progress Report

Presented below is the overall Progress Report in Percentage for the year 2078/79.

Fiscal Year	Progress %	
	Weightage Progress%	Financial Progress %
2078/79 (2021/22)	97.41	74.78

### 2. Financial Details

Financial details of this office till the end of FY 2078/79 are presented below.

#### 2.1) Budget and expenses

##### **Approved Budget and Actual Expenses: 2078/79**

Budget Title no	Budget Allocated (in Rs )	Budget Expense (in Rs)	Progress %
312021033	170189000	130889612	76.91%
312021034	29200000	18223273	62.41%
<b>Total</b>	<b>199389000</b>	<b>149112885</b>	<b>74.78%</b>

#### **2.2) Approved Budget and Actual Expenses: 2057/58 (2000/01) - 2078/79 (2021/22)**

Fiscal Year	Approved Budget (NRs)	Actual Expenses(NRs)
2057/58 (2000/01)	25125000.00	18635227.00
2058/59 (2001/02)	17205000.00	17145526.00
2059/60 (2002/03)	6259000.00	5359394.70
2060/61 (2003/04)	9017000.00	8585118.00
2061/62 (2004/05)	9385000.00	8385183.30
2062/63 (2005/06)	8710000.00	8169097.71
2063/64 (2006/07)	9433000.00	9048265.49
2064/65 (2007/08)	11801000.00	10896380.72
2065/66 (2008/09)	12355000.00	12160896.04
2066/67 (2009/10)	19865000.00	18244214.43



2067/68 (2010/11)	30833000.00	27819648.98
2068/69 (2011/12)	42000236.00	41783178.20
2069/70 (2012/13)	33930000.00	30238923.20
2070/71 (2013/14)	84100750.00	80251451.00
2071/72 (2014/15)	54790000.00	46348601.00
2072/73 (2015/16)	69963000.00	47395929.30
2073/74 (2016/17)	67569162.60	60686254.91
2074/75 (2017/18)	109400000	96445000
2075/76 (2018/19)	230984000	192083802.19
2076/77 (2019/20)	226874000	160742258
2077/78(2020/21)	212683000	175897688
<b>2078/79(2021/22)</b>	<b>199389000</b>	<b>149112885</b>

### 2.3) Annual Revenue

Revenue: 2078/79 (2021/22)

Revenue Source	Total Revenue NRs
From all the Units of NLBO	39606241

### 2.4) Beruju

Details of Beruju

Fiscal Year	Outstanding Beruju NRs	Cleared %	Remarks
Upto 2077/78	553644		
Cleared in 2078/79	166000	29.98%	
Added in 2078/79	2522611		
Remaining	2882229		

## **2.7 ACHIEVEMENTS**

We consider following works done in 2078/79 as achievements that our office has performed.

### **1) Semen Production:**

Since the beginning of frozen semen production NLBO, Pokhara has been producing & distributing semen to meet the required doses of semen all over the country. The lab after being relocated at Pokhara, has developed infrastructure and laboratory facilities and hence has increased semen production in quality as well as quantity. The lab is capable of producing semen of best quality to fulfill the country's total demand and also to export quality semen, provided enough facilities are created and sufficient resources are made available. Despite aftereffects of COVID-19 Pandemic NLBOs produced 801209 doses of qualitative semen in the year 2078/79 which is 2.26% more than the previous year.

### **2) Beginning & continuation of Semen Collection from E.T. Bulls**

NLBO, Pokhara in collaboration with NARC, began embryo transfer technology in cattle for the first time in Nepal in the year 2059/60 (2002/03). This was initiation of a step to fulfill long waited plan of initiating ET in Nepal to produce superior bulls and bull mothers. The cattle embryos imported from New Zealand few years ago were transferred into cows of government and private farms in Kathmandu, Lalitpur, Bhaktapur, Gorkha, Rupandehi, Dolakha, Bara, Kaski, Chitwan and Sunsari. During the last fiscal year too, the program got continuation.

So far, a total of 170 embryos were transferred resulting 36 pregnancies. Two ET born bulls are now in collection and two bulls born from ET born mother died. Fortunately, four more bulls born from ET born mother with ET2 father (F2 generation) are coming into semen production.

In the fiscal year 2072/73, a training programme of Embryo Transfer was organised by the then Directorate of Livestock Production from Ashad 31<sup>st</sup> to shrawan 5<sup>th</sup> 2073. The site for the embryo transfer was selected in the various farms located at Kaski, Gorkha, Tanahun, Kathmandu, Bhaktapur & Kavre. This landmark event is expected to be a turning point in the history of animal breeding in the country as the bulls obtained from ET can contribute in pure genetic material for improvement of genes to increase production and productivity in milking cattle of the country. Continuing the previous works, some of the cattle embryos were transferred to some of the cattle of selected elite herds during the fiscal Year 2078/79 too.

Participants of Embryo Transfer Technology Training held in Ashad 31<sup>st</sup> to shrawan 5<sup>th</sup> 2073

S.N.	Participants	Designation	Office During Participation
1	Shiva Nath Mahato	Senior Livestock Development Officer	DLSO, Sunsari
2	Dr. Khagendra Raj Sapkota	Senior Livestock Development Officer	RLSTC, Nepalganj
3	Thagendra Aryal	Veterinary Officer	DLSO, Kaski
4	Narendra Kumar Rai	Livestock Service Technician	NLBC, Pokhara
5	Purusottam Bdr. Singh	Livestock Service Technician	NLBC, Pokhara
6	Shiva Lal Adhikari	Livestock Service Technician	NLBC, Pokhara
7	Bir Bahadur Gurung		Animal Breeding Division, NARC
8	Shashi Khadka	Livestock Service Technician	DLSO, Kavre

### 3) Semen Production- Installation of Latest Laboratory Equipments

With JICA non-project grant, NLBC procured and installed following equipments/ machineries in different dates to upgrade the laboratory.

1. IMV IS-4 semen filling, sealing and printing machine.
2. Programmable bio-freezer.
3. Laminar Air Flow Cabinet.
4. 25 KVA Capacity Generator

Furthermore, from the Government Program we have installed Genomax (France) and MPP Quattro (Germany) semen filling, sealing and printing machine with programmable bio-freezer which is the latest machine among south Asia and CASA System which is very new in Nepal. The Air shower system and some other modern laboratory equipments have also been installed in the lab during the year 2077.78. Use of these machines is expected to improve frozen semen quality further while compared to manual machines (IS-1) the lab had been using. These latest equipments used by all the renowned labs all over the world are assets of NLBO and installation and use of these equipments has strengthened the capacity to produce quality frozen semen in large amount. Regular Strengthening of the lab facilities, repair and biosecurity measures also took place in the fiscal year 2078.79.

### 4) Lab establishment and production of Frozen Semen started in NLBO, Lahan

The Frozen Semen Production Laboratory established and started at LBO, Lahan from

FY 2066/67. At Lahan, we have been producing frozen semen of Murrah, Holstein, Gir, Shahiwal and Hariyana Bulls. A semen filling, sealing and printing machine, Genomax was handed over to NLBO, Lahan by NLBO, Pokhara. Since then, Lahan is producing semen of Murrah Buffalo Bull, Holstein Bull (though very limited in number) and Bulls of Indian origin using latest technology. However, new high tech lab equipments and machineries have been set to produce quality semen at NLBO, Lahan during the fiscal year 2075.76 which has been supposed to increase both the quality and quantity of the semen. 274225 doses of frozen semen was produced from NLBO, Lahan during the fiscal year 2078.79.

### **5) Initiation of Frozen semen production from Holstein Friesian**

The breeding policy, 2055/56 had not allowed to rear the Holstein cattle due to heavy investment and assumption of being unsuitable for Nepalese climatic condition. However, there was huge demand of Holstein by the farmers and the recent Breeding Policy has allowed semen collection/breed improvement from the Holstein bull as well. Because of the former policy, the inseminators were compelled to inseminate the Holstein cattle with Jersey semen which ultimately reduced the milk yield of offspring and caused frustration to the farmers. Some farmers used to receive the imported frozen Holstein semen and the service is also increasing. In this context, we had to start & give continuity to the production & distribution of Holstein semen from the year 2009/2010 AD. Nowadays, Holstein semen has a very high demand across the country.

### **6) Initiation & continuation of Progeny Testing and Pedigree Performance Recording System**

Progeny testing and pedigree and performance recording system was initiated by FAO with the collaboration of Animal breeding division of NARC & NLBO, Pokhara during the year 2008/2009 AD, as one of the partners. FAO has terminated its financial TCP assistance and now NLBO has been shouldering the program for its sustainability. Government of Nepal has recommended this program as one of the important tools for genetic improvement. NLBO chief was given the role of national coordinator and the program was initially implemented in 14 districts. This program gives the initiation of progeny testing at one hand, by other hand will create the resource center of improved cattle and breeding bulls. Some more details of the program has been given in the following chapter of the book. After the country entered federal system, the program has been limited to the 9 districts due to the inadequate human resources and budgetary issues. However, similar model of PPRS program in cattle & buffalo and PRS (Performance Recording System) in goat also is being considered.

### **7) Initiation of Frozen semen production from the imported bulls from the abroad & top Bulls selected from DCIP/PPRS Herds**

Though, two ET born bulls are now in collection, many more imported & selected bulls

born from the top mothers of DCIP/PPRS herds with high breeding values have been brought to NLBO, Pokhara for semen collection in the recent years. This program is supposed to have created the resource centers of improved cattle and breeding bulls to some extent. Purchase of selected bulls from DCIP herd will continue in coming years as well.

## 8) Initiation of Program of Livestock Breed Improvement (AI Mission)

Program of Livestock Breed Improvement (PLBI) was initiated by Government of Nepal during the Fiscal year 2067/068 BS as one of the important tools for genetic improvement. Government of Nepal has given high priority to this program. National Livestock Breeding Office, Pokhara was the leading organization for the program, and the then NLBO, Pokhara chief was recommended as the national coordinator of this program. There was a central coordination committee that provided direction to the program and Director General of DLS is the chairman of central coordination committee. The aim of the project was to produce high milk yielder cattle of Nepalese Jersey and HF within the country. The then DLSOs were the main working organization for the program. NLBO, Lahan and Nepalgunj were the responsible organizations. AI mission Program had contributed a lot in terms of quality AI service in the country. The Mission had also trained a lot of private as well as government technicians for quality AI service.

## 9. Major Achievements in Figures:

### Semen Production:

S.N.	NLBOs	Semen Production						Remarks
		Murrah	Holstein	Jersey	Buck	Hariyana	Total	
1	NLBO, Pokhara	142250	71225	280223	25715		519413	
2	NLBO, Lahan	42139	138791	84772	688	7835	274225	
3	NLBO, Nepalgunj	7277			294		7571	
4	Grand Total of Fiscal Year 2078.79	191666	210016	364995	26697	7835	801209	

### Semen Distribution:

S.N.	NLBOs	Semen Distribution						Remarks
		Murrah	Holstein	Jersey	Buck	Hariyana	Total	
1	NLBO, Pokhara	97509	148890	200444	9715		473910	Supplement/ Jarti 17352

2	NLBO, Lahan	26794	70607	57349	4454	34079	193283	
3	NLBO, Nepalgunj	26206	8103	25761	3347		57417	
4	Grand Total of Fiscal Year 2078.79	144509	227600	283554	17516	17352	724610	

### Liquid Nitrogen Production, Purchase & Distribution:

S.N.	NLBOs	LN2 Production	LN2 Purchase	LN2 Distribution	Remarks
		Litre	Litre	Litre	
1	NLBO, Pokhara	53420	142607	184002	
2	NLBO, Lahan	70831	34242	84336	
3	NLBO, Nepalgunj	1628	54781	45132	
4	Grand Total of Fiscal Year 2078.79	125879	231630	313470	

### Artificial Insemination:

S.N.	NLBOs	Artificial Insemination				Remarks
		Cattle	Murrah	Goat	Total	
1	NLBO, Pokhara	353457	134171	3955	491583	
2	NLBO, Lahan	154728	28523	2857	186108	
3	NLBO, Nepalgunj	24112	15296	1554	40962	
4	Grand Total of Fiscal Year 2078.79	532297	177990	8366	718653	

### Animal Distribution(Ruminants):

S.N.	Type of Ruminants	No Distributed	No. of Districts	Beneficiary (No. of family)	Remarks
1	Murrah Bull	20	5	134	Including 4 farmer Groups
2	Boer Buck & Doe	56	19	180	Including 2 farmer Group
	Total	76	24	314	

**Animal Distribution(Non Ruminants):**

S.N.	Type of Ruminants	No Distributed	No. of Districts	Beneficiary (No. of family)	Remarks
1	Poultry (chicks)	87496	16	1505	
2	Pig	313	19	103	Including four farmer Groups
	<b>Total</b>	<b>87809</b>	<b>25</b>	<b>1608</b>	

**Cultivation of Forages :**

S.N.	Title	Unit	Annual Target	Annual Progress	Remarks
1	Teosente	ha	30	30	
2	Napier-General	ha	5	5	
3	Signal	ha	5	5	
4	Super Napier	ha	7	7	
5	Winter forage	ha	18	18	
6	Oat	ha	8	8	
7	Berseem	ha	7	7	
8	Vetch	ha	3	3	
9	Silage	M. ton	1200	1200	
10	Demo plot	ha	3	3	
12	<b>Total</b>	ha	68	68	

## **DAIRY CATTLE AND BUFFALO IMPROVEMENT PROJECT (DCBIP)**

### **1) Introduction**

Initially, Dairy Cattle and Buffalo Improvement Program (DCBIP) was a joint program of NARC and DLS for dairy cattle & buffalo breeds improvement. When the project started, Animal Breeding Division of NARC, Khumaltar was the leading organization for the project at central level and National Livestock Breeding Office, Pokhara was next to leading organization for the programs for field implementation. At first, the project was funded by financial TCP assistance of FAO which has now been terminated and Government of Nepal has continued the project with its regular fund since then. Recently, NLSIP project funded by World Bank has also assisted the program. Government of Nepal has given high priority to this program. NLBO Pokhara cheif has been working as the national focal person of this program. There is a steering committee that provides direction to the project and Director General of DLS is the chairman of steering committee. Recently, NLBO, Pokhara has taken overall responsibility of animal registration, performance recording, artificial insemination, data analysis including breeding value analysis and bull purchase on the basis of estimated breeding value for semen collection from the elite herds where bull mothers are reared. As of today, 4211 animals from 86 herds and 9 districts are being registered, recorded and analysed.

### **2) Aim of the project**

The aim of the project is to produce high milk yielder Dam/cattle and Sire/bull of Nepalese Jersey and HF within the country. In case of buffalo, Murrah breed has been used to improve the milk yield of the domestic buffalo. To acheive the goals of breed improvement, registered potential bull mothers (cattle and buffaloes on the basis of milk yield records are selected and imported semen from the abroad is used to inseminate such cattle. Monthly milk recording and milk analysis is done from the registered animals to find out the lactation yield and milk content of each individual animal. The strategy behind this program is estimation of breeding value of each dam by pedigree and performance recording scheme. Finally, that helps to find out high milk yielder animal throughout the country and top animals are selected for mother cow and inseminated by imported frozen semen to produce better progeny than mother.

### **3) Command Area**

The project was previously launched at 28 clusters of 14 districts, but now it has been reduced to 9 districts/locations. However, the number of district is again going to increase in coming years as it is a high priority program of DLS. In command area, project has distributed imported frozen semen, AI Refri, AI gun, AI sheath and gloves to every cluster. At local level, the local governments and VHLSECs are the main working organization for the project. NLBOs Pokhara, Lahan & Nepalgunj are responsible organization for LN2 and imported frozen semen distribution to the command districts. ABD, Khumaltar



is a helping organization for data analysis and database program to find out breeding value of each mother dam as per requirement.

#### 4) DCIP/PPRS target

DCIP target is to register high producing milking animals under the program. These registered animals are known as nucleus herd and multiplier herd to produce better progeny than mother. The bull calf born by best mother are selected for frozen semen production and distributed to the districts for natural services as well.

#### WAY FORWARD

Another impact of AI, though not accounted for, is the improvement of local animals, which has been resulting from natural mating of nondescript cattle/buffaloes by AI born male calves in rural areas.

#### Present Status of DCIP/PPRS Program in Brief:

S.N.	Districts	No of Herds	No of animals			Total Animals
			Jersey	Holstein	Murrah	
1	Kaski	20	254	467	411	1132
2	Tanahu	14	212	235		447
3	Gorkha	1	85	130		215
4	Chitwan	8	254	467		725
5	Rupandehi	20	254	394	53	701
6	Nawalparasi (East)	20	319	432		751
7	Kavre	1	70	20		90
8	Dolakha, Jiri	1	80	20		100
9	Lamjung	1	35	15		50
	<b>Total</b>	<b>86</b>	<b>1563</b>	<b>2180</b>	<b>464</b>	<b>4211</b>

## **2.8 PROBLEMS/CONSTRAINTS**

Despite improvement in many areas still problems being faced by AI program and NLBO, Pokhara office currently are-

### **1) Inadequate Lab. Equipments & Expertise for Semen Quality test**

NLBO laboratory still lacks many equipments needed to increase quantity and improve quality of semen it produces. Though the lab has been continuously working in this direction, following equipments need to be available to improve semen quality further.

- i. Air Exhaust System with HEPA filter.
- ii. Gas Sterilizer
- iii. High power Electrical Backup

### **2) Lack of Proven/Pedigree Bulls**

The bulls kept at NLBO were either selected locally or imported from India, have limited information on their pedigree. This has made us unable to supply semen from pedigree bulls as per the expectations of the farmers/inseminators. Dairy Cattle Improvement Program (DCIP) has been running to tackle such problem; however, it certainly needs huge budget and time to solve the problems of this regard.

### **3) Inadequate Infrastructures**

Since this office was shifted to Pokhara in FY 058/59, infrastructures set up are inadequate and following facilities need to be developed urgently to facilitate smooth functioning of the office:

#### **i) Road:**

A separate trail for the movement of farm animals also is a requirement in the long run as the same narrow road is being used as footpath and motorable road by the office staff and pasture access trail by the animals.

#### **ii) Wire Fencing**

To protect the office and its grass cultivation area from outer encroachment, it needs to be wire fenced up to 3-kilometer perimeter along its periphery.

#### **iv) LN2 Production/Procurement/ Distribution**

Timely availability of LN2 has been the major challenge or limitation of AI program in the country. Despite our all efforts in supply of LN2 it is still irregular and in short of supply. The major problems in LN2 supply are:

- High cost of transportation and requirement of extra manpower than allocated or

approved Staff of NLBOs.

- Less Production- the government owned LN2 plants production capacity is very less and the production cost is high because of need of frequent maintenance and high electricity usage.
- Demand of LN2 is increasing whereas transportation facility is decreasing.

#### **v) Shortage of Skilled Manpower and Lack of Human Resource Development Plan**

Quality semen production & evaluation needs specialized and skilled human resource. So, a well planned Human Resource Development Document and assignment of such manpower to NLBOs for certain Period for the implementation of DCIP/ Progeny Testing programs, Lab management etc. by means of quality training inside and outside the country is an urgent need of NLBOs.

#### **vi) Extension of AI service in Goat & Pig**

Currently, AI service in Goat is occasional/casual & AI in pig is extremely limited in Nepal. However, demand of AI service in goat and pig is increasing day by day as it is very expensive for the farmers to rear and change (to avoid inbreeding depression) the male animals every year in these species too. To make AI service commonly available in these two species, we have to develop all the necessary infrastructures, relevant nucleus herds of high genetic merit, laboratory facilities, specific training and skilled manpower gradually so that the service can be easily available in near future.

## 2.9 NATIONAL LIVESTOCK BREEDING OFFICES, Lahan & Nepalgunj

Supporting and running of AI programme is the responsibility of the then NLBC and Livestock Breeding Offices (Now all NLBOs). The then Livestock Breeding Offices store AI equipments and support AI programme by regular monitoring and delivery of equipments to districts of their command area. Semen processing laboratory has been established in NLBO Lahan. This office has started the production of semen of Murrah buffalo, Holstein Cattle and Haryana cattle. Presented below is brief introduction of two NLBOs- Lahan and Nepalgunj.

### 1) National Livestock Breeding Office, Lahan

This office is situated in Lahan Municipality, Ward No. 10 of Siraha District, Madhesh Province. It is located 45 km far from district head quarter, Siraha Municipality. Though, this office provides general technical support to the eastern districts for animal breeding programs, it is primarily responsible for supplying frozen semen, liquid nitrogen and other A.I. accessories to the A.I. running districts. The VHLSECs & Local Governments of Eastern region are running A.I. program. Monitoring of AI programs in the Eastern region is another important responsibility of this office. The semen filling, sealing and printing machine has been handed over to NLBO, Lahan by NLBO, Pokhara. Also, NLBO, Lahan recently has established the new high tech semen processing plant as well.

#### Infrastructures

Land: Area of land: 6 Bigha, 7 Kattha, 10 Dhur

Facilities/Building

S.N	Description	Number	Remark
1	Office building	1	
2.	Officer's quarter (Office chief)	1	
3	Staff's quarter (11 family)	2	
4	Bull shed	1	
5	Generator house	1	

S.N	Description	Number	Remark
6	Liquid Nitrogen Plant	1	
7	Laboratory	1	
8	Toilet/Bathroom	9	

## 2) National Livestock Breeding Office, Nepalgunj

This office is situated in Nepalganj-17 of Banke District & Gaughat of Banke, Lumbini Province. This office was formed by the union of the then LBO, Nepalgunj and Livestock Development Farm, Gaughat (Gaughat farm), Banke. The office is situated 16 Km south from Kohalpur, East West Highway. This office is responsible for supporting animal breeding programs in general and A.I. program in particular in the certain districts of Lumbini Province and all the districts of Karnali & Sudurpaschim state. At present, this office mainly supports the districts of Banke, Bardiya, Surkhet, Dang, Kailali, and Kanchanpur for regular AI program and other districts of the reason like Jumla, Dailekh, Salyan, Bajhang, Baitadi, Doti, Rolpa and Bajura districts for occasional/seasonal AI. Monitoring of AI program, bulls for natural services and breeding groups of other livestock species also are the major job of this office.

### Infrastructures

#### Land:

Area of land: 1.9 Bigha (Except the land occupied by the then Livestock Development Farm, Gaughat (Gaughat farm), Banke.

### Facilities/Buildings

S.N	Description	Area	Number	Remarks
1	Office building (2 Storey)	130.8 Sq.m.	1	R.C.C. Roof
2.	LN <sub>2</sub> Plant Building (1 Storey)	168.6 Sq.m.	1	R.C.C. Roof
3	Shed Within office premises Within the premises of Livestock Development Farm, Gaughat	41 Sq.m. 21 Sq.m.'	2	With corrugated tin roof With R.C.C. Roof

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4	Laboratory for semen Production	80 Sq meter	1	Standard Laboratory
5	Tahara (टहरा)	26 Sq.m.	1	With corrugated tin roof

### **3. Other Details of Different Units of NLBO, Pokhara (Nucleus Herd, Double Track & Pasture Units)**

#### **1. Ruminant Production:**

A nucleus breeding herd of about 60 breeding Murrah buffaloes has been maintained at the buffalo unit of NLBO farm. Production and distribution of genetically superior Murrah bulls to upgrade native buffaloes is the main objective of this unit. The productivity of the farm herd has been gradually improving due to selection, artificial insemination and improved feeding and management practices. The farm produced 50 Murrah calves and distributed 20 breeding Murrah bulls in the fiscal year 2078.79. The farm has been supplying about twenty to thirty breeding bulls to various parts of the country every year.

We have also established our own Bull Mother Farm for dairy cattle within NLBO Pokhara premises which currently has 28 Cattle of Jersey and Holstein as of 2079.3.31. Milk Production records and other required details has been taken and is being processed to select the best cow for the bull production in future for semen collection purpose.

Boar goat production has also been started at this farm since 2074.75 fiscal year to establish a nucleus herd of Boar goat. As of 2079.3.31, the goat unit of NLBO farm had 59 adult does, 4 breeding bucks and 117 kids and hoggets. Also, the farm produced 111 kids & distributed 33 breeding bucks in different districts during the fiscal year 2078.79.

A small flock of native Kage breed of sheep reared in the mid-hills of the country has also been maintained at the farm. The rams produced at the farm are sold to farmers for breeding purpose in order to maintain genetic heterozygosity (out breeding) in local flocks. Also, the objective of rearing the flock of Kage breed of sheep in this farm is one of the components of Biodiversity Conservation Program of DLS.

#### **2. Non Ruminant Production**

##### **2.1 Pig Production:**

The farm maintains about 234 Pigs of all ages and breed including 53 breeding sows and 3 boars of exotic breeds, namely; Landrace, Yorkshire, Duroc and their crossbreds as of 2079.3.31. During the last fiscal year, the Pig Unit of NLBO The major responsibility of this unit is to produce and supply genetically superior piglets to breeder farmers, who further multiply and supply weaners to other farmers for fattening purpose. Artificial Insemination in pigs (using imported frozen boar semen) is in practice in the farm, to ensure genetic purity and superiority of the future generation. Pig unit produced 549 piglets & distributed 313 out of them for breed improvement during last fiscal year.

##### **2.2 Poultry Production:**

The NLBO Pokhara's Poultry Unit also maintains about 2000 to 3000 parent stock of New

Hampshire and Black Australorp breeds of chicken and a small hatchery to help for the development of rural chickens. Day old chicks of these pure dual purpose breeds are produced and supplied to the farmers of various parts of the country. These birds are found to be economically viable in rural conditions and are able to produce more eggs and meat for rural population as compared to native chicken breeds. During the fiscal year 2078.79, 91008 chicks were produced and 87496 chicks were distributed to different districts.

### **3.Pasture and Forage Production:**

This unit is mainly responsible for year round production and supply of green forage to buffalo, cattle, goat, breeding stocks and sheep units in the farm. Activities of this unit include production of summer, winter and perennial fodder crops. This unit is also responsible for making silage using summer fodder crops for long and dry winter season. This unit carries out daily chores of harvesting, chaffing and transporting green fodders from production fields to farm sheds, transporting silage from trench silos to buffalo barns and maintenance of farm machines and fences.

The farm used 18 and 40 hectares of land for cultivation of winter and summer fodder respectively. Oat and Berseem were the major winter forage crops, while the main summer crop were Teosinte. Maize & Forage Sorghum in addition to these crops were also cultivated in the past. Similarly, the farm maintains about 18 ha of land under Smart Napier, Giant Napier, Red Napier, Co4, Super Napier, Mott and Thin Napier. The Super Napier cultivar is very popular due to its high green matter yield, high protein content, multi-cut nature and better palatability. The farm has been supplying thousands of rooted slips of Napier since many years and can supply hundreds of thousands of sets if there is demand. Other than Napier, the farm also grows Signal, Joint Vetch, Guinea, Forage peanut, Paspalum, Desmodium, Setaria, Mulato and fodder trees like Leucaena, Rye Khanyu, Nimaro etc.

### **4. Location of Nucleus Herds:**

The Farm's Nucleus herds are located at Lampatan, Ward Number 14 of Pokhara Metropolitan City, Kaski district, Gandaki Province in Nepal. The farm is situated at an altitude ranging from 640 to 770 meters above sea level and at a distance of 200 km towards west from Kathmandu, side by side of Pokhara airport and three km towards the south from Amar Singh Chowk.

### **5. Soil Type of the Location:**

The topsoil layer of the farm land is very thin ranging from 6 to 9 inches with boulder stones in sub-soil layer. The soil is mostly silt loam and poor in organic matter content with PH ranging between 6.3 and 8.0.

### **6. Meteorological Records:**

The mean monthly temperature, rainfall and relative humidity of Pokhara valley are



presented in Table 1. The weather data were recorded at Pokhara airport by the Department of Hydrology and Meteorology. As presented in the table the mean monthly minimum temperature in Pokhara ranges between 7.2°C to 22.3°C while the mean monthly maximum temperature ranges between 21°C to 31°C.

Table 1: Average monthly temp, rainfall, and RH % of the year 2010 A.D.

Months	Max temp (°C)	Min temp (°C)	RH% at 0600 hr	Rain Fall (mm)
July	31.0	22.3	79.6	548.8
August	30.5	22.2	84.4	924.5
September	30.9	21.5	79.3	313.5
October	26.8	16.9	79.4	325.5
November	23.6	11.8	78.7	3.6
December	21.0	7.2	74.3	0.0
January	21.4	7.2	74.0	0.0
February	25.5	13.3	70.0	5.3
March	27.3	12.9	61.0	83.5
April	29.2	15.8	67.0	147.0
May	30.4	19.8	75.0	586.7
June	30.5	21.4	81.0	493.8
Overall	27.3	16.0	75.3	3,432.2

*Courtesy: Department of Hydrology & Meteorology, 2010*

Kaski district receives maximum rainfall in Nepal and as can be seen on the Table 1, about 60 percent (2,112 mm) of the total 3,432 mm rainfall in Pokhara valley occurs during first trimester (July to October) of the year.

The winter in Pokhara is cool and dry and almost all the vegetation during this season turns into brown and it requires preservation of surplus summer fodder crops as silage, purchase of rice straw and a large amount of concentrates necessary to maintain farm ruminants.

## 7. Physical Resources:

### 7.1 The Land: Area and Use:

The farm, in its early years owned an area of 145 hectares, but after handing over 25 hectares to Armed Police, 7 hectares to the then National Livestock Breeding Centre (NLBC), 10 hectares to Pokhara Metropolitan city and 3 hectares to proposed international

airport is, at present, left with about 100 hectares only. Pattern of use of the approximately 100 hectares of farm owned land has been presented in the table & figure below.

<b>Land Uses Pattern: (Hectares)</b>	
<b>Upper Terrace Area</b>	
Area under Forage crops	38.00
Perennial grasses	8.00
Introduction Plots	2.55
Silvipasture	0.45
Road, Buildings	6.00
Sub Total	55.00
<b>Lower Terrace Area</b>	
Natural grazing land	38.00
Silvipasture	2.00
Roads, Buildings & Sheds	5.00
Sub Total	45.00
<b>Total Area</b>	<b>100.00</b>

## 7.2 Buildings and Sheds:

Constructed over the years, there are altogether seventy eight buildings, sheds and working yards within the farm premises. The different residential buildings in the farm can accommodate sixty five families and thus most of the staff and workers are residing within the farm premises. The animal housings, sheds and stables can provide adequate space for 200 buffaloes, 450 sheep, 300 Boer Does, 150 Cattle or Bull mothers, 90 breeding sows, 100 Breeding Bull and Bucks and 3000 poultry breeding stock. The main office buildings comprises of 25 rooms and two meeting/training halls at the moment.

## 7.3 Farm Machinery:

The NLBO owns five tractors out of which only four are in working condition. We also have two chaffer/harvestors in working conditions out of which two were purchased in the year 2075.76. The green herbage is harvested, chaffed and loaded into trailers by tractor drawn German made one chaff cutter imported in FY 2049/50 and two Indian imported in FY 2070/71. Among three only two Indian chaff cutters are in condition and used to harvest green herbage for feeding buffaloes and ensiling of forage crops. Other machines include power generators feed mixing plant, weighing scales, moldboard ploughs, disc harrows, cultivator, tractor trailers, welding machines, refrigerators, hatchers and incubators. A list

of the farm machines and field tillage equipments are presented in Annex 4. The other machines, two tractors, one chaff cutter, one electricity generator and some of other farm implements which are too old to be repaired are included in the list of machines to be auctioned.

#### **7.4 Water Supply:**

Prevailing source of water supply in the farm is a deep tube well constructed in 2059/60 by Third Livestock Development Project (TLDP). Since then, the ground water is in use of two organizations the then NLBC and the farm. The water from the deep tube well has been found to be of good quality with slightly higher amount of iron. It contains no other harmful elements or germs and hence is safe for consumption. During the fiscal year 2078.79, an overhead cemented tank of 100,000 litres capacity was constructed.

#### **7.5 Vehicles and Transport Facilities:**

One Toyota Hilux pickup, One Ford Pickup, One Mahendra Scorpio, 2 delivery trucks and 12 motorcycles and scooters are there for the operation of NLBO, Pokhara. Two old motorcycles in irreparable condition are included in the auction list. Two Escorts motorcycles were taken away by rebels during insurgency in the year 2061/62 and are not found yet.

#### **7.6 Human Resources:**

There are fifty six permanent staff in present NLBO under the leadership of Cheif Livestock Development Officer including drivers and office helpers.

Besides the permanent staff, about forty four men and women work regularly in the various units of farm on daily wage basis. Among them, 5 in Goat & Sheep Unit, 5 in Pig unit, 16 in Buffalo unit, 5 in Poultry unit, 1 in Dairy Unit & 12 in Pasture unit have been assigned and working. A number of seasonal workers are also hired at the time of land preparation, manuring, sowing of forage seed, harvesting, chopping of green herbage and at filling of bunker silos. Additional labors are also required for management of perennial crops, reseeding of grasses, and transplanting and cleaning of farm premises.

**Table 3: Number of positions, posts fulfilled and vacant as of 2079.3.31**

<u>S.No.</u>	<u>Positions</u>	<u>Class</u>	<u>Posts</u>	<u>Fulfilled</u>	<u>Vacant</u>
1	Chief LDO	G I Tech	1	1	0
2	Senior LDO	G II Tech	3	2	1
3	LDO	G III Tech	7	5	2
4	Veterinary Officer	G III Tech	1	0	1
5	Account Officer	G III Admin	1	1	0

6	Livestock Service Technicians	NG- I Tech	12	12	0
7	Nayab Subba	NG-I Admin	1	1	0
8	Electrical Overseer	NG-I Tech	2	1	1
9	Junior LST	NG II Tech	11	11	0
10	Light Driver	Classless	4	3	1
11	Office Helpers	Classless	13	3	10
	Total		56	40	16

### 7.7 List of Office Chief:

Following is the list of farm managers who worked in this farm since it's establishment.

S.No.	Name	Service Period	
1	Mr. D.B. Rai	2017/18	2021/03/15
2	Dr. Heramba Bahadur Rajbhandari	2021/03/16	2021/05/26
3	Mr. Keshab Raj Keshari	2021/07/10	2023/11/18
4	Mr. Shatrughan Lal Pradhan	2024/01/22	2024/08/26
5	Mr. Laxman Prasad Tripathi	2025/02/14	2027/04/08
6	Mr. Hitraj Sharma	2027/04/09	2027/10/16
7	Mr. Shrigobinda Sah	2027/10/17	2032/10/27
8	Mr. Sikandar Sah	2032/10/28	2033/04/09
9	Dr. Prabeshman Singh Pradhan	2033/04/10	2039/04/05
10	Dr. Nanda Prasad Shrestha	2039/05/11	2045/05/16
11	Mr. Dalram Pradhan	2045/05/17	2047/03/30
12	Mr. Dan Bahadur Singh	2047/04/01	2066/03/20
13	Dr. Amar Bahadur Shah	2066/03/21	2067/11/01
14	Mr. Bhim Bahadur Gurung	2067/11/02	2068/03/26
15	Dr. Narayan Prasad Sharma	2068/3/27	2071/06/25
16	Mr. Mani Kumar Shrestha	2071/07/17	2073/08/05
17	Mr. Shiva ji Karki	2073/08/06	2073/10/17
18	Mr. Amrit Kumar Maske	2073/10/18	2073/11/07
19	Mr. Shiva ji Karki	2073/11/08	2073/12/26
20	Mr. Shambhu Raj Pandey	2073/12/27	2075/3/31
21	Mr Krishna Kanta Neupane	2075/4/01	2076/02/25

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22	Mr Shivanath Mahato	2076/02/26	2076/3/31
23	Dr. Narayan Prasad Sharma	2076/04/01	2078/12/08
24	Dr Jagat Bandhu Nepali	2078/12/09	2079/03/14
25	Dr. Khagendra Raj Sapkota	2079/03/15	2079/04/04
26	Dr. Jagadish Pandeya	2079/04/05	till date

**Biodiversity Conservation :**

A small flock of Kage, a native sheep of middle hills of the country as part of biodiversity conservation program is also maintained at the farm. Past attempts of crossbreeding in Kage sheep with a number of exotic breeds for the production of carpet quality wool was not very successful. So, crossbreeding has been discontinued and the farm at present maintains a flock of 60 pure breed of Kage ewes and supplies rams to flock owners for increasing genetic heterozygosity in native population.

**4. Karya Sanchalan Kosh:**

A *Karya Sanchalan Kosh* (operational fund) according to *Karya Sanchalan Kosh Act, 2043*, was established in the farm in the year 2049/50 and fifty percent of total farm income is deposited into *sanchit kosh* (national revenue) while the remaining fifty percent is deposited into this fund. The fund, after getting approval from the MoALD, could be utilized for construction, renovation and purchase of farm buildings, machines, and breeding animals. This fund could also be used to purchase various production inputs and raw materials. In this fund, Rs 1,09,20,638.00 was deposited during the last fiscal year.

## 5. More Details of Some NLBO Units

### 1. Pastures and Fodder Unit

There is a short poem that describes the significance of Grass. We have decided that the poem is worthy to be published in this Annual Progress Report as well.

Grass is immortal

Forests decay Harvests perish Flowers vanish

But grass is immortal.

It yields no fruits in air or earth And yet, should its harvest fail For a single year,

Famine would depopulate the earth.

Major Activities:

- Year-round production and supply of green fodder.
- Conservation of green herbage as silage.
- Production and supply of forage planting materials to the local bodies/farmers.
- Technology transfer through demonstrations and trainings.

### **Target and Progress:**

Presented in Table 12 is major annual targeted activities and progress of this unit.

Table 12 : Target & Progress 2078/79

S.No.	Activities	Unit	Target	Progress
1	Cultivation of winter fodder	ha	18	18
2	Summer fodder cultivation	ha	30	30
3	Perennial fodder crop /production & management	ha	20	20
4	Production of silage	mt	900	900

**Human Resource Assigned:**

Table 13 presents human resource assigned exclusively to this unit.

Table 13 : Manpower Assigned

S.N.	Designation	Responsibilities
1	Livestock Development Officer	Recording, Supervision
2	Livestock Service Technician -I	Supervision
3	Livestock Service Technician -II	Supervision
4	Office Assistant-I	Watchman
5	Office Assistant-II	Water Pump Operation, Water Supply, Maintenance
6	Daily wage based workers (17)	Green Matter Harvesting

**Green Herbage Production:**

Annual Fodder and Forage Crops:

Summer Fodder Crops:

Teosinte (*Euchlaena mexicana* / *Zea mexicana*/Makaichari):

Teosinte, in many ways resembles with maize and sorghum crops. This is well established main summer fodder crop grown in the farm. In addition, it is free from insects, diseases and pests. This crop tillers like *bajra* and yields more than maize. It needs heavy, rich soil and responds well to Farm Yard Manure and nitrogenous fertilizers. If sown early three cuttings of green matter can be obtained. However, in recent years, many varieties of different production potential have been developed.

The chopped green Teosinte fodder is fed to buffaloes and used for ensiling as well. It should be harvested at pre-tasselling stage as both the quality and green matter yields decline if harvested after maturation.

A weed Johnson grass (*Sorghum helipens*), affecting green matter yield and palatability of fodder, has appeared in Teosinte crop since last few years. Johnson grass is perennial and disperses both by seeds and stolons. The seeds of this weed mature early and shatter for propagating further. The general control measures recommended and followed are continuous grazing /over grazing and burning.

Total 1843 tons of green herbage from Teosinte was produced at the farm last year, out of which 455 ton was cut, chopped and fed fresh and remaining 1388 tons was used for silage production. The overall green matter yield of Teosinte crop was found to be 60.38 tons per



hectare (Table 14).

**Table 14 : Area under Teosinte crop and green matter yield (078/79)**

Plot Numbers	Area (ha)	Green Forage (Mt)	Silage (MT)	Total Biomass (MT)
3	2.5	140	90	230
4	3.08	175	100	275
6	2.6	140	50	190
10	4.22		320	320
14	4.04	-	300	300
17	4.96	-	400	400
20	5	-	290	290
22	1.97	-	160	160
24	2.15	-	188	188
<b>Overall</b>	<b>30.52</b>	<b>455</b>	<b>1898</b>	<b>2353</b>

### Winter Forage Crops:

About 12.4 hectares of the farm land has facility of surface irrigation, which makes cultivation of winter fodders like *Berseem* or *Egyptian clover* (*Trifolium Alexandrinum*) and *Oats* (*Avena sativa*) possible. The winter in Pokhara is cool and dry and whole ground cover during this season turns brown. So, the green matter production and supply during this season is possible only through cultivation of winter fodders species like *Oats*, *Berseem* and *Vetch*.

In fiscal year 2078/79, this farm has produced 270 tons of green grass from *Oats* and 275 tons of green grass from *Berseem* by cultivating these crops in 6.72 ha and 5.68 ha of land respectively. The average green matter yield per hectare was found to be 40.18 tons for *Oats* and 48.41 tons for *Berseem*. (Table 15 A & B)

Table 15, A : Production of Oat

Forage Crops	Plot Number	Area (ha)	Green Fodder (Mt)	Yield Mt/ha
Oats	10	4.22	165	39.09
	3	2.50	105	42
Total		6.72	270	40.18

Table 15, B : Production of Berseem

Forage Crops	Plot Number	Area (ha)	Green Fodder (Mt)	Yield Mt/ha
Berseem	4	3.08	150	48.70
Berseem	6	2.6	125	48.07
Total		5.68	275	48.41

### Perennial Fodder and Forage Crops:

Napier / Elephant grass (*Pennisetum purpureum*) :

Napier is also called 'elephant grass due to its tallness and vigorous vegetative growth. Hybrid Napier for eg, Super Napier, Giant, Red, Smart, Co3, Co4, Co5 etc, in comparison to thin Napier, produces more tillers and numerous leaves and grows faster and produces more herbage. Recently Super Napier, Giant, Red, Smart, Co3 & Co4 Napier have also been introduced into the Farm. Similarly, Co3, Co4, Co5, Super & Pusa Giant Napier has larger leaves, softer and less persistent hairs on leaf blades and sheaths and less sharp leaf edges. The stems of Super, Red, Smart, Co3, Co4, Co5, Super & Pusa Giant are less fibrous than Thin Napier and tillers are more numerous and grow faster. Napier yields higher green matter and is free from diseases and pests. Napier can be easily propagated by stem cuttings or rootstocks. The green matter is available throughout the non-winter period. It is a perennial crop and can also be grown in slops, less fertile areas and in hedgerows. Thus, it is also useful for soil conservation purpose.

Hybrid Napier, containing on an average about 13-18% protein and 30% fiber is superior in quality than Thin Napier grass as herbage of hybrid is more palatable. Some of the Napier varieties may contain higher amount of oxalate due to which calcium deficiency in the farm animal can be observed if fed napier regularly and in high amount. This problem can be mitigated by harvesting at longer intervals (45 to 60 days), feeding the Napier grass mixing with other forage crops & cutting the grass during the evening hours. The Napier is ideal for green fodder, silage and hay.

The Napier varieties being grown at Lampatan are *Super Napier*, Red Napier, Smart Napier, Giant Napier, Thin Napier, Napier-Bajra hybrid (NB 21), Mott, Co-3 & Co-4. The hybrids of Napier and Bajra (pearl millet) are sterile. The dwarf Napier 'Mott' was released by the University of Florida, USA. It is very leafy and makes good forage for cut and carry or grazing. This variety of Napier was brought by Mr. Dala Ram Pradhan, former DG, of DLS and was introduced at Pokhara farm. Its multiplication in the farm started in 1995 and at present, it has extensively spread from Terai to mid hills of Nepal. The TLDP played a major role in the spread of Mott Napier in the country and it has become very popular among dairy farmers of Nepal. Recently, Super Napier has become even more popular because of higher protein content and higher biomass yield at the same time. We

are also planning to introduce and extend a perennial grass popularly known as Smart Napier here among farmers in coming days.

The hybrid Napiers are also known for their high yield, high palatability, high leaf stem ratio and low oxalate contents. These crops need heavy doses of Nitrogen for better biomass production. They remain in dormancy during winter season. The green matter yield starts to decline after five years of plantation. The average green matter production of Napier grass at Lampatan in 2078/79 is around 170 Metric Ton/ha/year. However, the green matter production of the selected plot of Super Napier grass planted in 4 ha at Lampatan in 2078/79 was around 300 Metric Ton/ha/year when 5 cuttings were harvested.

#### Other Perennial Forage Crops:

Other perennial forage crops grown at Lampatan are Signal grass (Bracharia decumbens), Guinea grass (Panicum maximum), Paspalum plicatulum, Setaria (Seteria anceps), Forage peanut (Arachis pintoi), Joint vetch etc. All of these fodder crops are grown in silvi-pastoral system. Guinea grass and forage peanut are shade tolerant species and are therefore found suitable for growing in silvipasture.

#### Guinea grass (Panicum maximum):

Guinea grass, an excellent fodder is valued for its high productivity, palatability and good persistency. Since it can tolerate shade and drought, it suits best in silvi-pastoral system. Perennial Guinea grass once planted can be productive for 10-15 years.

Both seeds and slips can be used to plant Guinea. Since seed germination is poor, vegetative propagation is preferred over seed. If seeds are used (3 kg/ha), it should be sown in nursery and then the seedlings are transplanted. Guinea grass can also be mixed with leguminous fodder crops such as Cowpea, Stylo and Siratro.

Guinea grass is nutritious, palatable and free from oxalates. It makes good hay and silage. The crude protein and the crude fiber content of this grass vary from 8 to 14% and 28 to 36%, respectively.

#### Signal Grass (Brachiaria brizantha):

Signal grass is a perennial and stoloniferous pasture grass and provides good ground cover. It is found to be drought tolerant and responds well to nitrogen. Signal grass can be best grown from seeds than from vegetative propagation in the new field. It suits to a wide range of soil. It is often recommended to be grown with forage peanut and such like shade tolerant perennial hardy legumes.

#### Forage Peanut (Arachis pintoi):

Forage or perennial peanuts are creeping, low growing legumes native to Brazil and

make a dense cover. They are somewhat slow to establish and spread. They may be grazed and are useful as they need low maintenance and provide permanent covers for erosion control and beautification. Propagation is done by rhizomes however very little seed can be produced. They are shade tolerant and hardy and often withstand against over grazing.

#### Fodder Trees and Tree Fodders:

Many fodder trees of native species including imported fodder tree like Ipil-Ipil are grown within the farm areas. They serve as a fodder bank for dry winter period. But presence of hard pan in subsoil layer of the farm land is a constraint of growing fodder trees as it obstructs root system from further developing. Therefore, the fodder tree species that can grow moderately are listed in table 17.

Table 17: Fodder tree species in Lampatan:

S.N.	Nepali Name	Scientific Name
1	Badahar	<i>Artocarpus lakoocha</i>
2	Bakaino	<i>Melia azedarach</i>
3	Berulo/Gedulo	<i>Ficus clavata</i>
4	Chiuree	<i>Aesandra butyracea/Basia butyracea</i>
5	Chuletro	<i>Brassaiopsis hainla</i>
6	Dabdabe	<i>Garuga pinnata</i>
7	Ipil-Ipil	<i>Leucaena diversifolia</i>
8	Ipil-Ipil	<i>Leucaena leucocephala</i>
9	Kabro	<i>Ficus lacor</i>
10	Khanayo	<i>Ficus semicordata</i>
11	Kimbu	<i>Morus alba</i>
12	Koiralo	<i>Bauhinia variegata</i>
13	Kutmiro	<i>Litsea monopetala</i>
14	Nemaro/Timilo	<i>Ficus roxburghii</i>
15	Painyu	<i>Prunus cerasoides</i>
16	Pakhuri	<i>Ficus glaberrima</i>
17	Tanki	<i>Bauhinia purpurea</i>

#### Production cost of fodder crops:

Data on production cost of different fodder crops is presented on Table 18 and 19 which show the cost of producing per kg of green matter. For eg. Per kg cost of production of (green matter basis) of Teosente was Rs 0.82 and that of Napier was Rs 0.98. In case of Napier, being a perennial, multi-cut and high yielder forage, shows lowest cost of

production per unit of fresh matter, while production cost of green matter from Oat is the highest.

Table 18: Cost of production of summer fodder crops as of 2078.79

Cost items	Unit	Teosinte			Napier		
		Qty.	Rate	Amount	Quantity	Rate	Amount
				(Rs)			(Rs)
Seed	Kg.	1,200.00	100	120,000.00	-	-	-
Urea	Kg.	6,500.00	24	156,000.00	1300	24	31200
DAP	Kg.	4,100	35	143,500.00	-	-	
Potash	Kg.	-	-		-	-	
Wages, labour force	Man days	1,400	517	723,800.00	3500	517	1809500
Diesel	Litre	3,900	99	386,100.00	1650	99	163350
Hydrolic oil	Litre	70	500	35,000.00	70	500	35000
Mobil oil	Litre	50	424	21,200.00	50	424	21200
Gear oil, grease	Kg.	50	506.25	25,312.50	40	506.3	20250
Repairing cost	-	-	-	320000	-	-	170000
Total expenses	Rs.			1,930,912.50			2,250,500.00
Area cultivated	Ha			30.52			10.5
Green herbage	Kg.			2353000			2200000
Green Matter Yield	Mt/ha			77.10			209.52
Cost/kg green matter	Rs			0.82			0.98

The production cost of one kg green oat incurred Rs.1.75 while Rs. 2.07 was spent for one kg of green Berseem (Table 19). The costs of production include the costs of harvesting, chaffing, loading and transportation of green matter from crop growing fields to animal barns and silos.

Table 19 : Cost of production of winter fodder crops as of 2078.79

		Oat			Berseem		
Cost items	Unit			Amount			Amount
		Qty.	Rate	(Rs)	Quantity	Rate	(Rs)
Seed	Kg	700	40	28,000.00	150	250	37500
Urea	Kg	700	24	16,800.00			0
DAP	Kg	700	35	24,500.00	700	35	24500
Wages	Man days	607	517	313,819.00	803	517	415151
Diesel .	Ltr.	568	99	56,232.00	650	99	64350
Hydraulic oil		20	500	10,000.00	20	500	10000
Mobil oil		15	424	6,360.00	10	424	4240
Gear oil , grease		1	506.25	506.25	1	506.25	506.25
Repairing cost		1	15000	15,000.00	1	11700	11700
Total expenses				471,217.25			567947.25
Area cultivated	ha			6.72			5.68
Green herbage	mt			270			275
Green matter yield	Mt/ha			40.18			48.42
<b>Cost/ kg green matter</b>	<b>Rs</b>			<b>1.75</b>			<b>2.07</b>

**Cost of Silage Production:**

For nearly six months of a year, the farm depends mainly on about 900 tons of silage prepared from Teosinte for feeding buffaloes. The fodder crop, for preparing silage is harvested and chaffed by the tractor drawn harvester at pre-blooming stage. The chaffed material then is filled in the bunkers and pressed by tractors to make anaerobic environment in which lactic acid producing bacteria act on soluble sugars present in the green fodder producing lactic acid and lowering pH. This chemical process is known as fermentation and as the low pH in the grass heap resulting from this process does not permit growth of undesirable microbes in the silage and can be preserved for longer period of time.

Table 20: Cost of Silage Production (Rs.)

Item	Cost Rs
Fuel	200000
Wages	450000
Polythene sheets	100000
Molasses	0
Repairing (Including casual repairing for unexpected accidents & crane cost as well for this year)	270853
Depreciation & Financial Cost (Bunker, Tractors, Machineries etc.)	220000
Cost of Green matter /kg @ Rs. 0.82/kg for 1898000 kg (including wastage in the field & transport)	1556360
<b>Total Production Cost</b>	<b>2797213</b>
<b>Quantity of silage made (tons)</b>	<b>900</b>
<b>Cost of /kg silage Rs.</b>	<b>3.10</b>

As illustrated in Table 20, the cost incurred to produce a kg of green fodder of Teosinte was Rs 0.82. Thus, the costs of producing per kg of fresh silage last year was Rs 3.10.

Total Green Herbage Production in the FY: 078/79

The farm in the year 2078/79, produced a total of 4468 tons (approximately) of green matter out of which 1898 tons was utilized for silage production while the rest was fed to ruminants as fresh green (Table 21).

Table 21: Total Green Herbage Production

S.N.	Fodder crops	Area (ha)	Green forage (Mt)	Green matter yield Mt/ha
1	Teosinte	30.52	2353	77.10
2	Napier	10.5	2200	209.52
3	Oats	6.72	270	40.18
4	Berseem	5.68	275	48.42
	Overall	53.42	5098	95.43

**Calculation of Fertilizer and Applied Seed rate in the Farm**

Following table gives the brief information about the seed rate and fertilizer calculation (dose) applied in the pastureland of this farm during the fiscal year 2078.79.

S.N.	Type of Forage	Seed rate/ha		Recommended Chemical Fertilizer/ha			Required Fertilizer			Area	FYM M.T	Remarks (for forage production only)
1	Oat			N	P2O5	K	Urea	DAP	MOP			
		100		80	50	30		109	50			Recommended fertilizer is for Irrigated land & for forage production (not seed production) only.
	Nitrogen from DAP			20								
	Deficient nitrogen content			60								
	Urea for required nitrogen						131					50% @ land preparation & 25% during top dressing. Remaining 25% is given during FC. For all other following cuts 10-25% of the total dose is applied each time with irrigation.
	Land to be cultivated											
	Total Seed & fertilizer requirement											
2	Oat + Vetch											



		Oat	Vetch								
		70	20	50	50	30		109	50		Recommended fertilizer is for Irrigated land only. Upland requirement is lower than this. Both p2o5 & Potassium is reduced significantly as seed production is not the objective.
	Nitrogen from DAP			20							
	Deficient nitrogen content			30							
	Urea for required nitrogen						66				50% @ land preparation & 25% during top dressing. Remaining 25% is given during FC. For all other following cuts 10-25% of the total dose each time with irrigation.
	Area to be cultivated								17		
	Total Seed & fertilizer requirement	1190	340				1125	1848	850	170	
3	Berseem										Recommended fertilizer is for Irrigated land only. Both p2o5 & Potassium has been reduced significantly as seed production is not the objective.
		25		25	60	30		130	50		The dose of nitrogen is applicable only when it is not to be sown in new land.
	Nitrogen from DAP			23							
	Deficient nitrogen content			2							
	Urea for required nitrogen						3				50% @ land preparation & 25% during top dressing. Remaining 25% is given during FC. For all other following cuts 10-25% of the total dose each time with irrigation.
	Area to be cultivated								6		
	Total Seed & fertilizer requirement	142					19	741	284	57	
4	Teosente										Recommended fertilizer is for Irrigated land only. Both p2o5 & Potassium has been reduced significantly as seed production is not the objective.
		35		80	50	30		109	50		

Nitrogen from DAP			20								
Deficient nitrogen content			60								
Urea for required nitrogen						131					50% @ land preparation & 25% during top dressing. Remaining 25% is given during FC. If one or two more following cuts are planned, 10% Urea of the recommended dose can be given with irrigation.
Area to be cultivated								6			
Total Seed & fertilizer requirement	199					746	617	284		57	

## Ruminant Production

Buffalo: The Black Gold	भैसी : कालो सुन
<p>Though I am black, my milk is white, People feed me poorly, I improve their diet, They also raise me for meat and traction, Their satisfaction is my satisfaction, Please love me and don't hate, My milk is rich in SNF and fat Improve me more as I have told. As you know that I am black gold. (Courtesy: Buffalo News Letter, July 1955)</p>	<p>सेतो छ द"ध मेरो, रंग कालो पाए पनि, पोषिलो द"ध दिने गर्छु, घाँस, पराल खाए पनि, पाल्छु मलाई द"धको लागि, लिन्छु मासु र काम समेत सन्तुष्ट छु बिक्री हुँदा र मालिकले पाउँदा दाम समेत मलाई हेला नगर र कृपया माया गर, प्रोटीन, एस.एन.एफ. र फ्याट भएको, पोषिलो मेरो द"धलाई हेर, बिन्ती छ मेरो बिन्ती छ, मलाई अझ माया सुधार गर, तिखर कालो सुन हुँ म, यो सत्यलाई विचार गर । अनुवादक: डा. अमर बहादुर शाह</p>

## Buffalo Production Unit:

### Introduction:

Buffalo milk and meat play an important role in national economy of Nepal. Out of the total milk produced in country, buffaloes contribute approximately 64% while share of cattle is about 36%. Buffalo milk contains high fat percent, fetches higher prices in market and is preferred by consumers in comparison to cattle milk. According to MALD buffaloes also contribute about 53 percent in total meat production in the country followed by goats (20%), chicken (17%), pork (8%) and others 2% approximately.

Buffalo unit at Lampatan was initiated in the year 2027/028 BS (1971/72) with a total herd of 13 murrah buffaloes brought down from the then Livestock Improvement Section, Khumaltar and Livestock Development Farm, Tarahara Sunsari.

The breeding tract of Murrah breed is Rohtak, Hisar and Jind districts of Haryana and Habha and Patiala districts of Punjab in India. These animals have long been selected for milk and curled horns. The tail is long reaching up to the fetlocks. The color is usually jet black with occasional white markings found on tail, face and extremities. The udder is well developed.

In case of our country, the average lactation yield of murrah is 1500 to 2500 kg while the age at first calving is 45-50 months in villages but in a well managed herds it is as low as 36 to 40 months in better managed herds. The inter-calving period is 450-500 days. The body weight of an adult female ranges from 430 to 500 kg and that of a male is 530-575 kg. The bullocks though slow are powerful.

At present about sixty pure Murrah buffalo cows and their offsprings are maintained at this farm. The main activities of this unit are production of buffalo calves and supply of genetically superior Murrah bulls for upgrading native buffaloes.

### **Objectives:**

- To establish nucleus breeding herd of Murrah buffaloes.
- Production and supply of genetically superior bulls for crossbreeding/upgrading.
- To help technology transfer and extension activities.

### **Manpower:**

There are six permanent staff working in ruminant unit (Table 22). They are responsible for overall management of buffalo and sheep stationed at the farm. Besides, the permanent staff, the unit also employs 14 workers on daily wages basis to carry on its routine works.

Table 22 : Manpower assigned

SN	Designation	Responsibilities
1	LDO	Unit In-charge, supervision & AI in Buffalo Unit
2.	LST	Supervising, Milk Recording in Sheep Unit

3	JLST	Supervising, Milk Recording Buffalo Unit
4	JLST	Supervising, Milk Recording Buffalo Unit
5	Worker	Milking buffaloes
6	Worker	Cleaning, grazing, feeding & milking

NB : LDO - Livestock Development Officer, JLST = Junior Liv. Service Technician

The daily works of this unit include feeding, watering, grazing, cleaning and milking the animals. They also render treatment service as needed and keep various technical and financial records.

Besides this, the unit is also responsible for digging of bunker silos, taking out and loading the silage on the trailers and transporting it to buffalo barns. Sale of milk, manure, and culling of animals, monitoring of estrous cows and AI services are supervisor's routine jobs in this unit.

### Buildings and Sheds:

Table: 23 shows the sheds and facilities available for buffalo unit. There are altogether eight sheds that can accommodate about 300 heads of buffaloes. The loose house shed (SN. 8 Table 23) was initially built in lower terrace in year 2040/41. Since the shed is being used by Pokhara metropolis for landfill management, the new shed of same capacity and quality was constructed on plot number 8 as compensation.

There are three sheep sheds that altogether can accommodate 450 sheep. As the number of sheep at present stationed at the farm is low some of the sheds are also used for storing rice straw during winter season. Recently, two goat sheds have also been constructed, out of which one is underconstruction.

Table 23: Buildings & Sheds

S.N.	Type of Sheds	Area Sq. m	Capacity	Year of constructionn	Initial Costs Rs (in 000s) Rs in 000
1	Bull shed	145	6 heads	2026/27	50
2	Single Row shed	337	16 heads	2026/27	100
3	Double Row shed	472	32 cows	2030/31	2714
4	Single Row shed (E)	239	16 cows	2037/38	163
5	Heifer shed (open)	1273	100 heads	2037/38	125
6	Chaff cutter shed	144		2037/38	59

7	Manure platform	1054		2038/39	90
8	Loose House shed	435	50 heads	2040/41	440
9	Weaning Yard	157		2040/41	42
10	Weighing scale, enclosures	900 kg.		2040/41	42
11	Calf shed	472	50 calves	2041/42	338
12	Double row closed shed		40 heads	2058/59	990
13	Bull Mother Shed			2076/77	8000

### Herd Composition of Buffaloes:

Table 25 : Herd Composition of Buffaloes - 2079.3.31

Particulars	He buffalo	She buffalo	Buffalo Y Bulls	buffalo heifers	Buffalo he calves	Buffalo she calves	Total
At the beginning	1	76	18	28	14	37	174
At the end	1	76	6	29	21	40	173

Mcalves - Male calves, Fcalves - Female calves, YBulls - Young Bulls.

### Performance of Murrah Buffaloes:

#### **Herd Calving Percent and Calving Interval:**

The average number of breeding adult buffaloes (other than listed in culling Stock) maintained on the farm in 2078/79 was 65 and a total of 50 buffaloes calved in that year. Thus, the herd calving percentage according to the number of calving and number of cows present in the herd in FY 078/79 is 76.92% (Table 27).

The calving interval (CI) is the period of time between two consecutive calving. The calving interval (CI) and herd calving percent (HCP) are correlated with each other and when one of the parameter is known the other can be calculated as given in table 26. It shows that when 100% calving from multiparous cows occurs in a herd the calving interval is equal to 12 months and when 50% calving takes place, the calving interval equals to 24 months.

Table 26 : Herd Calving % and Calving interval (months)

Calving %	Calving Interval
100	12.0
90	13.3
80	15.0
70	17.1
60	20.0
50	24.0

Table 27 : Herd calving percent &amp; calving interval in Murrah buffaloes

Particulars	069/70	070/71	071/72	072/73	073/74	074/75	075/76	076/77	077/078	078/079
Average No. of buffaloes present in the herd	6.00	66.00	75.00	75.00	73.00	79	61	72	58	65
No. of cows calved	33.00	38.00	50.00	47.00	69.00	53	42	62	46	50
No. Heifer calves	-	18.00	16.00	6.00	21.00	25	22	55	21	31
Herd calving percent	53.00	57.60	66.66	62.66	NA	67	68.85	86.11	79.31	76.92%
Age at first calving (months)	-	48.00	45.00	NA	NA	49.5	48.5	44	44.5	44.2
Calving Interval (months)	22.00	20.83	18.001	NA	NA	17.91	17.42	13.93	14.15	15.60

CI=Total months of breeding female \* 100 /HCP.

Age of First Calving (AFC):

Presented on Table 28 is age of buffaloes in the farm at first calving. The data have been grouped in three groups according to time period and figures in parenthesis are the number of observations for that period.

Table 28 : Age of first calving

Attribute	2070-71	2071-72	2072-73	2073-74	2074-75	2075-76	2076-77	2077-78	2078-79
AFC (months)	48.5 (44)	48.8 (66)	50 (30)	49.7 (9)	49.7 (53)	48.5(11)	44(9)	44.5(7)	44.2(10)

**Lactation Yield:**

The lactation yield (LY), and lactation yield in 305 days (LY 305) have been compiled in the Table 29. Although the data on lactation yield excludes amount of milk suckled by calves, the milk yield has been converted into 4 teats in the next column assuming the yield of all the four quarters should be equal. The lactation yield of buffaloes reared at the farm, as can be seen from the table has been considerably increasing from 1312 liters in 1996-98 to about 2197 liters from 4 teats in 2021/22. This increment in lactation yield is mainly due to selection in the herd and improvement in genetic makeup of buffaloes by the use of frozen semen imported from India.

**Table 29: Lactation yield (LY) and lactation yield of 305 days (LY 305)**

Years	Lactation Yield (Actual)	Lactation Yield (305 Days, 3 teats)	Lactation Yield (305 Days, 4 teats)
1996-1998	1177.0	1012.0	1312.0
1998-2000	1333.0	1116.0	1416.0
2000-2002	1344.0	1243.0	1543.0
2002-2004	1631.0	1427.0	1727.0
2004-2009	1471.2	1229.3	1639.1
2009-2010	1517.9	1268.4	1691.2
2010-2011	1554.2	1298.7	1731.6
2011-2012	1559.1	1302.8	1737.1
2012-2013	1620.9	1354.4	1805.9
2013-2014	1660.3	1387.4	1849.9
2014-2015	1716.3	1434.2	1912.2
2015-2016	1742.8	1456.3	1941.8

2016-2017	1686.8	1409.5	1879.3
2017-2018	1842.1	1539.3	2052.4
2018-2019	1893.8	1582.5	2110.0
2019-2020	1900.4	1588.0	2117.3
2020-21	1910.6	1596.5	2128.6
2021-22	1914.2	1601.2	2134.6

The new born calves as routine practice are allowed suckling for milk let down and after complete milking of three teats, the calves are allowed again to suckle both the milked and the un-milked teats.

### **Mortality :**

The mortality rate of buffalo calves in the farm till the age of one year has been found approximately 6.43 percent since last many years. A higher mortality rate of 18.18 percent was recorded in FY 2067/68 is due to the outbreak of H.S. (Table 31).

Table 31 : Mortality in buffalo calves up to one year of age

Fiscal Year	Calves Born			Mortality	
	M	F	Total	Number	Percent
2060/61	19	17	36	3	8.33
2061/62	18	28	46	1	2.17
2062/63	17	28	45	1	2.22
2063/64	19	16	35	1	2.86
2064/65	17	14	31	1	3.23
2065/66	23	25	48	4	8.33
2066/67	18	25	43	4	9.30
2067/68	15	29	44	8	18.18
2068/69	25	20	45	2	4.44
2069/70	31	25	56	0	0.00
2070/71	20	21	41	3	7.32
2071/72	33	33	66	6	9.09



2072/73	23	24	47	4	8.51
2073/744	37	32	69	1	1.45
2074/75	28	25	53	1	1.89
2075/76	20	22	42	7	16.67
2076/77	31	31	62	6	9.67
2077/78	25	21	46	4	8.69
2078/79	23	27	50	4	8.0
Average	419	436	855	57	6.74

### Birth Weight of Calves:

The birth weight of buffalo calves since last few years has been presented in Table 32. As illustrated on the table, male calves are slightly heavier compared to their counterpart female calves and there is no significant change in birth weight of calves during the last four to five years period.

Table 32: Birth weight of male and female calves

Period	Male Calves (Kg)	Female Calves (Kg)
Till 2062/63	31.90 (n=140)	30.60 (n=148)
2065/66	31.82(n=38)	30.67 (n=57)
2066/67	33.77 (n=18)	28.76 (n=25)
2068/069	32.00 (h=15)	30.00 (n=29)
2068/69	33.24 (n=25)	30.5 (n=20)
2069/70	32.33 (n=31)	30.8 (n=25)
2070/71	33.45(n=20)	31.2(n=21)
2071/72	33.09 (n=33)	31.02 (n=33)
2072/073	33.08 (n=23)	33.08 (n=24)
2073/074	35.20 (n=37)	33.80 (n=37)
2074/75	32.3.00 (n=28)	30.7 (n=25)
2075/76	33.1(n=20)	30.6(n=22)
2076/77	34.2(n=31)	30.8(n=31)
2077/78	35.1(n=25)	30.6(n=21)
2078/79	35.6(n=23)	30.2(n=27)

**Pricing and benefit-cost ratio of buffaloes:**

The farm, since 1992 has been pricing breeding bulls and culling buffaloes following a formula developed by the farm and approved by the Department. According to the formula all the buffaloes to be sold are classified in to seven categories on the basis of their breed characters, body weight, milk production, reproduction performance etc and certain score as presented in Table 33 is allotted to each animal to calculate the price.

Table 33 : Category and body score of buffaloes

SN	Category	Score	SN	Category	Score
1	Excellent	2.00	2	Very Good	2.18
3	Good	2.40	4	Fair	2.66
5	Low Grade	3.00	6	Poor	3.40
7	Very Poor	4.00			

Then the price of buffaloes of different categories is calculated on the basis of following formulas -

## A. Live Wight Price

$$\frac{\text{Live Weight (Kg) x Whole Sale Buffalo Meat Market Price}}{\text{Score}}$$

## B. Milk Price

$$\left\{ \begin{array}{l} \text{(Average Milk Production} \\ \text{according to body weight} \end{array} + \frac{\text{(7-lactation year)}}{7} \right\} \times \text{Farm gate milk price} \times \frac{\text{(300 days milked in present lactation)}}{\text{present lactation}}$$

Where -

Average milk production according to body wight

$$= \frac{300 \text{ days x average daily milk production}}{\text{Body wight (kg)}}$$

## C. Pregnancy Price

$$\frac{\text{Average milk Production} \times \text{Farm gate milk} \times \text{Gestation Period in days}}{\text{Age of the buffalo-Lactation}}$$

Thus formula (A) is used to calculate price of bulls and dry and non-pregnant buffaloes while (A) and (B) or (A), (B) and (C) would be the selling price of the buffaloes depending on whether the buffalo is milking and non-pregnant or milking and pregnant also.

### Benefit Cost of Buffalo Production :

Average milk Production According to the body weight	x	Farm gate milk price	x	Gestation Period in days
Age of the buffalo-Lactation				

Thus formula (A) is used to calculate price of bulls and dry and non-pregnant buffaloes while (A) and (B) or (A), (B) and (C) would be the selling price of the buffaloes depending on whether the buffalo is milking and non-pregnant or milking and pregnant also.

### Benefit Cost of Buffalo Production :

Benefits		Costs	
Items	Value	Items	Value
Value of stock at the end of Fiscal year, 079/03/31	16545000	Value of stock at the beginning of Fiscal Year, 078/04/01	17850000
Cash benefits:		Cash costs:	
Sale of Breeding bulls	1440000	Concentrate Feed	3912620
Sale of culled Buffaloes	1550000	Roughages Feed ie. Green grass, silage, paddy straw	1670704
Sale of buffalo milk	7463300	Wages	2750957
Natural insemination (NS)		Veterinary drugs	18,000

Others	320000	Electricity, Water and others	23000
Sub-total of revenue		Miscellaneous costs	12,000
Value of stock increased	-1305000	Fixed Costs:	
Grand total of income	9468300		
		Repairing of sheds	200000
		Total Cost	8587281
Cost : Benefit Ratio = 1.1:1.00			

### Sheep production Unit:

#### Introduction:

Bhyanlung, Baruwai, Kage and Lampuchhre are the four identified indigenous breeds of sheep in Nepal. Lampuchhre breed is found in Terai (southern plain), while the other three breeds- Kage, Baruwai and Bhyanglung are found in low hills, high hills and mountains respectively. The sheep population in Nepal made up of 12% Lampuchhre, 21% Kage, 63% Baruwai and 4% Bhyanglung and is estimated to be around 80,90,536.

Attempts to upgrade Kage by crossbreeding with a number of exotic breeds have failed in the past. The exotic breeds introduced at the farm for this purpose were Polworth, Border Leicester and Romney Marsh. The crossbreds, while compared to Kage, were heavier with higher daily weight gain and their wool was found to be higher in yield. However, higher the wool quality and quantity produced by crossbred sheep, climatic conditions like high rainfall of Pokhara did not support for grazing in the pasture particularly in rainy season and the crossbreeding was discontinued. Sheep currently, is in low government priority and as a result only a small flock of native Kage breed comprising of about fifty ewes is maintained at the farm and pure breeding is being continued.

#### Annual Targets and Progress:

The farm maintains only a small Kage flock and so the unit also has very few activities. Presented on Table 34 are the major activities of this unit showing not much change in last fiscal years 070/71 to 078/79.

Table 34 : Annual Targets and Progress

Details	FY 2072/73		FY 2073/74		FY 2074/75		FY 2075/76		FY 2076/77		FY 2077.78		FY 2078.79	
	Target	Progress	Tar	Progres	Tar	Progres	Tar	Progres	Tar	Progres	T	P	T	P
Rearing of sheep	60	71	60	68	60	58	60	57	70	62	50	52	50	55
Production of lambs	50	79	50	88	50	48	70	54	70	59	70	49	40	60

**Flock Composition:**

The opening and closing stock of sheep last fiscal year was 84 & 81 respectively heads and thus at the end of fiscal year 2078/79, 81 Kage sheep were carried down to next fiscal year 2079/80. There were 60 lambs born with 7.04% pre-wearing lamb mortality and 16% twining.

Table 35 : Flock composition of Kage in the year 2077/78

Particulars	Rams	Ewes	Y Rams	Hoggets	M Lambs	F Lambs	Total
At the beginning	3	48	2	16	0	15	84
At the end	2	35	4	13	0	27	81

**Production Parameters:****Lambing Percent:**

This has been calculated as the number of lambs born per ewe exposed. During the year 2078/79, 41 multiparous ewes out of 55 had lambed giving birth to 49 lambs (the first lambing should be excluded) and hence the lambing percent is calculated to be 134.15 percent.

**Percent Multiple Births:**

Out of 55 ewes lambed(including uniparous), 9 ewes gave birth to twins lambs which shows 16.36 percent multiple births in the flock. In the past, the value for this trait was

lower than 5 percent. One of the ewes gave quadruplets three years earlier and all of them survived. An intense selection and improved feeding practices might have contributed to increase multiple births in sheep.

Age at first Lambing (AFL) and Lambing Interval (LI):

Traits like Age at First Lambing and Lambing Interval are not discussed here as the farm practices controlled mating in sheep to produce only limited number of lambs in order to maintain only desired number of sheep in the farm. Even though the recorded at first lambing (AFL) is found to be 1 year 6 month and Lambing interval (LI) is about 278 days on average in the last 5 years.

Greasy Wool Production:

Three years earlier, 52 sheep of different age group were shorn in the month of Chaitra (March-April) using hand shears and the mean greasy wool yields per animal and staple length of the wool was found to be 0.165kg and 5.561 cm respectively. The following table 36 shows the mean wool yield and staple length with standard deviations.

Table 36 : Greasy wool yield and staple length

Attributes	Wool yield (kg)	Staple length (cm)
Mean	0.165	5.561
Sd	0.92	1.118
n	52	52

Mortality in Kage Sheep:

3 Lambs and 2 adult out of the flock of 84 died during the year 2078/79 and mortality percentage of sheep in the farm last year thus is 5.95 percent for the herds.

Financial Analysis:

Sheep farming needs very little resources and its profitability increases if sufficient grazing land is available. Use of higher amount of concentrates and higher rates of wages make the enterprise less rewarding. So these expenses should be minimized to make the sheep raising enterprise profitable at farmer's level.

Table 39 presents financial analysis of sheep unit showing benefit cost ratio of 1.14:1.0 on direct benefit cost basis.

Table 39: Benefit cost analysis of sheep unit in FY 078/79

Benefits		Costs	
Items	Amount Rs.	Items	Amount Rs.
Value of stock at the end of year 2079/03/31	899600	Value of stock at the beginning of year 2078-4-1	1016000
Cash benefits:		Cash Costs:	
Sale of breeding rams	816000	Feed, supplement	640,000
Sale of culled sheep	720000	Wages	377410
Others	1965.6	Veterinary drugs	5,000
Subtotal	1537966	Repair	50000
Change in stock value	-116400	Depreciation cost	40000
Total Benefit	1421566	Total Cost	1,112,410

Benefit: cost ratio : = 1.27:1.00

### **Boer Goat Production**

Reasons to establish Boer Goat's Nucleus herd by NLBO, Pokhara.

The origin of the Boer goat is not precisely known, although it is believed that the ancestors of the Boer goat were probably kept by migrating tribes in Africa (Casey & Van Niekerk, 1988). Although various breeds of exotic origin such as Jamunapari, Barbari, Sinhal, Kiko, Boer etc have been introduced in the country and are used for crossbreeding with indigenous goats, Boer is the principal exotic breed used most commonly for crossbreeding in the new commercial farms(RDLS, 2015). However, very limited work has been done on carcass characteristics and economic analysis of Khari and crossbreds of Boer and Khari in Nepal. In a study by Tennessee Province University, USA live animal visual muscle conformation score was greater for Boer compared to Kiko and Spanish straightbred kids with better meat to bone ratio. (McMillin and Pinkerton, 2006).

The exact date of introduction of Boer goat into our country's goat farms by farmer's level is not yet clarified. Later, Nepal Agriculture Research Council (NARC) had introduced

the breed in its research station of Bandipur (GRS, 2017) as a part of its research program. Now the breed and its crosses with different blood level can be seen in limited number in the commercial and semi commercial goat farms throughout the country except in the high hills and mountains (Gautam, 2016).

In an experiment by Browning R. jr. & Browning M.L. (2009), litter size and litter weight at birth did not differ among Boer ( $1.83 \pm 0.04$  kids,  $5.78 \pm 0.12$  kg), Kiko ( $1.84 \pm 0.04$  kids,  $5.63 \pm 0.12$  kg), and Spanish dams ( $1.95 \pm 0.04$  kids;  $6.01 \pm 0.13$ kg). Maternal breed did not affect litter traits at birth. However, Boer does exhibited lowered levels of fertility as indicated by parturition rates.

Lehloenya et al., (2005) reported birth weights ranging from 2.3 to 2.5 kg for South African Boer goats following synchronization and artificial insemination. Casey & Van Niekerk (1988) reported mean litter size for Boer goat females of 1.93 kids per parturition. The litter size of Boer goat females varied from 15.2-24.5 % kids born as singles, 59.2-67.5% born as twins and 15.3-16.3% born as triplets (Erasmus, 2000; Greyling, 2000).

In a study involving 826 Boer goat does ranging from 1.5 to 6.5 years old, 7.6% of the kids were born as singles, 56.5% as twins, and 33.2% as triplets (Erasmus *et al.*, 1985). The growth rate of Boer goats is generally lower than that of sheep, but under good nutritional conditions, weight gains of more than 200 g per day can be obtained in goats, compared to maximum values of 176 g per day under extensive subtropical conditions (Van Niekerk & Casey, 1988).

Needless to say, among all superior traits for goat meat production, heavier body weight and faster growing rate are the most notable. According to the Association of Boer Goat Breeders of Australia, birth weight of Pure Australian Boer kids ranges from 3 to 4 kg with male kids weighing about 0.5 kg heavier than female. Kids at weaning can weigh from 20 to 25 kg, depending on weaning methods and age (Lu, 2002).

Another research regarding Boer buck and Khari doe crossbreds in GRS, Bandipur also showed very encouraging result. In cross breeding with Boer by AI & Natural mating, the kidding percentage in natural mating were found to be 40.54%, 54.05% and 5.41% for single, twins and triple, respectively whereas in AI were 83.33% and 16.67%, respectively for single and twins. Likewise, the mortality rate of kid was found to be 16.39 % in natural mating and 14.29 % in AI. The mean body weight of male kids at birth, four and twelve months of age in natural mating was  $2.27 \pm 0.17$ ,  $14.13 \pm 0.33$  and  $35.11 \pm 0.29$  kg, respectively (Adhikari et.al, 2013). The study had concluded that the growth performance of Boer crossbreed is better than other crossbreeds found in Nepal and can easily adapt in mid-hills of Nepal.

In a study conducted in Syangja and Kaski district of Nepal, Gautam(2016) found that overall mean live body weight of adult does was  $23.80 \pm 0.34$  kg which was not significantly affected by location, production system, parity. However, Live weight of adult does was



significantly affected ( $p < 0.001$ ) by the genetic group of dams. Accordingly, the does of Syangja district had longer body as compared to those from Kaski. However, production system and parity did not affect the body length of kids significantly.

As a result of all the reasons, facts and findings mentioned above, in later years, Boer being a relatively newer breed introduced in the country, has become a breed of great concern among goat keepers especially because of its faster growth rate. Many research publications or literatures agree that Boer goat also is competitively prolific as Khari provided better housing, feeding and health management accompanied by its fast growing nature. To address this situation and to meet the enormously increasing demand of "Breeding purpose Boer" by the Nepalese farmers, the farm has established the Nucleus Herd of this Breed and the herd will be expanded in coming years upto the optimum capacity of this farm.

### Size of Nucleus Herd

As of 2079-3-31, Closing balance of Boer Goat in the farm was as below.

S.N.	Stock	Unit	Quantity
1	Breeding Buck	no	2
2	Breeding Doe	no	56
3	Male kids (<3 months)	no	4
4	Female kids (<3 months)	no	34
5	Male kids (>3 months)	no	34
6	Female kids (>3 months)	no	27
	<b>Total</b>		<b>157</b>

### Reproductive Performances 2078/79:

Reproductive Parameters	Days
Average age at first Service	330(10)
Average age at first Kidding	475 (10)
Kidding Interval	285 (10)

**Note: the figure within the parenthesis indicate the number of observation**

**Growth Performance (Upto 6 months) of Boer Goat at NLBO, Pokhara (2077/78)**

Age	Male			Female		
	Weight (kg)	Wt gain ( gm/day)	No of Observations	Weight (kg)	Wt gain (gm/day)	No of observatuions
Birth	3.4		10	3.1		10
1st Month	8.3	163	10	7.6	150	10
2nd Month	12.3	133.3	10	10.4	93.3	10
3rd Month	15.3	100	10	13.4	100	10
6th Month	23	85.5	10	19.2	64.4	10

**Non-ruminant Production****Pig Production Unit****Introduction:**

The pig unit in the farm started in the year 2028/29 (1972), with seven sows and three board of Landrace and Hampshire breeds, brought from the then Livestock Improvement Section, Khumaltar, Lalitpur. As there was spread of contagious and fatal disease Atrophic Rhinitis all the pigs in the farm were disposed off in 2031/32. Pig production in the farm resumed with 46 piglets of Landrace, Hampshire, and Yorkshire breeds imported from UK by GADP in 2035/36 (1979) again.

In order to maintain breeding lines in the farm herd weaned pigs of Duroc, Landrace and Yorkshire breeds were imported from UK and Malaysia in 1983, 1986 and 1990. The farm currently uses frozen boar semen of different breeds imported from International Boar Semen, USA and maintains pure lines of exotic pig breeds. Popularity of pig farming in the country is in increase and so is the demand of piglets. So the farm, despite various limitations has been trying to increase piglet production and support breeder farmers of the country.

**Objectives:**

- To establish nucleus breeding herd of exotic pig breeds.
- Production and supply of genetically superior piglets.
- Supporting pig breeder farmer's group in swine breeding, improving nutrition and prevention of diseases.

**Resources Available:**

Resources available to this unit are presented in Table 40 and 41.

Table 40: Buildings, sheds and equipment available in the unit

Description	Number	Sq m/capacity	Construction Year	Cost Rs. (000)
Open pig shed	1	476	2034/35	100
Boar Shed cum feed store	1	167	2038/39	123
Farrowing shed	1	392	2040/41	504
Office cum changing Room	1		2064/065	425
Weighing scale for pigs	1	900 kg	2035/36	NA
Replacement Stock shed	1	25	2072/73	1500
Laboratory(Including AI)	1	120	2073/74	3000
New Shed for Sow & Piglets	1	20 Sows & Piglets	2077/78	9850
New Mating Yard	1	3 Partitions	2077/78	500

Table 41 : Human resource assigned to Pig unit:

Name	Designation	Responsibilities
Unit-in-Charge	LDO	Overall reponsibility
Senior Technician	JT	Records keeping, Super vision
Junior Technician	JTA	Treatment, Feed supply
Junior Technician	JTA	Treatment, Feed supply
Helper	Office Assistant	Feeding, watering, cleaning
6 heads daily paid worker	Wage based Staff	Feeding, watering, cleaning

## Annual Targets and Progress:

Table 42 presents annual target and achievement of this unit. Unfortunately, because of FMD outbreak during the last fiscal year, our targets for piglets production & distribution couldnot be acheived.

Table 42: Annual targets and achievement - 2078/79

S.N.		Details	Unit	Target	Achievement
1	Management of pig Nucleus herd		Number	60	62 (Male 5, female 57)
2	Piglet Production		Number	800	549
3	Piglet distribution/Sale		Number	600	313
4	Rearing of Replacement Pigs		Number	30	71
5	Procurement of pig frozen semen		Times	1	0
6	Pig Resource development:				
6.1	Vaccination (SF and FMD)		Times	2	2
6.2	Parasites Control in pigs		Times	2	2
6.3	Tagging (Identification), Recording and Monitoring		Times	2	2

**Herd Composition:**

The farm had following population of adult, young and piglets at the beginning and closing of the year (Table 44). Though there is high demand of farm produced piglets the farm owing to limitation of housing facilities has not been able to raise more sows in order to increase piglet production.

**Table 44: Herd Composition- 2078.3.31**

Breed/Type	Stock @2077.04.01	Stock @2078.03.31	Remarks
Duroc Adult Male	3	2	
Duroc Adult Female	13	8	
Duroc Young Female	0	2	
Duroc Young male	5	15	
Duroc male Piglet	10	10	
Duroc Female Piglet	11	4	
Landrace Adult Male	2	2	
Landrace Adult female	23	25	
Landrace Young Male	2	1	
Landrace Young Female	14	29	
Landrace Male Piglets	17	39	
Landrace Female Piglets	18	39	

Yorkshire Adult Male	2	2	
Yorkshire Adult female	10	18	
Yorkshire Young Male	0	0	
Yorkshire Young Female	6	10	
Yorkshire Male Piglets	2	8	
Yorkshire Female Piglets	7	10	
Cross Adult Male	0	0	
Cross Adult female	11	2	
Cross Young Male	0	0	
Cross Young Female	0	3	
Cross Male Piglets	5	1	
Cross Female Piglets	3	2	
<b>Total with other Stocks</b>	<b>164</b>	<b>232</b>	

### Financial Analysis:

#### Benefit Cost Ratio:

6 years ago, a comprehensive study on Cost : Benefit ratio of pig unit was conducted in the farm. As per the study, Benefit cost ratio of pig unit in the year 2070/71 was found to be 1.07:1.0 which seems similar to the table below even today.

Table: 45. Benefit: Cost ratio of Pig Unit.

During Year (2077/78), following brief economic analysis has been done for cost and benefit.

Benefits		Costs	
Items	Amount Rs.	Items	Amount Rs.
Cash benefits:		Cash Costs:	
Sales of breeding Piglets	3151500	Feed, supplement	3005000
Sale of culled Pigs	360000	Wages	840000
Others	17500	Veterinary drugs	24000
Subtotal	3529000	Repair	10000

Change in stock value	620000	Depreciation cost	25000
Total Benefit	4149000	Total Cost	3904000

### Benefit cost analysis of Pig unit in FY 077/78

**Benefit: cost ratio : = 1.06:1**

However, interest or financial cost and depreciation of old buildings (As it has been already deducted since the buildings are too old) & other capital hasnt been calculated in this cost.

### Production Performances:

Litter Size Born Alive (LSBA):

The success of a swine enterprises depends largely in the size of the litter delivered at birth and the number of pigs successfully reared up to weaning. Litter size born alive (LSBA) is measured as total number of live born piglets in a farrowing. LSBA in the farm during last FY 2077/078 for Landrace, Duroc, Yorkshire, DLC, LYC, DYC & DLYC breeds has been Presented below. These figures show improvement over previous farm performance of year 2062 to 2077 BS.

Table 46: Litter Size Born Alive (LSBA) and Litter Size at Weaning (LSW)

Breed	Statistic Tools	LSBA		LSW	
		062-76 Average	2077/78	062-76 Average	2077/78
Landrace	Mean	9.20	11.62	8.40	10.78
	Sd	2.30	1.6		1.47
	n	56	23		23
Duroc	Mean	10.30	9.9	8.87	8.9
	Sd	2.80	2.3		2.3
	n	130	13		13
Yorkshire	Mean	10.40	10.44	9.04	9.09
	Sd	2.72	1.650		1.4
	n	83	10		10
DLC	Mean	10.72	10.55	9.50	9.65
	Sd	2.89	3.1		3.01
	n	174	2		2
LYC	Mean	10.25	11.2	8.98	10.7

	Sd	2.75	2.75		2.88
	n	115	2		2
DYC	Mean		11.2		9.92
	Sd		1.75		1.81
	n		2		2
DLYC	Mean		11.6		10.1
	Sd		2.68		2.46
	n		2		2
Herd Average	Mean	10.46	11.4	9.12	9.89
	Sd	3.99	2.66		2.56
	n	583	731		731

### Litter Size at Weaning (LSW):

Large litters, having heavy weaners at weaning are necessary for a profit in pork production. The average figures for this trait for Landrace, Duroc, Yorkshire, DLC, LYC, DYC & DLYC crossbred pigs has been presented in the Table no. 46.

### Birth Litter Weight (BLW):

BLW depends mainly on litter size at birth and, is positively correlated with the LSB. The average figures for BLW have been found as per Table no 47. These figures also show improvement while compared to the average performances of 2062 to 2077 BS.

Table 47: Birth Litter Weight

Breed	Statistic Tools	BLW	
		2077/78	062-77 Average
Duroc	Mean	15.86	12.26
	Sd	2.55	3.05
	n	20	146
Landrace	Mean	14.25	12.5
	Sd	3.5	3.3
	n	22	162
Yorshire	Mean	12.95	12.8
	Sd	1.65	3.25
	n	15	113
DLC	Mean	15.9	13.68

	Sd	3.44	3.50
	n	10	184
LYC	Mean	16.0	12.68
	Sd	3.72	3.24
	n	5	120
DYC	Mean	15.17	
	Sd	2.5	
	n	10	
DLYC	Mean	14.40	
	Sd	3.4	
	n	20	
Herd Av	Mean	15.3	12.95
	Sd	3.23	3.35
	n	731	2422

#### Weaning Litter Weight (WLW):

The numbers of pigs at the time of weaning directly affects this trait. This is a function of both prolificacy and maternal ability. The analysis of 2076/077 data show that WLW of three pure and 4 cross breed types weaned at 35 days were 76.81, 62.55, 63.71, 66.52, 72.86, 66.92 and 68.32 kg for Landrace, Duroc, Yorkshire, DL, Ly, DY & DLY cross breeds respectively (Table 47). These figures have been found superior than the average values for the same trait in the year 2062 to 2077 BS.

#### Farrowing Interval (FI) & Litter Index (LI):

Farrowing interval (FI) is the time between two consecutive farrowings. The overall average farrowing interval in the farm last year is found to be 170.11, 188, 198.6, 174.5, 172.5 and 157.14 and 164.51 days in Landrace, Duroc, Yorkshire, DL, LY, DY and DLY cross respectively. Litter index (LI) refers to the number of farrowings per sow per year and the calculations here is based on 365 days divided by FI in days (Table 48).

#### Age at First Farrowing (AFF) & Gestation Period (GP):

Age at first farrowing is one of the factors to measure the reproductive ability of sows. Earlier the age of first farrowing, greater is the profitability. The average AFF was found to be 14.49, 15.08, 14.69, 10.72 and 11.15 months for Landrace, Duroc, Yorkshire DL, DY and DLY Cross breed sows, respectively (Table 49). The average calculated figures of gestation days in present and previous sows, have observed more or less similar (Table 49).



Table 49 : Age at first farrowing (AFF) and gestation period (GP)

Breed	Statistic Tools	AFF, months		Gestation Period, Days	
		2061/62	062-75 Average	2076/77	062-76 Average
Landrace	Mean	NA	11.14	114.7	114.88
	Sd	NA	1.81	1.23	1.82
	n	NA	16	20	156
Duroc	Mean	14.49	12.0	115.46	114.99
	Sd	2.68	1.60	1.33	1.78
	n	7	28	4	130
Yorshire	Mean	15.08	13.60	116.80	114.48
	Sd	0.95	3.40	1.69	1.56
	n	4	17	6	83
DLC	Mean	14.69	12.21	114.69	114.71
	Sd	1.19	1.79	1.19	1.87
	n	36	39	6	174
DYC	Mean	10.72		114.33	
	Sd	0		1.23	
	n	1		4	
LYC	Mean	NA	11.65	115.57	115.56
	Sd	NA	1.92	1.27	5.86
	n	NA	70	7	115
DLYC	Mean	11.15		116.08	
	Sd	0.65		1.79	
	n	7		4	
Herd Av	Mean	13.21	12.20	114.24	114.8
	Sd	2.23	2.11	1.58	1.61
	n	28	127	51	695

**Piglet Mortality (%) According to Age and Breed:**

Pre-weaning piglet mortality or survivability of piglets till weaning (35 days old) are the traits important to access the mothering ability of sows. The piglet mortality according to breed and age is has been presented in table no 50.

So, profitability would certainly increase if this pre-weaning loss could minimize. During the last fiscal year of 2077.78, mortality of pigs has been estimated to be 8.08% because of death of whole batch of piglets from some sows.

Table 50 : Breed wise pre-weaning piglet mortality at different age

Live born Piglets in 2077.78	795
Mortality of Piglets in 2077.78	64
Mortality Percentge in 2077.78	8.08%

Pig Breeding Plan:

The recently proposed pig breeding stragey of Government of Nepal resembles the breeding strategies followed by this farm since last many years. It is conceptualized in the following multi-tired breeding pyramind.

The nucleus farms are placed at the top of the pyramid with emphasis on pure lines of breeds which undergoes intense selection and introduces the improved genetics from abroad especaly through the use of frozen semen. The imported quality frozen semen (Boar of specific breed) and intensively selected gilts of respective breed will be the Great Grand Parent Stock for production of grand parent stock of specizlized breeds or lines for supplying to the multiplier pig herds.

The multipliers farms occuppies middle tier of the pyramid and is an indicatieve of large number of pig herd for multiplication and expansion of superior lines of breeds, multiple crossing of pure lines or breeds from nucleus herds.

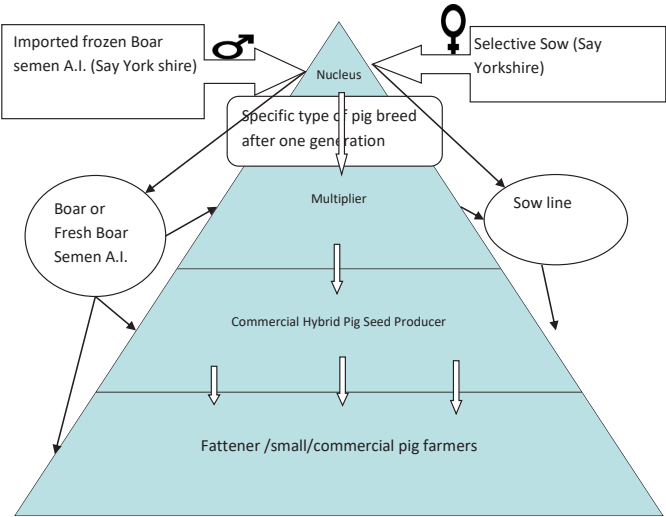


Figure: Pig Breeding Pyramid

The base tier of the pyramid represents commercial pig seed stock producers where large number of parents animals produced at the multipliers are mated using specific crossbreeding schemes to produce a pig and pork that meet the specific market demand.

A very cheap and practical way to carry out genetic improvement is through use of artificial insemination using quality frozen semen from abroad. The dissemination of improved genetics to commercial pig seed stock producer can further be enhanced by the use of fresh boar semen. The strength of A.I. in pig is generally depended on the genetic superiority of the boar produced at the nucleus herds.

#### Pure Breeding/Nucleus Breeding:

The farm maintains small nucleus herds of pure Landrace, Yorkshire and Duroc breeds to produce pure breed of pigs. The pure bred weaners are then sold to breeder farmers or used as replacement in the farm. The imported frozen boar semen is used to produce replacement boars and gilts and the first filial generation of crossbred progeny are either sold or used for replacement gilts. Also, the lean meat pig breeds have been given priority while importing the semen.

#### Two Breed Rotational Cross-breeding (Criss-crossing):

The criss-cross rotational crosses are general-purpose crosses. Offspring of each generation are used for market production and as replacement gilts. In a two-breed rotational program, females sired by breed A are bred to boars from breed B while females sired by breed B are bred to boars from breed A. A rotation of two breeds of Landrace and Yorkshire is followed at the farm.

#### Three Breed Rotational Cross-breeding:

A three-breed rotation using boars of three breeds rotated in order of one breed per generation is also in practice. Generally some heterosis is lost after the first full round of breeds in a rotation, but relatively high level of heterosis is retained in rotations of three or more breeds. The farm uses Landrace, Yorkshire and Duroc breeds for three-breed rotational program. In this system of crossbreeding the replacement gilts are reared from the same herd. The accurate records of sires in the rotations and sow's pedigree should be maintained to get maximum benefit of heterosis.

Table 51 : Heterosis percentage in rotational Crosses.

Heterosis percentage in rotational crosses:							
Crossbreeding system	Generation number						Equilibrium
	1	2	3	4	5	6	
Two-breed rotation	100	50	75	62.5	68.9	67.2	66.7
Three-breed rotation	100	100	75	87.5	87.5	84.4	85.7

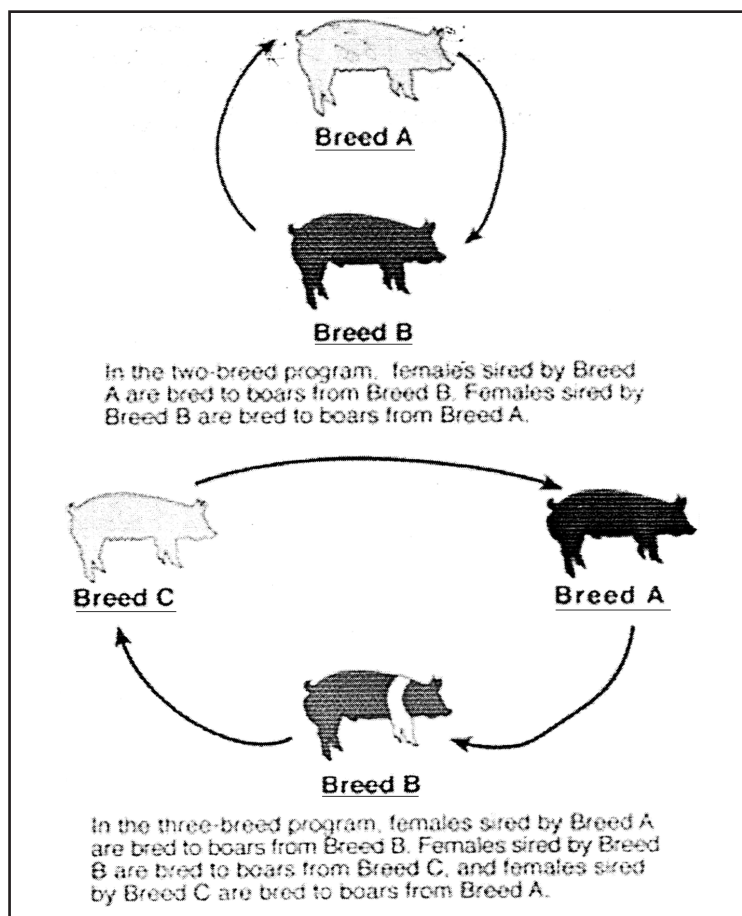


Fig 5 : Rotational Cross Breeding Plan

Following were the major support services provided to the farmers group in the past year (including Outreach Program).

- I. Twice a year vaccination against Swine Fever and FMD.
- II. Medication against internal and external parasites twice a year.
- III. Farmer's Training 3 times.
- IV. Tagging (identification), recording and monitoring- 3 times.
- V. Providing pure and F1 cross bred piglets for replacement.
- VI. Technical services as and when needed.

## **Poultry Production Unit:**

### **Introduction:**

The farm included poultry development activities in its program in year 1973. Brooding and distribution of poultry chicks was the initial program. The day old chicks of New Hampshire and White Leghorn breeds were brought from Central Hatchery, Parwanipur, brooded up to the age of four to six weeks and supplied to various districts of Western Development Region.

As the farm had no power supply, kerosene brooders were used for rearing the poultry chicks. A locally made fire wood furnace was also used initially to maintain temperature of brooding house. Later the brooding unit was shifted to the vicinity of DLSO, Kaski at Matepani and electric power was used for brooding and rearing of poultry chicks.

The year 1980 (2037/38) was very important for poultry unit, as two layer houses, one growers house and one hatchery building were constructed with financial and technical support from GTZ/GADP in that year. Similarly, incubators, hatchers and generator also were imported and installed. Parent stocks of New Hampshire, Black Australorp and White Leghorn breeds of poultry were imported and reared as breeding stocks.

The activities of poultry unit like supplying day-old chicks, brooded poultry chicks, fertile eggs, cockerels and dissemination of poultry management knowledge/skills to farmers have been significantly contributing to poultry development in this region.

### **Objective:**

- To support for poverty alleviation among the rural poor people through employment generation.
- To support the rural people for food and nutrition security through the rural backyard poultry program.

### **Activities:**

- Maintaining parent stocks of Australorp and New Hampshire poultry birds.
- Production of day old poultry chicks of Australorp and New-Hampshire breeds.
- Supply of day old poultry chicks, cockerels and hatching eggs.
- Dissemination of modern poultry production technologies to farmer's level.

### **Annual Target and Progress:**

Presented on Table 52 is annual program of this unit. Production of day old poultry chicks is the major activity of this unit and the unit despite demand for day old chicks has not

been able to meet the demand due to limitation of shed, budget, machinery and power cut. During Fiscal year, 2078/79, we crossed the targets of chicks production and distribution because of our quality chicks production, demand collection & subsidized rate as usual.

Table 52 : Annual program and progress accomplished in FY 078/79

S.No.	Details	Targets	Progress
1	Production of chicks	80000	91008
2	Maintenance of replacement stock	3000	4286
3	Supply of chicks	74000	87496

Resources:

The poultry unit has been utilizing resources mentioned on Table 53 and 54 to achieve its target.

Table 53: Physical facilities available

S.N.	Particulars	Number	Capacity	Date Constructed	Costs
1	Land area	0.8 ha		030/31	
2	Brooding	1	(39X6.5)m2	040/41	100,000
3	house Grower	1	(58.3X9.9)	040/41	645,100
4	house Layers	2	m2	041/42	305,767
5	house	1	(25.6X12)m2	037/38	472,481
6	Layers house	1	(34X9.9)m2	036/37	121,193
7	Hatchery	2	(11.7X9.4)	036/37	
8	building	1	m2 .	052/53	156000
9	Incubators	1	27000 eggs	068/69	
10	Hatchery	1	9000 eggs		
11	Generator set	2	25KVA	072/73	4000000
12	New Poultry House	1		(KUBK)	
13	Free Range Poultry House & Fence	1	500 birds	076/77	3000000

Table 54: Allocation of human resource

S.N.	Designation	Responsibility
1	LDO	Unit- in- charge
2	LST	Supervision, Reporting
3	JLST	Recording, Sales, Hatchery operation
4	Workers/ daily wage based- 6 Poultry boys	Cleaning, feeding and helping

## Breeds of Poultry

### New Hampshire

#### History

This breed originated in 1915 in New Hampshire of the United Provinces of America from selection of the Rhode Island Red. They were originally bred for eggs but have gained a reputation as a good table bird also. The body is well rounded with a deep full breast and medium length tail. The head is deep and rather flat on top with prominent eyes, a single comb with five points, smooth face, large wattles and oval red earlobes. The legs are yellow and the lower thighs are large and muscular with feet that have four toes. The feathers are a lovely deep chestnut red and are fluffy and full.

#### Behaviour

The chicks are quick to feather up and mature quickly. The hens lay well and are placid and friendly and are therefore easy to tame. They are not aggressive towards each other and are tolerant creatures. They do not have a tendency towards broodiness although it can occur occasionally and are good winter layers. They are able to cope with cold weather except that their combs are subject to frostbite so care should be taken.

Egg Colour : Light brown

### Australorp:

#### History:

The Australorp was developed as a utility breed from the Black Orpington in Australia in 1920s primarily for egg production rather than for meat. The name originates from the club which was founded for them. They are excellent layers of tinted eggs and hold the world record for egg production as a hen of the breed laid 364 eggs in 365 days! The feathers of the black birds have a wonderful beetle-green sheen and they have a prominent dark eye. Their comb is single and evenly serrated while their earlobes are red as are their

medium length wattles. Their black legs are strong and free from feathers and they have 4 toes.

#### Behaviour:

The Australorp is an active breed and they are fast growers with hens reaching point of lay at around five months of age. They are amazingly productive and are not prone to broodiness. An Australorp cock will weigh in at around 3.75 Kg while the hens tend to be in the range of 3 Kg.

Egg Colour: Tinted

#### Flock Composition:

The farm has been producing more than 1,50,000 day old chicks every year and in order to meet this production target, maintains about 2000 layers. Presented on table 55 is composition of flock in the farm.

#### The Farm Performances:

Tables 56, 57, and 58 present eight year farm data on a performance indicators like age at first egg laid, age at 50% egg laying and hen day laying percent etc starting from FY 2061/62.

**Table 55 : Flock Composition at the beginning and end of (077/78)**

At the beginning of This F.Y.		
Breed	Male	Female
Australop	29	192
New Hampshire	147	1199
<b>Total</b>	<b>1567</b>	
At the end of This F.Y.		
Breed	Male	Female
Australop	57	471
New Hampshire	222	1844
<b>Total</b>	<b>2592</b>	



Table 56 : Age at first egg lay

Year	067/68	068/69	069/70	070/71	071/72	072/73	073/74	074/75	075/76	076/77	077/78	078/79
Age in Days	146	130	134	145	138	140	142	139	138	132	135	141

Table 57 : Age at 50% egg lay

Year	067/68	068/69	069/70	070/71	071/72	072/73	073/74	074/75	075/76	076/77	077/78	078/79
Age in Days	175	165	166	170	167	165	170	168	169	167	165	171

Table 58 : Hen day laying percent

Year	067/68	068/69	069/70	070/71	071/72	072/73	073/74	074/75	075/76	076/77	077/78	078/79
%	53.32	48	48.61	53.81	55	54.1	54.8	55	54.4	55.1	54.1	56.2

### Fertility, Hatchability and Mortality:

- Fertility of eggs set in incubators for the FY 078/79 is 87.5 percent which is slightly higher than that of previous years.
- Farm performance on hatchability is satisfactory and has improved upto 84.6% in comparison to 80-81% of the previous years in the eggs set in the incubator.
- years.
- Mortality in the farm during brooding (0 to 8 weeks), growing (9 to 20 weeks) and laying (21 weeks onwards) in various age groups in last 10 years has ranged between 1.17 to 11.3% and except in the year 062/63 has remained within the limit.
- Hen day egg production has been increasing gradually and was highest in year 065/66. During the year 078/79 Hen day egg Percent was 56.2%.

### Financial Analysis

The benefit cost ratio last year was 1.16:1.0 and is widening every year owing to increase in prices of inputs.

Benefits		Costs	
Items	Amount Rs.	Items	Amount Rs.
Sale of Chicks	5585560	Cash Costs:	
Sale of eggs	1250026	Feed, supplement	5439960
Sale of culled Chicken	911500	Wages	952831

Others (Manure, sacs)	18220	Veterinary drugs	45000
Subtotal	7765306	Repair	25000
Change in stock value	-100500	Depreciation cost	120000
Total Benefit	7664806	Total Cost	6582791

### Benefit cost analysis of Poultry unit in FY 077/78

**Benefit: cost ratio : =1.16:1.0**

### DOUBLE TRACK MANAGEMENT SYSTEM (DTMS)

Background :

Double Track Management System (DTMS) was started in the farm in year 061/62 after agreement with MOAD and Rs. 25,00,000/- received as a soft loan from the government was used to run activities under this. According to DTMS karyabidhi the farm management with approval from the Farm Direction Committee can start any extra activity which is complementary to regular farm activities, earn profit and distribute bonus (only 30% of total net profit) among staff members.

The farm under DTMS had initially started Buffalo bull calf fattening and Animal feed production but Fattening of buffalo bull calves was discontinued and Pokhara Model dairy has been started. Thus, there were two activities namely; Animal feed production and Dairy (milk purchase and processing) under DTMS from FY 2071/72.

Activities- Annual Targets and Progress:

Animal Feed Production :

The farm, under DTMS has been producing animal feed since inception of DTMS in 061/62 and has been producing approximately 400 Mt of animal feed. Part of the produced feed (less than 1%) is sold outside after using about 95% in the farm itself. On the year 2021/2022, We produced 423000 kg of feed.

S.N.	Feed Production	Unit	Qty	Remarks
1	Poultry Feed (Starter)	kg	19500	
2	Poultry Feed (Grower)	kg	16500	
3	Poultry Feed (Breeder)	kg	94500	
4	Feed of Bulls	kg	30500	
5	Pig Feed	kg	92000	
6	Cattle Feed	kg	147500	
7	Goat Feed	kg	22500	

8	Total Feed	kg	423500	
9	Total Amount of Sales	Rs	23700495	

### Feed Quality

We are very sensitive toward the quality of the feed produced in our feed production unit because it is directly related to the production performance of our nucleus herds (animals and birds). Without quality raw materials, we cannot produce quality feed. Following is the acceptable standard of feed ingredients that we have been purchasing in this farm.

#### Acceptable standard of some feed ingredients to be purchased at National Livestock Breeding Office, Pokhara

S.N.	Feed Ingredients	DM%	CP%	Ca% or g/ kg DM	CF% of DM	Phosphorus %	Aflatoxin	Physical Form	Physical/variatal Impurities	Other details
1	Yellow Maize	NLT 87%	NLT 9 %	-	NMT 2.5%	-	*NMT 50 ppb	Tooth Shaped	*NMT 2%	Spoiled/ Damaged grain <2 %
2	Deoiled Rice Bran (DORB)	NLT 89%	15%	NLT 0.7 gm/ kgDM	NMT 9 %	NLT 12gm/ kgDM	*NMT 50 ppb	Granule/ pellet	*NMT 2%	
3	Mustard Cake (Preferable)	NLT 88%	NLT 34 %	NLT 0.5 gm/ kgDM	NMT 12 %	NLT 11 gm/ KgDM	*NMT 50 ppb	Ground or partly ground or pieces	*NMT 2%	
	if Rapeseed or Canola Meal (Alternate)	NLT 88%	NLT 37 %	NLT 0.5 gm/ kgDM	NMT 12 %	NLT 11 gm/ KgDM	*NMT 50 ppb	Ground or partly ground or pieces	*NMT 2%	
4	Soyabean Meal	NLT 88%	NLT 47 % (lysine 6.3% of Protein)	NLT 3 gm/ kgDM	NMT 6.5%	NLT 7 gm/ KgDM	*NMT 50 ppb	Ground or partly ground	*NMT 2%	Dehulled or ordinary
5	Full fat Soyabean Meal (Soya meal high oil)	NLT 87%	NLT 36%	NLT 0.28%	NMT 5%	NLT 0.66%	*NMT 50 ppb	whole	*NMT 2%	Dehulled or ordinary
6	Oyster shell/ Sippi	NLT 95%	-	NLT 33% (Made up of Oyster cell of NLT 94% Calcium Carbonate)	-	-	*NMT 50 ppb	Ground	*NMT 2%	*Salmonella = Negative
7	Fish Meal/ Jawala	NLT 88%	NLT 49 % (lysine 7% of Protein)	*NMT 6% or 79 gm/kg DM	-	*NLT 3% or 39 gm/Kg DM	*NMT 50 ppb	Whole or ground or partly ground	*NMT 2%	*Salt by Sodium Chloride= NMT 4%, Salmonella = Negative

8	Meat Cum Bone Meal (MBM_High fat)	NLT 95.8%	NLT 54%	NLT 101gm/kg DM	-	NLT 48.7 gm/kg DM	*NMT 50 ppb	Ground or partly ground	*NMT 2%	*Salt by Sodium Chloide= NMT 4%, Salmonella = Negative
	Meat Cum Bone Meal (MBM_Low fat)	NLT 93.2%	NLT 62%	NLT 94gm/kg DM	-	NLT 45.8gm/kg DM	*NMT 50 ppb	Ground or partly ground	*NMT 2%	*Salt by Sodium Chloide= NMT 4%, Salmonella = Negative
9	Dicalcium Phosphate (DCP)			NLT 22%	-	NLT 16%	-	Ground	*NMT 2%	
10	Limestone	NLT 98%		NLT 36%	-	0.18% (Pavl)		Ground	*NMT 2%	
11	Sunflower meal	NLT 93%	NLT 33%	NLT 0.37%	NMT 13%	NLT 1% (pavl 0.33%)	*NMT 50 ppb	Ground or partly ground or pieces	*NMT 2%	
12	Til meal or Sesame meal	NLT 92.8%	NLT 44.9%	NLT 19.7gm/kg DM	NMT 7.3%	NLT 12.6 gm/kg DM	*NMT 50 ppb	Ground or partly ground or pieces	*NMT 2%	
13	Rice Bran	NLT 90.1%	NLT 13%	NLT 0.7 gm/kg DM	NMT 8.6%	NLT 17 gm/kg DM	*NMT 50 ppb	flour	*NMT 2%	
14	Wheat Bran	NLT 90%	NLT 15 %	NLT 0.14 %	NMT 11%	NLT 1.15%	*NMT 50 ppb			
15	Calcite grit	NLT 98%			34%					

**Note on Acronyms:**

NLT=Not less than

NMT= Not more than

PPb= Parts per billion

NA= Not Applicable

ME=Mechanically Extracted or Expeller type

Pavl= Available phosphorus

SE= Solvent Extracted

\*= Very Sensitive ( Not Flexible)

Pavl= Available Phosphorus

**Pokhara Model Dairy:**

Pokhara Model Dairy, a small milk processing facility with capacity to process about 500 liters of milk daily, it was established for training purpose at the farm premises as part of a FAO/ TCP/ NEP/3103 (D). The TCP 3103 started in 2064/65 ran nearly for two years and provided initial support to start the dairy including all the equipment and part of the construction expenditure. The TCP also enhanced capacity of stakeholders including farm staff. The dairy started trial production from 2065-8-29 and came in to regular operation from 2065-12-20. The model dairy routinely procures milk from the buffalo unit and sells milk and products after processing. The facility is utilized to train participants whenever there is training program.

**Sales of milk and generated revenue during the fiscal year 2021/22**

Sales of Milk	Unit	Qty	Rate	Amount	Remarks
Buffalo milk	litres	74188	100	7418800	Sold from Model Dairy
Cow milk	litres	36500	70	2555000	Sold from Model Dairy
<b>Total</b>				<b>10233050</b>	

**Double Track Management System (DTMS) - Loan and Funds Generated :**

As mentioned earlier, the farm in 2060/61, received Rs. 2500,000/- as loan from the ministry (MOAC) and used that seed money to start DTMS activities. The farm has paid back the loan as per schedule (table 66) and generated different funds (Table 67) as per the provision of the operating procedure (*Karyabidhi*). In addition, DTMS activities contributed 15% of the profit to revenue and distributed 30% of the profit to all the farm employees as bonus.

Table 62 : DTMS Loan and Repayment

Particulars	Year	Amount	Remaining Amount	Remarks
Loan from MOAC	2060/061	2500,000	2500,000	
Repayment	2061/062	500,000	2000,000	
Repayment	2062/063	500,000	1500,000	
Repayment	2063/064	500,000	1000,000	
Repayment	2064/065	500,000	500,000	
Repayment	2065/066	500,000	500,000	Nil

**U. Special Problems of Farm Units:**

There are a number of problems that the Nuclues farm units of NLBO, Pokhara has been facing in its smooth running and the most important ones are;

### 1. Inadequate Budgets for Repair & Maintenance:

Maintenance budget has always been a limitation to all livestock farms and situation in this farm is not different. All roofing of farm buildings made up of CGI sheets, built almost three decades ago need renovation. Similarly, the farm has many infrastructures needing repair but inadequate allocation of annual budgets to do so.

### 2. Increasing costs of production Inputs:

There has been unexpected increase in wages and prices of production inputs in last few years, but the budget, especially for production inputs, is not increasing in that ratio. This limitation has compelled farm management to cut back farm operations and decrease the annual production targets.

### 3. Efficiency of manpower:

Concept of the government farm is not only to produce the required number of animals and birds for farmers, it is also a breeding and research station where the scientific works need to held. Unfortunately, the technicians are neither academically high qualified in the related field nor well trained. It is making much difficult to upgrade the farm scientifically.

## V. Biosecurity:

All the major principles of Biosecurity has been strictly followed by the NLBO authority. In short, following three major principles of Biosecurity has been followed in the farm premises.

### 1) Isolation-

The Farm shed area is located at distance and is not easily accessible to the unnecessary people and other livestock from the surrounding area.

### 2) Traffic Control

The unnesessary visits by the people, even from the farm staff family members, is discouraged in the farm area. Visits by the farmers of other area, trainees and livestock buyers, suppliers, feed suppliers etc is strictly regulated. The use of gloves, footwears, aprons, footbath and protective spray etc is always mandatory to the visitors.

### 3) Sanitation

When an infectious and devastating disease occurs in the farms (especially in poultry and swine farms) the infected area is completely sanitized by the ideal and appropriate methods.

## **6. Technical Session**

Effects of green fodder feeding on semen quality of buffalo bulls maintained in National Livestock Breeding Center Pokhara, a review of annual semen production records.

Poudel R.P.<sup>1</sup>, Sharma S<sup>2</sup>., Sapkota S.<sup>3</sup>

### **Abstracts**

National Livestock Breeding Centre reviewed the annual semen production record (fiscal year 2071/72) of 8 Murrah buffalo bulls maintained in the center. The objective of the present study was to find out the relationship between green fodders feeding on semen production performance of Murrah buffalo bulls. All the 8 bulls were maintained under naturally prevailing climatic condition at NLBC and were housed individually in pen with open space, having sufficient cross ventilation. All bulls were fed with good quality seasonal fodder at the rate of 25-30 kg and 2-3 kg concentrate formulated in Pokhara Livestock Development farm. Regular supply of sufficient green fodder is not only important for milk production but also for quality semen production for cattle and buffalo bull. Year round Fodder production is prerequisite for quality frozen semen production. National Livestock Breeding Center manages the provision of year round supply of green fodder for the bulls. The parameters of study were average semen volume, fresh semen motility, sperm concentration, dilution rate and post freezing motility. The semen production data was compiled and analyzed for individual performance of bulls for winter, summer and rainy season based on fodder availability in the season. The study shows that the average semen volume per ejaculation per bull was  $4.2 \pm 0.06$ , semen concentration was  $1295.5 \pm 16.88$  million/ml, fresh semen motility was  $74.59 \pm 0.14$  % and post freezing motility was  $48.2 \pm 0.27$ %. There was a significant difference between different fodder feeding regime ( $p < 0.001$ ) level in volume, concentration and post freezing motility of the semen. Hence, fodder can have significant effect on quality of the semen.

*Key words: Buffalo bulls, NLBC, semen quality, Fodder availability*

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### **INTRODUCTION**

Regular supply of sufficient green fodder is not only important for milk production but also for quality semen production for cattle and buffalo bull. Year round Fodder production is prerequisite for quality frozen semen production. National Livestock Breeding Center manages the provision of year round supply of green fodder for the bulls. However, there is short supply of green fodder between two seasons, although gap between two seasons

is about 4-5 weeks. Semen quality is affected by breed, reproductive health status of bulls, technical skills, age, and genetic constitution of bull. Moreover, quality of semen is affected by nutritional availability. The effect of nutrition on bull fertility before and after puberty is manipulated via the effect of the dietary constituents on the hypothalamic-pituitary axis, which may directly affect testicular development (Brown, 1984).

Malnutrition, particularly low energy intake in males, can also impair spermatogenesis. Buffalo bulls are comparatively more susceptible to heat stress due to their poor heat regulation mechanism than the females (Akhtar, 1988) and at the same time, availability of fodder for nutrition is also affected in different seasons which in turn have effect on quality of semen they produce. Adverse effects of high ambient temperature during summer is on the testicular size, libido and semen quality have been reported in sheep and goats (Ahmad, 1994), cattle (Soderquist et al., 1992) and buffaloes (Nazir, 1988; Barnabe et al., 1992). Semen quality is affected by breed (Mukhopadhyay et al. 2010); reproductive health status of bulls, technical skills, age (Mandal et al. 2010; Ahmad et al. 2011), and genetic constitution of bull (Koivisto et al. 2009) over a long period may not be consistent as it is not under a single managemental hand.

#### OBJECTIVE OF THE STUDY:

- To find out the relationship between green fodder feeding on semen production performance of Murrah buffalo bulls.
- To study the different species of fodder feeding on semen quality.
- To find the seasonal effect on semen quality.

#### MATERIALS AND METHODS

Annual semen production records of eight buffalo bulls maintained in National Livestock Breeding Centre in fiscal year 2071/2072 was reviewed. Altogether 608 ejaculations were studied. Five to seven years old buffalo bulls and having body weight of 450 to 550 kg were used to collect semen twice a week using artificial vagina. Two ejaculations were collected at an interval of 30 minutes. Green fodder of 25-30 kg/bull/day and Paddy straw depending upon DM content in green on an average of 3 to 5 kg/bull/day was given to each bull. In addition to this, concentrate of 3 to 4 kg/bull/day formulated in Pokhara Livestock farm was given along with adlibitum supply of fresh water.

Fresh mature Teosinte with concentrate was given to bulls during the month of July to October. Green oat with rice straw and concentrate was given during the month of November to March. Green maize with rice straw and concentrate was given during the month of April to June. The parameters for study was fresh semen volume, sperm concentration, sperm motility, final volume and post freezing motility. The fresh semen volume was measured by graduated semen collection tube used for collection. The sperm concentration was measured using photometer. The sperm motility was measured using Computer Assisted Semen Analyzer. All the concerned data was tabulated and statistical



analysis was carried out using Harvey (1990) software.

## RESULTS AND DISCUSSION

The result showed that the average semen volume when Teosinte, oat, Maize /Napier was fed was  $4.66 \pm 0.11$  ml,  $3.79 \pm 0.11$  ml,  $4.17 \pm 0.13$  ml respectively. The overall mean was  $4.2 \pm 0.06$ . There was a significant difference between the volume of ejaculates during different feeding regime. The volume was recorded highest during Teosinte feeding followed by maize/ napier and oat.

The average sperm concentration in fresh semen when Teosinte, oat, Maize /Napier was fed was  $1363 \pm 28.57$ ,  $1290.9 \pm 26.94$ ,  $1232.6 \pm 31.99$  million per ml respectively. The overall mean was  $1295.5 \pm 16.88$  million per ml. There was a significant difference between the volume of ejaculates during different feeding regime. The concentration was recorded highest during Teosinte feeding followed by oat and maize/ napier.

Effect of seasonal feeding on semen volume (ml) and concentration ( $\times 10^6$ ) of Murrah Bull at NLBC, Pokhara

Factors	Volume (LS $\pm$ SE)	Concentration LS $\pm$ SE)	No of Obs.
Overall mean	$4.2 \pm 0.06$	$1295.5 \pm 16.88$	608
Seasonal Feeding	***	***	
Teosinte	$4.66 \pm 0.11^a$	$1363.1 \pm 28.57^a$	208
Oat	$3.79 \pm 0.10^c$	$1290.9 \pm 26.94^{ab}$	234
Maize Napier	$4.17 \pm 0.13^b$	$1232.6 \pm 31.99^b$	166
CV	38.55	31.71	

Note: LS mean: Least square means; SE: Standard errors; No: Number of observations; \*\*\*: Significant at 0.1% level ( $P < 0.001$ ); NS: Not Significant; Means, within an effect, with the different superscript are significantly different.

The average Sperm motility in fresh semen in percentage when teosinte, oat, maize /napier was fed was  $74.47 \pm 0.24$ ,  $74.70 \pm 0.23$ ,  $74.61 \pm 0.27$  million per ml respectively. The overall mean was  $74.59 \pm 0.14$  in percentage. There was no significant difference between the Sperm motility in fresh semen during different feeding regime. There was significant difference between the final volume of semen after mixing the extender. The final volume of Teosinte feeding regime was highest followed by Maize/napier and oat respectively. This effect might be due to the difference in the volume and concentration per ml of the semen. There was also significant difference between the post freezing motility between different fodder feeding regime, the highest motility in the oat followed by maize/ napier and Teosinte respectively. The average post freezing motility was  $47.18 \pm 0.46$ ,

49.16±0.44, 48.34±0.52 percent respectively in Teosinte, oat and maize/napier feeding regime. The overall post freezing motility of buffalo bull semen was 48.2±0.27 percent.

Effect of seasonal feeding on semen motility (%), final volume (ml) and Motility PF (%) of Murrah Bull at NLBC, Pokhara

Factors	%Motility (LS±SE)	Final Volume (LS±SE)	%Motility PF (LS±SE)	No. of Obs.
Overall mean	74.59±0.14	57.9±1.79	48.2±0.27	608
Seasonal Feeding	NS	***	***	
Teosinte	74.47±0.24	70.33±3.03 <sup>a</sup>	47.18±0.46 <sup>b</sup>	208
Oat	74.70±0.23	50.31±2.86 <sup>b</sup>	49.16±0.44 <sup>a</sup>	234
Maize Napier	74.61±0.27	53.06±3.39 <sup>b</sup>	48.34±0.52 <sup>ab</sup>	166
CV	4.76	75.56	13.92	

Note: LS mean: Least square means; SE: Standard errors; No: Number of observations; \*\*\*: Significant at 0.1% level ( $P < 0.001$ ); NS: Not Significant; Means, within an effect, with the different superscript are significantly different.

#### CONCLUSION:

The green fodder has significant effect on the semen quality as far as volume, concentration, post freezing motility is concerned. The stages of fodder maturity, ambient temperature, age of the bull, weather, bull management etc. might play a vital role in determining semen quality which should be further studied.

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## **APPENDICES**

### **Appendix 1: Proposed Standard Operating Procedures Followed in Nepal for Performing Artificial Insemination**

#### **GENERAL PROCEDURES:**

1. Keep the premises of the AI Centre clean and maintain all equipment and material properly along with properly tagged canisters with complete description of semen.
2. Always respond to calls made by the farmers. In case there is likelihood of any delay, inform the farmer about expected time of visit.
3. Keep the A.I. kit clean and before leaving the AI centre, check that the A.I. kit has the following items:
  - Scissors
  - Thermometer
  - Thawing Tray
  - Forceps
  - Singly packed sheaths
  - AI Gun with container
  - Plastic gloves
  - Clean towel
  - Thermos-flask with hot water
  - Apron
  - 1.5 / 2 liter Refree with desired semen( White- Murrah, green- Jersey, Pink- H F and blue - buck)
4. Be at the centre on the scheduled day and time of semen and liquid nitrogen delivery.
5. Always keep the container with proper quantity of liquid nitrogen.

#### **INSEMINATION TECHNIQUE:**

1. After reaching farmer's place, first identify cow/buffalo and check past breeding records and history.
2. Examine the animal externally and ascertain that animal is in heat. The best sign of heat is clear, transparent, viscous and ropy vaginal discharge.
3. Wash hands.
4. Proceed with preparation of gun only after per rectal examination of                      genitalia.
5. Have plastic gloves, sheath, gun, scissors, forceps, tissue paper, and clean towel ready before thawing semen.
6. Pour hot water from flask in the thawing tray and adjust temperature of                      water in the tray to 37 degree centigrade by adding cold or hot water.
7. Remove semen from the refree with forceps and not with hands. Before holding the straw by the forceps, cool its tips for few seconds. While taking out, raise the canister just high enough – not above the frost line. Remove the straw within 10 seconds.

8. Shake straw to remove excess nitrogen and quickly plunge it into thawing tray containing warm water at 37 degree centigrade for 40-45 seconds in the horizontal position or otherwise cotton plug mat blow off.
9. Ensure that insemination gun and sheath also have temperature around 37 degree centigrade and not extremely hot or cold.
10. Take out straw from tray and wipe the straw with clean towel. After thawing A.I. should be performed as early as possible.
11. Before loading the straw in the gun, ascertain that air space in the straw is at the laboratory seal end.
12. Load the straw into the gun and make a clean cut at a right angle with a straight and sharp scissors just below the laboratory seal.
13. Take out the sheath by holding bottom of the sheath corner of the sheath packet and place the sheath on the gun and secure the sheath firmly with o-ring lock.
14. Wear shoulder length plastic glove, preferably on left hand and hold the gun with right hand.
15. Ask farmer to restrain the animal and hold the tail properly. Speak to the animal and make her calm down.
16. Lubricate the gloves with liquid paraffin or any other suitable lubricant before proceeding to rectum.
17. Gently put the gloved hand into the rectum by forming a cone with fingers.
18. Clean the rectum by removing the fecal material without ballooning.
19. Clean vulva with water and wipe with tissue paper.
20. Ask farmer to help spread the vulva.
21. Never allow gun's tip to touch external coat or anus/ vulva of the animal.
22. Insert insemination gun at approximately 30 degree angle till the gun reaches the fornix vagina to avoid entry of gun into the urethral opening/ urinary bladder.
23. Hold the cervix firmly through rectum and slightly stretch it forward to unfold the vaginal folds.
24. Gently and smoothly pass the gun through the vagina to the opening of the cervical canal.
25. Hold the external os of the cervix ahead of the gun's tip and negotiate vaginal folds and cervical rings to pass the gun through the cervix till the gun's tip reaches at internal os.
26. Feel the tip of the gun at internal os by gently moving the gun tip forward to ensure that the gun is in correct place (just at the internal os). Be certain the gun tip is not caught in a thin area between cervical rings or vaginal folds.
27. If the animal moves, STOP. Wait till the movement stops.
28. Hold the shoulder of the gun between your ring and middle fingers and push the gun piston with your thumb slowly (5 seconds) to deposit the semen just outside the internal os to allow semen to drain into the body of uterus. Gently remove the gun and check for abnormal discharge and a complete semen deposit.
29. Recheck semen ID – bull and batch number.

30. Properly dispose off the sheath, gloves and tissue papers. Clean gun if needed.
31. Record breeding information in the specified A.I. cow/ A.I. buffalo register provided by NLBC.
32. Blood on the gun tip and on the gloves indicate that too much force was used to pass the gun – be gentle and patient with the animal.
33. Ask farmer to release the animal and let her calm down.
34. Provide the A.I. fee receipt to the farmers.

#### Post Insemination Advice to Farmer

1. Ask farmer to keep the animal under observation for next 12-24 hrs.
2. Inform the farmer to save the animal from scrub bulls during the remaining part of present heat.
3. If signs of heat persist even after 18-24 hrs. Call for repeat AI, otherwise observe for heat symptoms after 18-21 days and also after 36-42 days.
4. If animal does not repeat heat at 18-21 days intervals for two consecutive times, call Inseminator for pregnancy diagnosis after 3 months from the date of insemination.

#### Post insemination follow-up by the Inseminators

1. Follow each and every animal inseminated after around 21 days to find out whether it has repeated.
2. Follow each and every animal inseminated for pregnancy diagnosis after 3 months and record the date and result of pregnancy diagnosis in the register/ format provided by NLBC.
3. Send it to DLSO/NLBC on a monthly basis in the format provided by NLBC.
4. Follow each and every pregnant animal and record calving detail of the animals inseminated in the register/ format provided by NLBC.
5. Maintain all records related to artificial insemination, pregnancy diagnosis, and calving and money transaction.
6. Advise farmers on proper heat detection, feeding, management and health care of animals.

#### SEMEN HANDLING

1. Keep the liquid Nitrogen container in a location that allows seeing into the neck tube of the container, and ease in withdrawing & replenishment of semen and liquid nitrogen. The surrounding should be well ventilated, dry and dust free.
2. Clean AI gun, scissors and other accessories whenever they get soiled or at least once a week with hot water and air dry them. Sanitize the AI gun and the scissor with Isopropyl alcohol after drying. The AI Gun piston and the scissors should be wiped clean with water after each insemination. Surgical spirit and soaps are lethal to semen, hence should not be used to clean equipments.
3. Maintain the liquid nitrogen level above the straw level in 1.5/2/ 3 liters capacity

containers.

4. Measure the liquid nitrogen level of 30 liters containers weekly with the help of measuring scale provided by the NLBC. Maintain the record of measurements to monitor its evaporation rate.
5. Carry the required semen doses in the liquid nitrogen container to farmer's door step. Never carry semen straws in pocket/ thermos-flask / polythene bags filled with water/ ice etc.
6. Maintain an accurate semen inventory to lessen the risk of semen exposure.
7. Always attach the paper tag provided with each goblet to the requisite canister of the container to identify the type of semen in each canister.

## Appendix 2

Livestock Species & Breeds Maintained in the Shed for semen production until the end of the Fiscal year 2075.76

S.N.	Livestock Type	Scientific name	Chromosome number(2N)	Breeds	No of animals
1	Domestic Water Buffalo(Riverian) Bull	Bubalus bubalis	50	Murrah	16
2	Humpless European Bull	Bos taurus	60	Holstein	8
3	Humpless European Bull	Bos taurus	60	Jersey	13
4	Goat	Capra hircus	60	Boer	8



**Appendix 3: Staff Quarters facilities:**

SN	Description	Number	Area sqm	Year of construction	Cost Rs. 000
1	B-Grade quarter	1	103	2040/41	146
2	C-Grade qtr (Guest House)	1	95.8	2026/27	70
3	C-Grade quarters	3	353	2037/38	344
4	C-Grade twin quarter	1	92	2026/27	65
5	D-Grade twin quarters	2	148	2037/38	152
6	D-Grade twin quarters	3	221	2040/41	282
7	E-Grade twin quarters	5	266	2037/38	545
8	F-Grade quarter.	1	30.8	2041/42	60
9	Workers quarter (1 family)	1	24.6	2032/33	50
10	Workers quarter (2 families)	1	121	2020/21	30
11	Workers quarter (4 families)	1	95.8	2030/31	45
12	Workers quarter (7 families)	1	205	2048/49	600
13	Workers quarter (8 families)	1	191	2030/31	90
14	Former NLBC Qtr	5	-	Different	NA
	Total	22			2,479

**Appendix 4 : The list of vehicles and office equipment :**

S.N.	Description	Number	Capacity	Date purchased	Cost in thousand
1	Bicycle	6			
2	Pickup (Ford,Scorpio,Hylux)	3	Double cab	2050/51	769
3	Motorcycle	12	100cc/125cc	Diff	40
4	Trucks	2	Eicher	2075.76	35
	Office Equipments:				
1	Desktop P1 100 mhz	1	100 Mhz	2053/54	80
2	Desktop P1 233 mhz	1	233 mhz	2050/51	105
3	Desktop P4	1	1.66 ghz	2060/61	80
4	Desktop P4	6	Misc	Misc	80
5	Laser Printer HP 1100	1		2055/56	34
6	Laser Printer HP 1200	1		2060/61	25
7	Overhead Projector	3		Diff	75
8	Photocopier	3		2060/61	
9	Slide Projector	1		2040/41	
10	Digital Camera (Sony & other)	2		Diff	25
11	Still camera (Samsung & other)	2		2060/61	7.5
12	Desktop computer Dell	1	Set	2068/69	50
13	Multimedia	1	Set	2059/70	50
14	Laptop (Misc)	6	Misciscisc	Misc	75
15	<b>Total</b>				<b>1,645</b>

**Appendix 5: Buildings and Sheds:**

SN		Description	Number	Area sq m	Year of construction	Cost Rs 000
1		Boar Shed cum feed store	1	167	2038/39	123
2		Buffalo shed (plot# 8)	1	435	2040/41	440
3		Bull Shed	1	145	2026/27	
4		Bunker I horizontal silos	2	1600 mt	2035/36	95
5		Calf Shed	1	472	2040/41	338
6		Double row Buffalo shed	1	472	2030/31	271
7		Electrical Chaff cutter shed	1	144	2037/38	59
8		Farrowing shed	1	392	2040/41	504
9		Feed milling & storage	1	77	2028/29	
10		Fuel store & cafeteria	1	122.2	2030/32	
11		Garage cum workshop	1	1115	2040/41	495
12		Generator house	1	54	2040/41	61
13		Growers house	1	577	2040/41	645
14		Hatchery building	1	110	2037/38	121
15		Heifer shed (loose stall)	1	1273	2037/38	125
16		Layer house	1	312	2040/41	306
17		Layer house	1	337	2041/42	472
18		Manure platform	1	1054	2038/39	
19		Nursery shed	1	285	2036/37	
20		Office building	1	600	2040/41	662
21		Open pig shed	1	476	2034/35	100
22		Poultry Brooding house	1	253	2030/31	100
23		Poultry Sales Counter, office	1	80	2057/58	250
24		Scrap store	1	180	2026/27	
25		Seed & fertilizer store	1	207	2029/30	
26		Sheep shed	1	211	2026/27	
27		Sheep sheds	2	422	2030/31	
28		Single row shed (dry buffalo)	1	228	2037/38	163
29		Single row shed (milch buffalo)	1	337	2026/27	
30		Store (Raw materials)	1	72	2026/27	

31	Weighing yard for buffaloes	1	157	2040/41	42
32	Working yard for sheep	1	650	2030/31	
33	Piggery Change room	1		2064/65	35
34	Dormitory Building	3		2068-75	4230
35	Communication Certer	1	3000	2075/76	8000
36	Canteen	1	30	2064/75	2000
	Total	80			11831

**Appendix 6 : Farm Machinery and Equipment:**

S.N.	Description	Number	Capacity	Date purchased	Cost in 000	
1	Air compressor	1		2051/52	NRs	17.3
2a	Chaff cutter, HIMCo	1		2037/38	NRs	
2b	Indian Chaff cutter	2		207071	NRs	.....
3	Dayal Hatcher	1	9,000 eggs	2037/38	NRs	40
4	Dayal Incubators	2	13,500"	2037/38	NRs	105.8
5	Dial balance	1	100 Kg	2051/52		
6	Digital Balance (0.00)	1		2060/61		
7	Egg candling table	2		2037/38	NRs	0.96
8	Electric Debeakers	3			NRs	6.3
9	Feed mixing plant	1		2040/41	NRs	37.2
10	Forage Harvester, Jaguvar	2		2049/50		
11	Harrow Disk type	1		2033/34		
12	Harrow Tooth type	1		2033/34	DM	2.1
13	Harrow Disk Type	1	RLTC			
14	Heat detector for cattle	1		2049/50		
15	Hot air Oven	1		2060/61		
16	Kirloskar generator	1	60KVA	2037/38	NRs	153.2
17	Kirloskar generator	1	25KVA	2048/49		117
18	Leveler	1		2033/34	DM	0.1
19	Microscope Binocular	1		2051/52	NRs	70
20	Microscope, Monocular	1		2049/50	NRs	16.3
21	Moldboard Ploughs	2	3 shares	2033/34	DM	10.14
22	Pregnancy detectors	1		2049/50		
23	Refrigerator Hitachi	1	210 litres	2051/52	US\$	590
24	Refrigerator LG	1	200 litres	2060/61		
25	Refrigerator Samsung	1	150 litres	2049/50	NRs	25.9
26	Tractor Belarus 12	1	65 HP	2048/49	NRs	408.3
27	Tractor Belarus 13		65 HP	2048/49	NRs	408.3
28	Tractor Russian Belarus	1	65HP	2042/43	NRs	185.7
29	Tractors Schluter 5 & 8	2	85HP	2033/34	NRs	128.4
30	Trailer	1	2049/50	NRs	21	

31	Trailers	2	2049/50	NRs	170	
32	Trailers	3	2037/38			
33	Transformer	100 KVA	2037/38			
34	Weighing scale buffaloes	1	1000 kg	2035/36	NRs	
35	Weighing scale for pigs	1	500Kg	2035/36		
36	Weighing scale for sheep	1	300Kg	2035/36		
37	Welding Machine	1	2037/38			
38	Tractor (Sonalika) 1243 (with front loader)	1	60HP	2065/66	NRs	1890
39	Tractor (Indofarm)1207	1	60HP	2065/66	NRs	959
40	Jet Pressure (Karcher)	2	2065/66	NRs	120	
41	Welding Machine Dry	1	RLTC	2062/63		
42	Hatcher1: and incubator set	1	6000/18000	2068/69	1200	
43	Tractor 4wd,	1	75HP	2069/70	NRS	2000
44	Grass/forage Harvester	2		2075/76	NRS	1600
45	Hydroponic Chamber	1		-	NRS	4000

## Appendix 7

### Livestock Species & Breeds Maintained in the Nucleus Farm

S.N.	Livestock Type	Scientific name	Chromosome number(2N)	Breeds
1	Domestic Water Buffalo(Riverian)	Bubalus bubalis	50	Murrah
2	Goat	Capra hircus	60	Boer
3	Sheep	Ovis aries	54	Kage
4	Pig	Sus domesticus	60	Landrace, Yorkshire, Duroc & their Crosses
5	Poultry	Gallus domesticus	78	New Hampshire & Black Australop
6	Jersey Cattle	Bos Taurus	60	Jersey
7	Holstein Cattle	Bos Taurus	60	Holstein