ANNUAL TECHNICAL REPORT
NATIONAL LIVESTOCK BREEDING OFFICE, POKHARA
(Fiscal Year 2077/78)









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Ministry of Agriculture and Livestock Development
Department of Livestock Services
National Livestock Breeding Office
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PREFACE

This year too, COVID-19 disrupted the entire economic and social life of Nepal. However, Agriculture sector remained least affected in comparison to other sectors of goods and services by this pandemic. Despite the COVID pandemic, the establishment of new commercial livestock & agriculture farms continued & contribution of agriculture and animal husbandry to Nepal's economy has been very significant during the fiscal year 2078.79 too. 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 to the GDP & Services Sector 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 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.

Importance of livestock is not just limited to income and employment but is very important from the perspective of food and nutrition security. 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 28 years' information about the AI programs, acheivements, relavant issues and other technical information of National Livestock Development Office, Pokhara. Also, it incorpaorates all the major activities of NLBO, Pokhara that relates to the fiscal year 2077/78. The issue of Annual Report of National Livestock Breeding Office, Pokhara contains details of what the relavant office, despite challenges of Corona pandemic, had been able to achieve in the fiscal year 2077/78. 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 unavailability of funds even for routine farm and semen collection operations. Despite all this, we have put our continuous efforts to acheive our goals. Genetic superiority and environmental factors together determine production potential of an animal or a bird 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 Mr. Govinda Prakash Sharma, Secretary, Ministry of Agriculture and Livestock Development, Dr. Damayanti Shrestha, DG, Department of Livestock Services and all former secretary of the ministry the visitors from MALD, 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. Narayan Prasad Sharma
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.

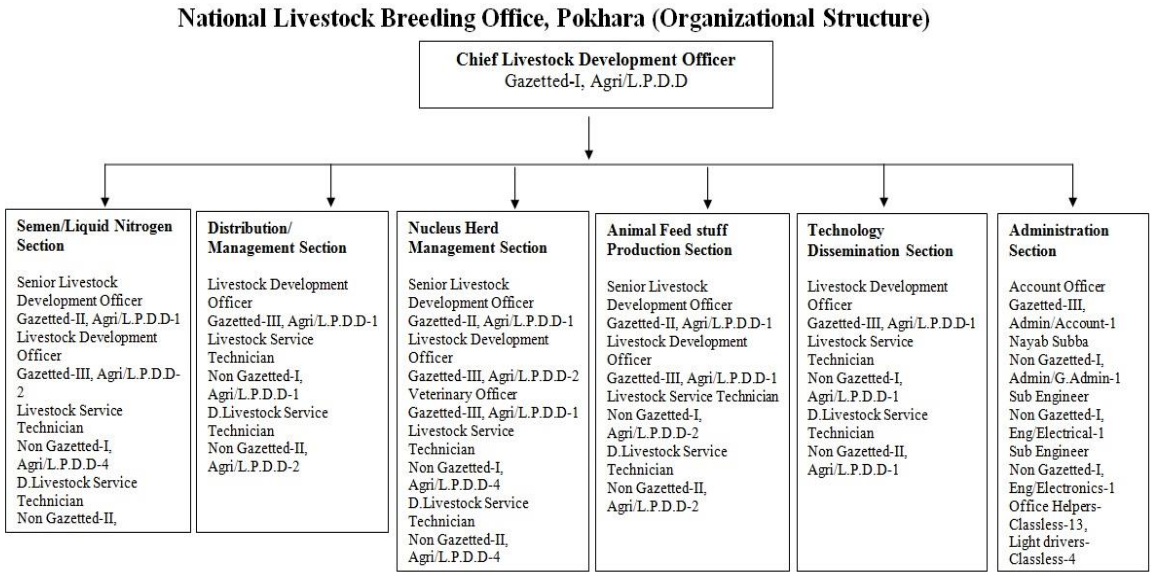
ACRONYMS

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.



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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_2) 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 Baruwal with exotic Polworth breed of sheep, but discontinued the practice as Baruwal 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 entrepreuners 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 is to be promoted and propagated in the country. However, as buffalo alone cannot meet the national demand for milk and draft power, upgrading of nondescript cattle with exotic blood level up to 75% will be continued 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 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, Baruwal, 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 Plan of 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:

The Integrated Farm with nucleus herds is located at Lampatan, Ward Number 14 of Pokhara Metropolitan City, Kaski district, Gandaki State 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, eight km from Pokhara 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 & Achievments

2.1. Breeding Policy

Presented below are both proposed New Breeding Policy(Proposed Breeding Policy:2066) and old Breeding Policy (Breeding Policy: 2055) of DLS and some other relavant issues of Animal Breeding in Nepal.

New Breeding Policy: 2066 (Proposed)

Present situation of Livestock Breeding

- Activities are being conducted on the basis of "Conservation of livestock and Poultry and their Breeding Policy" (2055/56 B.S.)
- Improvement of local breeds of Cattle and Buffalo by means of exotic breed's bull of Jersey, Holstein and Murrah or by the use of their frozen semen.
- Artificial Insemination program mostly through frozen semen of Jersey, Holstein and Murrah.
- In-Situ conservation of certain identified indigenous breeds of local livestock and poultry.
- Out of total population of livestock and poultry, highly productive cattle population is -12% and highly productive buffalo population is-28%. Hence there is an extreme need and potentiality of breed improvement in livestock.
- Nepal is rich in biodiversity and there are some indigenous breeds which are either extinct or endangered to be extinct.

Problems & Challenges

- Due to lack of suitable national livestock (breeding) policy Siri cow is almost extinct and some others have threats of extinction.
- Due to negligence, there is even import of frozen semen of unnecessary breeds of animals.There is no regulatory function of import of such unsuitable semen due to lack of policy.
- Even identified breeds of animals are being bred with other breeds which may cause the loss of breed characters of certain animals.
- Challenges due to inbreeding

- Due to lack of proper policy, the agreements of conservation of genetic resources and biodiversity are not properly followed.

Need of new Livestock Breeding Policy 2067 (Proposed)

- 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.

Objectives

- Identification and development of appropriate genetic group of livestock and poultry for different ecozones of Nepal .
- Increasing the productivity through appropriate method of breeding & exploring the genetic potential of the particular breed.
- Conservation, promotion & utilization of livestock biodiversity.
- Proper management of Breeding purpose & breed able livestock & Poultry.

Policies

A) Related to the objective of Identification and development of appropriate genetic group of livestock and poultry for different eco-zones of Nepal & increasing the productivity through appropriate method of breeding & exploring the genetic potential of the particular breed.

Cattle

a) Development of Jersey and Holstein Breed from 62.5 to 75% blood Level for milk production

b) Development of local Lulu and Achhamee cows by applying proper selection methods.

c) Improvement of breeds of Yak and Nak by appropriate selection methods.

d) Production of crossbred of Hariyana and Terai Cattle in Terai Region (By natural breeding & AI) for milk and draft power to address the need of Terai People.

Buffalo

a) Development of Lime, Parkote and gaddi buffaloes in hills through proper selection methods.

b) Development of Nepali Murrah breed of buffalo for Terai, shivalik range and low altitude of mid hills.

Goat

a) Development/improvement of Sinhal and Chyangra breeds of goat for high hills and mountain regions by proper Selection methods.

b) Development/improvement of Terai, Khari, Sinhal and Chyangra breeds of goat by proper Selection & Outbreeding methods.

c) For Mid hills, selection of Khari and crossbreeding of Boer, Barberi & Jamunapari males to Khari females.

Sheep

a) Development/improvement of Baruwal & Bhyanglung breeds by Selection methods for mountains region.

b) Development/improvement of Kage breed of sheep by proper Selection & Outbreeding methods for the mid hills.

c) Development/improvement of Bhyanglung, Baruwal, Kage & Lampuchhre breeds of sheep by proper Selection & Outbreeding methods.

Pigs

a) Development of black colored breeds of pigs.

b) Development of exotic breeds like Landrace, Yorkshire and Duroc (lean meat type) as per the suitable climatic condition of Nepal.

c) Development of meat purpose breed of Nepali Bandel(Nepalese Wild Boar).

Poultry

a) Development of appropriate breed of Rural poultry for Nepal .

b) Selection/Development of appropriate breed of Japanese quail, Ostrich, Turkey, Kaliz etc.

Horse/Mule:

a) Development of suitable breed of Horse and Mule for transportation service in mid and high hills.

B) Related to the Objective of Conservation, Conservation, promotion & utilization of livestock biodiversity.

- In-situ and Ex-Situ Conservation and Improvement of Achhame, Lulu, Khaila and yak in cattle breed whereas Lime, Parkote and Gaddi in buffalo breeds through people's participation.
- In- situ and Ex-situ conservation and improvement of endangered bampudke pig through people's participation.
- In-situ conservation and improvement of Chwanche and hurrah pigs through people's participation.
- There will be mechanism of identification, registration, conservation, improvement and utilization for local breed of animals
- Private and Non Governmental sector will be encouraged for the conservation and promotion of local breeds of livestock and poultry.
- Local farmers will be encouraged for the conservation, promotion and utilization of livestock and poultry(Ghantikhuile and Pwakh Ulte)
- Development of eco tourism and conservation of genetic resources through establishing ecological farm parks.

C. Related to the Objective: Proper management of Breeding purpose & Breedable livestock & Poultry.

- Development of resource and market centers for suitable breeds of bulls, buck, ram, buff bull, chicks on the basis of productivity.
- Utilization of semen and embryo of approved variety and breeds of livestock.
- Identification of the best breedable livestock on group, region and national level and development of their utilization system. Establishment of resource centers for specific species/breeds in specific regions and system of certification will be developed.

- Regulatory function for GMO will be established.
- Commercial production of breedable animals only for the utilization of breeding.
- Gene Bank for the conservation of biodiversity and its market management.
- Prioritization of biotechnological research.

Breeding Policy: 2055

Cattle and Buffalo

- Jersey bull/semen should be used to upgrade non descript and crossbred cows in mid-hills and Terai, with blood level not exceeding 62.5%.
- Haryana bull/semen should be used in Terai, to upgrade the native cows for milk and draft purpose.
- Existing Holstein and Brown Swiss crossbred animals will be maintained at 62.5% of respective blood level in dairy pocket areas and bull /semen of these breeds will be used to upgrade nondescript cows up to 62.5% of respective blood level. Exotic blood level above 62.5% will be lowered through back-crossing.
- Murrah buffalo bull/semen should be used to upgrade low producing buffalo cows. There will not be any restriction in Murrah blood level in the Terai belt. However, Murrah blood will not exceed 62.5% in the mid-hills.
- The productivity of Yak, Lulu and Achhame cattle will be improved through outbreeding scheme to conserve and maintain their population up to 50,000 heads.
- Bull exchange program between farmer groups will be followed to avoid inbreeding.
- Non descript bull elimination program, for controlling indiscriminate breeding, would be started in districts with intensive AI.

Sheep and Goat

- Carpet wool type breeds (Border Leicester, Romney Marsh) will be introduced to upgrade Kage and Baruwal sheep.
- Barberi breed will be used to increase body weight of Khari and non descript goats.
- No exotic blood will be introduced to increase the productivity of Bhyanglung and Lampuchhre sheep, and Chyangra and Sinhal goat. Instead, selective group breeding scheme will be followed to improve the pure line's productivity.
- Ram and buck exchange program between farmer groups will be followed to check inbreeding.
- Artificial insemination in sheep and goat will be started.

Pig and Poultry

- Pure breeding of Landrace, Yorkshire, Hampshire and Duroc will be encouraged while crossbreeding and Criss-crossing among these breeds will be practiced for commercial pork production.
- New Hampshire and Australorp breeds of poultry will be used to improve egg and chicken production in rural areas.
- Artificial insemination in pig and poultry will be started.

Strategies followed for the implementation of the old breeding policy 2055 are:

- Inclusion of conservation and maintenance of indigenous animal genetic resources activities in regular program of District Livestock Services Offices (DLSOs).
- Intensive mobile AI Program in potential areas.
- Expansion of AI service through partnership with private sector, especially in the urban/ peri-urban commercial dairy pocket areas.
- Distribution of serviceable ET born cattle and buffalo bulls for natural breeding.
- Development of suitable breeds of cattle for different ecological zones in collaboration with Nepal Agriculture Research Council/IAAS.
- Strengthening of National Livestock Breeding Center (NLBC), and Livestock Breeding Offices for quality frozen semen production/distribution.
- Strengthening of service package, including- pasture, fodder, breeding and animal health activities together.
- Establishment of Animal Genetic Resources Centers in potential pocket areas in collaboration with private sector.
- Setting up Improved Animal Resources Development Committee, Pasture and Feeds Development Committee, Pig and Poultry Development Committee at the national level.

2.2 Infrastructures/fascilities:

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.

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 family's 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
	Total		**Rs.11,15,94,557.00**

2) Facilities Developed by TLDP Resources

SN	Item	Detail	Cost of Construction
1	Officer Quarter	Plinth area: 173.864 sq.m. Two floors; Four families' 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

	Total		Rs. 1,50,57,846.42

3) Facilities Developed by JICA Senior Volunteer

SN	Item	Detail	Cost
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	Generator	25 KVA	Rs. 700000.00
7	Bicycle	-	Rs. 6000.00
	Total		Rs. 17,24,000.00

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^{0}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
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
Total			Rs. 94,19,290.00

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 FUJIKA 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 4th March1999 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 9th 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) including 2500 doses of Holstein and 4000 doses of Jersey Semen imported in the fiscal year 2076.77. Similarly, 66690 doses of buffalo frozen semen also have been imported from India (Second Table). The roles of agencies like GTZ, FAO, LIAJ, Second and Third Livestock Development Projects and Embassies have been very significant in strengthening AI program.

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

S.N.	DATE	COUNTRY	BREED	SEMEN DOSE	SOURCE
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 Iun	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	*B. Swiss*	2000	-
27	2/14/1986	Switzerland	*B. Swiss*	2000	-
28	5/18/1988	Germany	*B. Swiss*	10786	-
29	10/14/1991	USA	*B. Swiss*	1000	SLDP

S.N.	DATE	COUNTRY	BREED	SEMEN DOSE	SOURCE
30	11/16/1991	-	*B. Swiss*	1000	SLDP
31	5/2/1994	USA	*B. Swiss*	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

S.N.	DATE	COUNTRY	BREED	SEMEN DOSE	SOURCE
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	Hariana	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

S.N.	DATE	COUNTRY		BREED	SEMEN DOSE	SOURCE
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	
Total of Cattle Bull, Murrah Bull and Buck semen import till the end of FY 2077/78 (2020/2021)				**385518**	

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 from year 2051/52 (1994/95) to 2077/78 (2020/21). It shows production of frozen semen from year 2057/58 (2000/01) to 2077/78 (2020/21).

NLBO, Pokhara has produced record 605693 doses of frozen semen in this year and this, as shown in Figure below, is a remarkable achievement.

2.1) Breed wise Frozen Semen Production from 2053/54 to 2077/78 (2020/21)

No	066/67	067/68	068/69	069/70	070/71	071/72	072/73	073/74	074/75	075/76	076/77	077/78	Total from 2053/54 to 2077/78
	009/10	010/11	011/12	012/13	013/14	014/15	015/16	016/17	017/18	018/19	019/20		
Jersey													
35													32692
40													13293
43													36459
54													45343
59													418
111													8828
366													12365
PTr-858													3990
PJ-925													94129
PJ-45	29725	22152											172815
PJ-46	1538												105095
PJ-49	7724												15415
PJ-50	2419												13064
PJ-51	27283	29051	38037	41354	35953	38683	3653						235013
PJ-52	16765	21688	22714	27866	27898								127535
PJ-53	9395	12417	10425										32237
PJ-55	4006	18507	26269	30123	28550	47479	50912	67114	53255				326215
PJE-1													2792
PJE-2	17142	20881	26011	13231									118474
PJE-3	16082	18073	23140	16081	20472								135824
PJE-4	8072	24695	30416	10858	27785								101826
PJ-56			8204	26374	32952	39059	41237	51369	31605	59318			290118
PJ-57			1645	15035	24495	37189	37596	5997	15255	4650			141862

PJ-58					10376	48039	42093	58076	59394	54535	44587	0	317100
PJ-59												0	0
PJ-66				4001	10366	11547	7883					0	33797
PJ-67				20	3215	14400	24335	41388	13272	6003	18065	18697	139395
PJ-68						13020	25024	28634	34256	41428	26485	17742	186589
PJ-69							16415	36074	30180	28220	29690	30931	171510
PJ-70							1728	3566	200			0	5494
PJ-71								28826	72121	49151	48280	52947	251325
PJ-72								320				0	320
PJ-73									18754	20450	31598	47745	118547
PJ-75									8825	8124	22965	21998	61912
PJ-76										21372	23857	**35058**	80287
PJ-77										2565	12279	**960**	15804
PJ-78											6805	**17857**	24680
ET 6										730	16855	**29591**	47176
PJ79												**9204**	**9204**
PJ-80												**2225**	**2225**
S-total	**140151**	**167464**	**186861**	**184943**	**222062**	**249416**	**250876**	**321364**	**337117**	**296546**	**281466**	**284955**	**3506487**
120													6644
121													19397
204													9768
PHF 10	4932	14716	16114	19277	15959	24747	24499	1223					121467
PHF 11	972	8787	14068	23668	8656	15346	17202						88699
PHF 12	1952	8716	21417	27894	34406	43607	35252	33912	12115				219271
PHF 13	3225	12030	12780	11689	17765	20927	18149	7255					103820
PHF 14			7103	20662	28941	23750	7553	114					88123
PHF 15			1759	7022	9301	2058							20140
PHF 16			215	511	525								1251
PHF 17			2245	8966	13472	20039	7278	1800					53800
PHF 18				9058	13058	9579	3828	825					36348
PHF 20				1662	1497	23284	41324	56911	59016	58573	38790	9505	290562
PHF 22				9545	15764	21128	18169	33100	23428	30522	12715	0	164371
PHF 23						13784	34495	35810	37965	35115	16740	1880	175789
PHF 24									10150	6955	10933	0	28038
PHF 25						14973	29722	44805	49552	43035	37217	26355	245659
PHF 26								7855	31263	35571	20318	9745	104752
ET-07											20105	42787	62892

PHF 28												**11702**	11702
S-total	**11081**	**44249**	**75701**	**139954**	**159344**	**233222**	**237471**	**223610**	**223489**	**209771**	**156818**	**101974**	**1852493**
26													903
27													4595
28													24391
122													9387
123													5228
142													1525
PM-29													4181
PM-30													12242
PM-31													23858
PM-32													12934
PM-35													21051
PM-36													6211
PM-37													18928
PM-38	2943	8791	2418										14806
PM-39	1057	5838	11565	12648	4156								35264
PM-41	6090	12259	10892	162									29403
PM-42		7392	17467										24859
PM 45		4467	11745										16212
PM 46			1177	4770	6216	9462	10870	5118	393				38006
PM 47			811	12507	18073	24342	17919	12533	7445				93630
PM 48				82	203								285
PM 53				6147	7199	8240	1376	201					23163
PM 54				13633	16244	21782	19623	19127	20208	12863			123480
PM 55				618	8715	12394	10229	6028	3770	7546			49300
PM 56				1708	1417	1826							4951
PM 57				15082	19371	23045	16560	18192	12795	9165			114210
PM 58				5377	18253	26033	23397	20075	2698	7885			103718
PM 59				2842	5582	1973	8684	860					19941
PM 60					11176	761							11937
PM 61								6400	15270	12378	22005	**20682**	76735
PM 63								336	1855	10393		**0**	12584
PM 64								1870	21884	16959	18937	**18856**	78506
PM 65								1650	3235	5232	973	**0**	11090
PM 67								750	5080			**0**	5830
PM 68									1350	10500	1070	**0**	12920

PM 69										2988	6170	**13991**	23149
PM 70										3472	7705	**6667**	17844
PM 71										2007	6615	**3130**	11752
PM 72										3080	10540	**0**	13620
PM 101										640	10648	**10420**	21708
PM 102											11605	**20985**	32590
PM 103										1750	13321	**13685**	28756
PM 104										815	5413	**3529**	9757
PM 105										905	7217	**4365**	12487
PM 106											15050	**16459**	31509
PM 107												**8202**	8202
PM 108												**2615**	2615
S-Total	**10090**	**38747**	**56075**	**75576**	**116605**	**129858**	**108658**	**93140**	**95983**	**108578**	**137269**	**143586**	**1260253**
G-Total With BS & Parkote	***161322***	***250460***	***318637***	***400473***	***498011***	***612496***	***597005***	***638114***	***656589***	***654126***	***575553***	**530515**	**6619233**
Boer Bucks										***11689***	***30140***	**32813**	**62953**
GRAND TOTAL										***665815***	***605693***	***563328***	***6682186***

2.2) Buckwise Semen Production in 2077.78

BAT	DATE	PG 001	PG 002	PG 005	PG 106	PG 107	PG 015	PG 014	PG 009	PG 010	PG 013	PG 012	Total	Monthly
1	4/5/2077	0	0	0	0	0		0	0	0	0	0	0	
2	4/8/2077	0	0	0	0	0		0	0	0	0	0	0	
3	4/12/2077	0	0	0	0	0		0	0	0	0	0	0	
4	4/15/2077	0	28	45	55	20		0	42	80	0	70	340	
5	4/20/2077	0	60	85	30	0		0	80	150	0	50	455	**2120**
6	4/23/2077	0	145	90	45	45		0	65	65	0	75	530	
7	4/26/2077	0	35	95	45	20		0	40	105	0	70	410	
8	4/29/2077	0	60	65	45	10		0	50	90	0	65	385	
9	5/1/2077	0	60	105	60	40		0	85	185	0	55	590	
10	5/4/2077	0	50	65	70	5		0	95	100	0	115	500	**3520**

11	5/8/2077	0	70	70	50	20		0	50	50	0	75	385	
12	5/11/2077	0	100	85	50	0		0	50	55	0	90	430	
13	5/15/2077	0	30	75	40	70		0	75	70	0	60	420	
14	5/18/2077	0	50	65	25	0		0	105	110	0	85	440	
15	5/22/2077	0	40	0	65	0		0	65	55	0	85	310	
16	5/25/2077	0	55	65	10	40		0	55	160	0	60	445	
19	6/5/2077	0	60	50	120	60		0	110	65	0	100	565	
20	6/8/2077	0	45	135	70	25		0	90	70	0	75	510	
21	6/12/2077	0	180	100	65	10		0	90	80	0	60	585	
22	6/15/2077	0	155	100	45	50		0	140	95	0	120	705	
23	6/19/2077	0	185	140	0	60		0	100	70	0	105	660	**4414**
24	6/22/2077	0	140	70	165	75		0	85	85	0	80	700	
25	6/26/2077	0	101	0	50	46		0	32	90	0	0	319	
26	6/29/2077	0	55	95	35	55		0	40	85	0	5	370	
27	7/17/2077	0	115	95	75	60		0	110	105	0	65	625	
28	7/20/2077	0	195	110	40	0		0	45	105	0	125	620	
29	7/24/2077	0	140	135	80	50		0	95	105	0	55	660	
30	7/27/2077	0	120	110	25	90		0	47	150	0	100	642	
31	8/4/2077	0	0	0	0	0		0	0	0	0	0	0	
32	8/8/2077	0	70	100	30	15		0	80	80	0	85	460	**2862**
33	8/11/2077	0	85	20	40	95		0	65	50	0	60	415	
34	8/15/2077	0	45	40	5	15		0	55	40	0	40	240	
35	8/18/2077	0	0	105	40	40		0	95	60	0	105	445	
36	8/22/2077	0	0	80	70	40		0	45	125	0	120	480	
37	8/25/2077	0	0	105	35	60		0	125	95	0	0	420	
38	8/29/2077	0	0	85	35	25		0	70	120	0	55	390	**2465**
39	9/2/2077	0	0	40	30	70		0	75	65	0	60	340	
40	9/3/2077	0	0	75	40	30		0	50	60	0	140	395	

41	9/6/2077	0	0	105	45	25		0	65	120	0	80	440	
42	9/9/2077	0	0	65	50	35		0	35	60	0	110	355	
43	9/13/2077	0	0	160	50	20	0	0	90	95	0	85	500	
44	9/16/2077	0	0	0	55	125	0	0	140	90	0	55	465	
45	10/19/2077	0	0	0	60	27	0	0	55	95	0	95	332	
46	10/22/2077	0	0	120	80	50	0	0	60	110	20	100	540	**3682**
47	10/26/2077	0	0	135	85	0	0	20	130	75	30	80	555	
48	10/29/2077	0	0	85	30	30	0	0	100	15	0	80	340	
49	11/3/2077	0	0	60	45	60	0	0	90	110	0	40	405	
50	11/6/2077	0	0	60	25	0	50	0	0	0	25	30	190	
51	11/10/2077	0	0	0	0	25	40	0	125	90	45	35	360	
52	11/13/2077	0	0	130	40	0	15	0	55	85	80	70	475	
53	11/17/2077	0	0	85	0	35	0	0	55	95	0	80	350	
54	11/21/2077	0	0	170	45	80	40	0	130	0	5	135	605	**2190**
55	11/25/2077	0	0	0	0	0	0	0	0	0	0	0	0	
56	12/2/2076	0	0	40	70	0	0	0	75	105	50	60	400	
57	12/9/2076	0	0	110	0	0	0	0	55	25	0	60	250	
58	12/12/2076	0	0	0	0	0	0	0	0	65	0	0	65	
59	12/13/2076	0	0	0	125	135	70	0	35	115	45	155	680	
60	12/17/2076	0	0	95	140	0	100	0	50	140	40	190	755	
61	12/20/2076	0	0	0	0	0	0	0	0	0	0	0	0	**1750**
62	12/31/2076	0	0	0	0	0	0	0	0	0	0	0	0	
63	1/3/2078	0	0	0	0	0	0	0	0	0	0	0	0	
64	1/6/2078	0	0	0	0	0	0	0	0	0	0	0	0	
65	1/10/2078	0	0	0	0	0	0	0	0	0	0	0	0	
66	1/16/2078	0	0	180	100	0	85	0	0	0	75	0	440	
67	1/20/2078	0	0	0	60	80	100	0	30	140	80	155	645	**5723**
68	1/23/2078	0	0	0	42	0	30	0	85	105	37	255	554	

69	1/27/2078	0	0	105	95	30	35	0	160	75	0	0	500	
70	1/30/2078	0	0	125	42	125	70	0	77	170	42	171	822	
71	2/3/2078	0	0	130	60	55	85	0	110	55	90	270	855	
72	2/6/2078	0	0	55	75	40	110	0	140	160	47	115	742	
73	2/10/2078	0	0	125	100	40	180	0	145	210	80	285	1165	
74	2/13/2078	0	0	0	0	0	0	0	0	0	0	0	0	
75	2/17/2078	0	0	105	30	0	80	0	15	65	40	55	390	
76	2/20/2078	0	0	120	0	0	0	0	30	70	0	0	220	
77	2/24/2078	0	0	25	0	0	0	0	0	37	0	0	62	**1137**
78	2/27/2078	0	0	70	55	0	74	0	45	106	30	85	465	
79	2078-02-31	0	0	0	0	0	0	0	0	0	0	0	0	
80	3/3/2078	0	0	140	50	0	40	0	80	95	30	80	515	
81	3/7/2078	0	0	60	65	0	80	0	0	240	40	75	560	
82	3/10/2078	0	0	0	0	0	0	0	0	0	0	0	0	
83	3/14/2078	0	0	0	0	0	0	0	0	0	0	0	0	
84	3/17/2078	0	0	0	0	0	0	0	0	0	0	0	0	**1705**
85	3/21/2078	0	0	0	115	0	75	0	40	115	110	175	630	
86	3/24/2078	0	0	0	0	0	0	0	0	0	0	0	0	
87	3/28/2078	0	0	0	0	0	0	0	0	0	0	0	0	
88	3/31/2078												0	
		0	2474	5360	3404	2258	1284	20	4763	6093	931	5596	32813	**32813**

2.3) Trend of Species/Breedwise Semen Production in Breif from all NLBOs (2008/09 to 2020/21)

Species	***008/09***	***009/10***	***010/11***	***011/12***	***12/13***	***13/14***	***14/15***	**15/16**	**16/17**	**17/18**	**18/19**	**19/20**	**020/21**	**Total**
Jersey	*119954*	*140151*	*167464*	*186861*	*184943*	*222062*	*254090*	250876	321364	337117	291245	281466	312244	3069837
Holstei	*0*	*110*	*442*	*757*	*139*	159	233	237	223	223	215	233	195	1992005

n		*81*	*49*	*01*	*954*	344	222	471	610	489	544	129	211	
Hariyana						660	6213	1582	11387	13633	13633	74927	39020	161055
Murrah	*19109*	*10090*	*38747*	*56075*	*75576*	*116723*	*129858*	108658	93140	98193	133704	174222	204173	1258268
Buck(Boer)										8280	11689	30140	32813	82922
Others BS,Parkote etc(casual)							*8813*	19629	8280	9542				46264
Total	**139063**	**161322**	**250460**	**318637**	**400473**	**498789**	**632196**	**618216**	**657781**	**690254**	**665815**	**793884**	**783461**	**6610351**

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 ready made 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 mechine (Minitube Company,Germany) which is a great change for this lab.
- Use of SMILE Software to reduce data recording error and to set intregrated 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_2 while transferring.

3.8) Distribution

- Counting semen straw in LN_2 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: 2077/78 (2020/21)

Presented in the table below is summary of quality control tests conducted at NLBO lab in the year 2077/78.

Summary of semen quality control-2077/78

S.N.	Test	Standard	At NLBO		
			Lowest	Best	Average
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 3rd hour	10 % after 2nd hour	30 % after 3rd 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 -2077/78

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 ($x10^9$)
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 2077/78 from NLBOs.

S.N.	Species/Breed	Semen produced(dose)
1	Cattle/Holstein	195211
2	Cattle/Hariyana	39020
3	Cattle/Jersey	312244
4	Buffalo/Murrah	204173
5	Goat/Boer	32813
6	**Total**	**783461793884**
	Overall Growth	-1.31%

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

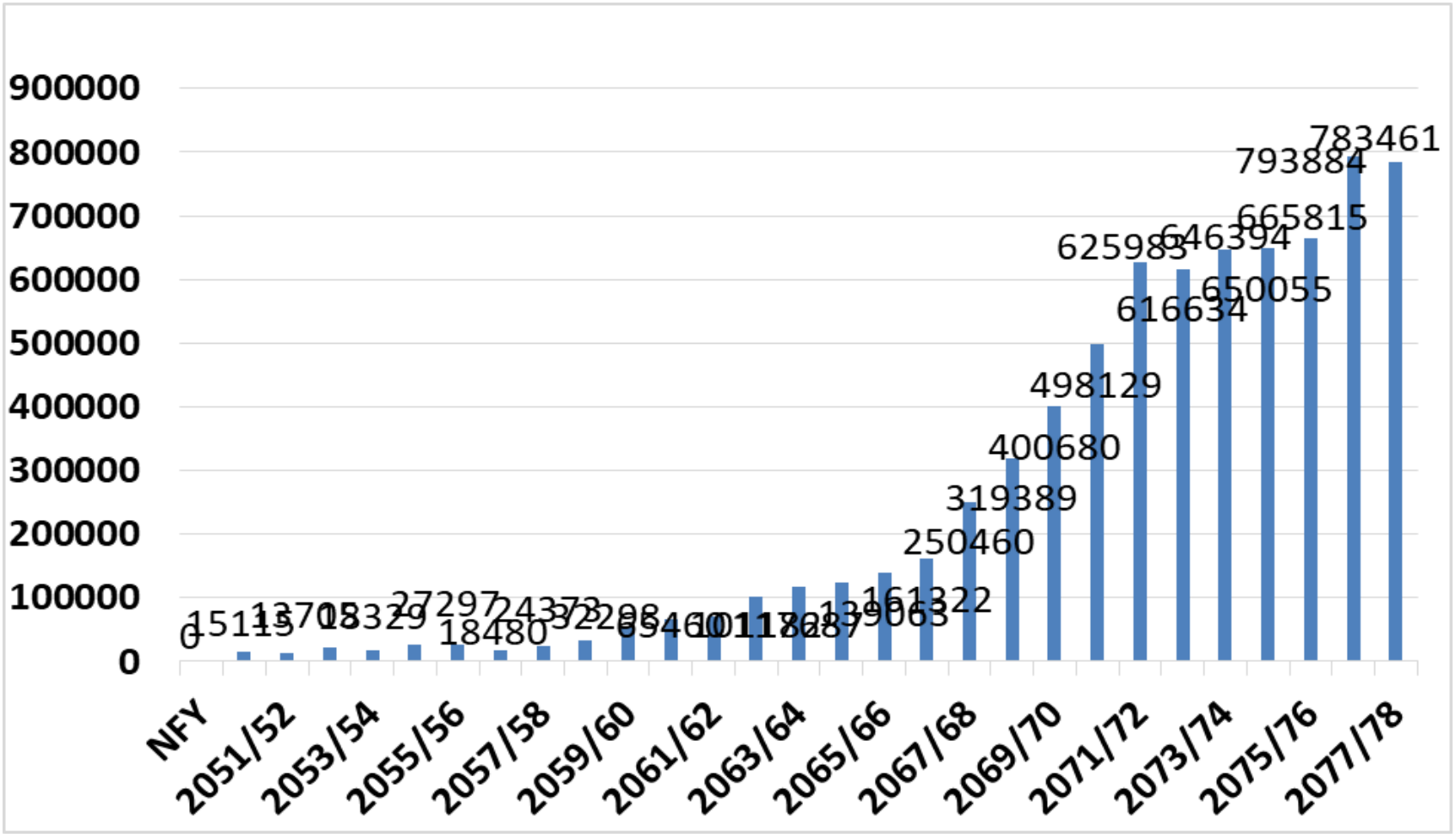
Following table compiles the production & distribution of semen & liquid nitrogen in relation to AI from the year 2050/51 to the year 2077/78 & the growth trend as well.

NFY	Semen Production	Increment	Semen Distribution	Increment	LN_2 Distribution/ Consumption	Increment	AI Progress	Growth	LN_2/AI	Semen/AI	AI/Lit LN2
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
2054/5	27586	50.5	47935	36.6	43107	27.6	32817	26.8	1.31	1.4	0.7

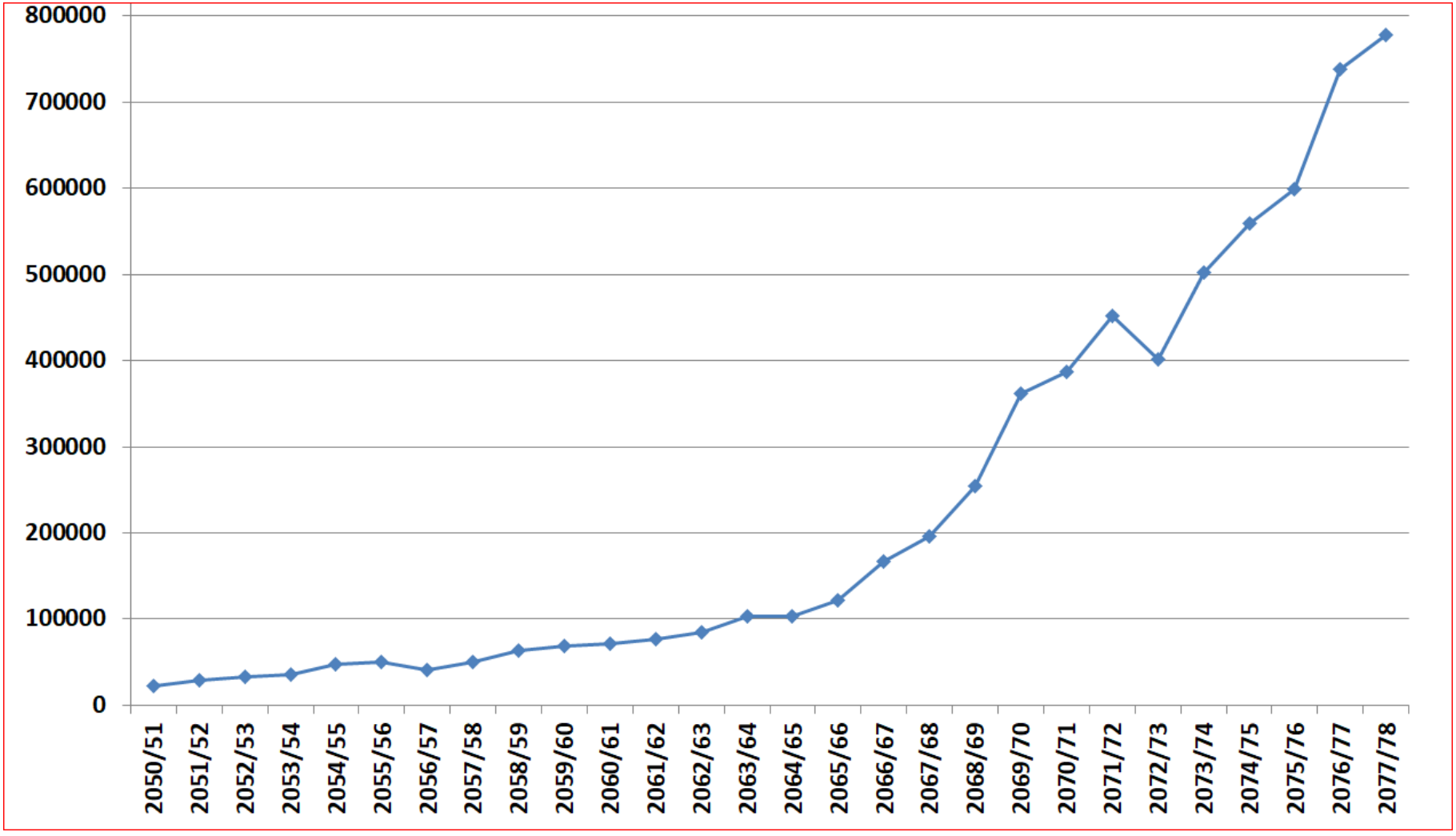
5		0		3		6		8		6	6
2055/56	27297	-1.05	50856	6.09	28802	-33.18	32637	-0.55	0.88	1.56	1.13
2056/57	18480	-32.30	40332	-20.69	28239	-1.95	35248	8.00	0.80	1.14	1.25
2057/58	24373	31.89	49675	23.17	37908	34.24	41165	16.79	0.92	1.21	1.09
2058/59	32298	32.52	64122	29.08	48601	28.21	56439	37.10	0.86	1.14	1.16
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

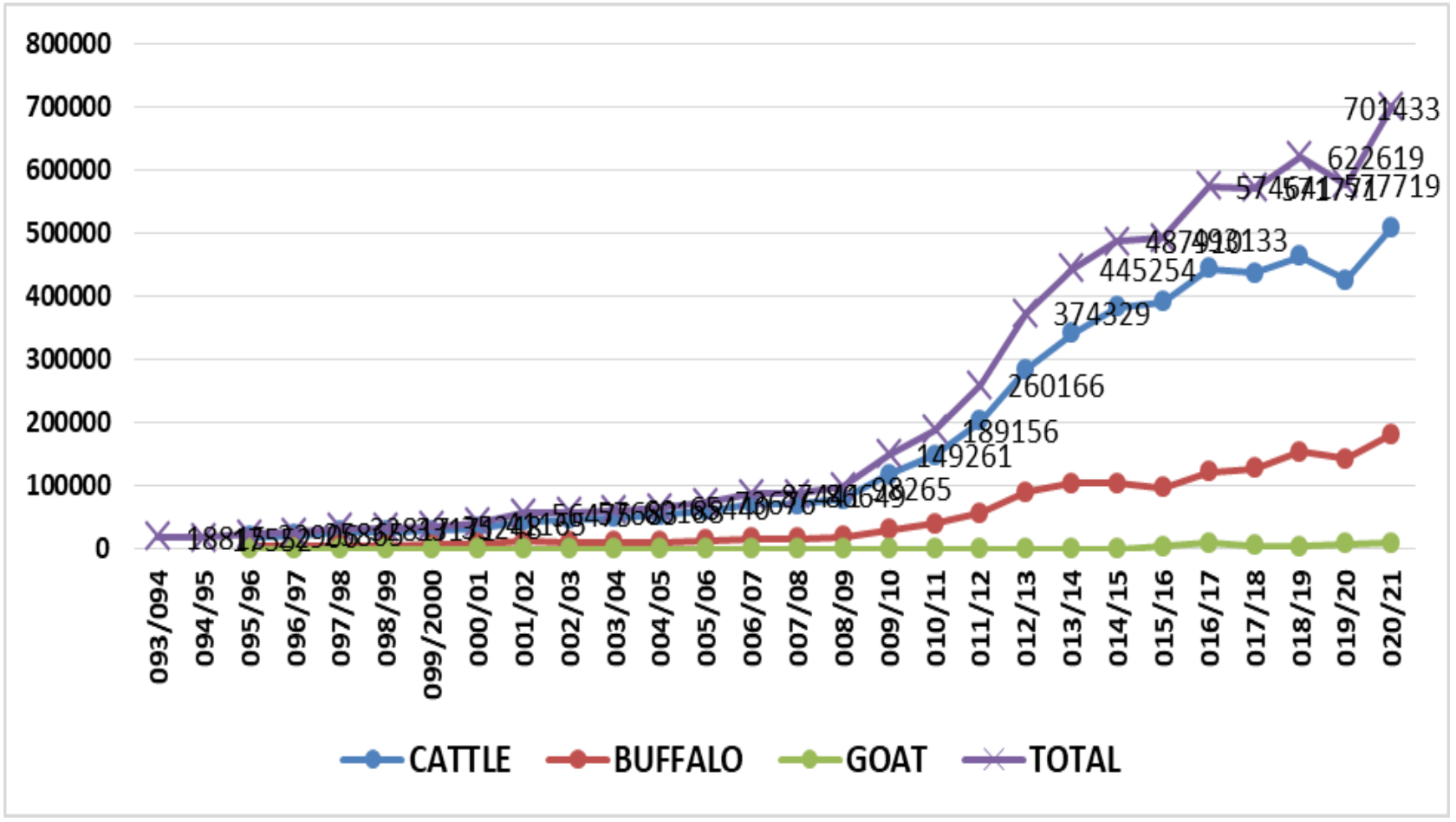
Trend of Semen Prodution in Graph (Last 28 Years)



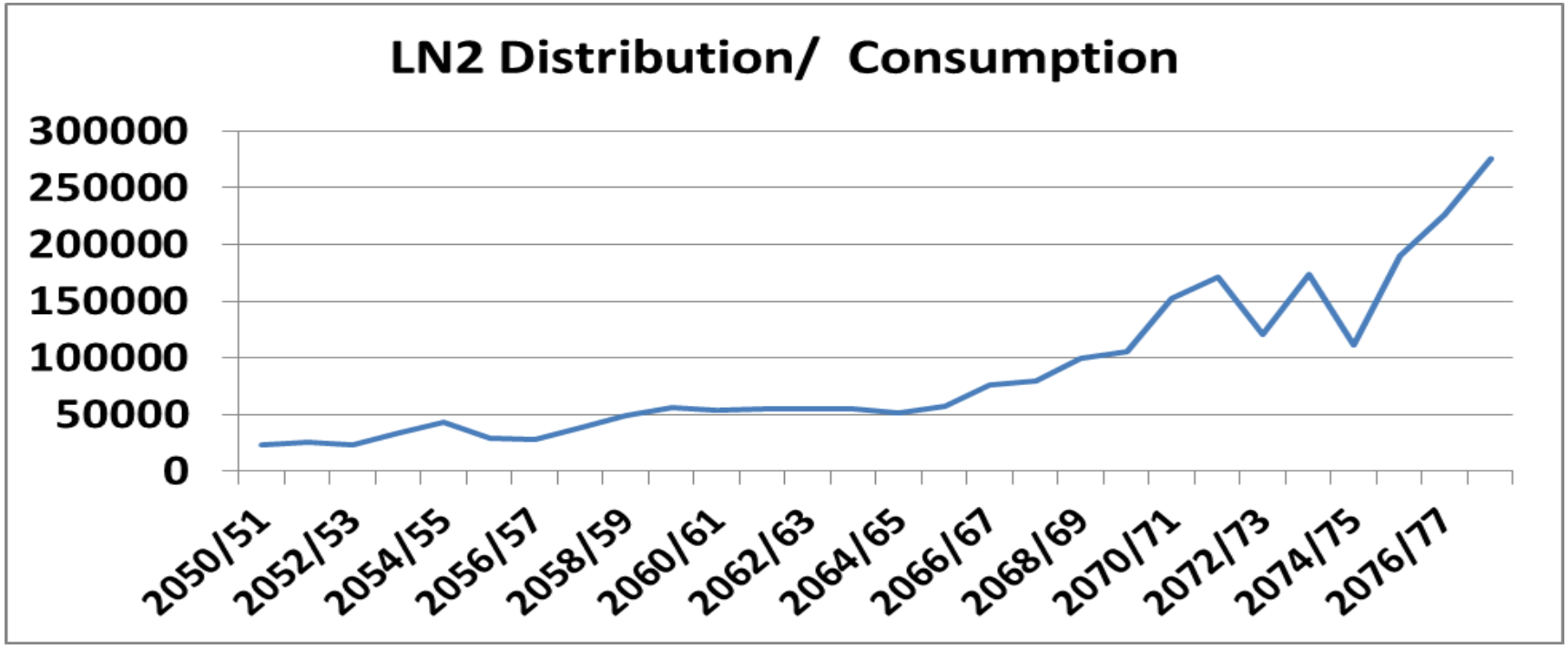
Trend of Semen Distribution in Graph(Last 28 Years)



Trend of Artificial Insemination in Graph(Last 28 Years)



Trend of Liquid Nitrogen Distribution/Consumption (last 28 years)



4.3) Cost of Semen Production: 2077/78 (2020/21)

Production cost per dose of straw on the basis of all the direct costs in the year 2077/78 (2020/21) is estimated to be Rs. 31.87. 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- 2077/78

Item	Cost Rs
Breeding bull Management	8504444
Laboratory Processing cost	7735008
Semen Straw Cost	1508550
Liquid Nitrogen 3400 litres@ Rs/litre	204000
Total Expenses Excluding Fixed costs &staff salary Rs.	17952002
Number of Frozen Semen Straw Produced	563328
Cost of per straw frozen semen Production Rs.	31.87

4.4) Import of Embryo in the Fiscal Year: 2077/78

S.N.	Breed	No. of Embryo imported	Country
1	Jersey	0	
2	Holstein	0	
Total		**0**	

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, the bulls are either imported from India or selected locally. NLBO, Pokhara has not been able to import pedigree bulls due to resource constraint. Since, NLBO has already initiated Progeny Testing and Pedigree Performance Recording Scheme, some bulls are selected on the basis of breeding value with the collaboration of Animal Breeding Division of Nepal Agriculture Research Council. We have the programs of purchasing Full Blood Jersey, Holstein and Murrah Bulls from Abroad by means of G to G Approaches and the operation is in process for the same.

Breeding Bull and Buck with Pedigree Record 2078/03/31 (Closing Stock)

Pedigree Record of the Bulls at NLBO, Pokhara (Jersey)

Pedigree Record of the Bulls at NLBO, Pokhara (PJ)										
S. N	**Bull No.**	**Bull Name**	**Breed and blood level**	**Birth date**	**Received date**	**Sire No.**	**Sire's dam's milk productio /Lact**	**Dam ID (DCIP)**	**Dam's milk production/Lactation**	**Source**
1	PJ-51	Guru	Jersey NA	2063/02/31	1/10/2064	PJ 925	4000	Jersey	3500	NLBC Selection (Lalitpur)
2	PJ-55	Hari	Jersey NA	10/12/2064	11/23/2066	PJ-46	6000	Jersey	4200	NLBC Selection (Rupendehi)
3	PJ-56	Delhi	Jersey NA	8/22/2066	12/29/2067	PJET2	7500	4044	3141.75	DCIP Selection (Rupendehi)
4	PJ-57	Nandi	Jersey NA	10/23/2066	12/29/2067	103085 NZ	8000	4185	3071.65	DCIP Selection (Rupendehi)
5	PJ-58	Gumba	Jersey NA	8/28/2067	12/28/2067	PJET2	7500	2622	3240.7	Giri farm, Dholakha
6	PJ-66	Sitaram	Jersey NA	10/25/2067	11/29/2068	304126NZ	7500	3060	5290.2	DCIP Selection
7	PJ 67	Sawarmati	Jersey NA	12/15/2069	2/13/2071	7JE 7859US	8500	3156	4506.45	DCIP Selection (Gorkha)
8	PJ 68	Lake	Jersey NA	5/15/2068	2/13/2071	7JE 7859US	8500	3144	3721.1	DCIP Selection (Gorkha)
9	PJ 69	Gorkha	Jersey NA	12/15/2069	2/13/2071	7JE 7859US	8500	3118	3999.15	DCIP Selection (Gorkha)
10	PJ 70	John	Jersey NA	4/16/2070	2/13/2071	7JE 7859US	7500	3165	5726.1	DCIP Selection (Gorkha)
11	PJ 71	Kapoor	Jersey NA	4/13/2070	2/26/2071	305054USA	8000	2642	3369.75	Giri farm, Dholakha
12	PJ 72	Giri	Jersey NA	6/27/2070	2/26/2071	10333 USA	8000	2621	4416.45	Giri farm, Dholakha
13	PJ 73	Nare	Jersey NA	7/3/2071	3/28/2072	7JE859USA	8500	11107	4692	DCIP Selection (Gorkha)
14	PJ 74	Sahdev	Jersey NA	12/22/2071	3/28/2072	7JE859USA	8500	3032	3365.95	DCIP (Kaski, Sovakanta)
15	PJ 75	Nakul	Jersey NA	12/2/2071	3/28/2072	7JE859USA	8500	2621	4377.2	Giri farm, Dholakha
16	PJ-79	Praladh	Jersey NA	4/10/2076	8/16/2077	VJ Link 303327	7043	C 0935	4500	DCIP (Kabhrepalanchok)
17	PJ-80	Damu	Jersey NA	6/22/2076	8/16/2077	Sex semen	7500	2190	11.05 lit /day	DCIP Dholakha
18	PJ-81	Jirel	Jersey NA	5/25/2076	8/16/2077	Sex semen	7500	22234	9.17ltr/day	DCIP Dholakha

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

Pedigree Record of the Bulls at NLBO, Pokhara (HF)

Pedigree Record of the Bulls at NLBO, Pokhara (HF)										
S. N.	Bull No.	Bull Name	Breed and blood level	Birth date	Received date	Sire No.	Sire's dam's milk producti o/Lact	Dam ID (DCI P)	Dam's milk production/L actation	Source
1	PHF-10	Sunris e	HF 100	9/16/2 062	11/22/ 2066	HF Bull	8000	NA	6500	NLBC Selection (Rupandehi)
2	PHF-11	Rajesh	HF 100	7/24/2 065	11/22/ 2066	HF Bull	8000	NA	6100	NLBC Selection (Rupendehi)
3	PHF-12	Dipen	HF 75	5/14/2 065	11/22/ 2066	PJE-3	8000	NA	6500	NLBC Selection (Rupendehi)
4	PHF-13	Naraya n	HF 100	9/10/2 064	11/22/ 2066	HF Bull	8000	NA	6000	NLBC Selection (Chitwan)
5	PHF-14	Janak	HF 75	6/25/2 066	12/29/ 2067	FB884 NZ	8000	4026	5717.85	NLBC Selection (Rupendehi)
6	PHF-16	Raju	HF 75	2/8/20 67	10/19/ 2067	100090 NZ	8000	3169	3057.2	DCIP Selection Gorkha
7	PHF-17	Krishn a	HF 75	10/27/ 2066	11/4/2 067	100098 NZ	8000	6602	4500	DCIP Selection (Dharan)
8	PHF-18	Raj	HF 100	2/5/20 67	7/4/20 67	102017 NZ	8000	3008	3971.85	DCIP Selection (Pokhara)
9	PHF-20	Purna	HF 100	2/10/2 067	12/30/ 2067	100093 NZ	9500	3897	5369.85	DCIP Selection (Chitwan)
10	PHF-22	Shiva	HF 100	8/27/2 067	11/29/ 2068	HF104212NZ	10000	2775	6750.2	DCIP Selection (Panta Farm)
11	PHF-23	Amit	HF 85	7/20/2 068	2/13/2 071	HF101169NZ	8500	4062	3879.3	DCIP Selection (Rupandehi)
12	PHF-24	Pande y	HF 85	4/25/2 070	2/13/2 071	7H010862USA	9000	4062	3879.3	DCIP Selection (Rupandehi)
13	PHF-25	Puspa	HF 100	1/11/2 069	9/25/2 070	7H010533USA	9000	10212	5973.4	DCIP Selection (Pokhara)
14	PHF-26	Subash	HF NA	5/5/20 67	12/29/ 2067	302031NZ	8500	4225	4578	DCIP Selection (Gorkha)
15	PHF-27	Suman	HF 100	1/2/20 74	1/30/2 075	HOC8956379USA	9000	NA	5050	DCIP Selection (Gorkha)
16	ET 7	Dollar	HF 100	2/7/20 74	1/29/2 075	HOC8956379	10000	CHO RUS	11000	Gorkha, Born from ET
17	PHF-28	RAJE EV	HF NA	10/1/2 074		14HO7660	7000 lit	3060	5430	DCIP , Gorkha
18	PHF-	NA	HF NA	6/20/2 075	8/16/2 077	29 HO 17544 ABS,USA (Freedom)	12104	11887	5850	DCIP Selection (Rupandehi)
19	PHF-	NA	HF NA	2/6/20 76	8/16/2 077	00200HO0185	9000	26025	6050	DCIP Selection (Chitwan)
20	PHF-	NA	HF NA	5/2/20 76	8/16/2 077	VJ Link 303327	7043	D123	4200	DCIP (Kabhrepalanchok)
21	PHF-	NA	HF NA	5/10/2 076	3/15/2 078	HO7090	10885	9645	4620	DCIP Selection (Gorkha)
22	PHF-	NA	HF NA	3/18/2 076	3/15/2 078	7HO13279	10660	12809	5550	DCIP Selection (Gorkha)

23	PHF-	NA	HF NA	8/19/2077	3/11/2078	ABS,Brute 28HO18391	11353	23270	4700	DCIP Selection (Rupandehi)
24	PHF-	NA	HF NA	9/15/2077	3/11/2078	WWS,250HO13449,USA (Allstar)	12104	23324	5110	DCIP Selection (Rupandehi)

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

Pedigree Record of the Bulls at NLBO, Pokhara (Murrah)

Pedigree Record of the Murrah Bulls at NLBO, Pokhara (PM)										
S. N	**Bull No.**	**Bull Name**	**Breed**	**Birth date**	**Received date**	**Sire No.**	**Sire's dam's milk productio/ Lact**	**Dam ID**	**Dam's milk production/Lactation (Lit)**	**Source**
1	PM-46	Yam	Murrah	2/2/2065	5/2/2065	NA	NA	NA	3200	Local Selection, Lahan
2	PM-47	Dilip	Murrah	2065/02/30	5/20/2065	NA	NA	NA	3000	Local Selection, Lahan
3	PM-54	Kiran	Murrah 100	1/25/2009	3/28/2069	NA	NA	RPP/618	3653	Imported from Hariyana, India
4	PM 53	Badal	Murrah 100	8/4/2099	3/28/2069	NA	NA	RRP/729	3762	Imported from Hariyana, India
5	PM-55	Laldhoj	Murrah 100	1/7/2009	3/28/2069	NA	NA	RRP/727	3711	Imported from Hariyana, India
6	PM-56	Chanda	Murrah 100	6/10/2009	3/28/2069	NA	NA	RRP/728	3794	Imported from Hariyana, India
7	PM-57	Badri	Murrah 100	2/10/2009	3/28/2069	H-45	3850	RRP/640	3740	Imported from Hariyana
8	PM-58	Biru	Murrah 100	20009-07-7	3/28/2069	NA	NA	RRP/607	3710	Imported from Hariyana, India
9	PM-59	Sultan	Murrah 100	6/11/2008	3/28/2069	NA	NA	RRP/639	3686/305	Imported from Hariyana, India
10	PM-60	Arjun	Murrah 100	5/15/2009	3/28/2069	NA	NA	RRP/668	2516/300	Imported from Hariyana, India
11	PM-61	Ram	Murrah 100	11/27/2011	6/10/2016	H-52	4120	H-45	3830	Imported from Hariyana,

12	PM-62	Tej	Murrah 100	11/26/2011	6/25/2016	H-72	4080	H-55	3875	Imported from Hariyana, India
13	PM-63	Deepak	Murrah 100	11/29/2011	6/25/2016	H-83	4100	H-66	3850	Imported from Hariyana, India
14	PM-64	Ratna	Murrah 100	11/1/2011	6/10/2016	H-85	4000	H-74	3875	Imported from Hariyana
15	PM 65	Hira	Murrah 100	11/5/2011	7/11/2073	H-95	4115	H-82	3890	Imported from Hariyana
16	PM-66	Bhim	Murrah 100	12/15/2011	6/25/2016	H-105	3900	H-94	3910	Imported from Hariyana, India
17	PM 68	Rubi	Murrah 100	7/17/2012	11/10/2073	H-58	3950	H-50	3790	Imported from Hariyana
18	PM 69	Basanta	Murrah 100	10/20/2013	3/3/2019	HLD B-165	4260	RRP-162	3860	Imported from India
19	PM 70	Shishir	Murrah 100	10/11/2013	3/3/2019	HLD B-152	4220	RRP-160	3940	Imported from India
20	PM 71	Bhole	Murrah 100	6/22/2013	3/3/2019	HLD B-219	4250	RRP-105	3890	Imported from India
21	PM 72	Bulbule	Murrah 100	9/27/2013	3/3/2019	HLD B-193	4190	RRP-85	3885	Imported from India
22	PM 101	Pratap	Murrah 100	6/19/2013	6/7/2019	HLD B-205	4200	RRP-68	3950	Imported from India
23	PM 102	Bipu	Murrah 100	7/10/2013	6/7/2019	HLD B-261	4230	RRP-82	3810	Imported from India
24	PM 103	Shambhu	Murrah 100	11/26/2013	6/7/2019	HLD B-151	4180	RRP-150	3740	Imported from India
25	PM 104	Aabhash	Murrah 100	12/14/2013	6/7/2019	HLD B-154	4170	RRP-95	3950	Imported from India
26	PM 105	Hem	Murrah 100	1/8/2014	6/7/2019	HLD B-263	4210	RRP-180	3820	Imported from India
27	PM 106	Rishi	Murrah 100	1/25/2014	6/7/2019	HLD B-221	4250	RRP-75	3895	Imported from India
28	PM 107	Prem	Murrah	1/16/2074	3/25/2076	6299	3800	N214	3100	NLBO Farm
29	PM-108	Thaneshwar	Murrah	12/17/2071	8/16/2078	Yubaraj	3800	D314	3700	Rupandehi
30	PM_	Juvenile	Murr	6/17/20	8/16/20	Yubar	4000	2127	3400	Lachok,Pok

			ah	76	78	aj				hara
31	PM-	Juvenile	Murrah	7/1/2076	8/16/2078	5647	3200	N214	4200	NLBO,Pokhara
32	PM-	Juvenile	Murrah	4/14/2076	8/16/2078	5647	3100	280	2900	NLBO,Pokhara
33	PM-	Juvenile	Murrah	5/23/2076	8/16/2078	5647	3000	N174	3750	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) 2078/03/31 (Closing Stock)

Pedigree Record of the Bucks and Doe at Semen Collection Station of NLBO,Pokhara (Boer)									
S. N	***Buck No.***	***Smile id***	***Buck name***	***Breed***	***Birth Date***	***Received Date***	***Sire No.***	***Dam ID***	***Source***
1	55615	PB05	Mission	Boer	9/26/2074	10/21/2075	FL-89	B0084/55601	LDF,Pokhara(brought from Bandhipur)
2	55620	PB06	Rajak	Boer	10/3/2074	10/21/2075	FL-75	B023	LDF,Pokhara(brought from Budhitola)
3	B15		Doe	Boer	4/9/2073	10/21/2075			LDF,Pokhara(brought from khajura)
4	18-104	PB10	Lokendra	Boer	9/21/2018	8/22/2076	PFAFMO100	PFAFJO215	KUBK
5	18-167	PB09	Lokman	Boer	9/19/2018	8/22/2076	PFAFM0014	PFAFMO288	KUBK
6	JA-292	PB12	Jagatpur	Boer (African)	12/26/2075	12/18/2076	KLE128	101	Jagatpur
7	55968	PB15	Sandy	Boer	1/11/2077	8/14/2077	55640	55611	NLBO, pokhara
8	55947	PB13	Bhanu	Boer	9/26/2076	4/1/2977	SPB3114(AI)	55635	NLBO, pokhara
9	104720	NA	NA	Boer	9/10/2077	3/18/2078	JA265	55965	NLBO, pokhara

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

2.5 ARTIFICIAL INSEMINATION

1. Organization and Manpower

Though, AI was introduced in the country about 56 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_2 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_2 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 LN2 distribution

- National Livestock Breeding Office,Pokhara.(Districts of State number 3 & 4 and some other districts of State no 5 that are covered by NLBO Nepalgunj, 34 districts, 289 Local Governments).
- National Livestock Breeding Office, Lahan. (Districts of State number 1 & 2, 15 districts, 110 Local Governments).
- National Livestock Breeding Office, Nepalgunj.(Districts of State number 6 & 7 and some districts of State no 5, 17 districts, 71 Local Governments).

2. Providing AI Service

Following is the present scenario of AI Service in Nepal.

1. Districts with AI Service: 66
2. Districts with Regular AI Service: 58
3. Districts with Casual/Seasonal AI Service: 8

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 Inseminotors in Community Livestock Breeding Center: 395
8. No. of Inseminators Recorded in the Inseminator's Diary: 2674

AI Services in Nepal as of 2078.3.31, an overview

Species-wise AI Services in Nepal upto B.S. 2077/78

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

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) and the negetive effects of COVID-19, 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 2077/78 in comparison to AI in previous year.

2076/77			Total	2077/78			Total	Growth %
Cattle	Buff	goat		Cattle	Buff	goat		
426178	143114	8427	577719	509896	181432	10105	701433	21.41

4. State wise AI Report

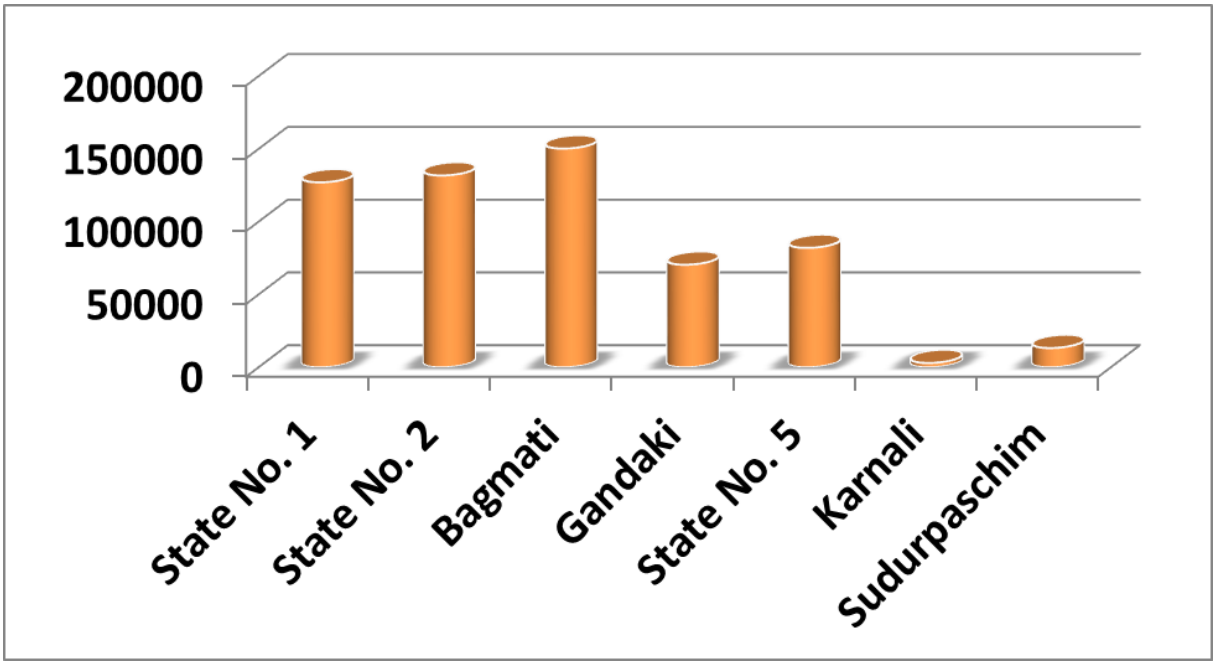
Distribution of AI number according to the Seven states in the year 2077/78 in comparison to the same in previous year has been presented in the tables below.

State wise AI in the year 2077/78

State wise AI Progress- In Comparison to Last year's Progress				
S.N.	States	AI in 2077.78	AI in 2076.77	Increment in AI (%)

1	State no 1	158344	127038	24.64
2	State no 2	172755	131754	31.11
3	Bagmati State	184766	150247	22.97
4	Gandaki State	65266	70464	-7.37
5	State no 5	95085	82018	15.93
6	Karnali State	3960	2968	33.42
7	Sudur Paschim State	21257	13230	60.67
	GRAND TOTAL	701433	577719	21.41

State wise AI Report in Graph



4.1) AI in State No 1

S.N.	Districts	Phone No.	AI in 2076.77	AI in 2077.78			
				Sub Total	Cow	Buff	Goat
1	Taplejung	024-460176	**291**	**1655**	**1291**	**364**	**0**
2	Ilam	027-521335	**18642**	**15519**	**14576**	**750**	**193**
3	Pachthar	024-520127, 469	**1891**	**3115**	**2481**	**632**	**2**
4	Jhapa	023- 521161	**38472**	**54780**	**51048**	**2264**	**1468**
5	Dhankuta	026-520283, 280	**1179**	**1579**	**1363**	**216**	**0**
6	Morang with Madan smriti	021-471958	**36654**	**40281**	**37254**	**2713**	**314**
7	Sunsari	025-560162	**25764**	**30827**	**28010**	**2506**	**311**
8	Udayapur	035-420129	**3609**	**10155**	**6286**	**3462**	**407**
9	Solukhumbu	038- 520103	**45**	**17**	**4**	**11**	**2**
10	Terathum	026-460127	**336**	**127**	**85**	**42**	**0**
11	Khotang	036420107	**0**	**0**	**0**	**0**	**0**
12	Bhojpur	029420129	**23**	**7**	**7**	**0**	**0**
13	Okhaldhunga	037520210	**0**	**0**	**0**	**0**	**0**
14	Sankhuwasabha	029560159	**132**	**282**	**251**	**31**	**0**
	Total	**TOTAL**	**127038**	**158344**	**142656**	**12991**	**2697**

4.2) AI in State no 2

S.N.	Districts	Phone No.	AI in 2076.77	AI in 2077.78			
				Sub Total	Cow	Buff	Goat
8	Saptari	031-520308, 142	10612	13504	8462	5011	31
9	Siraha with NLBO	033- 520008, 560273	23405	20106	11346	8725	35
10	Dhanusa	041-520179	15214	22197	11605	10369	223
11	Mahottari	044-520073	14861	22954	13218	9540	196
12	Sarlahi with Ranjitpur Farm	046-520145	21615	29257	16679	12273	305
13	Rautahat	055-520125	13152	20809	12776	7770	263
14	Bara	053-550041	18326	22986	15861	6887	238
15	Parsa (without Bara)	051-522551, 9855035252	14569	20942	12325	8440	177
	Total		**131754**	**172755**	**102272**	**69015**	**1468**

4.3) AI in Bagmati State

S.N.	Districts	Phone No.	AI in 2076.77	AI in 2077.78			
				Total	Cow	Buff	Goat
23	Sindhuli	047-520185,9843481500	8095	8417	5804	2609	4
24	Sindhupalchok	011-620115, 9841026327,9841753137	2452	243	145	93	5
25	Kavre	011-490266,9851164594	29157	31617	26450	4898	269
26	Lalitpur	01-5547377,9851137970	11431	13344	9423	3861	60
27	Bhaktapur	016-610022	6843	8244	7607	545	92
28	Kathmandu	01-4032201,137	18414	25304	23099	1563	642
29	Rasuwa (Uttarganga & Kalika)	010-540129	868	1276	820	450	6

30	Nuwakot	010-560012, 9849159785	2993	3929	2645	1200	84
31	Dhading	010-520107	5199	2065	1558	438	69
32	Makawanpur	057412828/9864021707	13219	31040	24643	6062	335
33	Chitwan	056-525097,520176	48840	56643	49805	6246	592
34	Dolakha with Jiri Farm	049- 421115	507	651	434	186	31
35	Ramechhap	048- 540032, 9854040032	2257	1993	1492	501	0
	Total		150247	184766	153925	28652	2189

4.4) AI in Gandaki State

S. N.	Districts	Phone No.	AI in 2076.77	AI in 2077.78			
				Sub Total	Cow	Buffalo	Goat
36	Gorkha	064411251, 9846039308h	605	1682	674	926	82
37	Lamjung	066-521231,20131	2305	2236	1067	1128	41
38	Tanahun with Bandipur Farm	065-560205	10039	6945	3848	2988	109
39	Syangja	063-420108,9846052191s	2500	3366	1201	1995	170
40	Kaski	061-152082	21409	29752	15568	13926	258
41	Manang		140	0	0	0	0
42	Mustang	069-440121	4	0	0	0	0
43	Myagdi	069-520121	350	297	134	163	0
44	Parbat	067-420123,9857630855	1625	1646	1072	569	5
45	Baglung	068-520121	1813	2054	1303	745	6
46	Nawalparasi-East From Bardaghat	078-520149, 9847297834	29674	17288	13822	3029	437

	Total		**70464**	**65266**	**38689**	**25469**	**1108**

4.5) AI in Lumbini State

S. N.	**Districts**	**Phone No.**	**AI in 2076.77**	**AI in 2077.78**			
				Sub Total	**Cow**	**Buffalo**	**Goat**
47	Gulmi	079-52227	2071	1486	723	739	24
48	Arghakhachi	077-420062,9840493638	4418	9391	4860	4311	220
49	Palpa	075-520145\f,9847067265	5078	4327	2435	1845	47
50	Nawalparasi-West from Bardaghat	078-520149, 9847297834	8278	11943	7890	3909	144
51	Rupandehi	071-520206/9851134786	43200	44434	28484	15705	245
52	Kapilbastu	076560021,9865242401	7005	8602	4581	3810	211
53	Pyuthan	086-420014	639	909	330	483	96
54	Rolpa	086-440056	256	519	153	231	135
55	E.Rukum	088-530010	0	13	3	2	8
56	Dang	082-5633604	2975	3112	1791	1062	259
57	Banke with NLBO & Gaughat	081-520254,521020,621243,9857840068	4125	5628	3107	2473	48
58	Bardia	084-420229,9814553981	3973	4721	2899	1593	229
	Total		**82018**	**95085**	**57256**	**36163**	**1666**

4.6) AI in Karnali State

S.N.	Districts	Phone No.	AI in 2076.77	AI in 2077.78			
				Sub Total	Cow	Buffalo	Goat
59	Salyan	088-520062	148	283	75	77	131
60	W.Rukum	088-530010	130	213	57	117	39
61	Surkhet	083-520288, 9848038930	2182	2449	1416	993	40
62	Dailekha	089-420148	203	661	320	318	23
63	Jajarkot	089430030	102	76	4	46	26
64	Jumla	087-520028	203	264	221	40	3
65	Dolpa		0	0	0	0	0
66	Kalikot		0	14	2	5	7
67	Mugu		0	0	0	0	0
68	Humla		0	0	0	0	0
	Total		2968	3960	2095	1596	269

4.7) AI in Sudurpaschim State

S. N.	Districts	Phone No.	AI in 2076.77	AI in 2077.78			
				Sub Total	Cow	Buffalo	Goat
69	Kailali wuth Budhitola farm	091-524867	4845	8285	5395	2446	444
70	Kanchanpur	099-521176 , 525657	7668	11793	6866	4781	146
71	Doti	094-420114	149	245	198	35	12
72	Dadeldhura	096-420114	326	492	251	163	78
73	Baitadi	095-529306	0	11	4	1	6
74	Bajhang	092421050	242	347	252	95	0

75	Achham	097620102	0	30	10	12	8
76	Darchula	093420104	0	0	0	0	0
77	Bajura	097541064	54	54	27	13	14
	Total		**13230**	**21257**	**13003**	**7546**	**708**
	GRAND TOTAL		**577719**	**701433**	**509896**	**181432**	**10105**

5. A.I. Coverage

Out of the total Livestock Population, 1038335 cattle, 1381845 buffaloes and 2456750 goats in the country are estimated to be breeding stock at a time respectively. If the estimated number of breedable animals is assumed to be conceived as per the given estimated conception rate, AI coverage of cattle, buffaloes and goats all over the contry can be estimated as below.

Table 10: AI Coverage: 2077/78

S.N.	Breed	Total Number of Animals	Total estimated No. of Breedable Animals	Total AI in FY 2077/78	Estimated Conception Rate (%)	Total Animal Conceived	AI Coverage (%)
1	Cattle	7385035	1038335.92	509896	56.12	286051.65	**27.54**
2	Buffalo	5308664	1381845.24	181432	48.02	87087.36	**6.30**
3	Goat	12283752	2456750.4	10105	50	5052.5	**0.20**
	Total	**12409480**	**2364019**	**701433**		**378,191.51**	**15.99**

6. Top 10 AI Districts

Names 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 2077/78 has been compared with fiscal year 2076/77.

S.N.	Districts	Last year's Position	This year's Position	AI in 2076.77	AI in 2077.78	Cattle	Buffalo	Goat

1	Chitwan	First	First	48840	56643	49805	6246	592
2	Jhapa	Third	Second	43200	54780	51048	2264	1468
3	Rupandehi	Second	Third	38472	44434	28484	15705	245
4	Morang	Fourth	Fourth	36654	40281	37254	2713	314
5	Kavre	Sixth	Fifth	29674	31617	26450	4898	269
6	Makwanpur	------	Sixth	29157	31040	24643	6062	335
7	Sunsari	Seventh	Seventh	25764	30827	28010	2506	311
8	Kaski	Tenth	Eight	23405	29752	15568	13926	258
9	Sarlahi	Ninth	Ninth	21615	29257	16679	12273	305
10	Kathmandu	--------	Tenth	21409	25304	23099	1563	642

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 acuarate 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 2077.78 has been calculated 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 2062/63(2006/07) – 2077/78(2020/21)

Year Species	2006/07 (63/64)	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)
Cattle	52.44	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
Buffalo	43.14	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
Goat															49.25	50

Average	**49.00**	**55.48**	**51.34**	**51.15**	**52.46**	**52.39**	**52.08**	**52.02**	**52.12**	**52.00**	**51.75**	**51.78**	**52.1**	**52.1**	**52.12**	**53.91**

8. Private Sector in AI

Involvement of private sector in AI is in increasing trend. Mostly private practitioners' (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 State and Local Governments last FY has been presented below. Government job holders who work as part time inseminators may 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 Statewise 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 Aritificial inseminators updated upto the fiscal year 2077/78.

Contribution of Private Sector in A.I.

Particular	**Insemination center**	**Inseminators**	**AI/Insemination Center**	**AI/Inseminator**
Governments	373	722	728	359 (in theYear 2077.78)
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)				
Estern 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 2077/78.

Fiscal Year	Progress %	
	Weightage Progress%	Financial Progress %
2077/78 (2020/21)	94.62	82.7

2. Financial Details

Financial details of this office till the end of FY 2077/78 are presented below.

2.1) Budget and expenses

Approved Budget and Actual Expenses: 2077/78

Budget Title no	Budget Allocated (in Rs)	Budget Expense (in Rs)	Progress %
312021033	162613000	133538131	82.12%
312021034	50070000	42359557	84.60%
Total	**212683000**	**175897688**	**82.70%**

2.2) Approved Budget and Actual Expenses: 2057/58 (2000/01) - 2077/78 (2020/21)

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

2.3) Annual Revenue

Revenue: 2077/78 (2020/21)

Revenue Source	Total Revenue NRs
From all the Units of NLBO	43521599

2.4) Beruju

Details of Beruju

Fiscal Year	Outstanding Beruju NRs	Cleared %	Remarks
Upto 2076/77	1719740		
Cleared in 2077/78	1166096	67.81%	
Remaining	553644		

2.7 ACHIEVEMENTS

We consider following works done in 2077/78 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 COVID-19 Pandemic NLBOs produced only 1.31 % less doses (783461in place of 793884 doses in the last year) of qualitative semen in the year 2077/78 than the same in 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, Bhaktpur, Gorkha, Rupandehi, Dolakha, Bara, Kaski, Chitwan and Sunsari. During the last fiscal year too, the program got continuation.

So far, a total of 150 embryos were transferred resulting 28 pregnancies. Two ET born bulls are now in collection and two bulls born from ET born mother died. Fortunately, The three 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 31st to shrawan 5th 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 embroys were transfered to some of the cattle of selected elite herds during the fiscal Year 2077/78 too.

Participants of Embryo Transfer Technology Training held in Ashad 31st to shrawan 5th 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 recently 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 fascilities, repair and biosecurity measures also took place in the fiscal year 2077.78.

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 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 Hariyana Bull 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. 220133 doses of frozen semen was produced from NLBO, Lahan during the fiscal year 2077.78.

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. Because of the 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 in Cattle & Buffalo and Goat

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 NLBC 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 6 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 implemented by NLSIP project in association with NLBO Pokhara.

7) Initiation of Frozen semen production from the top Bulls selected from DCIP Herds

Though, two ET born bulls are now in collection, the 18 more bulls born from the top mothers of DCIP (8 HF and 11 Jersey) and 7 Hariyana Buffalo bulls with high breeding values bought and started to semen collection from 2 years earlier. This program is supposed to have created the resource center of improved cattle and breeding bulls to some extent. In the fiscal year 2077.78, 16 bulls including 7 Holstein, 6 Jersey & 3 Murrah from DCIP herds were purchased for the same purpose. 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 is the leading organization for the program, and the then NLBO, Pokhara chief is recommended as the national coordinator of this program. There is a central coordination committee that provides direction to the program and Director General of DLS is the chairman of central coordination committee. The aim of the project is 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 are the responsible organizations. AI mission Program has contributed a lot in terms of quality AI Service in the country. The Mission has also trained a lot of private as well as government technicians for quality AI service.

9. Major Acheivements in Figures:

Semen Production:

S.N.	NLBOs	Semen Production						Remarks
		Murrah	Holstein	Jersey	Buck	Hariyana	Total	
1	NLBO, Pokhara	143586	101974	284955	32813		563328	
2	NLBO, Lahan	60587	93237	27289	0	39020	220133	
3	NLBO, Nepalgunj							
4	Grand Total of Fiscal Year 2077.78	204173	195211	312244	32813	39020	783461	

Semen Distribution:

S.N.	NLBOs	Semen Distribution						Remarks
		Murrah	Holstein	Jersey	Buck	Hariyana	Total	
1	NLBO, Pokhara	126152	174512	255097	19462		593134	
2	NLBO, Lahan	31640	99898	54195	4300	54034	173067	

3	NLBO, Nepalgunj	21428	9056	25868	4294		60646	
4	Grand Total of Fiscal Year 2077.78						778721	

Liquid Nitrogen Production, Purchase & Distribution:

S.N.	NLBOs	LN2 Production	LN2 Purchase	LN2 Distribution	Remarks
		Litre	Litre	Litre	
1	NLBO, Pokhara	45058	135016	164435	
2	NLBO, Lahan	72429	20559	72957	
3	NLBO, Nepalgunj	4706	37814	38115	
4	Grand Total of Fiscal Year 2077.78	122193	193389	275507	

Artificial Insemination:

S.N.	NLBOs	Artificial Insemination				Remarks
		Cattle	Murrah	Goat	Total	
1	NLBO, Pokhara	324320	139251	5603	469174	
2	NLBO, Lahan	162181	27206	2759	192146	
3	NLBO, Nepalgunj	23395	14975	1743	40113	
4	Grand Total of Fiscal Year 2077.78					

Animal Distribution(Ruminants):

S.N.	Type of Ruminants	No Distributed	No. of Districts	Beneficiary (No. of family)	Remarks
1	**Murrah Bull**	23	7	575	Including 3 farmer Groups
2	**Boer Buck**	34	18	850	Including 2 farmer Group
3	**Sheep(Ram)**	48	6	50	Including one farmer Group
4	**Total**	105	25	1475	

Animal Distribution(Non Ruminants):

S.N.	Type of Ruminants	No Distributed	No. of Districts	Beneficiary (No. of family)	Remarks
1	**Poultry**	139639	12	2792	
2	**Pig**	573	28	143	Including four farmer Groups
	Total	**140212**	**31**	**2935**	

Animal/Birds Distribution (Non Ruminants):

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	**Total**	ha	68	68	

DAIRY CATTLE AND BUFFALO IMPROVEMENT PROJECT (DCBIP)

1) Introduction

Dairy Cattle and Buffalo Improvement Program (DCBIP) is a joint program of NARC and DLS. Initially Animal Breeding Division of NARC, Khumaltar was leading organization for the project and National Livestock Breeding Office, Pokhara was a next to leading organization for the program. The financial TCP assistance of FAO has been terminated and Government of Nepal has given the high priority to this program. NLBO Pokhara cheif chief

is recommended as the national coordinator 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.

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. For that bigger herd of cattle were selected for the program. Monthly milk recording and milk analysis was 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 6 districts/locations. However, the number of district is again going to increase in coming years as it is being supported by NLSIP Project. Those districts are Chitwan, Rupandehi, West Nawalparasi, Nawalpur, Kaski, Gorkha, Tanahu, and Jiri farm Dolakha. In command area, project 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. ABD, Khumaltar, NLBOs Pokhara, Lahan & Nepalgunj are responsible organization for LN2 and imported frozen semen distribution to the command districts. ABD, Khumaltar is responsible for data analysis and database program to find out breeding value of each mother dam.

4) DCIP 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.

Considering a Nucleus for Cattle

In the country there is about 7 million cattle population. Among them, about one million are supposed to be in milking. For this calculation we consider 50% of milking population for genetic improvement through AI and NS.

Target population is 500000. Out of them 100000 are supposed to be covered by AI and rest 400000 by NS. The scheme is as below:

Targeted population AI-100000

NS – 400000

Required Bull 10

(50 cow/bull/yr) 800

If 8000 bull are produced in 2 year
We need bull production as
1st year 10 for AI 4000 for NS
2nd year 10 for AI 4000 for NS

So, we need
1. Nucleus – 2000 cow & all inseminated and produced 1000 male calf among which we select 500 of having most information and those 500 bulls use for NS at target population of 400000.

1st yr 500 from nucleus and

3500 from multiplier

2nd yr ,

2. Multiplier- 7500 cow and inseminated all and produce 3750 males among them we select 3500 form multiplier at 1st year and same as 2nd year. In 2 year we get 7000 bull for NS to target population from multiplier and rest 1000 from Nucleus.

As,

Nucleus -2000 cow do AI –produce: 1st yr- 1000 bull but we take 500 bull (with information)

2nd yr- 500 bull total 1000 bull for NS

Multiplier-7500 cow do AI- produce: 1st yr – 3500 bull (with selection)

2nd yr – 3500 bull ,, total 7000 for NS

Target population AI – 100000 cow/10 bull NS- 400000 cow/8000 bull.

2.8 PROBLEMS/CONSTRAINTS

Despite of 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, with 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:

About 2 km long approach road from the entrance gate of NLBO to the laboratory and bull shed structures needs to be upgraded. Besides, 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

Semen production 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, relavant nucleus herd of high genetic merit, laboratory fascilities, 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, State no 2. 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	
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 State no 5. 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 State no 5 and all the districts of State no 6 & 7. 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 occassional/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_2 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
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 42 male & female Murrah calves and distributed 23 breeding Murrah bulls in the fiscal year 2077.78. The farm has been suppluing about twenty to thirty breeding bulls to various parts of the country every year.

Recently, we have established our own Bull Mother Farm within NLBO Pokhara premises which currently has 24 Cattle of Jersey and Holstein. 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 proudcution has also been started at this farm since 2074.75 fiscal year to establish a nucleus herd of Boar goat. As of 2078.3.31, the goat unit of NLBO farm had 62 adult doe, 4 breeding bucks and 70 kids and hoggets. Also, the farm produced 95 kids & distributed 34 breeding bucks in different districts during the fiscal year 2077.78.

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 164 Pigs of all ages and breed including 51 breeding sows and 3 boars of exotic breeds, namely; Landrace, Yorkshire, Duroc and their crossbreds as of 2078.3.31. 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.

2.2 Poultry Production:

The NLBO Pokhara's Poultry Unit also maintains about 2000 to 3000 parent stock of New Hampshire and 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 rural 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 2077.78, 147414 chicks were produced and 139639 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 last year, used 18 and 40 hectares of land for cultivation of winter and summer fodder respectively. Oat and Berseem were the 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 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. The other major perennial crops being grown at the farm are guinea, forage peanut, paspalum, Signal grass, Setaria, Mulato, hybrid Napier (Co-3) and setaria.

4. Location of Nucleus Herds:

The Farm's Nucleus herds are located at Lampatan, Ward Number 14 of Pokhara Metropolitan City, Kaski district, Gandaki State 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, eight km from 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 (^{0}C)	Min temp (^{0}C)	RH% at 0600	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.

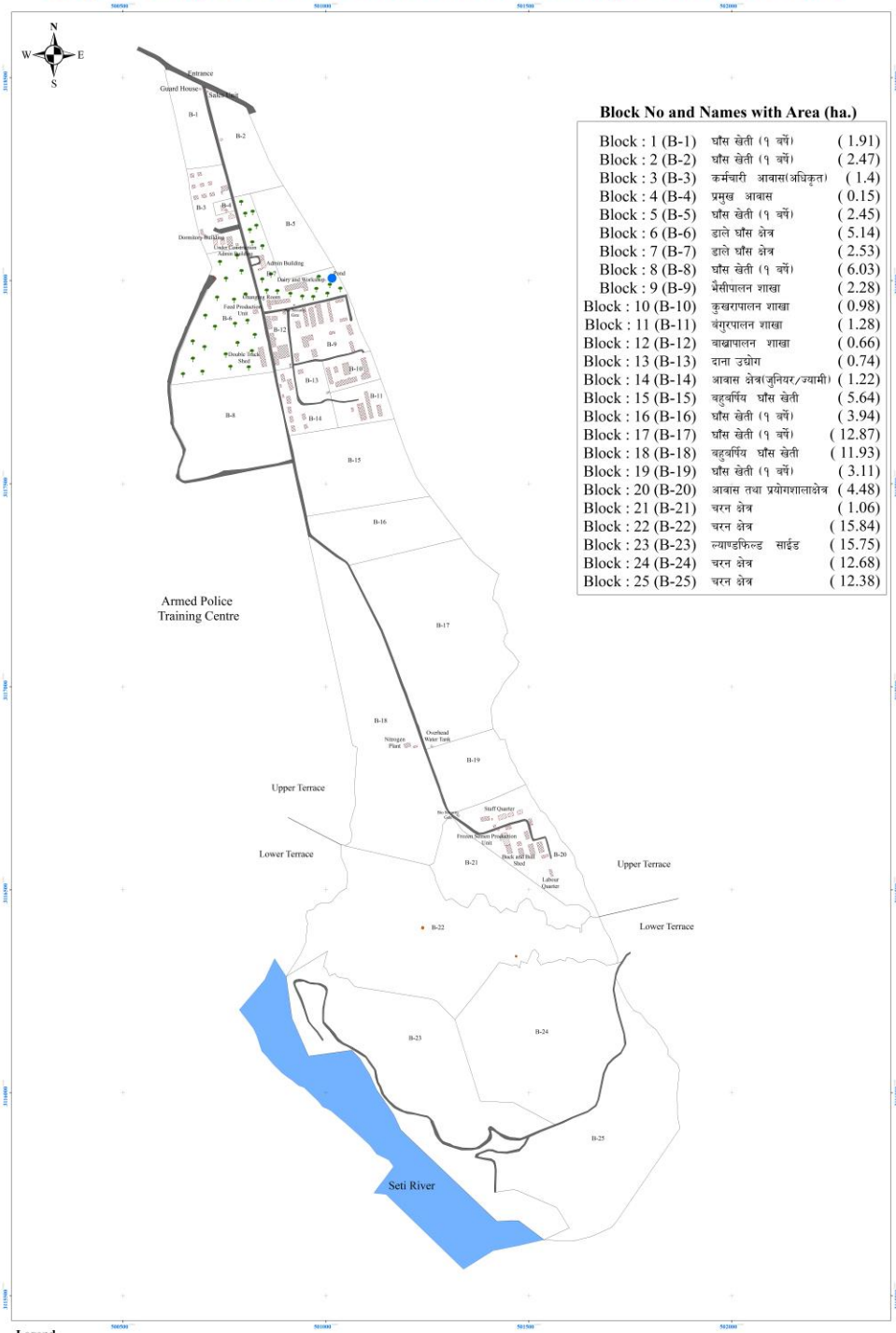
7. Physical Resources:

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.

Land Uses Pattern: (Hectares)	
Upper Terrace Area	
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
Lower Terrace Area	
Natural grazing land	38.00
Silvipasture	2.00
Roads, Buildings & Sheds	5.00
Sub Total	45.00
Total Area	**100.00**

Layout Map of National Livestock Breeding Office, Pokhara



Block No and Names with Area (ha.)

Block : 1 (B-1)	घाँस खेती (१ वर्षे)	(1.91)
Block : 2 (B-2)	घाँस खेती (१ वर्षे)	(2.47)
Block : 3 (B-3)	कर्मचारी आवास(अधिकृत)	(1.4)
Block : 4 (B-4)	प्रमुख आवास	(0.15)
Block : 5 (B-5)	घाँस खेती (१ वर्षे)	(2.45)
Block : 6 (B-6)	डाले घाँस क्षेत्र	(5.14)
Block : 7 (B-7)	डाले घाँस क्षेत्र	(2.53)
Block : 8 (B-8)	घाँस खेती (१ वर्षे)	(6.03)
Block : 9 (B-9)	भैंसीपालन शाखा	(2.28)
Block : 10 (B-10)	कुखरापालन शाखा	(0.98)
Block : 11 (B-11)	बंगुरपालन शाखा	(1.28)
Block : 12 (B-12)	बाख्रापालन शाखा	(0.66)
Block : 13 (B-13)	दाना उद्योग	(0.74)
Block : 14 (B-14)	आवास क्षेत्र(जुनियर/ज्यामी)	(1.22)
Block : 15 (B-15)	बहुवर्षिय घाँस खेती	(5.64)
Block : 16 (B-16)	घाँस खेती (१ वर्षे)	(3.94)
Block : 17 (B-17)	घाँस खेती (१ वर्षे)	(12.87)
Block : 18 (B-18)	बहुवर्षिय घाँस खेती	(11.93)
Block : 19 (B-19)	घाँस खेती (१ वर्षे)	(3.11)
Block : 20 (B-20)	आवास तथा प्रयोगशालाक्षेत्र	(4.48)
Block : 21 (B-21)	चरन क्षेत्र	(1.06)
Block : 22 (B-22)	चरन क्षेत्र	(15.84)
Block : 23 (B-23)	ल्याण्डफिल्ड साईड	(15.75)
Block : 24 (B-24)	चरन क्षेत्र	(12.68)
Block : 25 (B-25)	चरन क्षेत्र	(12.38)

Legend

Building

- Temporary Building
- Permanent Building
- Pond
- River
- Block
- Road
- Transmission Tower

Scale 1:2,500

0 105 210 420 630 840 Meters

Prepared By:- Apex Engineering Consultancy, Pokhara

Spatial Reference
Projected Coordinate System: Nepal_84
Projection: Transverse_Mercator
False_Easting: 500000.00
False_Northing: 0.0
Central_Meridian: 84.0
Scale_Factor: 0.9999
Latitude_Of_Origin: 0.0000
Linear Unit: Meter

7.2 Buildings and Sheds:

Constructed over the years, there are altogether seventy buildings, sheds and working yards within the farm premises. The different residential buildings in the farm can accommodate fifty-eight 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, 100 Boer Does, 60 Cattle or Bull mothers, 90 breeding sows, 50 Breeding Bull and Bucks and 3000 poultry breeding stock. The main office building comprises of 15 rooms and a meeting/training hall at the moment. Recently, New Training Hall and communication Center, Farm Gates, New Goat Sheds, Feed Unit, Bull mother Sheds etc. have been constructed and some of the infrastructures are still underconstruction.

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.

7.5 Vehicles and Transport Facilities:

One Toyata 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 forty-Seven permanent positions of the then Livestock Development Farm .

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 2078.3.31

S.No.	Positions	Class	Posts	Fulfilled	Vacant
1	Chief LDO	G I Tech	1	1	1
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	6	6
7	Nayab Subba	NG-I Admin	1	1	0
8	Electrical Overseer	NG-I Tech	2	0	2
9	Junior LST	NG II Tech	11	5	6
10	Light Driver	Classless	4	3	1
11	Office Helpers	Classless	13	12	1
	Total		56	36	20

7.7 List of Office Cheif:

Following is the list of farm managers who worked in this farm since its' 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
22	Mr Shivanath Mahato	2076/02/26	2076/3/31
23	Dr. Narayan Prasad Sharma	2076/4/01	Till Date

4. Outreach Programs & Biodiversity Conservation

NLBO, Pokhara under outreach resource development program provides technical as well as some meterial supports as subsidy to the selected areas of the following districts as per respected livestock commodities.

S.N.	Districts	Livestock Species	Support Programs
1	Syangja (Khalte, Pitlek, Sirsikot)	Rural Poultry	Trainings, Chicks distribution, Small Hatchery Distribution, Shed

			improvement, Other related equipments (Feeder, waterer) distribution, Vaccination, Drenching & Medications etc
2	Tanahu (Dagam, Tutepani, Ranagau)	Rural Poultry	"
3	Chitwan (Madi), Tanahu(Dhorphirdi), Kaski (Nagdanda), Kavre	Murrah	Trainings, Forage Seed Distribution, Shed Improvement, Breeding Bull distribution, Other related equipments distribution, Vaccination, Drenching & medications etc
4	Chitwan	Pig	Trainings, Breeding Purpose piglets distribution, Shed improvement, Other related equipments (Feeder, Waterer, Pig holder etc.) Distribution, Vaccination , Drenching & Medications etc
5	Makwanpur	Pig	"
6	Myagdi (Bhakimli)	Goat	Trainings, Breeding Purpose Bucks distribution, Shed improvement, Vaccination , Drenching & Medications etc

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.

5. 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 MALD, 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. The

fund, carries a final balance of Rs. 83723556.50 (Table 7).

Table 7 : Karya Sanchalan Kosh as of 2078.3.31

Total Revenue Rs	Sanchit Kosh Dakhila Rs	Karya Sanchalan Kosh Dakhila Rs	Karya Sanchalan Kosh Balance as of 2078.3.31	Last year's Karya Sanchalan Kosh Balance Rs	Karya Sanchalan Kosh expenditure in 2077.78 Rs
43521599	31648135	10002191	83723556	72407733.50	557641

6. 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 2077/78

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	1200	1200

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 -	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 responses 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 (077/78)

Plot Numbers	Area (ha)	Green Forage (Mt)	Silage (MT)	Total Biomas (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
Overall	**30.52**	**455**	**1898**	**2353**

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 2077/78, 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	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 tallerness and vigorous vegetative growth. Hybrid Napier for eg, Super Napier, 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,Co3 & Co4 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 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 13-15% 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 content high 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 verieties being grown at Lampatan are *Super Napier, thin, 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 biomass yield than any other Napier grasses introduced so far in the country. 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 Co-3, Co-4, Co5 & Super Napier 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 2077/78 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 2077/78 was around 280 Metric Ton/ha/year.

Other Perennial Forage Crops:

Other perennial forage crops grown at Lampatan are Guinea grass (Panicum maximum), Paspalum plicatulum, Signal grass (Bracharia decumbens), 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 prapagation 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 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	*Artocarpus lakoocha*
2	Bakaino	*Melia azedarach*
3	Berulo/Gedulo	*Ficus clavata*
4	Chiuree	*Aesandra butyracea/Basia butyracea*
5	Chuletro	*Brassaiopsis hainla*
6	Dabdabe	*Garuga pinnata*
7	Ipil-Ipil	*Leucaena diversifolia*
8	Ipil-Ipil	*Leucaena leucocephala*
9	Kabro	Ficus lacor
10	Khanayo	*Ficus semicordata*
11	Kimbu	*Morus alba*
12	Koiralo	*Bauhinia varigata*
13	Kutmiro	*Litsea monopetala*
14	Nemaro/Timilo	*Ficus roxburghii*
15	Painyu	*Prunus cerasoides*
16	Pakhuri	*Ficus glaberrima*
17	Tanki	*Bauhinia purpurea*

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 2077.78

		Teosinte			Napier		
Cost items	Unit	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 2077.78

		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
Cost/kg green matter	**Rs**			**1.75**			**2.07**

Cost of Silage Production:

For nearly six months of a year, the farm depends mainly on about 1000 tons of silage (This Year 1200 M. ton was produced) 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	250000
Wages	620000
Polythene sheets	100000
Molasses	0
Repairing	250853
Cost of Green matter /kg @ Rs. 0.82/kg for 1898000 kg	1556360
Total Production Cost	2777213
Quantity of silage made (tons)	**1200**
Cost of /kg silage Rs.	**2.31**

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 2.31.

Total Green Herbage Production in the FY: 077/78

The farm in the year 2077/78, 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 2077.78.

S.N.	Type of Forage	Seed rate/ha		Recommended Chemical Fertilizer/ha			Required Fertilizer			Area	FYMM.T	Remarks (for forage production only)
1	Oat			N	P205	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			60							

	content										
	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					7461	617	284		57

Buffalo: The Black Gold

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)

भैसी : कालो सुन

सेतो छ दूध मेरो, रंग कालो पाए पनि,
पोषिलो दूध दिने गर्छु, घाँस, पराल खाए पनि,
पाल्छन् मलाई दूधको लागि, लिन्छन् मासु र काम समेत
सन्तुष्ट छु बिक्री हुँदा र मालिकले पाउँदा दाम समेत
मलाई हेला नगर र कृपया माया गर,
प्रोटिन, एस.एन.एफ. र फ्याट भएको, पोषिलो मेरो दूधलाई हेर,
बिन्ती छ मेरो बिन्ती छ, मलाई अझ माया सुधार गर,
तिख्खर कालो सुन हुँ म, यो सत्यलाई बिचार गर ।

अनुवादक: डा. अमर बहादुर शाह

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)
1	Bull shed	1	6 heads	2026/27	50
2	Single Row shed	3	16 heads	2026/27	100
3	Double Row shed	4	32 cows	2030/31	2714
4	Single Row shed (E)	2	16 cows	2037/38	163
5	Heifer shed (open)	1273	100 heads	2037/38	125
6	Chaff cutter shed	1		2037/38	59
7	Manure platform	1054		2038/39	90
8	Loose House shed ·	4	50 heads	2040/41	440
9	Weaning Yard	1		2040/41	42
10	Weighing scale, enclosures	900		2040/41	42
11	Calf shed	47'2	50 calves	2041/42	338
12	Double row closed shed		40 heads	2058/59	990
13	Sheep shed	2	150 heads	2026/27	
14	Sheep sheds	4	300 heads	. 2030/31	
15	Working yard (sheep)	3	300 heads		

16	Goat Shed				
17	Bull Shed IV		8 bulls	2069	3000
18	Buck Shed		bucks Capacity	2070	500
19	Communication		Misc	2075/76	14700
20	Bull Mother Shed			2076/77	8000
21	New Goat Shed		40 Breeding Does	2076/77 & 2077.78	7000

Herd Composition of Buffaloes:

Table 25 : Herd Composition of Buffaloes - 2077.3.31

Particulars	He buffalo	She buffalo	Buffalo Y Bulls	buffalo heifers	Buffalo he calves	Buffalo she calves	Total
At the beginning	2	72	25	49	25	26	199
At the end	1	76	18	28	14	37	174

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

Performance of Murrah Buffaloes:

Herd Calving Percent and Calving Interval:

The average number of adult buffaloes maintained on the farm in 2076/77 was 58 and a total of 46 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 077/78 is 79.31% (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 multiparious 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 & calving interval in Murrah buffaloes

Particulars	068/69	069/70	070/71	071/72	072/73	073/74	074/75	075/76	076/77	077/078
Average No. of buffaloes present in the herd	56.00	6.00	66.00	75.00	75.00	73.00	79	61	72	58
No. of cows calved	29.00	33.00	38.00	50.00	47.00	69.00	53	42	62	46
No. Heifer calves	-	-	18.00	16.00	6.00	21.00	25	22	55	21
Herd calving percent	52.00	53.00	57.60	66.66	62.66	NA	67	68.85	86.11	79.31
Age at first calving (months)	-	-	48.00	45.00	NA	NA	49.5	48.5	44	44.5
Calving Interval (months)	22.97	22.00	20.83	18.001	NA	NA	17.91	17.42	13.93	14.15

Presented in Table 27 is nine years farm data on herd calving percent and calving interval. Calculation of CI is done by multiplying the total months of breeding female rearing with 100 and dividing the product by 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	2069-	2070-	2071-	2072-	2073-	2074-	2075-76	2076-77	2077-78
AFC	48	48.5	48.8	50	49.7	49.7	48.5(11)	44(9)	44.5(7)

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 2128.6 liters from 4 teats in 2020/21. 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

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. In the table below, the milk yield from the selected buffaloes during the fiscal year 2077.78 have been presented.

Tag no.	Date of Calving	Date until lactation stage	lactation length(Days)	Lactation yield(litres)	Following calving Date	Calving Interval (Days)	Milk yield (305 days)	Milk Yield (305 days, 4 Teats)
141	4/12/2076	8/28/2077	503	2554	4/10/2078	728	1549	2065
206	11/8/2074	12/30/2075	417	2015	7/3/2076	603	1474	1965
240	5/15/2075	4/15/2076	336	2694	4/12/2077	698	2445	3261
N 433	8/29/2076	4/15/2077	229	2394	9/9/2077	376	3189	4251
30	11/12/2075	7/15/2076	246	1506	6/27/2077	593	1867	2490
N 412	10/12/2075	8/15/2076	308	1956	6/1/2077	598	1937	2583
060	7/3/2076	4/15/2077	286	2540	7/23/2077	385	2709	3612
N 378	11/12/2075	7/15/2076	246	2151	7/4/2077	600	2667	3556
161	8/10/2075	5/30/2076	294	2194	11/27/2076	475	2276	3035
425	8/29/2076	11/15/2077	443	2268	4/10/2078	589	1561	2082
252	8/6/2075	7/30/2076	359	1775	7/1/2077	695	1508	2011

Mortality :

The mortality rate of buffalo calves in the farm till the age of one year has been found approximately 6.43 percent sice 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

	Calves Born			Mortality	
Fiscal Year	**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
Average	419	436	855	57	6.66

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)

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.

0 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

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

Where -
Average milk production according to body wight

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

C. Pregnancy Price

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

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 :

Benefits		Costs	
Items	Value	Items	Value
Value of stock at the end ofFiscal year, 078/03/31	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, Baruwal, 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, Baruwal 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% Baruwal 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 069/70 to 077/78.

Table 34 : Annual Targets and Progress

Details	FY 2069/70		FY 2070/71		FY 2072/73		FY 2073/74		FY 2074/75		FY 2075/76		FY 2076/77		FY 2077.78	
	Tar	Prog	Tar	Prog	Tar	Prog	T	Pro	T	Pro	T	Pro	T	Pro	T	P
Rearing of sheep	52	65	60	60	60	71	60	68	60	58	60	57	70	62	50	52
Production of lambs	50	80	50	71	50	79	50	88	50	48	70	54	70	59	70	49

Flock Composition:

The opening and closing stock of sheep last fiscal year was 117 & 84 respectively heads and thus at the end of fiscal year 2077/78, 84 Kage sheep were carried down to next fiscal year 2078/79. There were 53 lambs born with 7.54% pre-wearing lamb mortality and 17% 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	1	52	3	9	27	25	117
At the end	3	48	2	16	0	15	84

Production Parameters:

Lambing Percent:

This has been calculated as the number of lambs born divided by the number of ewes lambed and multiplied by 100 in a year. During the year 2077/78, 44 multiparous ewes out of 50 had lambed giving birth to 56 lambs (the first lambing should be excluded) and hence the lambing percent is calculated to be 88 percent.

Percent Multiple Births:

Out of 48 ewes lambed(including uniparous), 8 ewes gave birth to twins lambs which shows 16.66 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 ealier 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 in FY 2077/78.

Greasy Wool Production:

Two years ealier, 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:

7 Lambs and 2 adult out of the flock of 117 died during the year 2077/78 and mortality percentage of sheep in the farm last year thus is 7.6 percent for the herds (Table 37).

Table 37 : Mortality in Kage flock - 2077/78

Category	Number present / born	Number died	Percent mortality
Lambs	56	7	12.5
Adults	53	2	3.77
Yearlings	8	0	0
Total	117	9	7.6

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 farmers' 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 077/78

Benefits		Costs	
Items	Amount Rs.	Items	Amount Rs.

Value of stock at the end of year 2078/03/31	899600	Value of stock at the beginning of year 2077-4-1	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 State 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 ± 0.04 kids, 5.78 ± 0.12 kg), Kiko (1.84 ± 0.04 kids, 5.63 ± 0.12 kg), and Spanish dams (1.95 ± 0.04 kids; 6.01 ± 0.13kg). 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±0.17, 14.13±0.33 and 35.11±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±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 finidings 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 enourmously 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 2078-3-31, Closing balance of Boer Goat in the farm was as below.

S.N.	Stock	Unit	Quantity
1	Breeding Buck	no	4
2	Breeding Doe	no	62
3	Male kids (<3 months)	no	5
4	Female kids (<3 months)	no	27
5	Male kids (>3 months)	no	25
6	Female kids (>3 months)	no	13
	Total		**136**

Growth Performance (Upto 6 months) of Boer Goat at NLBO, Pokhara (2076/77)

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 farmers' 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	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.

Table 42: Annual targets and achievement - 2077/78

S.N.	Details	Unit	Target	Achievement
1	Management of pig Nucleus herd	Number	60	60 (Male 5, female 55)
2	Piglet Production	Number	800	731
3	Piglet distribution/Sale	Number	600	573

4	Rearing of Replacement Pigs	Number	30	49
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	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	1	3	
Duroc Adult Female	10	13	
Duroc Young Female	2	0	
Duroc Young male	8	5	
Duroc male Piglet	5	10	
Duroc Female Piglet	2	11	
Landrace Adult Male	3	2	
Landrace Adult female	29	23	
Landrace Young Male	1	2	
Landrace Young Female	0	14	
Landrace Male Piglets	11	17	
Landrace Female Piglets	7	18	
Yorkshire Adult Male	0	2	
Yorkshire Adult female	3	10	
Yorkshire Young Male	3	0	
Yorkshire Young Female	9	6	
Yorkshire Male Piglets	0	2	
Yorkshire Female Piglets	0	7	
Cross Adult Male	0	0	
Cross Adult female	12	11	
Cross Young Male	0	0	
Cross Young Female	0	0	
Cross Male Piglets	0	5	
Cross Female Piglets	0	3	

Total with other Stocks	**106**	**164**	

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 hasn't 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	1.65		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	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 especialy 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 occupies middle tier of the pyramid and is an indicaticve 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.

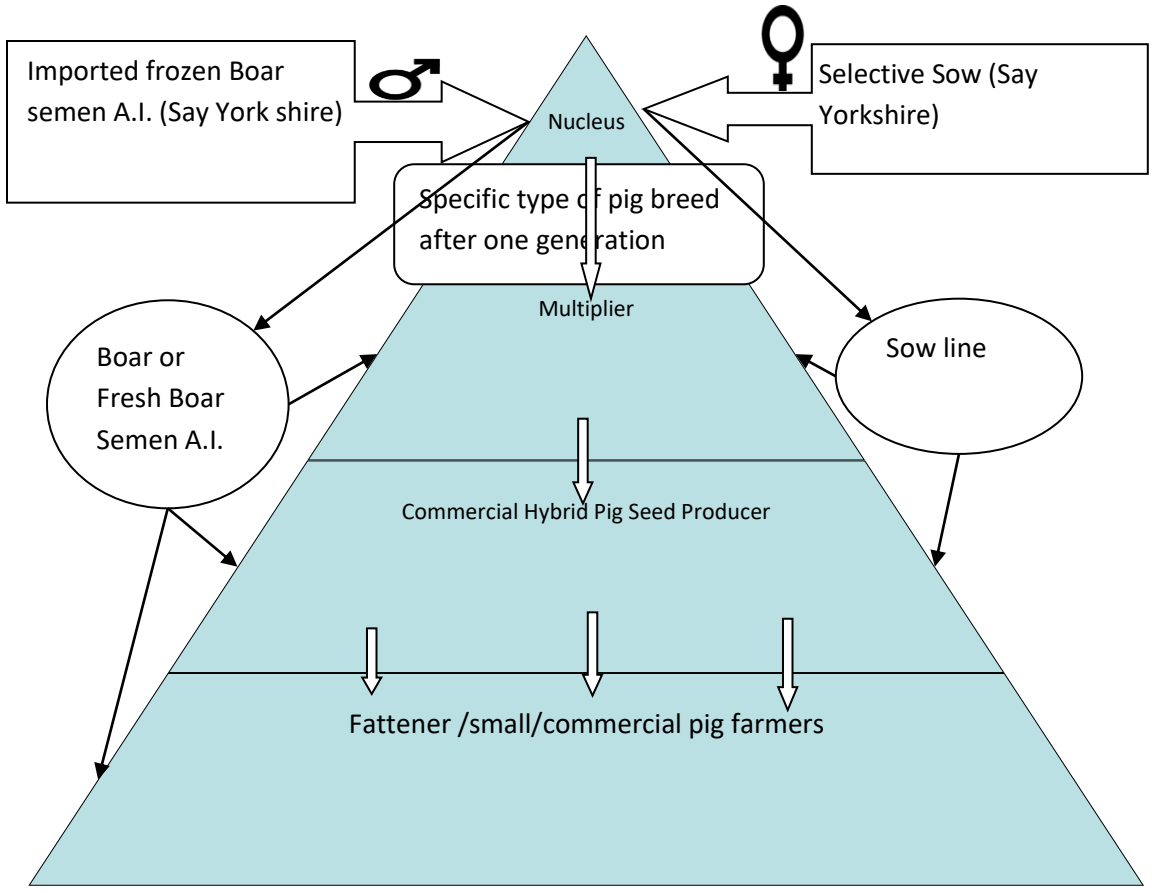


Figure: Pig Breeding Pyramid

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

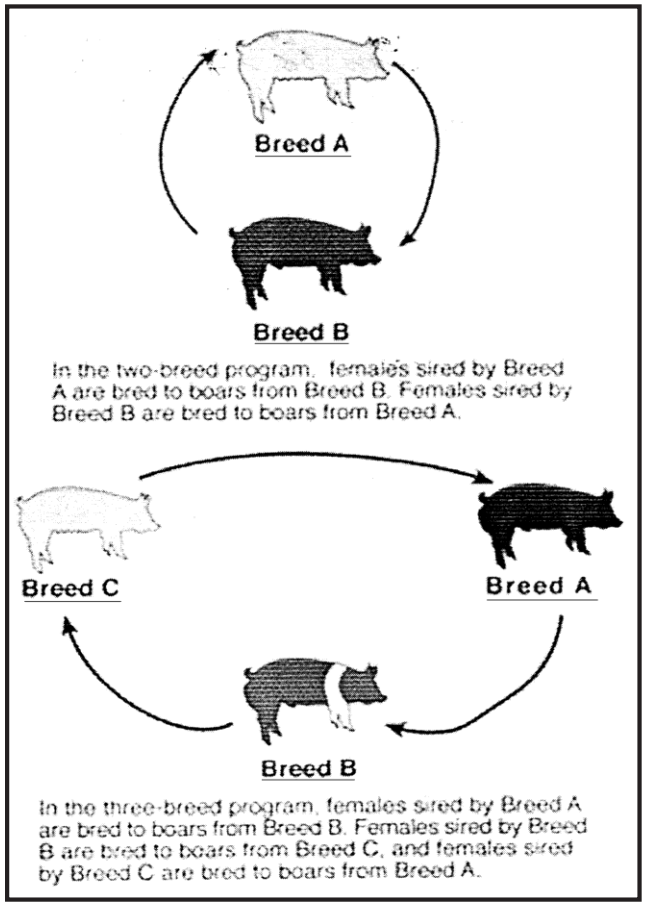


Fig 5 : Rotational Cross Breeding Plan

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 Farmers' 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 farmers' 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, 2077/78, We easily 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 acomplished in FY 077/78

S.No.	Details	Targets	Progress	Percent
1	Production of chicks	80000	147414	184.26
2	Maintenance of replacement stock	3000	4000	133.33
3	Supply of chicks	74000	139639	188.4

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			
2	Brooding	1	(39X6.5)m2	030/31	100,000
3	house Grower	1	(58.3X9.9)m	040/41	645,100
4	house Layers	2	2	040/41	305,767
5	house	1	(25.6X12)m2	041/42	472,481
6	Layers house	1	(34X9.9)m2	037/38	121,193
7	Hatchery	2	(ll.7X9.4)m2	036/37	
8	building	1	.	036/37	156000
9	Incubators	1	27000 eggs	052/53	
10	Hatchery	1	9000 eggs		
11	Generator set	2	25KVA	068/69	
12	New Poultry House	1		072/73 (KUBK)	4000000
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 States 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	146	667
New Hempshire	451	1968
Total	**3232**	
At the end of This F.Y.		
Breed	Male	Female
Australop	147	1199
New Hempshire	29	192
Total	**1567**	

Table 56 : Age at first egg lay

Year	066/67	067/68	068/69	069/70	070/71	071/72	072/73	073/74	074/75	075/76	076/77	077/78
Age	155	146	130	134	145	138	140	142	139	138	132	135

Table 57 : Age at 50% egg lay

Year	066/67	067/68	068/69	069/70	070/71	071/72	072/73	073/74	074/755	075/76	076/77	077/78
Age	200	175	165	166	170	167	165	170	168	169	167	165

Table 58 : Hen day laying percent

Year	066/67	067/68	068/69	069/70	070/71	071/72	072/73	073/74	074/75	075/76	076/77	077/78
%	47.2	53.32	48	48.61	53.81	55	54.1	54.8	55	54.4	55.1	54.1

Fertility, Hatchability and Mortality:

Last seven year data on performance of farm hatchery and mortality pattern indicates are -

- Fertility of eggs set in incubators for the FY 077/78 is 84.5 percent which is slightly higher than that of previous years.
- Farm performance on hatchability is satisfactory and has improved upto 85.5% in comparison to 80-81% of the previous years.

  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 077/78 Hen day egg Percent was 54.1%.

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 5%) is sold outside after using about 95% in the farm itself. On the year 2020/2021, We produced 419865 kg of feed.

S.N.	Feed Production	Unit	Qty	Remarks
1	Poultry Feed (Starter)	kg	23200	

2	Poultry Feed (Grower)	kg	25400	
3	Poultry Feed (Breeder)	kg	91420	
4	Feed of Bulls	kg	26800	
5	Pig Feed	kg	92600	
6	Cattle Feed	kg	138500	
7	Goat Feed	kg	20450	
8	**Total Feed**	**kg**	**419865**	**Including 1200 Oilcake sales**
9	**Total Amount of Sales**	**Rs**	**22489620**	

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/varietal 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 (Alternat	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%	

	e)									
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 Chlroide = NMT 4%, Salmonella = Negative
8	Meat Cum Bone Meal	NLT 95.8	NLT 54%	NLT 101gm/kg	-	NLT 48.7 gm/kg	*NMT 50 ppb	Ground or partly ground	*NMT 2%	*Salt by Sodium Chlroide = NMT

	(MBM_ High fat)	%		DM		DM				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 Chlroide = 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 2020/21

Sales of Milk	Unit	Qty	Rate	Amount	Remarks
Buffalo milk	litres	74307	100	7430700	Sold from Model Dairy
Cow milk	litres	24428	70	1709960	Sold from Model Dairy
Total				**9140660**	

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	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	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.

7. 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.

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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±0.06, semen concentration was 1295.5±16.88 million/ml, fresh semen motility

was 74.59±0.14 % and post freezing motility was 48.2±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., l992) 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±0.11 ml, 3.79±0.11ml, 4.17±0.13ml respectively. The overall mean was 4.2±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±28.57, 1290.9±26.94, 1232.6±31.99 million per ml respectively. The overall mean was 1295.5±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 ($x10^6$) of Murrah Bull at NLBC, Pokhara

Factors	Volume (LS±SE)	Concentration LS±SE)	No of Obs.
Overall mean	4.2±0.06	1295.5±16.88	608
Seasonal Feeding	***	***	
Teosinte	$4.66±0.11^{a}$	$1363.1±28.57^{a}$	208
Oat	$3.79±0.10^{c}$	$1290.9±26.94^{ab}$	234
Maize Napier	$4.17±0.13^{b}$	$1232.6±31.99^{b}$	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±0.24, 74.70±0.23, 74.61±0.27 million per ml respectively. The overall mean was 74.59±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±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[a]	47.18±0.46[b]	208
Oat	74.70±0.23	50.31±2.86[b]	49.16±0.44[a]	234
Maize Napier	74.61±0.27	53.06±3.39[b]	48.34±0.52[ab]	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- Jursey, 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		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 purchase	Cost in thousand
	Vehicle				
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	Misc	Misc	75
15	**Total**				**1,645**

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 purchase	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			

S.N.	Description	Number	Capacity	Date purchase	Cost in 000	
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 (Indofarrn)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 Harvestor	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 Hempshire & Black Australop
6	Jersey Cattle	Bos Taurus	60	Jersey
7	Holstein Cattle	Bos Taurus	60	Holstein