

A field study report on:

**BULL MANAGEMENT AT NATIONAL LIVESTOCK BREEDING OFFICE:
EVALUATE, ADDRESS CHALLENGES AND PROVIDE SOLUTIONS**

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Submitted To:

Livestock Service Training Center
Lagankhel, Lalitpur

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level 7th and 8th**

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EXECUTIVE SUMMARY

This report delves into the bull management: evaluate, address challenges, and provide solutions at the National Livestock Breeding Office (NLBO), Pokhara. The objectives of this report include elucidating NLBO's standard operating procedure in bull management, examining initiatives for improvement, conducting a SWOT analysis on bull management, and formulating mitigation solutions to address challenges. The methodology, including a field visit schedule, secondary data collection from the NLBO website, structured interviews with officers and workers, and a strategic SWOT analysis, ensuring a thorough examination of bull husbandry practices.

NLBO's Standard Operating Procedures (SOPs) for breeding bulls, focusing on objectives, requirements, and selection criteria. The organization strategically manages its 51 bulls, allocating them across different phases—collection, training, and growth. Noteworthy initiatives include the Progressive Progeny Recording Scheme (PPRS) and the integration of the Embryo Transfer Technique to enhance bull management and semen production.

The SWOT analysis highlights NLBO's strengths, such as its location, organizational structure, and meticulous record-keeping. Weaknesses include reliance on tested rather than proven bulls and challenges in managing older bulls. Opportunities lie in the increasing demand for improved bulls, while threats include disease outbreaks and economic uncertainties.

This report concludes that NLBO, despite challenges, remains committed to SOPs, government guidelines, and advanced technologies, leveraging extensive resources, collaborative programs like PPRS, and strategic breeding practices to strengthen processes and contribute to sustainable livestock development in Nepal.

It provides practical recommendations for improvement, including a thorough review of the PPRS project, upgrading laboratory facilities, implementing genetic characterization programs, developing capacity-building initiatives, strengthening collaboration, reevaluating bull procurement modalities, and emphasizing the use of proven bulls.

In summary, this report provides a detailed exploration of NLBO's breeding bull management practices, offering valuable insights and practical recommendations for further enhancement in the realm of sustainable livestock development in Nepal.

List of Abbreviations

1	AI	Artificial Insemination
2	BQ	Black Quarter
3	BVD	Bovine Viral Diarrhea
4	CVL	Central Veterinary Laboratory
5	DLS	Department of Livestock Services
6	ET	Embryo Transfer
7	F.Y.	Fiscal Year
8	FMD	Foot and Mouth Disease
9	FSS	Frozen Semen Station
10	GTZ	German Technical Cooperation
11	HS	Hemorrhagic septicemia
12	JD	Johne's disease
13	LSD	Lumpy Skin Diseases
14	NAFLQML	National Animal Feed and Livestock Quality Management Laboratory
15	NLBC	National Livestock Breeding Center
16	NLBO	National Livestock Breeding Office
17	OIE	Office International des Epizooties (World Organisation for Animal Health)
18	PPRS	Pedigree Performance Record Scheme
19	T.B	Tuberculosis
20	TANUVAS	Tamil Nadu Veterinary and Animal Sciences University
21	TDN	Total Digestible Nutrients

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Chapter 1

INTRODUCTION

1.1 General Background

The Veterinary and Fisheries Government Officers, comprising 18 members from the Ministry of Agriculture and Livestock Development, Bagmati Province, along with representatives from the municipality level, recently participated in a comprehensive 30-day in-service training program organized by the Livestock Services Training Center in Lagankhel, Bagmati Province. The training, conducted from Poush 1st to 7th of Magh, included 21 theoretical classes and 7 days of field-level training.

As part of the practical component, the participants were divided into 6 groups, each assigned a specific topic relevant to their job descriptions. Our group, consisting of three members namely Dr. Aavash Koirala, Dr. Puja Khanal and Mr. Dhanipat Ray Yadav was tasked with conducting a field study on bull management, focusing on understanding the challenges associated with it and proposing viable solutions. The field study involved visits and surveys, enabling us to gather valuable insights and firsthand experiences.

To enhance the depth of our research, the training center facilitated a visit to the National Livestock Breeding Office in Pokhara, providing us with a broader perspective on bull management practices. The culmination of our efforts was the preparation of a detailed report encapsulating our findings, recommendations, and solutions related to bull management. This training not only enriched our knowledge but also allowed us to apply theoretical concepts to real-world scenarios, contributing to our professional development and the enhancement of livestock management practices in the region.

1.2 Context

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 (LN₂) 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. And organizational structure of NBLO has been shown in Figure.

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 entrepreneurs and technical support and services to Pig Breeder Farmers Group of Pokhara in producing high quality weaner piglets being supplied to various districts of Nepal.

The vision of the Nepal Livestock Breeding Office (NLBO) in Pokhara is to leverage the rich diversity of domestic animals in the country, focusing on conserving and utilizing the genetic potential of indigenous livestock for disease resistance and adaptability. Emphasizing the enhancement of productivity in domestic animals, particularly in milk and meat production, the NLBO aims to upgrade low-producing animals through both artificial and natural breeding with suitable exotic breeds. Long-term objectives include collaborating with research institutions for the development of breeds, conserving genetic resources, increasing production, and formulating breeding policies. Short and medium-term goals involve characterizing and utilizing indigenous genetic resources, enhancing cattle and buffalo productivity through artificial insemination, providing technical guidelines for private sector centers, implementing advanced technologies like Embryo Transfer, and expanding artificial insemination services in potential districts for various livestock species. The overarching aim is to meet domestic demand, reduce import dependency, and promote sustainable breeding practices. Among different section breeding bull management comprises management of breeding bull and follows its own standard operating procedure and consists of 51 breeding bull.

National Livestock Breeding Office, Pokhara (Organizational Structure)

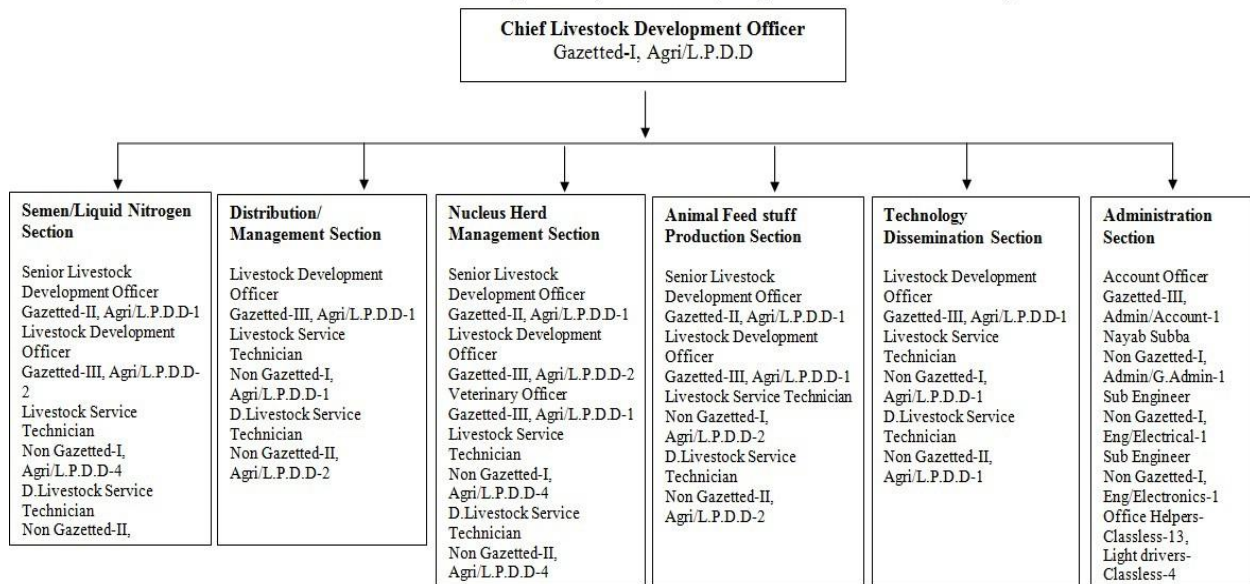


Figure 1: Organizational Structure of NLBO

1.3 Aims and Objectives

- To explain the standard operating procedure followed by NLBO in bull management.
- To explore the steps taken by NLBO to improve bull management.
- To analyze the strengths, weaknesses, opportunities, and threats to bull management.
- To generate the mitigation solutions to overcome the challenge of bull management.

1.4 Limitations

- The day when we visited the farm was a public holiday, so we couldn't interact with more staff working in the bull management section.
- Limited access to comprehensive data on individual bulls, including health records, lineage information, and reproductive history, restricts the depth of the study.
- There was no interaction with the farm worker involved in bull management.

Chapter 2

REVIEW OF LITERATURE

Effective breeding bull management is essential for quality semen production, starting from the calf stage. Inadequate care from infancy can impact growth rates and lead to delayed maturity, affecting breeding outcomes. Upon selection, bull calves should be promptly separated, placed in dedicated pens, and provided specialized care to prevent vices, scours, and parasitic infestations. Individualized feeding based on body weight is crucial. Immediate colostrum feeding imparts disease resistance until vaccination. Access to fresh water is vital. In Nepal, where livestock farming is integral to rural livelihoods and the economy, breeding bulls play a pivotal role in genetic progress and overall productivity. This essay highlights the significance of managing breeding bulls in Nepal, emphasizing practices that contribute to the improvement of dairy production in the country's livestock industry.

Genetic Selection

There is only one way to select and that is to "keep the best and cull the poorest (TANUVAS). The various selection methods are techniques for identifying or estimating the genetic values of individual candidates for selection. Individual performance testing, pedigree selection and progeny test are the reliable method for selection of breeding bull.

Nutritional Management

Bulls of all breeds grow up to age of 5 years of age and during this period they need good growth promoting rations (Pashudhan praharee, 2023). Bulls need 2% of dry matter of their body weight and 15-18% of digestible crude protein. Bulls should be fed twice a day both morning and evening dividing the daily ration into two halves (Pashudhan praharee, 2023). Normally a bull weighing about 600 Kg body weight require about 12 Kg of dry matter which should be met 50% by green grass 25% by concentrates and 25% dry fodder. A mineral and vitamin mix should be offered that contains adequate calcium, phosphorus, and vitamin A (Smith, 2014). A standard mineral mix would be 40% di-calcium phosphate, 20% limestone, 30% trace mineral salt, and 10% selenium 90 (mg/lb) premix. Quality green forages should provide enough vitamin A (Marston, 2019). If forages are weathered and/ or of low quality, an intramuscular injection of 3 million IU of vitamin A is advisable (Marston, 2019). A vitamin A injection might also be considered with corn silage-

based diets. Adlib quality water should be provided to ensure the health status and better performance.

Housing and Space

Bulls require comfortable sheds with ample air circulation and proper ventilation. The sheds, maintained in a clean and hygienic manner, should offer a standard floor space of 12 m² for an average bull, complemented by a 24 m² run (Pashudhan praharee, 2023). Cross ventilation, feeding mangers, and water troughs are essential. While separate boxes are ideal, tying bulls in two rows face to face with strong railings is a practical alternative. Buffalo bulls benefit from loose box-type arrangements due to their tendency to fight. Construction considerations include a hard, non-slippery floor, effective drainage, wind protection, and access to fresh drinking water. Planting trees around sheds aids in summer cooling. Proper control, partitions, semi-circular-shaped feed mangers, proximity to collection yards, and drainage connected to a slurry tank enhance overall efficiency.

Health Monitoring

Sick animals are promptly identified and moved to the sick bull shed for appropriate treatment. Detailed clinical sheets are maintained, documenting symptoms, treatment, and investigations. Bulls designated for semen collection undergo regular screening for Brucellosis, Tuberculosis, John's disease, and Trichomoniasis. Positive reactors are culled. Testing frequencies: Brucellosis every 3 months, T.B. annually, and Trichomoniasis as needed (Pashudhan praharee, 2023). New entrants, especially those from outside areas, undergo a 2-month quarantine. All tests must be completed, and only disease-free new bulls proved through quarantine are allowed into the bull sheds. Regular health check-ups, vaccinations, and deworming highlighted as key components for optimal health. Vaccination should be done against FMD twice a year, HS and BQ, LSD every year.

Exercise and Growth Monitoring

Regular exercise is crucial for maintaining bull condition and activity in semen collection. Using an exercise ring in the morning or letting bulls roam in paddocks helps prevent overgrown hooves. Bulls require 1-2 hours of exercise at least 3-4 times weekly (Pashudhan praharee, 2023). Monitoring growth rates is vital, especially for young bulls. Monthly weigh-ins, along with

measurements of girth and height at withers, inform the creation and study of a comprehensive growth chart.

Measurements of scrotal taken monthly with a tape, are crucial for monitoring bull growth. Ideally done on a warm day or after sun exposure for scrotum relaxation. Regular grooming, using a stiff brush, aids in removing loose hairs and scales, ensuring cleanliness. Coir brushes are effective, with brushing done against the hairs initially.

Identification and Record-Keeping

Bulls require effective identification. Calves are tattooed inside the ear, and upon transfer to bull rearing stations, a flexible plastic ear tag with a bold, permanent number is applied for easy visual recognition. Cold branding on the rump is an alternative, but not suitable for buffalo bulls.

Breeding Training

Selected bulls at 14-18 months undergo semen collection training at rearing stations (Pashudhan praharee, 2023). Grouped in paddocks, natural mounting behavior is observed. Training, preferably in the calm morning hours (7-9 AM), is gradual and patient (Pashudhan praharee, 2023). Rough treatment is avoided to prevent a non-reactive or shy bull. Initial disinterest is expected, but patience allows acclimation. Mounting on females is discouraged. A smaller, sturdy dummy is introduced, allowing time for the bull to acquaint with it. Once active desire is shown, semen collection attempts begin. Handling is gentle, introducing an artificial vagina (A.V.) gradually. Successful weekly collections indicate readiness for entry into the regular breeding program, with the bull transferred alongside its complete file.

Maintaining the sexual libido of bulls is crucial for successful breeding programs. Factors such as age, inexperience, excessive exercise, frequent usage, unfavorable semen collection conditions, and unsuitable fittings can reduce libido. Rectifying issues like faulty feeding, obesity, inherent defects, or injuries is essential. Sensitivity to artificial vagina varies among bulls, and rough handling can impact sexual reflexes.

Bulls often perform well in familiar surroundings with a consistent attendant, fostering positive associations. Painful or distracting situations can inhibit sexual reflexes, necessitating careful

handling. Rest periods should be granted to bulls showing inhibition, and changing surroundings can aid recovery.

Young bulls need controlled mating opportunities to avoid overwork. Limiting services to each cow and introducing a young bull to service after 2-2 ½ years are important considerations (TANUVAS). Mature bulls can handle multiple ejaculations per week without impacting libido or semen quality.

Reduced libido may be addressed by teasing and delaying services. Environmental factors, such as small paddocks, can lead to boredom, and introducing changes like the presence of another bull or altering surroundings can revive interest. Summer stress affects libido and semen quality, especially in exotic and crossbred bulls. Housing bulls in cool, well-ventilated sheds and implementing measures like cold water showers during hot periods mitigate these challenges.

Significance of bull nutrition for successful breeding

The nutritional well-being of bulls is crucial for successful breeding, yet their needs are often overlooked compared to cows. Bulls, responsible for 50% of herd reproductive success, must be maintained on a balanced nutritional plane to ensure optimal conception rates throughout the entire herd.

After puberty, bulls continuously produce sperm in a 60-day cycle, meaning their nutritional status over the previous two months directly influences the quality of semen ejaculated today (Pashudhan praharee, 2023). Fertility in bulls is dynamic, requiring consistent proper nutrition to maintain peak fertility. Nutritional management significantly impacts reproductive performance, with energy, protein, minerals, and vitamins playing key roles (Pashudhan praharee, 2023).

Energy: Energy is vital for growth and bodily functions, with excess energy deposited as fat. Adequate dietary energy accelerates pre-pubertal development, but extremes can adversely affect libido and sperm quality. Proper energy levels, balanced for growth stage and body condition, are essential for optimal reproductive performance.

Protein: Protein is a building block for tissues, with deficiency leading to loss of body condition. High-protein diets enhance reproductive parameters, including scrotal circumference, body weight, semen volume, and sperm motility.

Minerals: Macro-minerals (e.g., Calcium, Phosphorus) and micro-minerals (e.g., Copper, Selenium, Zinc) are vital for enzymatic and metabolic processes. Copper, Selenium, and Zinc are critical for reproduction and can be deficient in diets, affecting libido and fertility. Proper nutrition in gestating females is crucial for newborns dependent on prenatal copper.

Vitamins: Vitamin A deficiency inhibits spermatogenesis and reduces testicular size in bulls. Vitamin E deficiency impacts germ cell proliferation and can lead to testicular degeneration.

Effect of Calfhood Nutrition: Calfhood nutrition influences gonadotropic hormone secretions, affecting later testis size and onset of spermatogenesis. Proper calfhood nutrition increases LH and FSH secretion, crucial for pubertal development and final testis size.

Chapter 3

METHODOLOGY

- **Field visit;** The visit was scheduled to take place from Poush 26th to 29th, and the participants consist of a group of three individuals. The purpose of the visit is to explore and gain insights into the practices related to bull husbandry at NLBO

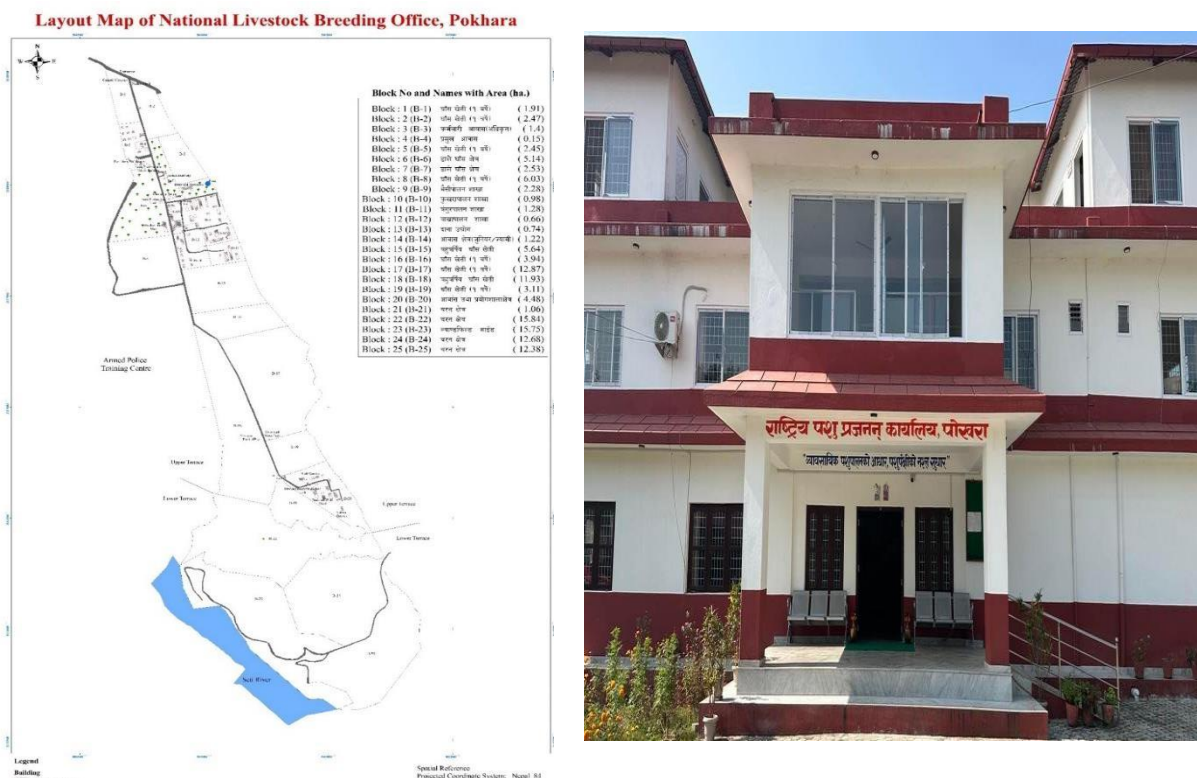


Figure 2: Map and office of NLBO

- **Secondary information from website of NLBO**
- **Interview with Officer and worker:** It typically involved a structured conversation to gather information, insights, and perspectives from both hierarchical levels within an organization.
- **SWOT analysis;** We conducted SWOT analysis which is a strategic planning tool used to assess and evaluate the Strengths, Weaknesses, Opportunities, and Threats associated with a business, project, or situation.

Chapter 4

DISCUSSION

4.1 Standard Operating Procedures For Breeding Bulls Selection And Management At NLBO

4.1.1 Background

Breeding bulls selected by Frozen Semen Station (FSS) are considered highly valuable units of semen production. Good management practices are essential for maximizing use of the selected bull. The breeding bull is expected to produce large number of frozen semen doses of good quality which will result in optimum pregnancy rate in the field. The number of doses produced per bull per year depends on breed, size and age of the bull. Currently there are 51 total bull among them 31 are in collection, 10 are on training and remaining 10 are in growing stage as shown in Figure 3.

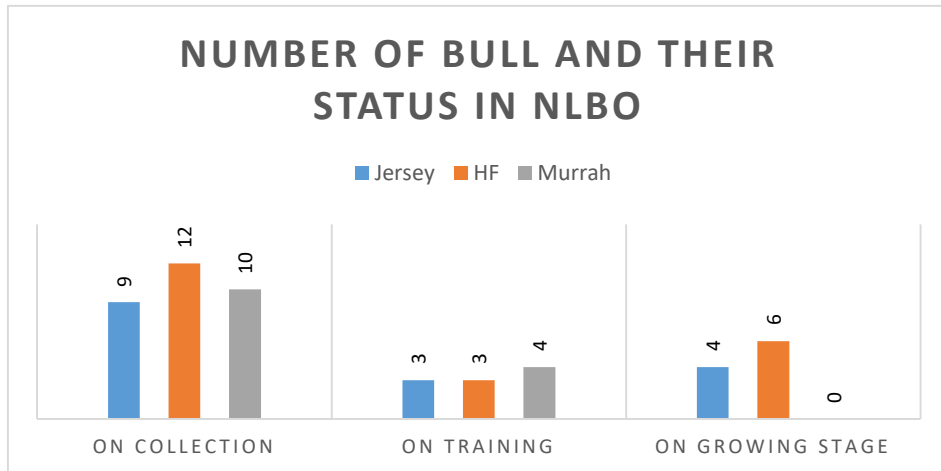


Figure 3: Number of bulls and their status in NLBO

For better management of bull NLBO has approved standard operating procedure which included following points.

4.1.2 Objectives: To select and manage breeding bulls for producing good quality of semen

4.1.3 Requirements

- Pedigree Records
- Balance Ration

- Housing Requirement
- Health Measures
- Procedure

4.1.4 Selection Criterial

- Breeding Bulls for frozen semen production shall be selected based on
- Government approved PPRS guidelines
- Pedigree Records (Annex 1)
- Phenotypical characters (Annex 2)
- Libido Index and Sexual Behavior (Annex 3)
- Estimated Breeding Value of Pedigree and Progeny Testing

4.1.5 Management: Bull management comprises of following: Generally, the management of breeding bulls depends on factors like age, breed, and season and varies with them.

4.1.5.1 Feeding of adequate fodder and feed

- The bulls being ruminants require fodder of good quality and in adequate quantity for their maintenance and NLBO had used 52 hectare for fodder production as shown in Figure 4.
- It is estimated that a developing bull requires 2.5-3.0 % of body weight as dry matter per day and 1.0-1.2% crude protein with 65% TDN.
- Yearling bull need dry matter 2.0 to3.0% of the body weight per day
- Adult bull dry matter intake is 1.2 to 1.4% of body weight per day. Feeding of maize /oat silage in limited quantity of 5-10 Kg/day/bull is harmless.
- Wherever silage is prepared, adequate precautions should be taken to avoid growth of molds and aerobic condition.
- About 3 to 5 kg of concentrate/bull according to body weight should be provided every day.
- It is preferable to avoid feeding of cotton seed cake to bulls.



Figure 4: Fodder production unit

4.1.5.2 Feeding of Mineral mixture

- Supplementary feeding of 50 to 150 grams of mineral mixture / day / bull is essential to meet the physiological requirements.
- The ingredients of the mineral mixture should be free from animal origin.
- Salt in the range of 10-15 g/day / bull can be added to the mineral mixture.
- The Multivitamins, Phosphorus and Selenium injection should be provided in every 15 days interval regularly for better quality semen production.

4.1.5.3 Supply of potable water at all the time

- Adlib fresh water should be given throughout the day.
- The water should be clean, free from organic matter and potable

4.1.5.4 Housing and floor

- All housing facilities should have arrangements for feeding and supply of water.
- The sheds should be in East-West direction to avoid direct sunlight on bulls as shown in Figure 5.
- There should be top ventilation to allow escape of hot air.

- There should be provision of water foggers and fans for use during the summer particularly for exotic breeds and buffalo bulls.
- The fans and water foggers should be operated alternately for about 4-5 hours/day during summer time.
- Each bull should have adequate covered area (minimum 10M²).
- The flooring of covered area should be non-slippery cement concrete with adequate grooves.
- The floors should be scrubbed and burnt at least once in a year by blowlamp.



Figure 5: Breeding bull shed

4.1.5.5 Basic Management of the animals

- During summer, it is desirable to wash the buffalo bulls twice a day.
- It is recommended to groom the cattle bulls with coir/nylon brush every day to keep the skin in shining and glowing condition.
- All the bulls shall be groomed at least once a day- which helps maintain good health of the bulls and keep their coats clean.
- Grooming of animals every day, minimum 10 minutes per animal is essential for production of good quality of semen.
- It is preferable to exercise the bulls for about a minimum of 30 minutes per day in the training center as shown in Figure 6. During the exercise, it would be possible to observe the gait and note any lameness foot problems.
- Deworming is done once in 6 months or as required. Regular fecal examination will determine the frequency of deworming.

- Hooves of bulls are examined every fortnight and trimmed every three months or as needed. Foot bath is given to all the breeding bulls with 4% formalin or 4% copper sulphate solution.
- Preputial hair clipping of adult bulls should be carried out fortnightly. The length of the hair at the preputial orifice should be cut leaving at about 2 cm to prevent bacterial load. in the preputial orifice.
- The body weight at the time of semen collection should have the standard body weight. All bulls should be weighed every month in weigh machine as shown in Figure 7.
- Sick animals are segregated from the normal stock in isolation shed and separate feeding and watering should be provided.
- All newly introduced should be kept on Quarantine for 21 days, during this period collect the sample for disease screening and conduct tests against major contagious diseases.
- Bull should be culled to ensure semen quality and to reduce feed and other expenditures. on the following basis
 - The bulls with poor libido.
 - Poor serving ability
 - Poor semen quality (Based on Motility, Viability, Concentration etc.)
 - Poor freezability
 - Positive for Brucellosis and Tuberculosis on screening test
 - Old age over 9 years for cattle bulls and 10 years for buffalo bulls



Figure 6: Bull training center



Figure 7: Weighing machine

4.1.5.6 Health Management of Bulls

- It is recommended to minimize the number of vaccinations each year using combination vaccines like HS & BQ. In case of FMD, it is preferable to use oil adjuvant vaccine.
- After any vaccination rest the bulls for collection at least two consecutive collections to reduce febrile reaction in spermatogenesis and thereby quality of semen.
- Vaccinations have to be carried out against contagious diseases in bull station as well as vaccination of animals in the surroundings covering 2 kilometers radius of FSS.
- The breeding bulls should be screened every year with the collaboration of disease diagnostic laboratories for Brucellosis, TB, Leptospirosis, Campylobacter, BVD, JD and Trichomoniasis as per OIE guidelines/Kit guidelines. (Annex 4)

4.1.5.7 Recording: All the records regarding the selection and management of breeding Bull should be kept up to date.

4.2 Steps taken by the NLBO to improve bull management

Besides the standard operating procedure, the National Livestock Breeding Organization (NLBO) has undertaken a series of strategic steps to enhance the management of bulls, ensuring the overall health and productivity of the livestock. Currently, with 51 bulls in their possession, the NLBO allocates these bulls across different stages, with 31 in the collection phase, 10 undergoing training, and 10 in the growing stage. Semen collection started from 2–2.5 years to 6 years, and after 6 years they will be sold to farmers, mainly in the hilly region, where they are further used for natural insemination for more than 2 years. Those unsold buffalo-bulls will be sold to the market for meat

purposes, and those cattle-bulls have to remain in an old home that is located within NLBO and is generally kept under feed deficit, and they just stay on maintenance rations until the time of death.

Now, to produce improved-quality semen from the bull, NLBO has started the embryo transfer technique, through which we get high-yielding bulls that are used for semen production. In the current FY, NLBO is planning to produce 50 ET bulls for semen production. Currently, at NLBO and the farm under PPRS, there are 9 ET bulls.

The implementation of the PPRS scheme in nine districts, namely Chitwan, Dolakha, Gorkha, Kaski, Kavre, Rupendehi, Lamjung, Nawalparasi, and Tanahun, plays a pivotal role in NLBO's approach. Through this scheme, the organization engages in programs focused on good farm practices and supplies necessary materials to ensure the health status of the bulls. Regular monitoring is conducted to assess and maintain biosecurity standards. Moreover, NLBO purchase high-yielding bulls from selected farms under the PPRS project, contributing to the production of quality semen. By integrating these measures, NLBO establishes a comprehensive framework for effective bull management, encompassing health, training, and strategic breeding practices to elevate the overall quality of livestock and semen production in the designated districts.

4.3 SWOT analysis interpretation of breeding bull management section in NLBO

STRENGTH	WEAKNESS
<ul style="list-style-type: none"> • NLBO is located on 100 hectares. • Fodder and forage production on 52 hectares • Well-designed organizational structure and well-qualified staff • The bull shed is in a 1hectare area. • PPRS program launched by NLBO • 20-25% replacement plan to avoid inbreeding • Well maintained daily record • Quality ration prepared by the experts. 	<ul style="list-style-type: none"> • Using tested bull instead of proven bull • Bull herd is within the periphery of other farm like goat, cattle/buffalo, swine and poultry. • Problems in management of old bull • Aggressive behavior of bull which is hard to restrain • Lack of proper maintained laboratory facilities and has to depend on CVL and NAFLQML • Lack of genetic characterization of buffalo bull

<ul style="list-style-type: none"> • Yearly twice medical checkup of bull and staff as well to ensure the quality health status • Adaptation of Embryo Transfer Technology 	<ul style="list-style-type: none"> • Quality assurance of ET bulls should be performed by NARC • Sometimes the growing bull is incapable of producing semen that will increase the inputs cost without outputs.
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • Increase in the AI coverage day by day (there is increase in AI coverage by 21% as compared to F.Y 2019/20 and F.Y 2020/21) • Increased in demand of improved bull in the hilly region for natural insemination • Increase in the number of Inseminator • Increase in the number of high yielding cattle and buffalo around the country • More number of program formulations by provincial and local government on dairy sector to increase production and productivity • Subsidy program launched by different local government in the charges of AI. 	<p>THREATS</p> <ul style="list-style-type: none"> • Outbreak of diseases through the Kanji house which is located to the western part of the bull herd. • Political instability and economic recession due to which there is dwindling in the number of dairy farms • Brain drain of qualified inseminator due to better opportunities in abroad • Excessive illegal trading of semen straw from abroad. • Complicated process in buying bulls

CHAPTER 5:

CONCLUSION

In conclusion, the National Livestock Breeding Office (NLBO) in Pokhara has meticulously outlined and implemented Standard Operating Procedures (SOPs) for the selection and management of breeding bulls, aiming to maximize the production of high-quality semen. Through strategic measures like the Embryo Transfer Technique and the Progressive Progeny Recording Scheme (PPRS), NLBO seeks to enhance bull management, ensuring optimal health and productivity. Despite challenges such as the need for proven bulls and nearby Kanji house, NLBO leverages its extensive land and fodder production, well-designed organizational structure, and collaborative programs like PPRS to strengthen the overall breeding process. The organization's commitment to adherence to government guidelines, regular monitoring, and the incorporation of advanced technologies reflects its dedication to improving the quality of semen production and contributing to the sustainable development of the livestock sector in Nepal.

CHAPTER 6

SUGGESTION

6.1 Continuation of PPRS Project:

Suggestion: Ensure a thorough review of the PPRS project to assess its effectiveness and alignment with current goals before deciding on its continuation.

6.2 Upgrading Laboratory and Biosecurity Facilities:

Suggestion: Prioritize the upgrade of laboratory and biosecurity facilities to incorporate advanced technologies for genetic research and characterization.

6.3 Genetic Characterization:

Suggestion: Implement a comprehensive genetic characterization program to enhance the understanding of livestock genetics.

6.4 Capacity Building Programs:

Suggestion: Develop a structured and sustainable capacity building program to enhance the knowledge, skills, and attitudes of the NLBO staff.

6.5 Collaboration with NARC and University:

Suggestion: Strengthen collaboration with the National Agricultural Research Center (NARC) and universities to leverage their expertise and resources.

6.6 Change in Bull Procurement Modality:

Suggestion: Reevaluate the current modality for purchasing bulls from abroad to improve efficiency and cost-effectiveness.

6.7 Use of Proven Bulls:

Suggestion: Emphasize the use of proven bulls over tested bulls to enhance breeding success and genetic improvement.

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ANNEXES

Annex 1

Pedigree selection

It is based on

Breed	Dam's milk Production/lactation (Under PPRS)
Jersey	Minimum of 4500 liters
Holstein	Minimum of 6000 liters
Murrah	Minimum of 3000 liters

Annex 2

Phenotypical Selection

Before procuring new bull calves/bulls for a semen station, a thorough phenotypic examination shall be conducted by an accredited Official / Veterinarian to ensure that the bulls are free from abnormality and do not display clinical symptom(s) of any infection or any contagious diseases. Standards for scrotal circumference and weight gain index for various breeds shall be fixed by initiating age wise recording of scrotal circumference once in three months and body weight once a month, by the semen stations. For every new calf procured, the measurement of scrotal circumference and body weight should be initiated immediately. Prior to introduction of new bulls for semen collection, breeding soundness examination shall also be carried out. It should be done on the following basis;

- Physical examination by experts.
- Characteristics of the breeds.
- Gentle gait, equally distributed limbs.
- No deformities in hooves.
- Both testicles should be descended.
- No pendulous sheath.
- No warts.
- No bad vices like masturbation
- Scrotal circumference should be 30 cm at the time of collection
- Animal should weigh according to prescribed standards to age.
- No umbilical hernia.

Annex 3

Libido Index and Sexual Behavior

Normal patterns of bull's sexual behavior

1. Sexual arousal.
2. Courtship: Guarding, chin resting, sniffing, licking, nuzzling, frontal contact etc.
3. Erection of penis and penile protrusion.
4. Mounting.
5. Seeking for vulva (location)
6. Ejaculatory thrust.
7. Ejaculation.
8. Dismounting.

Variations in patterns of sexual behavior (From full to no expression of sexual behaviour)

1. Complete service with ejaculation.
2. Mounts with erect penis but without thrust.
3. Mounts with non-erect penis.
4. Refusal to mount.

Libido index

1. Intense libido: reaction time up to 3 minutes.
2. Normal libido: reaction time from 3 to 10 minutes.
3. Poor libido: reaction time more than 10 minutes. (Treatment should be done)

Annex 4

Screening of diseases

The breeding bulls should be screened every year with the collaboration of disease diagnostic laboratories for Brucellosis, TB, Leptospirosis, Campylobacter, BVD, JD and Trichomoniasis as per OIE guidelines. All animals are tested against the major contagious diseases as follows;

Screening Diseases	Bulls	Semen doses
FMD	Retain	Last one month's doses to be discarded
Brucellosis	Castrate and remove within 48 hours	FS doses in stock to be discarded since the last negative test
Tuberculosis (TB)	Treat and retain	FS doses in stock to be discarded since the last negative test
Campylobacteriosis	Treat and retain	FS doses in stock to be discarded since the last negative test
Trichomoniasis	Treat and retain	FS doses in stock to be discarded since the last negative test
Leptospirosis	Treat and retain	FS doses in stock to be discarded since the last negative test

Annex 5

A Glimpse of field visit at NLBO



Group photo with field facilitator



Breeding bull shed



Bull training center



Weigh machine and entrance gate of bull shed