STUDY ON SEASONALITY OF MILK PRODUCTION
IN NEPAL AND WAY FORWARD TO MITIGATE THE EFFECT

REPORT

National Dairy Development Board
Hariharbhawan, Lalitpur
2026

MAP OF NEPAL SHOWING SAMPLE PROVINCE AND DISTRICTS

Figure 1 Map of Nepal Showing Sample Province and Districts

ACRONYMS

ADS:	Agriculture Development Strategy
AI:	Artificial Insemination
BS:	Bikram Sambat
BQ:	Black Quarter
CDCAN:	Central Dairy Cooperative Association Nepal
CAGR:	Compound Annual Growth Rate
DoC:	Department of Cooperative
DDC:	Dairy Development Corporation
DLS:	Department of Livestock Services
DMPCU:	District Milk Producers Cooperative Union
DoLFD:	Directorate of Livestock and Fishery
FAOSTAT:	Food and Agriculture Organization Statistics
FGD:	Focus Group Discussion
FMD:	Foot and Mouth Disease
HF:	Holstein Friesian
HS :	Hemorrhagic Septicemia
HH:	Household
KII:	Key Informant's Interview
MoALD:	Ministry of Agriculture and Livestock Development
MoFE:	Ministry of Forests and Environment
MT:	Metric Ton
MMT:	Million Metric Ton
NDDB:	National Dairy Development Board
NEPC:	Nepal Environment Protection Center
NRs:	Nepali Rupees
MPC:	Milk Producer's Cooperative
SMP:	Skimmed Milk Powder
TBC:	Total Bacterial Count
WMP:	Whole Milk Powder
SAARC:	South Asian Association for Regional Cooperation
SCC:	Somatic Cell Count
USA:	United States of America
VHLEC:	Veterinary Hospital and Livestock Expert Center

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EXECUTIVE SUMMARY

The dairy sector is a key pillar of Nepal's economy, supporting rural livelihoods, household food security, poverty reduction, self-employment, and regularized family income. Milk production peaks from September/October to March/April due to monsoon-improved fodder availability and calving cycles, then declines from April/May to August/September due to fodder scarcity, heat stress, and buffalo seasonality — creating a surplus-deficit cycle across seasons.

Study Objectives: Identify 4-year seasonal production trends and 3-year forecasts across small, medium, and large farmer categories -milk delivery cooperatives; identify causes of seasonal variation (forage availability, climate, breeding cycles, animal nature); assess seasonality's impact on farmers, industries, and consumers; and recommend mitigation strategies including evaluation of powder plant operations.

Methodology: Mixed qualitative-quantitative approach covering literature review, consultative meetings with NDDB, survey tool development, field data collection, and analysis. Primary quantitative data was collected from five of seven provinces (excluding Karnali and Sudurpaschim), two districts per province, covering 400 farmer households 200 small, 150 medium, 50 large split equally between cow and buffalo farmers. Qualitative data was collected from MPC committees, palika livestock sections, VHLEC, provincial directorates, DLS, NDDB, CDCAN, DMPCU, dairy scholars, and industry associations.

Global & Regional Context: Global milk production grew from 906 million MT (2020/21) to 982 million MT (2024/25), with Asia as the dominant region and India the largest producer (239 million MT in 2023/24, 248 million MT in 2024/25). Within SAARC, India accounts for 75–80% of regional production; Pakistan and Bangladesh showed rapid growth; Nepal ranks fourth with moderate but steady growth driven by improved crossbred adoption and better farm management. Regional growth enablers include AI expansion, breed improvement, commercial farm development, better veterinary access, balanced feeding, and urbanization-driven demand. Persistent constraints include feed shortages, climate stress, long calving intervals, new disease variants, weak cold chain infrastructure, and difficulty culling low-productivity animals.

Nepal's Production Trends & Forecast: Total national milk production grew from 2.48 million MT (2020/21) to 2.72 million MT (2024/25). At a CAGR of 2.33%, production is projected to reach 3.05 million MT by 2029/30, supported by improved breed adoption, AI expansion, dairy commercialization, better feeding and fodder management, rising urban demand, and expanded collection/processing infrastructure.

Seasonality Comparison: Across South Asia, flush-to-lean ratios are: Nepal 57:43 (improved from 65:35), India 60–70:30–40, Pakistan 62.5:37.5, Bangladesh 63:37. Buffalo-dominant systems (Nepal, Pakistan, NW India) show stronger seasonality due to seasonal breeding, while cow-dominant cooperative systems show more balanced year-round production.

Herd Composition: Large cow farms: 57.7% Jersey cross, 42.3% HF cross; large buffalo farms: 97.7% Murrah. Medium cow farms: 77.9% Jersey, 30.2% HF; medium buffalo: 97.3% Murrah. Small cow farms: 76.4% Jersey, 22.6% HF; small buffalo: 95.4% Murrah, 2.3% local, 2.3% other. Herd stage distribution is: large cow farms: 48.7% lactating, 29.8% pregnant, 20.0% heifer; large buffalo: 41.9% lactating, 30.2% pregnant, 20.0% heifer. Medium cow: 46.7% lactating, 30.6% pregnant, 20.2% heifer, 2.5% dry; medium buffalo: 47.6% lactating, 29.6% pregnant, 20.4% heifer, 2.39% dry. Small cow: 65.3% lactating, 26.0% pregnant, 8.7% heifer; small buffalo: 45.5% lactating, 39.0% pregnant, 15.5% heifer.

Feeding Practices (Flush Season): Large cow farms: 70.2% green forage, 15.0% dry roughage, 2.8% silage, 11.9% concentrate; large buffalo farms: 70.0% green forage, 16.4% dry, 1.1% silage, 12.5% concentrate. Medium cow farms: 70.2% green, 14.0% dry, 3.0% silage, 12.0% concentrate; medium buffalo farms: 71.1% green, 16.0% dry, 1.0% silage, 11.8% concentrate. Small cow farms: 70.7% green forage, 16.0% dry roughages, 2.9% silage, 12.2% concentrate; small buffalo: 72.3% green forage, 14.6% dry, 0.9% silage, 12.2% concentrate.

Feeding Practices (Lean Season): Large cow farms: 64.0% green forage, 17.5% dry roughages, 3.3% silage, 15.2% concentrate; large buffalo farms: 62.4% green forage, 21.3% dry, 1.0% silage, 15.3% concentrate. Medium cow farms: 65.8% green forage, 16.4% dry roughages, 3.1% silage, 14.6% concentrate; medium buffalo farms: 63.1% green forage, 20.5% dry roughages, 0.9% silage, 15.5% concentrate. Small cow farms: 55.6% green forage, 25.6% dry roughages, 3.9% silage, 14.9% concentrate; small buffalo: 62.8% green, 20.6% dry, 1.0% silage, 1656% concentrate.

Housing Infrastructure: Large cow farms: 20.0% open yard, 22.9% well-ventilated, 22.9% full sunlight, 11.4% temperature-controlled; large buffalo: 19.4% open yard, 22.2% ventilated, 19.4% good waterer, 22.2% full sunlight, 16.7% temperature-controlled. Medium cow: 15.6% open yard, 18.8% ventilated, 25.0% good waterer, 28.1% full sunlight, 12.5% temperature-controlled; medium buffalo: 18.2% each open yard and ventilated, 24.2% good waterer, 21.2% full sunlight, 18.2% temperature-controlled. Small cow: 21.6% open yard, 18.9% ventilated, 21.6% good waterer, 18.92% each full sunlight and temperature-controlled; small buffalo: 19.8% open yard, 17.28% each ventilated and good waterer, 24.7% full sunlight, 18.52% temperature-controlled.

Disease Prevalence: Large cow farms: mastitis 40.91%, and other disease in 59.09%; large buffalo: mastitis 38.46%, and other 61.54%. Medium cow: mastitis 35.94%, and other 64.06%. Small cow: mastitis 34.18% and other 65.82%; small buffalo: mastitis 33.80% and other 66.20%.

Reproductive Issues: Large cow farms: repeat breeding and anestrous each 33.33%, other reproductive disease 33.33%; large buffalo farm: repeat breeding 40.74%, anestrous 29.63%, other 29.63%. Medium cow farm: repeat breeding 41.67%, anestrous 22.92%, other 35.42%; medium buffalo farm: repeat breeding 41.67%, anestrous 27.78%, other

30.56%. Small cow farm: repeat breeding 37.61%, anestrous 31.19%, other 31.19%; small buffalo farm: repeat breeding 35.11%, anestrous 30.85%, other 34.04%.

Climate Change Impacts: Large cow farms: breeding cycle disruption 35.3%, new disease 33.3%, reduced feed intake 31.4%; large buffalo: breeding cycle disruption 34.7%, reduced feed intake and new disease each 32.7%. Medium cow farm: new disease and breeding disruption each 33.9%, reduced feed intake 32.2%; medium buffalo farm: breeding disruption 35.7%, reduced feed intake 33.3%, new disease 31.0%. Small cow farm: new disease 34.9%, breeding disruption 33.3%, reduced feed intake 31.7%; small buffalo farm: reduced feed intake and new disease each 34.1%, breeding disruption 31.7%.

Seasonality is improving through technology adoption, breed improvement via AI, better feed management, technical service availability, and improved housing and health management. Replication of these practices to more districts could tangibly reduce seasonal production gaps.

Industry Impact: Large dairies face a 20% procurement reduction during lean months (May–August), while private medium and small dairies report only 3–7% fluctuation. Overall lean-season procurement is less than 15% below flush-season levels in aggregate, with gradual monthly reductions of 2.5–20%. Seasonal differences at large scale dairies is also driven by farmers' preference for local market sales offering better prices and prompt payment.

Calving Interval and Lactation Period: Large cow farms: calving interval 12.5 months, lactation 10.1 months; large buffalo farm: 13.6 months and 9.4 months respectively. Medium cow farm: 12.40 months calving interval, 10.0 months lactation period; medium buffalo farm: 12.5 months calving interval and 9.0 months lactation period. Small cow farm: 12.30 months calving interval, 10.2 months lactation period; small buffalo farm: 14.1 months calving interval and 9.3 months lactation period.

Seasonal Production Split: Large farms: 56.1% flush, 43.9% lean (cow: 30.1% flush/24.3% lean; buffalo: 26.0% flush/19.6% lean). Medium farms: 56.5% flush, 43.5% lean (cow: 30.8%/24.4%; buffalo: 25.7%/19.1%). Small farms: 56.5% flush, 43.5% lean (cow: 30.8%/24.9%; buffalo: 25.7%/18.6%).

Milk Yield: Large cow: 11.8 L/day (flush), 9.6 L/day (lean); large buffalo: 10.3 L/day (flush), 7.7 L/day (lean). Medium cow: 11.9 L/day (flush), 9.4 L/day (lean); medium buffalo: 9.9 L/day (flush), 7.4 L/day (lean). Small cow: 11.8 L/day (flush), 9.5 L/day (lean); small buffalo farm: 9.8 L/day (flush), 7.1 L/day (lean).

Feed Prices: Average green forage NRs. 2.4/kg, dry forage NRs. 6.9/kg, silage NRs. 12.0/kg, concentrate NRs. 44.8/kg. Concentrate cost was highest in Gandaki (NRs. 46.0/kg) and lowest in Madhesh (NRs. 43.5/kg).

Policy Interventions: Existing policies address year-round forage/fodder production, silage and hay conservation, breed improvement, climate-resilient technology, lactation management, expansion of chilling and processing capacity, dairy commercialization, livestock insurance, soft credit, cooperative strengthening, and market system development.

SMP Plant Assessment: SMP plants were established to absorb flush-season surplus, substitute imports, and retain farmers in dairy production. Currently operating at only 33.82% of installed capacity, producing an estimated 4,516 MT SMP annually. Plants were set up without adequate strategic planning: lacking milk procurement plans, alternative market assessments, export protocols, cold chain infrastructure, and working capital management frameworks. Technically, SMP plants are feasible as they absorb surplus milk, prevent dumping, stabilize collection, and support farmer retention. Economically and financially, they are only conditionally feasible: below-optimal operation inflates processing costs, products remain unsold, cash recovery fails, and farmer payment liabilities escalate.

Core Drivers of Seasonality: Dependence on rainfed forage, seasonal green fodder availability, climatic stress (heat, erratic precipitation), and traditional livestock management are the primary drivers. Post-monsoon and winter months favor productivity; summer and dry months sharply reduce yields through fodder scarcity, heat stress, and poor feeding practices. During flush seasons, dairies over-collect relative to market absorption capacity, accumulating unsold butter and SMP while delaying farmer payments. During lean seasons, dairies operate below capacity, raising production costs, weakening cash flow, and further impairing farmer payments.

Recommendations:

1. **National Feed and Forage Security Program:** Establish forage production zones/clusters, silage pits, silage machine, hay units, fodder seed multiplication centers, forage irrigation, community feed banks in drought-prone areas, and promote perennial species (Napier, oats, berseem, stylo, fodder trees).
2. **Lean Season Milk Incentives:** Implement differential milk pricing in lean season anchored to a cloud-based data system; provide premium prices/bonuses for year-round suppliers.
3. **Buffer Stock and Export Promotion:** Establish a GON-overseen national SMP and butter stabilization reserve; develop export protocols aligned with regional and international dairy trade agreements.
4. **Cold Chain and Collection Infrastructure:** Build chilling centers at strategic milkshed areas, refrigerated transport systems, and solar-powered cooling in remote areas.
5. **Reproductive Health and Herd Management:** Establish cloud-based breeding calendars, expand AI services with sexed semen/registered bulls, and implement animal specific feeding with mineral mixtures, balanced rations, and heat stress management.

6. **Climate-Resilient Dairy Systems:** Raise farmer awareness on climate change; promote climate-smart sheds, water harvesting, drought-resilient fodder, and economic irrigation; establish cloud-based annual milk balance forecasting, monitoring, and weather advisory systems.
7. **Dairy Governance Reform:** Formulate a National Seasonal Milk Stabilization Taskforce for rapid farmer support; integrate cloud-based annual milk balance forecasting and monitoring.
8. **Reform subsidy system/practice:** One door practice for subsidy articulating it in cloud-based data system and evenly distribute the subsidy to all farmers/ entrepreneurs and encourage competitiveness in milk production.
9. **Amendment in quality standard and farm gate milk price**: Discourage volume-based pricing and encourage quality / total solid based pricing, remunerative pricing between the season, establish code of conduct among the value chain actors, and reduce the tendency of milk sale to parties other than purchase agreement made.
10. **Dairy Financing and Payment Reform:** Introduce mandatory 15-day milk payment via automatic online systems; provide subsidized seasonal working capital loans for the dairy sector.
11. **Capacity Building and Extension:** Train farmers on IT-based dairy management, silage production, balanced feeding, and year-round consistent milk production; operationalize problem-based professional and management training for cooperatives and processors.

CHAPTER I
INTRODUCTION

1.1 Background

Dairy sector is one of the key pillars of the Nepalese economy, playing an essential role in both national economic growth and rural livelihoods. Dairy is deeply integrated into rural life, contributing directly to household food security by providing a reliable source of nutrition, while also helping reduce poverty driving towards self-employment and regularize family income. -generation opportunities.

Its overall sustainability and competitiveness depend largely on how efficiently milk is produced, how well demand and supply are managed, and how effectively pricing policies support both farmers and consumers. This is particularly important because the sector enables a regular flow of cash from urban markets back to rural households, strengthening the local economy. In Nepal, around forty-five percent of the total milk produced is consumed or retained by farming families themselves for food, feeding calves, or home processing. The remaining portion enters the market through both formal and informal channels, including dairy cooperatives, milk collection centers, local sweet shops, small traders, neighbors, hotels, and restaurants demonstrating the wide and diverse market network that supports rural producers and connects them to urban consumers.

Milk production in Nepal follows a clear seasonal pattern. Supply is **highest from September/oct to March/April**, when buffalo milk production started in pick, started mild weather and cow started calving while green forage and fodder is also found abandon. Production then **declines from April/May to August/September** due to shortages of green feed, reliance on low-quality dry fodder, heat stress, and the natural decline in lactation, especially buffaloes, which are more seasonal breeders. As a result, Nepal faces a **surplus of milk in the mild cooler weather** and **shortages in the dry season**, creating strong seasonal fluctuations in the dairy market.

National Dairy Development Board (NDDB) is an apex level policy making body with the major functions and responsibilities of formulating and recommending policies and plans for dairy development in Nepal; strengthening the dairy sector by bringing coordination between private and public sector, formulating and recommending price fixing policies of milk to Government of Nepal, monitoring and evaluating dairy development programs and mobilizing funds for dairy sector development.

In Nepal, the cyclical pattern of milk production leads to significant fluctuations in supply, with surplus volumes during the flush season and acute shortages during the lean season. These swings create persistent challenges throughout the dairy value chain from farmers and cooperatives to processors and retailers. During periods of peak production, the available processing capacity often becomes insufficient to handle the excess liquid milk, forcing cooperatives and dairies to either sell at distressed prices or dispose of unsellable volumes, resulting in economic losses and reduced farm incentives. In contrast, lean seasons are marked by limited milk availability, which disrupts processing operations, reduces product diversity, and constrains the supply of dairy items to urban markets. This seasonal imbalance undermines efficiency, increases production costs, and limits the sector's ability to meet consistent consumer demand.

Recognizing these challenges, the Dairy Development Policy 2078 highlights the strategic use of **skimmed milk powder (SMP) and whole milk powder (WMP)** as a key tool for stabilizing supply. By converting surplus milk into powder during the flush season, the industry can store a storable, transportable, and reconstitute product that can later be utilized during the lean months. This approach not only minimizes wastage and ensures continuity of milk supply, but also supports price stability, strengthens processing viability, and enhances overall resilience of the dairy sector. Through such measures, Nepal aims to reduce seasonal vulnerabilities and build a more reliable and efficient dairy value chain.

1.2 Rationale of the study

The rationale for this study arises from the urgent need to address the marked seasonal fluctuations in milk production that continue to challenge Nepal’s dairy sector. These seasonal shifts generate significant supply–demand imbalances, which in turn create market instability, depress producer incomes, and lead to inefficient use of resources across the value chain. Understanding this issue is essential, as milk shortages during lean periods force processors to operate below capacity, while surplus production during flush seasons often results in wastage or distressed sales.

This research is therefore designed to systematically investigate the root causes of production seasonality, including climatic patterns, variations in feed and fodder availability, and the reproductive cycles of cattle and buffalo. It will also assess the broader socioeconomic impacts on farming households and rural economies. By examining these dimensions, the study seeks to identify practical and evidence-based mitigation measures, such as improved year-round fodder management, adoption of better breeds and genetic improvement programs, and supportive policy and institutional interventions.

Ultimately, the goal is to contribute to more stable milk production throughout the year. The insights generated will help policymakers, cooperatives, and private-sector actors develop more resilient and efficient dairy value chains that ensure consistent farmer incomes, strengthen national food security, and promote the long-term sustainability of Nepal’s dairy industry—one of the most vital components of the country’s agricultural economy.

1.3 Objectives of the study:

a) Identify the trend (using 4 years of data) of seasonal variation in milk production and forecast the trend for the next 3 years at different level of farmer: small, medium, large farms delivery milk including cooperative level.
b) Identify the causes for the seasonal variation of milk production (availability of green grass, forage, nature of dairy animals, specific climatic conditions, breeding cycles) etc.
c) Assess the impact of seasonality of milk production on farmers, dairy industries, and consumers.
d) Recommend ways to mitigate the effect of seasonality on farmers, dairy industries, and consumers.
e) Assess the performance (sustainability/ feasibility aspects) of powder plant operation as a strategic means to mitigate the effect of seasonality.

1.4 Scopes of the study:

The scope of the study mainly focused on two points/stages.

a) Review the literature for milk production, productivity, and seasonal variation in milk production including national and neighboring countries
b) Review and analyze policy and plans related to seasonality.
c) Review the literature on the seasonal pricing, along with the methods adopted.
d) Collect and analyze data from Koshi, Madhesh, Bagmati, Gandaki, and Lumbini provinces.
e) Analyze seasonal variation in milk yield and assess the impact of breeding, feeding, and animal health.
f) Identify and analyze the province-based milk production in different levels of dairy farm size (small, medium, and large)
g) Review the milk price received by farmers from the formal and informal sectors
h) Identify challenges arising from seasonal surplus and shortage
i) Analyze seasonal milk production trend and associated challenges
j) Suggest and way forward to mitigate the effect of seasonal milk production

1.5 Limitations of the study:

The study was undertaken in major milkshed areas. So, the result may not represent overall national scenario. Furthermore, while the project was undergoing, national parliamentary election, it took more time to collect the data from the field.

CHAPTER. II
METHODOLOGY OF THE STUDY

Both qualitative and quantitative research method was adopted to undertake the assignment. While both primary and secondary data was utilized to come up the concreate findings and recommendations. Following methodological approaches were used:

2.1 Desk study/ literature review

Literatures/ documents on milk production, productivity, and seasonal variation, way out for minimizing the seasonal variation and the strategy to be undertaken to combat the variation was reviewed. The national policy, plan and the policy and plan intervene by neighboring countries and other countries across the globe to address the seasonality problems. Also reviewed the documents related to seasonal pricing, the criterion used to practice such pricing policy/ plan and its impact after implementation. Also collect the information effect of establishment of SMP in different location of the country and their operational status. Government's policy, programs, guideline, operating manuals on milk powder plant, ADS, reports, Department of Custom (DoC), neighboring SAARC country and China reports, import, export of the milk powder across the regions was reviewed.

The secondary information on the basic data was collected visiting to different websites, blogs, connecting the scholars and other information technology within the country, neighboring countries and across the globe.

2.1.1 Consultation meeting with concerned authorities

Consultative meeting with concern officials in National Dairy Development Board (NDDB) was done and discussed on various aspects of milk production, productivity, seasonal variation and impact of seasonal variation in other all dairy sector value chain, milk processing including milk powdering and overall scenario of SMP production and its import/export situation. Importance of milk powder plant its gravity to mitigate the seasonality in milk production. Also discuss on the policy, plan and programs utilized by federal, provincial and local level governments to improve the production and productivity and consistent milk production through the year. Experiences of operating SMP plant to solve the seasonality of milk production and its impact in overall economics of dairy value chain.

2.1.2 Sampling

The study was designed covering Koshi, Madehesh, Bagmati, Gandaki and Lumbini provinces of Nepal. Two districts were selected from each province to collect information, Milk Producer Cooperatives (MPCs) and their associated producer farmers from rural and peri-urban areas in respective districts were taken as entry point of data collection. The required sample farmers were selected for HH survey using random sampling method. Following table (Table 1) indicate the sample

Table 1: Geographical distribution of sample districts and markets

Province	**Districts for Producer Farmers (MPCs) survey**	**Sample MPC**	**Sample per MPC**	**Total sample per province**
Koshi	Ilam, Jhapa	4	20	80
Madhesh	Dhanusha, Parsa	4	20	80
Bagmati	Kavre, Chitwan	4	20	80
Gandaki	Kaski, Tanahu	4	20	80
Lumbini	Rupandehi, and Banke	4	20	80
	Total	**20**	**100**	**400**

2.1.3 Sampling and the sample Size

The study utilized stratified random sampling method to select the required sample size. Among others, the sample size of farmers and consumers was designed by using the following formula[1] where it is assumed that the number of farmers and consumers to be greater than 100,000 and confidence level to be 95 per with 5 per cent margin of error:

$$n = \frac{\chi2 * N * P * (1-p)}{(ME^2 * (N-1)) + (\chi2 * P * (1-p))}$$

where,

n is required sample size
$\chi2$ is chi square for the specified confidence level at 1 degree of freedom (Value* 3.841 for
5% confidence level with 1 degree of freedom)
N is population size
P is population proportion (0.5)
ME is desired Marginal error (expressed as a proportion)

By using the above formula, the sample size was arrived at 384. The sample is further increased by 5 per cent to account for contingencies such as non-response or recording error. Therefore,

The final sample size will be: n + 5% = 384

This sample will be divided almost equally for each district/MPC. However, the sample size will be more than the formula derivation, as presented in the following table (Table 2 and 3).

[1] Krejcie & Morgan: "Determining Sample Size for Research Activities" (*Educational and Psychological Measurement*, #30, pp. 607-610), 1970

Table 2: Sample farmers

Farmers' size	No. of animals	No. of farmer to be surveyed/district	Districts	Total
Large	>20	5	10	50
Medium	6 -20	15	10	150
Small	1-5	20	10	200
Total		**23**	**10**	**400**

The farmers were further stratified to three strata viz: large, medium and small holders as specified by Department of Livestock Services was selected for interview. Based on the strata, 50 big, 150 medium and 200 small holder farmers were selected for interview.

Two Focus Group discussion (FGD) and three KII from each district was undertaken to triangulate the information from the HH survey. The district level KII was done with DMPCU, Palika Livestock section and cooperative section, the custom offices wherever available. FGO was conducted with MPC members and farmers.

Table 3:Summary sample

Province	Sample		Quantitative	Qualitative	
	District	MPC	Farmers	KII	FGD
Koshi	2	4	80	6	4
Madhesh	2	4	80	6	4
Bagmati	2	4	80	6	4
Gandaki	2	4	80	6	4
Lumbini	2	4	80	6	4
Total	10	20	400	30	20

Under this sample design a total of 400 farmers HH, 20 FGD and 30 KII was conducted. Direct observation of each sample HHs and dairy industries was done during the survey. Provincial KII will be from Ministry of Land Management, Agriculture and Cooperatives, Livestock Directorate, PDDB while at central level KII was taken from MoLD, NDDB, DLS, DoC, CDCAN, DDC, NDA, DIA and other stakeholders.

2.1.4 Tools preparation

Based on the literature review and consultative meeting with concerned authorities of NDDB structured and semi-structured questionnaires/checklists was prepared addressing the objectives and scope of assignment as defined in the ToR. Semi structured checklists were designed to conduct Focus Group Discussion (FGD), Key Informant's Interview (KII) and secondary information collection. The data collection tools are presented in Annex: 1

2.1.5 Selection and training to the enumerators

Enumerators were shortlisted from the NEPC roster and selected administering the interview. Orientation training will be organized to orient the field research team members on the project goal, objectives, methodology of the research, sampling design, sampling process, sample size, quality control of the data collection processes. After the training session, simulation exercise was conducted to check the respondent friendly questionnaire. The Expert Team Members facilitate the training and simulation exercise and collect feedback on the contents, ordering sequences of the questions/issues in the interview schedules/checklists and time taken for filling the questionnaires/checklist by the Enumerators. After incorporating the feedback survey tools were finalized and submitted to NDDB for final approval. Receiving the approval from NDDB, field was initiated.

2.2. Field survey

The field work was started organizing meeting with District Milk Producers Cooperative Union (DMPCU) followed by MPC. Sizes of dairy farms (no. of dairy animal holding by the farmers) in the particular area was taken from that meeting. Also identify the location for farmer household survey, KII, FGD and observation.

2.2.1 Household Survey

Household survey was done administering the structured questionnaire using KOBU tool as per the sample size fixed earlier.

2.2.2 Key Informant's Interview

Key Informants drawn from among the concerned stakeholders who are involved directly or indirectly in the project implementation process at various levels and considered knowledgeable about the project activities. The district level KII was with DMPCU, VHLEC. Provincial Key Informants was done from DoLFD, MoLMAC, Central level key persons representing NDDB, MPCS, MPCU, CDCAN, dairy processors, DLS, Department of Customs (DoC), Department of Cooperative (DoC) at the center.

2.2.3 Focus Group Discussion

The focus group discussion was done with 7-10 participants in each FGD assuring balance in gender and social inclusion. Discussion was organized in public places convenient to all participants. One member of the research team will facilitate the discussion while other will record literally the words, phrase without distorting the opinion of the participants. Semi-structured checklist was used for conducting the discussion. Participants of the FGD will be members of Milk Producer's Cooperatives (MPCs), milk vendors, farmers group members, teachers and others.

2.2.4 Direct Observation

The research team during the course of data collection from the field was observed the field from the eye of dairy and dairy farming and conducive environment for milk production variables i.e. feed, feeding, housing, breeding, care management, animal health service availability and market. The expert team keenly observed the farmers farm and dairy industries and assess the physical, infrastructure, social, environmental, geological, natural resources and their use pattern etc.

2.2.5 Quality Assurance of the data collection

Quality assurance was with the training to data collector. The team leader and experts of the research team were made field visit and oversight the data collection and provided feedback to the data collectors as per required. A communication loop was established with NDDB, NEPC and field team. WhatsApp group was formulated to communicate with the field team and experts. The problems faced by the data collectors was solved by expert team and data manager.

The data forwarded by the enumerators electronically was monitored by the data manager. All data will be cleaned to ensure that the data analyzed was of robust quality. The development of coding frame and categories used in the qualitative data analysis was be done. The fact that the data was received from several different sources allowed triangulation and further ensured quality.

2.2.6 Progress update

The progress report of the study was communicated to NDDB regularly during study period.

2.2.7 Data Management and analysis

Quantitative data— All completed forms was placed separately in a confidential place at NEPC office. Questions with open-ended responses were coded manually. A database was designed using CSPro 5.0 version and MS-Excel. Data was checked for out-of- range values and inconsistencies between variables. The data was then transferred to the IBM SPSS Statistics version 13 software (SPSS), and data analysis, tabulation was carried out.

Qualitative data — Qualitative data collected through FGD and key informant interviews with respondents at each level was organized by key issues and themes and the answers to questions within the themes was grouped and summarized in data analysis frameworks. Verbatim quotes that illustrated the views of the majority of participants or contradicted the majority view was extracted from the interviews. These issues were then summarized by district and type of farm, consumer type and will be included within the relevant sections.

2.2.8. Draft report preparation

Draft report: Draft was prepared after tabulation, analysis and interpretation of qualitative and quantitative information collected from the field, secondary information following the objectives and scope of the study.

Report dissemination: Draft report was disseminated to firstly to NDDB and secondly inviting all concern stakeholders meeting. Feedback from the meeting participants have been incorporated and in the final report.

Final Report: After incorporating the feedback from stakeholders and NDDB, final report has been prepared and submitted to NDDB.

CHAPTER III
MILK PRODUCTION TREND

3.1 Milk production across the globe

Based on the recent FAOSTAT and global dairy production statistics, world milk production has continued to increase steadily during the period from 2020/21 to 2024/25. It is mainly driven by rising dairy product demand, expansion of commercial dairy farming, genetic improvement of dairy animals, and increasing milk production in Asia, especially in India and China. It was found stress, shortages of feed, and disease outbreaks that affected production growth in some years. However, global milk output maintained an overall upward trend.

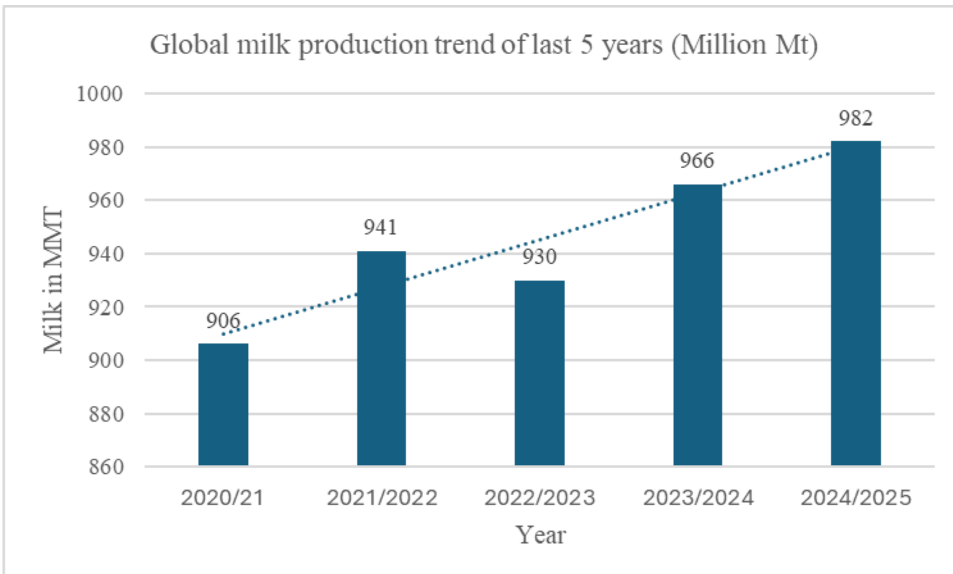

Figure 1 Global milk production trend in last five years

Source: Wikipedia – List of Countries by Milk Production

Figure *2024/25 represents recent FAOSTAT/global estimate and provisional international dairy statistics.

The data show that global milk production increased from approximately 906 million metric tons in 2020/21 to nearly 982 million metric tons in 2024/25. Asia remained the dominant milk producing region, contributing the largest share of global production, while India continued to be the world's largest milk producer. Cow milk accounted for the majority of total milk production globally, followed by buffalo milk, goat milk, sheep milk, and camel milk.

The slight decline observed during 2022/23 was largely associated with: Rising global feed prices, drought and heat stress (climate change effect), disease outbreaks, supply chain disruptions, increasing production costs in Europe and other dairy exporting regions. However, production recovered strongly during 2023/24 and 2024/25 due to improved feed availability, increased dairy investment, and expansion of commercial dairy systems in developing countries. Major milk producing countries are: India, USA, China, Pakistan, Brazil, Germany, Russia, France, New Zealand and Turkey.

India alone produced approximately 239 million metric tons of milk in 2023/24 and around 248 million metric tons in 2024/25, maintaining its position as the world's largest milk producer.

3.2 Milk production in SAARC regions

Milk production in South Asian Association for Regional Cooperation (/SAARC) countries has shown a steadily increasing trend during the period from 2020/21 to 2024/25. This mainly due to population growth, rising dairy demand, expansion of commercial dairy farming, genetic improvement of dairy animals, improved veterinary services and feed and feeding practice. India remained the dominant milk producer in the SAARC region, followed by Pakistan and Bangladesh, while Nepal also recorded gradual growth in milk production over the period.

Table 4: Milk production in SARRAC countries (Million MT)

Countries	**2020/21**	**2021/2022**	**2022/2023**	**2023/2024**	**2024/2025***
India	210	221	231	239	248
Pakistan	61	63	65	67	69
Bangaladesh	10.7	11.5	12.3	13.1	13.8
Nepal	2.3	2.4	2.5	2.6	2.7
Srilanka	0.53	0.56	0.58	0.6	0.62
Bhutan	0.09	0.1	0.1	0.11	0.11
Afganisthan	2.1	2.2	2.3	2.4	2.5
Maldives	Trace	Trace	Trace	Trace	Trace

*2024/25 values are provisional estimates based on recent FAOSTAT, government livestock statistics, and regional dairy sector reports.

Sources-1. FAOSTAT – Food and Agriculture Organization Statistical Database
2. SAARC Statistical Yearbook 2023
3. India Ministry of Fisheries, Animal Husbandry and Dairying – Basic Animal Husbandry Statistics
4. Pakistan Economic Survey – Livestock Sector Statistics
5. Department of Livestock Services Nepal – Statistical Information on Nepalese Agriculture and Livestock
6. Bangladesh Department of Livestock Services

Based on the data available from authentic sources of SAARC countries, dairy sector continued to expand during the last five years. Where India accounting for nearly 75–80 percent of total regional milk production. Pakistan is found the second-largest milk producer in South Asia, which is largely driven by buffalo based dairy systems. While on the other hand, Bangladesh also demonstrated rapid milk production growth. It is due to expansion of crossbred dairy cattle and commercial dairy farms. Nepal showed moderate but steady growth in milk production, mainly through increasing adoption of improved dairy cows and buffaloes in milk pocket areas and improving dairy farm management system.

In South Asia particularly in Inda and Pakistan, buffalo milk contributes a significant share of total milk production. Nepal also relies heavily on buffalo milk production, while it is observed that the proportion of cow milk has gradually increased in recent years because of expansion of Holstein Friesian (HF) and Jersey crossbred dairy cattle due to expanding Artificial Insemination (AI) service in milk production pocket.

The growth in regional milk production has been supported by: expansion of artificial insemination (AI) services, improved dairy animal breed/genetics, commercial dairy farm development, access and availability of better veterinary services, feeding balanced ration (increasing concentrate feed use), expanding forage and fodder production conducting mission program through improved fodder cultivation, urbanization and rising demand of dairy products due to health-conscious people. Despite it, the region still faces several major constraints: shortage of feed shortages, climate stress, long calving intervals, new variant disease prevalence, weak cold chain infrastructure, and low productivity of indigenous animals and culling is difficult.

3.3 Milk production projection globally

Compound Annual Growth Rate (CAGR) method was used to project the milk production. Footing on the milk production timeseries data for the period 2020/21–2024/25, future milk production for the next five years (2025/26–2029/30) has been projected. This method is applied in many countries including India, Nepal. The reason for using this method is: the historical data show a relatively stable increasing trend, the available time series is short (5 years), is widely used in agricultural production forecasting, it provides smooth medium-term projections where long-term structural shocks are not modeled separately.

The following formula was used:

CAGR= $((EV/BV)/1/n-1)\times100$

where:
EV = Ending year production
BV = Beginning year production
n= Number of years

The projected future production was estimated using:
Future Production = Present Production× (1+r)t

Where:

r = annual growth rate (CAGR),
t = projected number of years.

Table 5: Projection of milk production globally

Fiscal year	Milk (Mt)	MMt
2025/26	1,002,000,000.00	1002.00
2026/27	1,022,000,000.00	1022.00
2027/28	1,043,000,000.00	1043.00
2028/29	1,064,000,000.00	1064.00
2029/30	1,086,000,000.00	1086.00

Using the above approach, the estimated average annual global milk production growth rate during 2020/21–2024/25 was approximately 2.0 percent.

The projection indicates that milk production may exceed 1.08 billion metric tons by 2029/30 under current growth trend of the continues globally. Growth is expected mainly driven primarily by Asia, especially India, Pakistan, and China, together with continued expansion of commercial dairy systems in developing economies across the globe.

3.4 Milk production projection in SAARC countries

The projections suggest that India will continue dominating South Asian milk production and may exceed 300 million metric tons by 2029/30. Pakistan is expected to maintain steady growth through expansion of buffalo-based dairy systems. Bangladesh is likely to experience relatively rapid growth due to commercialization and crossbreeding programs. Nepal’s milk production is projected to grow gradually due to increasing adoption of improved dairy cattle and buffaloes in milk pocket areas. Smaller SAARC countries are expected to maintain moderate growth but remain limited by land availability, feed deficits, and small dairy sectors.

Table 6:SAARC country milk production projection (Million Mt)

Countries	2025/26	2026/2027	2027/2028	2028/2029	2029/2030
India	257	267	278	289	301
Pakistan	71	73	75	77	79
Bangaladesh	14.4	15	15.7	16.4	17.1
Nepal	2.78	2.84	2.91	2.98	3.05
Srilanka	0.64	0.66	0.68	0.7	0.72

Countries	2025/26	2026/2027	2027/2028	2028/2029	2029/2030
Bhutan	0.11	0.12	0.12	0.13	0.13
Afganisthan	2.6	2.7	2.8	2.9	3
Maldives	Trace	Trace	Trace	Trace	Trace

Assumptions Used in Projection: Continued population and dairy product demand growth, stable dairy development policies, expansion of improved dairy genetics. Continued AI and veterinary services, gradual improvement in feeding systems, no major global livestock disease pandemic occur, moderate climate variability without catastrophic production collapse.

Limitations of Projection: The CAGR trend projection method does not fully capture: climate shocks, geopolitical disruptions, disease outbreaks, feed price volatility, sudden policy changes, technological breakthroughs. In such circumstances, the projected figures may be indicative medium-term estimates rather than exact forecasts.

3.5 Milk production trend in Nepal

Based on the data from MoALD and Agriculture diary 2026, milk production data from 2020/21 to 2024/25 shows, gradual increasing trend over the five-year period. It was found that, total national milk production increased from approximately 2.48 million metric tons in 2020/21 to about 2.72 million metric tons in 2024/25. This indicated an overall increase of nearly 9.5 percent over five years period. This growth reflects the gradual expansion of commercial dairy farming, increasing breed improvement program through Artificial Insemination (AI) services, improve in access and availability of veterinary services, expansion of forage mission and improved market demand for milk and dairy products due to health sensitive consumers.

A comparison between cow milk and buffalo milk production trends shows an important structural transformation occurring within Nepal’s dairy sector development. Traditionally, buffalo milk was dominating to national milk production due to the widespread rearing of indigenous and improved buffaloes under smallholder farming systems across the country. The time series data for last five years indicated that the buffalo milk remained single largest contributor to total national milk production. While on the other hand, cow milk production has been increasing much more rapidly than buffalo milk in recent years due to increasing crossbred improved cow.

It was found that, cow milk production increased substantially from 1.06 million metric tons in 2020/21 to approximately 1.30 million metric tons in 2024/25. This shows an increase of cow milk production by 22.8 percent over the five-year period. The sharp rise in cow milk production is primarily associated with the rapid expansion of improved and crossbred dairy cattle, augmenting AI using semen from high productive bull particularly

Holstein Friesian (HF) and Jersey crosses, in commercial milk pocket areas. It is also associated with improved feeding practices, increasing use of concentrate feed, growing commercialization of peri urban dairy farming have also contributed to the increasing contribution of cow milk production.

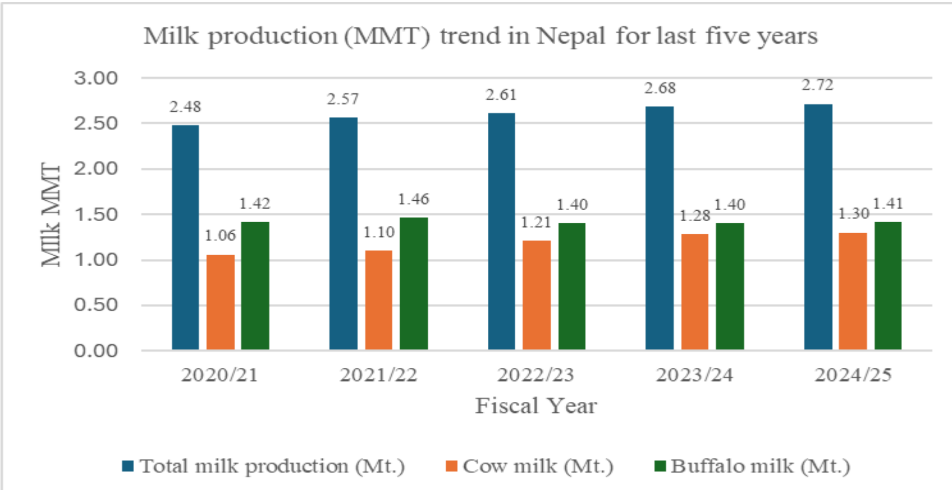

Figure 2 Milk production in Nepal (MT)

Source: Statistical Information of Nepalease Agriculture (MoALD)-2024 and Agriculture Diary 2026

While on the other hand, buffalo milk production remained relatively stable during the same period (2020/21-2024/25). Buffalo milk production increased slightly from 1.42 million metric tons in 2020/21 to 1.46 million MTs in 2021/22, which was declined to around 1.40 MTs in 2022/23 showing only marginal recovery in later years. It was observed that, by 2024/25, buffalo milk production reached approximately 1.41 million MTs, which is slightly lower than the production level recorded in 2020/21. This indicated buffalo milk production growth is stagnated in compared to the rapidly increasing cow milk production.

The declining growth trend of buffalo milk production are associated with several structural and biological constraints affecting buffalo based dairy systems: have longer calving intervals, seasonal breeding behavior, delayed maturity, lower reproductive efficiency, and slower genetic improvement in comparison to cow. Additionally, shortage of feed, limited availability of improved Murrah genetics, inadequate reproductive management lower conception rate through AI, and declining grazing resources could be the reasons behind it.

In contrast, the data further shows that the contribution share of cow milk to total national milk production has increased steadily over the last five year. In 2020/21, cow milk accounted for approximately 42.8 percent of total milk production, while by 2024/25, the cow milk share increased to nearly 48 percent, shrinking buffalo milk contribution to around 52 percent. This trend indicates that Nepal's dairy sector is gradually transforming from traditional buffalo dominated milk production to improved dairy cattle farming.

The rapid growth of cow milk production has important implications for Nepal's future dairy development strategies as crossbred dairy cattle generally produce substantially higher milk yields compared to indigenous buffaloes. This allows farmers to increase production under limited land and feed resources for milk production. Moreover, improved dairy cows require better feeding, disease management, cooling, veterinary services, and intensive management systems that may increase the cost.

Overall, the data suggest that Nepal's dairy sector is undergoing gradual commercialization followed by transformation in genetics, feed and feeding practice, animal health care management and expanding milk market. While buffaloes continue to play a dominant role in national milk production, the faster growth rate of cow milk production showing increasing adoption of improved dairy cattle farming systems to response growing urban milk demand and commercialization of dairy farming through the dairy sector domain.

3.6 Province wise milk production in Nepal

Among 7 provinces, Lumbini province contributed more (19.49%) in total national milk production in 2023/24, followed by Koshi (19.18%), Bagmati (17.95%), Madhesh (16.41%), and least from Karnali province (4.25%). Province wise contribution to total national milk production is presented in the following table.

Table 7: province wise milk production in Nepal

Nepal and Provinces	Production of Cow Milk (Mt)	Production of Buffalo Milk (Mt)	Total milk produced (Mt)	Share of Province in Milk Production (%)
Nepal	**1281718**	**1402156**	**2683874**	**100.00**
Koshi	396904	117847	514751	**19.18**
Madhesh	176371	263958	440329	**16.41**
Bagmati	228858	252913	481771	**17.95**
Gandaki	107375	148286	255661	9.53
Lumbini	211573	311581	523154	**19.49**
Karnali	24760	89376	114136	4.25
Sudurpaschim	135877	218195	354072	13.19

Source: MoALD, 2023/24

3.7 Districts producing more milk in Nepal

Among 77 districts, Morang district of Koshi province used to produce more milk (135071 Mt.) in 2023/24 which contributed about 5% to the national milk production, followed by Sunsari district of Koshi province (4.16%). Under Madhesh province, Sarlahi district is number one district contributing 2.84% of total national milk production in the same year. In Bagmati province, Chitwan district contributed more i.e. 3.54%, followed by Kavre (2.99%). Nawalparai-East of Gandaki used to contribute highest (2.06%) among other districts of the province, followed by Kaski (1.96%) in the national milk production in 2023/24. Banke district is the most milk producing district in Lumbini province, contributed 3.72% to national milk production in 2023/24, followed by Rupandehi (3.43%). Only Surkhet district under Karnali province contributed highest share (0.89%) among other districts in national milk production in same year. Whereas in Sudurpaschhim province, Kailali and Kanchanpur districts contributed considerable amount, i.e. 3.6% and 3.25%, respectively, in national milk production in 2023/24. The details on the list of districts under each province producing and contributing more in national milk production in FY 2023/24 is presented in the following table.

Table 8: List of Districts producing more milk in 2023/24

Nepal, Provinces and Districts	Production of Cow Milk (Mt)	Production of Buffalo Milk (Mt)	Total milk produced (Mt)	Share of Province in Milk Production
Koshi				
Ilam	33472	4830	38302	**1.43**
Jhapa	77773	7655	85428	**3.18**
Morang	118967	16104	135071	**5.03**
Sunsari	84266	27436	111702	**4.16**
Madhesh				
Bara	27780	31293	59073	**2.20**
Dhanusha	24493	36030	60523	**2.26**
Mahottari	20371	40573	60944	**2.27**
Saptari	35409	29059	64468	**2.40**
Sarlahi	21648	54664	76312	**2.84**
Bagmati				
Kabhrepalanchok	38,253	42,027	80280	**2.99**
Chitwan	48,995	46,146	95141	**3.54**
Dhading	20,980	29,058	50038	**1.86**
Makwanpur	26,880	23,440	50320	**1.87**
Gandaki				
Kaski	27975	24697	52672	**1.96**
Nawalparasi east	36795	18375	55170	**2.06**

Nepal, Provinces and Districts	Production of Cow Milk (Mt)	Production of Buffalo Milk (Mt)	Total milk produced (Mt)	Share of Province in Milk Production
Lumbini				
Banke	46073	53696	**99769**	**3.72**
Bardiya	35449	33320	**68769**	**2.56**
Kapilbastu	25185	29680	**54865**	**2.04**
Rupandehi	25058	67087	**92145**	**3.43**
Karnali				
Surkhet	10895	12902	**23797**	**0.89**
Sudurpaschim				
Kailali	38389	58240	96629	**3.60**
Kanchanpur	32462	54639	87101	**3.25**

Source: MoALD, 2023/24

3.8 Milk Production projection in Nepal

The milk production projection indicates that Nepal's total milk production is expected to continue growing steadily over the next five years. It is expected that the historical growth trend continues under similar production circumstances. Based on the CAGR estimation approximately 2.33 percent annual growth is expected. Total milk production may increase from about 2.72 million metric tons in 2024/25 to approximately 3.05 million metric tons by 2029/30 owing the growth rate before. The projected growth is likely to be supported by: increasing adoption of improved dairy cattle and buffaloes, expansion of artificial insemination services, commercialization of dairy farming, improved feeding and fodder management, rising urban demand for milk and dairy products, expansion of milk collection and processing infrastructure.

Table 9: Milk Production projection in Nepal

Fiscal year	MT	MMT
2025/26	2,778,649.00	2.78
2026/27	2,843,391.52	2.84
2027/28	2,909,642.54	2.91
2028/29	2,977,437.22	2.98
2029/30	3,046,811.50	3.05

However, future milk production growth may still be constrained by: shortage of feed and fodder, probability of disease prevalence, climate change and its stress, reproductive inefficiency, inadequate veterinary services, limited adoption of improved dairy technologies among smallholders and technology development and transfer. Therefore, while the CAGR based projection provides a useful medium-term estimate. Actual future production may vary depending on policy support, climate conditions, market dynamics, and technology development and transfer of technology to farmstead.

3.9 Cow and Buffalo Milk Production projection in Nepal

The projection analysis shows a major structural shift as cow milk production is projected to increase rapidly over the next five years, while buffalo milk production is expected to remain relatively stagnant under the current growth pattern and farmer's preference.

Based on the time series data from 2020/21–2024/25, cow milk production is projected to grow approximately 5.28 percent annually. Revised projection of cow milk is based on the projection of total milk production, which is distributed proportionately between cow and buffalo milk production based on their individual projected growth. It is thus expected that the cow milk production may increase from about 1.30 million metric tons in 2024/25 to nearly 1.66 million metric tons by the year 2029/30, with revised growth rate of 4.95 percent. This strong growth trend is mainly associated with the rapid expansion of improved and crossbred dairy cow viz: Holstein Friesian (HF) and Jersey crosses across the milkshed areas. Improved feeding practices, increasing use of concentrate feed, expansion of AI services, and commercialization of peri urban dairy farming are influencing factor for anticipated growth.

Table 10: Cow and Buffalo Milk Production projection in Nepal

Fiscal year	Cow (Mt)	MMt	Buffalo (Mt)	MMt
2025/26	1,365,154.69	1.37	1,413,494.31	1.41
2026/27	1,411,161.83	1.41	1,432,229.69	1.43
2027/28	1,514,457.15	1.51	1,395,185.39	1.40
2028/29	1,586,685.29	1.59	1,390,751.93	1.39
2029/30	1,656,223.00	1.66	1,390,588.50	1.39

In contrast, buffalo milk production indicated almost no growth with a slightly negative CAGR of approximately –0.09 percent as revealed by last five years' time series data. Revised projection of buffalo milk is based on the projection of total milk, which is distributed proportionately between cow and buffalo milk based on their individual projected growth. Under the current trend, buffalo milk production is projected to remain nearly constant at around 1.39 million metric tons till year 2029/30, with revised negative growth rate of 0.41 percent. The stagnant growth in buffalo milk production could be linked to several biological and management-related constraints, including seasonal breeding behavior, longer calving intervals, slower genetic improvement/ low conception rate through AI, shortage of feed, and lower adoption of improved reproductive technologies in buffalo production management systems.

The projections suggest that Nepal’s dairy sector is gradually transforming from a traditionally buffalo dominated production system toward an increasingly cow milk oriented commercial farming practice. It is thus expected that, if current trends continue, the contribution share of cow milk in national milk production will upscaling over the coming five years.

3.10 Milk Production Projection Based on Farm Size

The milk production projection has been done footing on the number of farms holding as per agriculture census CBS 2021, the farm size and proportion of lactating cows and buffaloes was derived from Livestock statistics of Nepal, Ministry of Livestock Development July 2017. While the milk production was taken from the statistical information of Nepalese agriculture (MoALD, 2023/24). The annual growth rate remains 2.33% per annum.

Table 11 : Milk production Projection Based on Farm Size

Fiscal year	Small	Medium	Large	Cow (Mt)	MMt
2025/26	1,174,907.53	171,979.39	18,267.77	1,365,154.69	1.37
2026/27	1,214,503.14	177,775.27	18,883.42	1,411,161.83	1.41
2027/28	1,303,403.29	190,788.20	20,265.66	1,514,457.15	1.51
2028/29	1,365,565.76	199,887.36	21,232.18	1,586,685.29	1.59
2029/30	1,425,412.73	208,647.57	22,162.70	1,656,223.00	1.66
Fiscal year	**Small**	**Medium**	**Large**	**Buffalo (Mt)**	**MMt**
2025/26	1,379,561.71	31,153.59	2,779.01	1,413,494.31	1.41
2026/27	1,397,847.32	31,566.52	2,815.85	1,432,229.69	1.43
2027/28	1,361,692.31	30,750.06	2,743.02	1,395,185.39	1.40
2028/29	1,357,365.28	30,652.35	2,734.30	1,390,751.93	1.39
2029/30	1,357,205.78	30,648.74	2,733.98	1,390,588.50	1.39

Nepal's national milk output is projected to grow from 2.78 million metric tons (MMt) in FY 2025/26 to 3.05 MMt by FY 2029/30 indicating an increase of roughly 268,000 Mt, equivalent to a compound annual growth rate of approximately 2.3%. This aggregate growth, however, masks a significant divergence between the two dominant dairy species.

Cow milk is the clear growth driver, rising steadily from 1.37 MMt to 1.66 MMt over the five-year horizon at a compound growth rate of nearly 5% annually. In contrast buffalo milk shows a much flatter route: it peaks early at 1.43 MMt in FY 2026/27 before gradually contracting to 1.39 MMt by FY 2029/30, a net decline of about 1.6% from its FY 2025/26 base. The practical consequence is a structural shift in Nepal's dairy composition: buffalo milk, which has traditionally been the larger of the two sources, is overtaken by cow milk starting in FY 2027/28, and the gap widens through the remainder of the projection period.

Farm size structure remains stable but reveals a heavily smallholder dominated sector. Across both species, small farms consistently account for the overwhelming majority of production which is roughly 86% of cow milk and 97–98% of buffalo milk in every projected year with medium and large farms contributing progressively smaller shares. Buffalo production in particular is almost entirely a smallholder activity, with large farms contributing under 0.2% of buffalo output throughout the period. Cow production shows marginally greater participation from Medium (12.6%) and Large (1.3%) farms, but the overall pattern confirms that commercial scale, large dairy operations remain a negligible share of national supply.

When the two species are combined, the small farm share of total national milk production edges down slightly, from about 91.9% in FY 2025/26 to 91.3% in FY 2029/30, while the combined medium share rises from 7.3% to 7.9% and large rises modestly from 0.76% to 0.82%. This gentle rebalancing is not driven by any shift in farm size proportions within either species those internal ratios are held constant across the projection but by the changing mix of cow versus buffalo milk in the total: since cow farms have a comparatively larger medium/large presence than buffalo farms, cow milk's rising share of the national total pulls the blended farm size distribution incrementally away from small and toward medium and large.

3.11 Province-Wise Milk Production Projection in Nepal

The below table represents the projection of province-wise milk production in flush and lean season over the period of 5 years from 2025/26 to 2029/30. Flush season and Lean season milk production is 56.33% and 43.67% of total milk production respectively as per this study finding. CAGR of 2.33%, derived using 5 years' time-series MoALD data on milk production, has been used to project the milk production in the respective season and provinces over 5 years. While these studies didn't not cover Sudurpaschim and Karnali Provinces, still the projection has been made for these two provinces also. It also observed that milk production in Karnali is low. Hence, it is required to intervene with more resources to adapt and expand new technologies to produce milk in close coordination between 3 governments.

Table 12: Province wise milk production Projection in Nepal (Flush and Lean Seasons) (Million Metric Tons)

Year	Season	Nepal	Koshi	Madhesh	Bagmati	Gandaki	Lumbini	Karnali	Sudur paschim
25/26	Flush	1.57	0.30	0.26	0.28	0.15	0.31	0.07	0.21
	Lean	1.21	0.23	0.20	0.22	0.12	0.24	0.05	0.16
	Total	**2.78**	**0.53**	**0.46**	**0.50**	**0.26**	**0.54**	**0.12**	**0.37**

Year	Season	Nepal	Koshi	Madhesh	Bagmati	Gandaki	Lumbini	Karnali	Sudur paschim
26/27	Flush	1.60	0.31	0.26	0.29	0.15	0.31	0.07	0.21
	Lean	1.24	0.24	0.20	0.22	0.12	0.24	0.05	0.16
	Total	**2.84**	**0.55**	**0.47**	**0.51**	**0.27**	**0.55**	**0.12**	**0.38**
27/28	Flush	1.64	0.31	0.27	0.29	0.16	0.32	0.07	0.22
	Lean	1.27	0.24	0.21	0.23	0.12	0.25	0.05	0.17
	Total	**2.91**	**0.56**	**0.48**	**0.52**	**0.28**	**0.57**	**0.12**	**0.38**
28/29	Flush	1.68	0.32	0.28	0.30	0.16	0.33	0.07	0.22
	Lean	1.30	0.25	0.21	0.23	0.12	0.25	0.06	0.17
	Total	**2.98**	**0.57**	**0.49**	**0.53**	**0.28**	**0.58**	**0.13**	**0.39**
29/30	Flush	1.72	0.33	0.28	0.31	0.16	0.33	0.07	0.23
	Lean	1.33	0.26	0.22	0.24	0.13	0.26	0.06	0.18
	Total	**3.05**	**0.58**	**0.50**	**0.55**	**0.29**	**0.59**	**0.13**	**0.40**

CHAPTER IV
SEASONALITY OF MILK PRODUCTION

4.1 Seasonality of milk production in South Asia

Milk production in South Asia shows the same broad seasonality, but for different biological reasons across the countries. Milk production usually follows a flush season (high supply) and a lean season (low supply), but the timing and intensity vary by species composition and production systems by countries:

- Buffalo dominant systems (Nepal, Pakistan, north west India) show stronger seasonality as buffalo breeding is more seasonal.
- Cow dominant/cooperative systems (much of India, parts of Bangladesh) show compliment seasonality because cattle calve year-round and feed systems are more managed.
- Smallholder mixed systems (Bangladesh, Nepal hills) are highly sensitive to fodder, heat stress, disease, extension services and market access.

Seasonal fluctuations in milk production remain one of the major characteristics of dairy systems in South Asian countries. These seasonal variations directly influence milk production, collection, dairy processing operations, milk prices, farmer income, and national dairy supply chains at large. The seasonal imbalance between flush and lean milk production continues to pose significant challenges for dairy sector planning and milk market stabilization process.

Table 13: Milk production seasons across south Asian countries and its effect

Season	Nepal	India	Pakistan	Bangaladesh	Effect
Winter, cold dry (Nov-Feb)	Flush	Flush	Flush	Moderate–high	Over supply
Spring / Pre-summer (Mar–Apr)	Moderate	Moderate	Moderate	Moderate	Transition
Summer / Hot dry (May–Jun)	Lean	Lean	Lean	Lean	Heat stress, fodder stress
Monsoon / Rainy (Jul–Sep)	Lean to recovery	Mixed	Lean to recovery	Mixed (feed improves)	Recovery begins where green fodder improves

Milk production in South Asian countries exhibits strong seasonal variation. This is due to changes in climate, fodder availability, animal physiology, feeding conditions and technology use. Countries such as Nepal, India, Pakistan, and Bangladesh generally experience distinct flush and lean milk production seasons throughout the year. This significantly influence milk supply, pricing, processing capacity, and dairy market stability.

During the winter and cold dry season (November–February), Nepal, India, and Pakistan typically experience the flush milk production season, while in Bangladesh it records moderate to high milk production. Favorable temperatures, improved animal comfort, better feed intake, and availability of winter fodder contribute to increased milk yield during this period in these countries. In many dairy producing areas, milk supply exceeds market demand, resulting in seasonal oversupply conditions owing milk holiday. Winter fodder crops such as oat, berseem, and green grasses further support higher milk productivity during this season that facilitate increase milk yield.

The spring and pre-summer season (March–April) generally a transitional production period across south Asian countries. Milk production in Nepal, India, Pakistan, and Bangladesh remains at moderate levels during this season. Although climatic conditions are still relatively favorable, gradual increases in temperature and changes in fodder availability begin to affect milk productivity to some extent and maintain moderate milk yield. While milk production starts declining compared to the winter flush season.

The summer and hot dry season (May–June) is widely trigger as the lean milk production period. Nepal, India, Pakistan, and Bangladesh all experience reduced milk production during this season due to severe heat stress, water scarcity, and shortage of fodder/ forage. High temperature negatively affects feed intake, reproductive efficiency, and overall animal health, leading to significant declines in milk yield. Limited availability of green fodder and dependence on low-quality dry roughage further intensify reduced production.

During the monsoon or rainy season (July–September), milk production conditions begin to gradually improve in many areas due to regeneration of green forage/fodder and improved pasture availability. Nepal and Pakistan generally experience a lean-to recovery phase during this season. While on the other hand India and Bangladesh show mixed production patterns depending on local rainfall conditions, flooding, and availability of feed and fodder. In areas where green fodder availability improves substantially, milk production begins recovering from the summer lean period, while on the other hand excessive rainfall, muddy housing conditions, parasitic diseases, and feed quality deterioration may continue affecting productivity in some locations.

4.1.1 Seasonal difference of milk production in India

Milk production in India shows strong seasonal variation between the flush and lean periods. The flush season, occurring mainly during winter, contributes approximately 60–

70% of annual milk production and represents the peak production period due to favorable climatic conditions, better fodder availability, and improved animal productivity. In contrast, the lean season during summer and monsoon contributes only about 30–40% of annual milk output. Milk production during the lean season generally remains 50–70% of peak flush season levels, indicating a decline of about 30–50% compared to the peak period. These significant seasonal swings create challenges for milk collection, processing, and market supply management in the Indian dairy sector.

Table 14: Seasonality of milk production in India

Season	Approx. Share of Annual Milk Output
Flush (Winter)	60–70 %
Lean (Summer/Monsoon)	30–40 %
Difference	Lean may be 30–50 % lower than peak

It is realized that, precise national monthly milk production data are not publicly available in India. However, there is broad consensus among government agencies, dairy cooperatives, and industry stakeholders regarding clear seasonal variation in milk production across the country. Seasonal fluctuations are widely recognized in Indian milk production and reflected in cooperative milk procurement patterns at different parts of the country.

Table 15: Seasonal milk production in India (Million MT)

Season	2020/21	2021/22	2022/23	2023/24	2024/25
Flush (Lits)	126	133	139	143	149
Lean (Lits)	84	88	92	96	99
Total (Lits)	**210**	**221**	**231**	**239**	**248**

Source: *Total milk production: Basic Animal Husbandry Statistics (BAHS), Government of India; 2024/25 from BAHS 2025 release*
Seasonal split: NDDB / cooperative milk procurement pattern (Flush:Lean 60:40 national milk flow equivalent)

The five years' time series data reveals that, seasonal milk production in India demonstrates a consistent dominance of flush season output over lean season. Based on NDDB and cooperative milk procurement patterns, approximately 60% of annual milk production have been found during the flush season in contrast, it is around 40% is in lean season. Moreover, total milk production increased steadily from about 210 million MT in 2020/21 to 248 million MT in 2024/25, it entails that there is continuous growth in India's milk production. Flush season production rose from 126 million MT to 149 million MT during the same period, whereas lean season production increased from 84 million MT to 99 million MT for the same period. Despite overall growth, substantial seasonal variation persists, creating challenges for milk procurement, utilization of processing capacity, storage, and market supply management during lean season.

Milk production generally increases during the winter or flush season (November–March) due to favorable climatic and feeding conditions and feed intake increased. While on the other hand, there is availability of winter fodder, crop residues, and green grasses supports higher milk yield and, a larger proportion of animals are also in peak lactation stage, contributing to increased milk production.

In contrast, milk production declines during the summer and monsoon or lean season (April–October) significantly. High temperatures and heat stress reduce feed intake, while fodder availability and forage quality decline after the harvest period that resulted lower production. Many smallholders' dairy farmer continues to rely on seasonal fodder resources rather than year-round balanced feed supplementation, that further contribute to production variation by season. Cooperative milk collection records also indicate substantially higher milk procurement during winter months and shortage during lean season.

Overall, the flush season contributes approximately 60–70% of annual milk output, while the lean season accounts for about 30–40%. Lean season milk production may remain 30–50% lower than peak flush season production, demonstrating significant seasonal swings in India's dairy sector.

Main reasons for such seasonal variation in milk production was said: Seasonal breeding in buffalo is still persist matters in north west India, summer heat stress sharply reduce the feed intake and lowers yield, fodder scarcity in pre monsoon months, reproductive inefficiency in low input systems, regional demand spikes (festivals, weddings) affect marketed surplus and disease and subclinical mastitis reduce summer productivity.

Mitigation priorities were said: promoting year-round ration balancing practice, promoting fodder banks and silage production, heat stress control by sprinklers, shade, fans etc, AI-based reproductive scheduling, cooperative milk balancing by conversing milk to SMP and administering seasonal procurement incentives to producers

4.1.2 Seasonal milk production in Pakistan (Million MT)

In Pakistan November–March is flush and May–August is lean season. From the time series data on milk production, Pakistan shows a clear dominance of flush season production over lean season output demonstrating clear seasonal variation. Based on Pakistan dairy value chain assessments and Punjab–Sindh processor studies, approximately 62.5% of annual milk production was during the flush season (Nov.-March), while on the other hand only 37.5% is produced during the lean season (May to August).

Table 16: Seasonal milk production in Pakistan (Million MT)

Season	2020/21	2021/22	2022/23	2023/24	2024/25
Flush (Lits)	38.1	39.4	40.6	41.9	43.1
Lean (Lits)	22.9	23.6	24.4	25.1	25.9
Total (Lits)	**61.0**	**63.0**	**65.0**	**67.0**	**69.0**

Source: *Total milk production: Pakistan Economic Survey (Livestock Chapter); OECD-FAO cross-check for 2024 level*
Seasonal split: Pakistan dairy value-chain / Punjab-Sindh processor studies (Flush:Lean 62.5:37.5)

Total milk production increased gradually from about 61 million MT in 2020/21 to 69 million MT in 2024/25. This data indicated steady growth in milk production. It was found that, flush season production increased from 38.1 million MT to 43.1 million MT, while on the other hand lean season production rose from 22.9 million MT to 25.9 million MT during the same period. Despite overall growth, significant seasonal fluctuations remain evident, affecting milk availability, processing efficiency, storage requirements, and market supply management during lean season and managing processing capacity of the industries.

Main reasons for such seasonal variation are cited as: strong breeding seasonality in buffalo, severe summer heat stress, water scarcity and fodder stress during dry season, high feed costs and market volatility, weak cold chain, informal marketing dominance and disease and reproductive stress in peri urban dairies farms.

Mitigation priorities are mentioned: summer cooling (fans, misters, shade), cultivation/ promotion of heat-tolerant fodder and silage, synchronization in breed and calving time, expansion of formal milk collection/chilling, price stabilization and additional support in feed and administer preventive herd health and mastitis control mechanism.

4.1.3 Seasonal milk production in Bangladesh (Million MT)

Based on the five years' time series data on milk production, it is found a clear seasonal imbalance between flush and lean periods. While December–March is taken as flush and July–September (especially September trough in several milk shed records) is season in Bangladesh. Based on Milk Vita monthly milk collection patterns, approximately 63% of annual milk production is found in the flush season, while around it is reduced to 37% in lean season. Total milk production increased steadily from about 10.7 million MT in 2020/21 to 13.8 million MT in 2024/25, reflecting gradual expansion of milk production in the country. Flush season production increased from 6.7 million MT to 8.7 million MT, while lean season production rose from 4.0 million MT to 5.1 million MT during the same time frame. Despite the positive growth trend, seasonal fluctuations in milk supply continue to affect milk collection, processing operations, storage management, and market availability during lean periods is prominent problem.

Table 17: Seasonal milk production in Bangladesh (Million MT)

Season	2020/21	2021/22	2022/23	2023/24	2024/25
Flush (Lits)	6.7	7.2	7.7	8.3	8.7
Lean (Lits)	4.0	4.3	4.6	4.8	5.1
Total (Lits)	**10.7**	**11.5**	**12.3**	**13.1**	**13.8**

Source: *Total milk production: Department of Livestock Services (DLS), Bangladesh Livestock Economy reports*

Seasonal split: Milk Vita monthly milk collection series (Dec–Mar high, Jul–Sep low; equivalent flush: lean 63:37 from observed monthly shares)

It was said that, **s**mallholder dominance, feeding variability, flood and waterlogging effects in monsoon, heat stress in late summer, fodder shortage in flood prone areas, seasonal disease and poor housing and weak cold chain in remote milk sheds are the main reasons for seasonal variation of milk production in Bangladesh.

Mitigation measures were cited: promoting flood-resilient fodder systems, community silage production, raised housing and drainage facility, breed improvement and reproductive scheduling, chilling hubs in milk sheds areas and addressing summer disease prevention.

4.1.4 Seasonal milk production in Nepal (Million MT)

In Nepal, seasonal milk production shows a consistent dominance of flush season over lean season production. Based on the current data collected from the field, approximately 56.37% of annual milk production takes place during the flush season. While only 43.63% of total milk production occurs during the lean season. From the time series data, it is found that total national milk production increased gradually from about 2.5 million MT in 2020/21 to 2.7 million MT in 2023/24 and 2024/25. It indicates that, there is modest but stable growth in milk production. Despite the increase in overall production, seasonal imbalance remains a major challenge for milk marketing and processing as there is oversupply during the flush season and shortages during the lean months/season.

Table 18: Seasonal milk production in Nepal (Million MT)

Season	2020/21	2021/22	2022/23	2023/24	2024/25
Flush	1.40	1.45	1.47	1.51	1.53
Lean	1.08	1.12	1.14	1.17	1.19
Total	2.48	2.57	2.61	2.68	2.72

Source: *Total milk production: MoALD livestock statistics*

Seasonal split: Current field study 2026

The key informants told that, there are different reasons for such seasonality, included seasonal breeding in buffalo which is the major driver, fodder and green forage availability is mostly seasonal i.e. rainy season, poor winter fodder conservation in hills/mountains and lower production due to lack of irrigation facility. Heat stress and water shortage in Terai summer that reduce the feed intake followed by milk. While seasonal disease burden (mastitis, parasites), weak milk chilling and market absorption in flush season and low-price incentives during surplus months are crucial.

Mitigation majors, included promoting staggered breeding/calving, transform the herd composition slowly toward improved cow, promote silage/hay systems for dry months, increasing chilling facility at village and milk powder/butter conversion in flush months. Seasonal milk pricing practice for procurement reduce price during flush and premium price during lean season, manage heat stress managing shade, water, cooling and better management of mastitis and reproductive health.

CHAPTER: V
DAIRY PRODUCTION SYSTEM IN NEPAL

5.1 Sample covered

Total sampled covered for the household survey was 400, out of them 200 each were cow and buffalo farmers/farms. Large size cow and buffalo farm each were 25, medium size cow and buffalo farm each were 75 and small each cow and buffalo farm/farmers were 100.

Table 19: Sample covered by farm holding in the study

Province	Cow			Buffalo			Total
	Large ('> 20 animal)	Medium ('6-20 animal)	Small ('1-5 animal)	Large ('> 20 animal)	Medium ('6-20 animal)	Small ('1-5 animal)	
Koshi	5	15	20	5	15	20	80
Madhesh	5	15	20	5	15	20	80
Bagmati	5	15	20	5	15	20	80
Gandaki	5	15	20	5	15	20	80
Lumbini	5	15	20	5	15	20	80
Total	**25**	**75**	**100**	**25**	**75**	**100**	**400**

5.2 Herd size and type of breed kept by the herd size of farmers/farms

Out of the large size cow farms/farmers interviewed, 57.7% hold jersey cross, 42.3% hold HF cross dairy cows while 97.7% of same size buffalo farmers hold Murrah, 1.8% hold local breed and 0.5% hold other breed buffaloes in their farms. It seems that near Murrah breed buffalo is popular among the farmers.

Table 20: Herd size by province and breed type in large size dairy farm

Province	Cow (N= 25)							Buffalo (N= 25)						
	Jersey Cross	%	HF cross	%	Local	%	Total	Murah Cross		Local		Others		Total
Koshi	53	9.4	36	6.4	0	0.0	89	83	14.8	5	0.9	1	0.2	89
Madhesh	70	12.5	49	8.7	0	0.0	119	121	21.5	2	0.4	0	0.0	123
Bagmati	70	12.5	51	9.1	0	0.0	121	114	20.3	2	0.4	0	0.0	116
Gandaki	63	11.2	49	8.7	0	0.0	112	113	20.1	1	0.2	2	0.4	116
Lumbini	68	12.1	53	9.4	0	0.0	121	118	21.0	0	0.0	0	0.0	118
Total	**324**	**57.7**	**238**	**42.3**	**0**	**0.0**	**562**	**549**	**97.7**	**10**	**1.8**	**3**	**0.5**	**562**

Source: Field survey 2026

Quite different scenario was observed by breed type in middle size farms. It was found that, out of the total medium size farms, 77.9% hold jersey cross, 30.2% hold HF cross dairy cow breed. While on the other hand 97.3% of buffalo farmers hold murrah 1.5% hold local breed and 1.1 % hold other breed buffaloes in their farms.

Table 21: Herd size by province and breed type in medium size dairy farm

Province	Cow (N= 75)							Buffalo (N= 75)						
	Jersey Cross	%	HF cross	%	Local	%	Total	Murhha Cross	%	Local	%	Others	%	Total
Koshi	80	11.6	50	7.2	0	0.0	130	145	20.4	6	0.8	1	0.1	152
Madhesh	95	13.7	70	10.1	0	0.0	165	152	21.4	1	0.1	4	0.6	157
Bagmati	116	16.8	38	5.5	0	0.0	154	139	19.6	1	0.1	1	0.1	141
Gandaki	127	18.4	21	3.0	0	0.0	148	134	18.9	1	0.1	1	0.1	136
Lumbini	120	17.4	30	4.3	0	0.0	150	121	17.0	2	0.3	1	0.1	124
Total	**538**	**77.9**	**209**	**30.2**	**0**	**0.0**	**747**	**691**	**97.3**	**11**	**1.5**	**8**	**1.1**	**710**

Source: Field survey 2026

It was found that 76.4% of the small size farms hold jersey cross, 22.6% hold HF cross and 1.0% hold local dairy cow breed. Similarly, 95.4% of buffalo farmers hold murrah and 2.3% each hold local breed and other unspecified breed buffaloes in their farms. From the data collected, jersey cross among the cow farm/farmers and murrah cross among the buffalo farmers are dominant breed across the survey areas.

Table 22: Herd size by province and breed type of animal in small size dairy farm

Province	Cow (N= 100)							Buffalo (N= 100)						
	Jersey Cross	%	HF cross	%	Local	%	Total	Murhha cross	%	Local	%	Others	%	Total
Koshi	46	14.6	12	3.8	1	0.3	59	59	19.3	1	0.3	2	0.7	62
Madhesh	48	15.3	17	5.4	0	0.0	65	59	19.3	2	0.7	2	0.7	63
Bagmati	45	14.3	16	5.1	0	0.0	61	51	16.7	1	0.3	1	0.3	53
Gandaki	47	15.0	16	5.1	1	0.3	64	65	21.3	1	0.3	2	0.7	68
Lumbini	54	17.2	10	3.2	1	0.3	65	57	18.7	2	0.7	0	0.0	59
Total	**240**	**76.4**	**71**	**22.6**	**3**	**1.0**	**314**	**291**	**95.4**	**7**	**2.3**	**7**	**2.3**	**305**

Source: Field survey 2026

5.3 Stage of dairy animals hold by the farmers/farms

Different stage cows and buffaloes were kept by the respondent farmers/ farms. It was found that out of large size farms, 48.7% hold lactating, 29.8% pregnant, 20.0% heifer and 1.1% dry cows. While on the other hand, out of buffalo farming farmers 41.9% hold lactating, 30.2% pregnant, 20.0% heifer and 0.8% dry. It was thus found that, nearly fifty percent cows and buffaloes farmers kept milking animals and pregnant and heifer are supposed to calved to maintain milking animal in the farm.

Table 23: Number and type of animal in large size dairy farms by province

Province	Cow								
	Lactating	%	Pregn Ant	%	Heifer+ Calf	%	Dry	%	Total
Koshi	**53**	**9.4**	**35**	**6.1**	**23**	**4.0**	**2**	**0.4**	113

Province	Cow								
	Lactating	%	Pregn Ant	%	Heifer+ Calf	%	Dry	%	Total
Madhesh	55	**9.7**	31	**5.4**	24	**4.2**	1	**0.2**	111
Bagmati	56	**9.9**	36	**6.4**	24	**4.3**	1	**0.2**	118
Gandaki	59	**10.4**	34	**5.9**	22	**4.0**	0	**0.0**	115
Lumbini	53	**9.3**	34	**5.9**	22	**4.0**	1	**0.2**	110
Total	**276**	**48.7**	**169**	**29.8**	**115**	**20.4**	**6**	**1.1**	**567**
	Buffalo								
Koshi	53	9.2	35	6.1	22	3.8	1	0.2	112
Madhesh	60	10.3	35	6.0	23	4.0	1	0.2	119
Bagmati	57	9.8	35	6.0	23	3.9	1	0.2	116
Gandaki	58	9.9	36	6.3	26	4.4	1	0.2	121
Lumbini	57	9.8	34	5.8	23	4.0	0	0.0	114
Total	**285**	**48.9**	**176**	**30.2**	**117**	**20.0**	**5**	**0.8**	**582**

Source: Field survey 2026

Medium size cow farm/ farmers hold 46.7% lactating, 30.6% pregnant, 20.2% heifer and 2.5% hold dry animal. While on the other hand, 47.6% milking, 29.6% pregnant, 20.4% heifer and 2.39% medium size buffalo farmer hold dry animals.

Table 24: Number and type of animal in medium size dairy farms by province

Province	Cow								
	Lactating	%	Pregn Ant	%	Heifer+ Calf	%	Dry	%	Total
Koshi	59	7.9	40	5.3	26	3.5	5	0.7	130
Madhesh	77	10.3	50	6.7	34	4.6	4	0.5	165
Bagmati	70	9.4	48	6.4	31	4.2	3	0.4	153
Gandaki	70	9.4	45	6.1	29	3.9	4	0.5	148
Lumbini	72	9.7	46	6.1	29	3.9	3	0.3	150
Total	**348**	**46.7**	**228**	**30.6**	**150**	**20.2**	**19**	**2.5**	**745**
	Buffalo								
Koshi	72	10.1	45	6.3	31	4.3	2	0.3	150
Madhesh	78	11	46	6.4	33	4.7	2	0.32	159
Bagmati	67	9.4	41	5.8	29	4.1	3	0.45	140
Gandaki	63	8.9	41	5.7	27	3.8	5	0.74	136
Lumbini	57	8.1	37	5.3	25	3.6	4	0.57	124
Total	**338**	**47.6**	**209**	**29.6**	**145**	**20.4**	**17**	**2.39**	**709**

Source: Field survey 2026

The case of small holder farmers/farm is different where 65.3% of their cows were at lactating stage, 26.0% were at pregnant stage and 8.7% were heifer stage. While on the other hand, 45.5% buffalo farmers hold lactating stage, 39.0% pregnant stage and 15,5% heifer stage buffaloes in small size farm/farmers.

Table 25: Number and type of animal in small scale dairy farms by province

Province	Cow								
	Lactating	%	Pregn Ant	%	Heifer+ Calf	%	Dry	%	Total
Koshi	39	12.5	12	3.9	8	2.6	0	0	59
Madhesh	41	13.2	18	5.8	3	1	0	0	62
Bagmati	39	12.5	16	5.1	7	2.3	0	0	62
Gandaki	40	12.9	18	5.8	5	1.6	0	0	63
Lumbini	44	14.1	17	5.5	4	1.3	0	0	65
Total	**203**	**65.3**	**81**	**26**	**27**	**8.7**	**0**	**0**	**311**
	Buffalo								
Koshi	27	9.3	23	8	8	2.8	0	0	58
Madhesh	30	10.5	22	7.8	8	2.7	0	0	60
Bagmati	23	8	23	8	8	2.8	0	0	54
Gandaki	27	9.5	26	9.1	6	2	0	0	59
Lumbini	23	8.2	17	6.1	15	5.2	0	0	56
Total	**130**	**45.5**	**112**	**39**	**44**	**15.5**	**0**	**0**	**286**

Source: Field survey 2026

5.4 Feed and feeding practice of different size farms/farmers for lactating stage animals

5.4.1 Feeding practice in Flush Season

Commonly used feeding stuff to the lactating dairy animals in different size farmers in flush season were: green, dry forage, silage and concentrate feed. Among the large size cow farmers 70.2% of the feed was came from green source, 15.0% dry roughages, 2.8% silage and 11.9% was concentrate to lactating animals. While on the other hand, farmers feed 70.0% green, 16.4% dry roughages, 1.1% silage and 12.5% concentrate feed to the lactating buffaloes in large size farms.

Table 26: Feeding practice of large dairy farms for lactating animal in flush season

Province	Cow (N=25)								
	Green forage	%	Dry forage	%	Silage	%	Conc	%	Total
Koshi	130	14.0	27.5	3.0	8.5	0.9	22	2.4	188
Madhesh	127	13.7	28.2	3.0	0	0.0	22.4	2.4	177.6
Bagmati	133	14.3	29.2	3.1	11.1	1.2	21.5	2.3	194.8
Gandaki	128	13.8	25.8	2.8	4.5	0.5	22.8	2.5	181.1
Lumbini	134	14.4	28.6	3.1	2	0.2	22.1	2.4	186.7
Total	**652**	**70.2**	**139.3**	**15.0**	**26.1**	**2.8**	**110.8**	**11.9**	**928.2**

	Buffalo (N=25)								
	Green forage	%	Dry forage	%	Silage	%	Conc	%	Total
Koshi	117	13.4	29.9	3.4	4	0.5	20.6	2.4	171.5
Madhesh	125	14.4	29	3.3	2.2	0.3	21.1	2.4	177.3
Bagmati	128	14.7	30.9	3.5	1.5	0.2	25.6	2.9	186
Gandaki	119	13.7	27.5	3.2	1.6	0.2	23.8	2.7	171.9
Lumbini	121	13.9	25.7	3.0	0	0.0	17.6	2.0	164.3
Total	**610**	70.0	**143**	16.4	**9.3**	1.1	**108.7**	12.5	**871**

Source: Field survey 2026

Lactating dairy cows in the medium size farms in flush season offered 70.2% green forage, 14.0% dry, 3.0% silage and 12.0% concentrate. Similarly, 71.1% green, 16.0% dry, 1.0% silage and 11.8% concentrate feed has been feeding to lactating buffaloes by medium size buffalo farmers in flush season in the survey districts/areas.

Table 27 Feeding practice of medium dairy farms for lactating animal in flush season

Province	Cow (N=75)								
	Green forage	**%**	**Dry**	**%**	**Silage**	**%**	**Conc**	**%**	**Total**
Koshi	386.8	13.9	76.1	2.7	12.9	0.5	66.6	2.4	542.4
Madhesh	391.9	14.1	78.4	2.8	24	0.9	70.4	2.5	564.7
Bagmati	398.9	14.4	80.5	2.9	13.9	0.5	67.2	2.4	560.5
Gandaki	390.9	14.1	74.6	2.7	11.4	0.4	69.7	2.5	546.6
Lumbini	397.9	14.3	83.3	3.0	15.3	0.6	67	2.4	563.5
Total	**1950.3**	70.2	**388**	14.0	**82.4**	3.0	**334.7**	12.0	**2777.7**
	Buffalo (N=75)								
Province	**Green forage**	**%**	**Dry**	**%**	**Silage**	**%**	**Conc**	**%**	**Total**
Koshi	363.3	14.0	84.8	3.3	7.6	0.3	60.6	2.3	516.3
Madhesh	378.3	14.6	81.6	3.1	5.5	0.2	62.8	2.4	528.2
Bagmati	369.3	14.2	86.3	3.3	3.7	0.1	65.5	2.5	524.8
Gandaki	370.3	14.3	79.6	3.1	5	0.2	60.2	2.3	515.1
Lumbini	364.3	14.0	84.1	3.2	3.8	0.1	58.1	2.2	510.3
Total	**1845.5**	71.1	**416.4**	16.0	**25.6**	1.0	**307.2**	11.8	**2594.7**

Source: Field survey 2026

Quite similar feeding practice was observed in small size dairy farms in flush season. It was found that, the composition of feed stuffs offered to lactating animals in the small size cow farms category was: 70.7% green forage, 14.2% dry, 2.9% silage and 12.2% concentrate. Similarly in small scale buffalo farms farmers are offering 72.3% green, 14.6% dry, 0.9% silage and 12.2% concentrate to the lactating animals.

Table 28: Feeding practice of small dairy farms for lactating animal in flush season

Province	Cow (N=100)								
	Green	%	Dry	%	Silage	%	Conc	%	Total
Koshi	518.7	14.0	101.3	2.7	23.7	0.6	89.8	2.4	733.5
Madhesh	525.7	14.2	105	2.8	17.2	0.5	90.1	2.4	738
Bagmati	529.8	14.3	106.9	2.9	30.2	0.8	95.1	2.6	762
Gandaki	522.9	14.1	109.5	3.0	12.8	0.3	89.8	2.4	735
Lumbini	525.7	14.2	105.3	2.8	24.2	0.7	86.8	2.3	742
Total	**2622.8**	70.7	**528**	14.2	**108.1**	2.9	**451.6**	12.2	**3710.5**
	Buffalo (N=100)								
Koshi	484.2	14.3	96.3	2.8	7.4	0.2	80.7	2.4	668.6
Madhesh	490.2	14.5	92.6	2.7	5	0.1	86.8	2.6	674.6
Bagmati	495.2	14.6	96.8	2.9	5.7	0.2	89.5	2.6	687.2
Gandaki	486.2	14.4	99.9	3.0	4.2	0.1	80	2.4	670.3
Lumbini	488.8	14.5	107	3.2	7	0.2	77	2.3	679.8
Total	**2444.6**	72.3	**492.6**	14.6	**29.3**	0.9	**414**	12.2	**3380.5**

Source: Field survey 2026

5.4.2 Feeding practice in Lean Season

By season, large size cow farmers offered 64.0% green, 17.5% dry, 3.3% silage and 15.2% concentrate during lean season to lactating cows. On the other hand, the buffalo farmers offered 62.4% green, 21.3% dry, 1.0% silage and 15.3% concentrate in lean season for lactating stage animal. It clearly seems that, more concentrate has been offered during lean season.

Table 29: Feeding practice of large dairy farms for lactating animal in lean season

Province	Cow (N=25)								
	Green forage	%	Dry	%	Silage	%	Conc	%	Total
Koshi	100.8	12.5	28.6	3.6	8.7	1.1	24	3.0	162.1
Madhesh	108.6	13.5	27.2	3.4	0	0.0	26.1	3.2	161.9
Bagmati	110	13.7	29.2	3.6	11.3	1.4	28.3	3.5	178.8
Gandaki	108.4	13.5	30.9	3.8	5.2	0.6	24.9	3.1	169.4
Lumbini	105.6	13.1	27.8	3.5	2	0.2	23.8	3.0	159.2
Total	**514.4**	**64.0**	**140.7**	**17.5**	**26.6**	**3.3**	**122**	**15.2**	**803.7**
	Buffalo (N=25)								
Koshi	90.1	12.2	33.5	4.5	4.1	0.6	22	3.0	149.7
Madhesh	93.1	12.6	35.5	4.8	0	0.0	24.9	3.4	153.5
Bagmati	99.3	13.5	40.1	5.4	1.5	0.2	26.9	3.7	167.8
Gandaki	91.6	12.4	30.8	4.2	0	0.0	20.2	2.7	142.6
Lumbini	95.6	13.0	28.9	3.9	1.7	0.2	25.5	3.5	151.7
Total	**459.7**	**62.4**	**156.8**	**21.3**	**7.3**	**1.0**	**112.5**	**15.3**	**736.3**

Source: Field survey 2026

Medium size cow farmers offered 65.8% green forage, 16.4% dry, 3.1% silage and 14.6% concentrate to lactating cows during lean season. Similarly, the buffalo farmers offered 63.1% green, 20.5% dry, 0.9% silage and 15.5% concentrate to lactating dairy buffalo in lean season. It clearly seems that, more concentrate has been offered during lean season.

Table 30: Feeding practice of medium dairy farms for lactating animal in lean season

Province	Cow (N=75)								
	Green forage	**%**	**Dry**	**%**	**Silage**	**%**	**Conc**	**%**	**Total**
Koshi	328.8	13.0	79.9	3.2	13.1	0.5	73.6	2.9	495.4
Madhesh	339.5	13.4	80.7	3.2	15.2	0.6	75.6	3.0	511
Bagmati	340.4	13.5	86.7	3.4	17.8	0.7	77.1	3.1	522
Gandaki	320.2	12.7	82.8	3.3	14.7	0.6	74.1	2.9	491.8
Lumbini	332.2	13.2	85.1	3.4	18.3	0.7	68.9	2.7	504.5
Total	**1661.1**	**65.8**	**415.2**	**16.4**	**79.1**	**3.1**	**369.3**	**14.6**	**2524.7**
	Buffalo (N=75)								
Koshi	283.6	12.4	96.1	4.2	8.5	0.4	68.1	3.0	456.3
Madhesh	290.8	12.7	92.4	4.0	1.8	0.1	69.9	3.1	454.9
Bagmati	288.1	12.6	93.7	4.1	4.1	0.2	71.5	3.1	457.4
Gandaki	292.6	12.8	97	4.2	1.8	0.1	72.2	3.2	463.6
Lumbini	288.9	12.6	90.3	3.9	3.4	0.1	73.9	3.2	456.5
Total	**1444**	**63.1**	**469.5**	**20.5**	**19.6**	**0.9**	**355.6**	**15.5**	**2288.7**

Source: Field survey 2026

Small size cow farmers offered 55.6% green forage, 25.6% dry, 3.9% silage and 14.9% concentrate to lactating cow during lean season. Similarly, the small size buffalo farmers offered 62.8% green forage, 20.6% dry forage, 1.0% silage and 15.6% concentrate in lean season to lactating buffalo. It clearly seems that, more concentrate has been offered during lean season to maintain the milk production.

Table 31: Feeding practice of small dairy farms for lactating animals in lean season

Province	Cow (N=100)								
	Green forage	**%**	**Dry**	**%**	**Silage**	**%**	**Conc**	**%**	**Total**
Koshi	383.3	10.9	171.5	4.9	30.1	0.9	102	2.9	686.9
Madhesh	389.8	11.1	179.8	5.1	22	0.6	102.9	2.9	694.5
Bagmati	392.5	11.2	182.1	5.2	26.9	0.8	106.4	3.0	707.9
Gandaki	387.8	11.0	175.5	5.0	30.1	0.9	104	3.0	697.4
Lumbini	399.3	11.4	191.3	5.4	27.6	0.8	110.1	3.1	728.3
Total	**1952.7**	**55.6**	**900.2**	**25.6**	**136.7**	**3.9**	**525.4**	**14.9**	**3515**

	Buffalo (N=100)								
Koshi	382.4	12.4	126.9	4.1	6	0.2	93.7	3.0	609
Madhesh	394.2	12.8	125	4.0	5.8	0.2	95.3	3.1	620.3
Bagmati	388	12.6	122.3	4.0	6.5	0.2	97.4	3.2	614.2
Gandaki	390.6	12.6	132.2	4.3	5.5	0.2	96.5	3.1	624.8
Lumbini	384.8	12.5	129.2	4.2	7.2	0.2	99.2	3.2	620.4
Total	**1940**	**62.8**	**635.6**	**20.6**	**31**	**1.0**	**482.1**	**15.6**	**3088.7**

Source: Field survey 2026

5.5 Feed and feeding practice of different size farms/farmers for pregnant dairy animals

5.5.1 Feeding practice in flush season

Large size cow farmers offered 76.0% green forage, 14.6% dry, 1.4% silage and 8.0% concentrate to pregnant cows during flush season. While on the other hand, large size buffalo farmers offered 70.2% green fodder,20.7% dry, 1.6% silage and 7.5% concentrate during flush season

Table 32: Feeding practice of large dairy farms for pregnant animal in flush season

Province	Cow (N=25)								
	Green forage	**%**	**Dry**	**%**	**Silage**	**%**	**Conc**	**%**	**Total**
Koshi	85	14.5	20.3	3.5	2.5	0.4	11.2	1.9	119
Madhesh	90	15.3	15.7	2.7	1	0.2	8.3	1.4	115
Bagmati	87	14.8	16.7	2.8	0	0.0	9.3	1.6	113
Gandaki	95	16.2	16.1	2.7	3	0.5	8.4	1.4	122.5
Lumbini	90	15.3	17.2	2.9	1.5	0.3	9.8	1.7	118.5
Total	**447**	**76.0**	**86**	**14.6**	**8**	**1.4**	**47**	**8.0**	**588**
	Buffalo (N=25)								
Koshi	77	13.6	22.6	4.0	4	0.7	10.4	1.8	114
Madhesh	80	14.1	21.1	3.7	2.2	0.4	9.8	1.7	113.1
Bagmati	79	13.9	29.1	5.1	1.5	0.3	6.8	1.2	116.4
Gandaki	76	13.4	26.4	4.7	1.6	0.3	7.4	1.3	111.4
Lumbini	86	15.2	18.2	3.2	0	0.0	8.1	1.4	112.3
Total	**398**	**70.2**	**117.4**	**20.7**	**9.3**	**1.6**	**42.5**	**7.5**	**567.2**

Source: Field survey 2026

Medium size cow farmers offered 76.8% green forage, 14.3% dry, 1.1% silage and 7.7% concentrate to pregnant cows during flush season. Similarly, medium size buffalo farmers offered 73.5% green forage, 17.8 % dry forage,1.4% silage and 7.2 % concentrate during flush season

Table 33: Feeding practice of medium dairy farms for pregnant animal in flush season

Province	Cow (N=75)								
	Green forage	%	Dry	%	Silage	%	Conc	%	Total
Koshi	264.6	14.9	52.2	2.9	3.8	0.2	27.8	1.6	348.4
Madhesh	278.8	15.7	49	15.7	3	15.7	26.1	15.7	356.9
Bagmati	276.7	15.6	52.8	3.0	3.3	0.2	29.8	1.7	362.6
Gandaki	278.8	15.7	51.6	2.9	4.8	0.3	28.2	1.6	363.4
Lumbini	265.6	15.0	49	2.8	5	0.3	25.3	1.4	344.9
Total	**1364.5**	**76.8**	**254.6**	**14.3**	**19.9**	**1.1**	**137.2**	**7.7**	**1776.2**
	Buffalo (N=75)								
Koshi	238.8	14.2	64	3.8	7.6	0.5	21.2	1.3	331.6
Madhesh	250	14.9	58.7	3.5	5.5	0.3	22.4	1.3	336.6
Bagmati	246.9	14.7	61.8	3.7	5.2	0.3	26.2	1.6	340.1
Gandaki	249	14.8	59	3.5	1.5	0.1	27.2	1.6	336.7
Lumbini	250	14.9	56.1	3.3	3.2	0.2	24.5	1.5	333.8
Total	**1234.7**	**73.5**	**299.6**	**17.8**	**23**	**1.4**	**121.5**	**7.2**	**1678.8**

Source: Field survey 2026

Small size cow farmers offered 76.0% green forage, 14.9% dry roughages, 1.1% silage and 8.1% concentrate to pregnant cows during flush season. On the other hand, small size buffalo farmers offered 74.9% green, 16.1% dry forage, 1.1% silage and 7.9 % concentrate during flush season

Table 34: Feeding practice of small dairy farms for pregnant animal in flush season

Province	Cow (N=100)								
	Green forage	%	Dry	%	Silage	%	Conc	%	Total
Koshi	350.2	15.1	71.7	3.1	5.7	0.2	39.6	1.7	467.2
Madhesh	344.6	14.9	68.2	2.9	5.6	0.2	36.4	1.6	454.8
Bagmati	356.3	15.4	70.8	3.1	6.4	0.3	36.7	1.6	470.2
Gandaki	352.2	15.2	68.3	2.9	5.4	0.2	40.4	1.7	466.3
Lumbini	359.2	15.5	65.6	2.8	2.2	0.1	34.1	1.5	461.1
Total	**1762.5**	**76.0**	**344.6**	**14.9**	**25.3**	**1.1**	**187.2**	**8.1**	**2319.6**
	Buffalo (N=100)								
Koshi	316.1	14.2	72.4	3.2	5.8	0.3	31.7	1.4	426
Madhesh	343.4	15.4	70.6	3.2	4.6	0.2	33.2	1.5	451.8
Bagmati	337.3	15.1	72.4	3.2	5.6	0.3	37.1	1.7	452.4
Gandaki	333.3	15.0	75.1	3.4	4.1	0.2	38.3	1.7	450.8
Lumbini	339.3	15.2	68.7	3.1	4.8	0.2	35.6	1.6	448.4
Total	**1669.4**	**74.9**	**359.2**	**16.1**	**24.9**	**1.1**	**175.9**	**7.9**	**2229.4**

Source: Field survey 2026

5.5.2 Feeding Practice in Lean Season

Large size cow farmers offered 71.0% green forage, 18.4% dry forage, 1.3% silage and 9.2% concentrate during lean season to pregnant cows. Large size buffalo farmers offered 64.3% green forage, 24.4% dry forage, 1.5% silage and 8.7 % concentrate during lean season to pregnant buffalo.

Table 35: Feeding practice of large dairy farms for pregnant animal in lean season

Province	Cow (N=25)								
	Green forage	%	Dry	%	Silage	%	Conc	%	Total
Koshi	68	13.5	21.9	4.3	1.3	0.3	11.4	2.3	102.6
Madhesh	72	14.3	17	3.4	1.2	0.2	8.5	1.7	98.7
Bagmati	69.6	13.8	18	3.6	1.5	0.3	9.2	1.8	98.3
Gandaki	76	15.1	17.4	3.5	1.5	0.3	8.6	1.7	103.5
Lumbini	72	14.3	18.6	3.7	1.2	0.2	8.8	1.7	100.6
Total	**357.6**	**71.0**	**92.9**	**18.4**	**6.7**	**1.3**	**46.5**	**9.2**	**503.7**
	Buffalo (N=25)								
Koshi	59.3	12.6	25.3	5.4	4.1	0.9	9.7	2.1	98.4
Madhesh	61.6	13.1	23.6	5.0	0	0.0	9.6	2.0	94.8
Bagmati	60.8	12.9	27.6	5.9	1.5	0.3	6.6	1.4	96.5
Gandaki	55.5	11.8	22.8	4.8	0	0.0	7.3	1.5	85.6
Lumbini	66.2	14.0	20.4	4.3	1.7	0.4	8	1.7	96.3
Total	**303.4**	**64.3**	**119.7**	**25.4**	**7.3**	**1.5**	**41.2**	**8.7**	**471.6**

Source: Field survey 2026

Medium size cow farmers offered 72.5% green forage, 17.3% dry, 1.3% silage and 8.8% concentrate to pregnant cows during flush season. Similarly, medium size buffalo farmers offered 65.8% green forage, 23.8% dry forage, 2.0% silage and 8.4 % concentrate to pregnant buffalo during lean season.

Table 36: Feeding practice of medium dairy farms for pregnant animal in lean season

Province	Cow (N=75)								
	Green forage	%	Dry	%	Silage	%	Conc	%	Total
Koshi	224.9	14.2	54.8	3.5	4.9	0.3	28.5	1.8	313.1
Madhesh	229.2	14.4	55.7	3.5	3.4	0.2	30.4	1.9	318.7
Bagmati	233.5	14.7	57.4	3.6	4.7	0.3	27.6	1.7	323.2
Gandaki	224.9	14.2	55.3	3.5	5.1	0.3	28.3	1.8	313.6
Lumbini	239.3	15.1	51.9	3.3	3.2	0.2	25.1	1.6	319.5
Total	**1151.8**	**72.5**	**275.1**	**17.3**	**21.3**	**1.3**	**139.9**	**8.8**	**1588.1**
	Buffalo (N=75)								
Koshi	186.4	12.6	72.6	4.9	8.1	0.5	24	1.6	291.1
Madhesh	195.1	13.1	68.5	4.6	5.9	0.4	23.1	1.6	292.6
Bagmati	198.8	13.4	70.1	4.7	6.1	0.4	27	1.8	302

	Buffalo (N=75)								
Gandaki	203	13.7	75.3	5.1	6.5	0.4	24.8	1.7	309.6
Lumbini	192.8	13.0	66.9	4.5	3.3	0.2	26.2	1.8	289.2
Total	**976.1**	**65.8**	**353.4**	**23.8**	**29.9**	**2.0**	**125.1**	**8.4**	**1484.5**

Source: Field survey 2026

Small size cow farmers offered 67.0% green forage, 21.5% dry forage, 1.9% silage and 9.5% concentrate to pregnant cows during flush season, while small size buffalo farmers offered 61.2% green forage, 27.1% dry, 2.5% silage and 9.2 % concentrate during lean season to pregnant animal.

Table 37: Feeding practice of small dairy farms for pregnant animal in lean season

Province	Cow (N=100)								
	Green forage	%	Dry	%	Silage	%	Conc	%	Total
Koshi	267.8	13.4	86	4.3	8.1	0.4	39.5	2.0	401.4
Madhesh	262.5	13.1	85.5	4.3	5.9	0.3	37.8	1.9	391.7
Bagmati	270.8	13.5	89.9	4.5	7.9	0.4	40.1	2.0	408.7
Gandaki	268.8	13.4	87.3	4.4	7.1	0.4	39.4	2.0	402.6
Lumbini	274.5	13.7	83.3	4.2	8.8	0.4	34.3	1.7	400.9
Total	**1344.4**	**67.0**	**432**	**21.5**	**37.8**	**1.9**	**191.1**	**9.5**	**2005.3**
	Buffalo (N=100)								
Koshi	249.6	14.1	95.4	5.4	10.6	0.6	29.2	1.7	384.8
Madhesh	271.2	15.4	93	5.3	8.8	0.5	31.7	1.8	404.7
Bagmati	27.4	1.6	102.2	5.8	9.9	0.6	34.4	1.9	173.9
Gandaki	268.2	15.2	97.2	5.5	8.1	0.5	35.3	2.0	408.8
Lumbini	264	15.0	90.5	5.1	6	0.3	31.8	1.8	392.3
Total	**1080.4**	**61.2**	**478.3**	**27.1**	**43.4**	**2.5**	**162.4**	**9.2**	**1764.5**

Source: Field survey 2026

5.6 Housing management of the dairy farms by animal type, farm size and province

From the study it was found that, 20.0% large dairy cow farms had open yard, 22.9% had well ventilated, 22.9% had full of sunlight, 11.4% had temperature controlling system in cow sheds while out of the buffalo farmers 19.4% had open yard, 22.2% had ventilated shed, 19.4% had good waterer, 22.2% had full of sunlight and 16.7% had temperature controlling system in their farms.

Table 38: Housing management in large size dairy farms by province

Cow											
Province	**Open Yard**	**%**	**Venti lated**	**%**	**Good Wat erer**	**%**	**Full Sun light**	**%**	**Temp Main tain**	**%**	**Total**
Koshi	1	2.9	2	5.7	2	5.7	2	5.7	1	2.9	8

Cow											
Province	**Open Yard**	**%**	**Venti lated**	**%**	**Good Wat erer**	**%**	**Full Sun light**	**%**	**Temp Main tain**	**%**	**Total**
Madhesh	2	5.7	1	2.9	1	2.9	1	2.9	1	2.9	6
Bagmati	1	2.9	2	5.7	2	5.7	2	5.7	1	2.9	8
Gandaki	1	2.9	2	5.7	2	5.7	1	2.9	1	2.9	7
Lumbini	2	5.7	1	2.9	1	2.9	2	5.7	0	0	6
Total	**7**	**20**	**8**	**22.9**	**8**	**22.9**	**8**	**22.9**	**4**	**11.4**	**35**
Buffalo											
Koshi	1	2.8	2	5.6	1	2.8	2	5.6	1	2.8	7
Madhesh	2	5.6	1	2.8	1	2.8	2	5.6	1	2.8	7
Bagmati	1	2.8	2	5.6	2	5.6	1	2.8	2	5.6	8
Gandaki	1	2.8	2	5.6	1	2.8	1	2.8	1	2.8	6
Lumbini	2	5.6	1	2.8	2	5.6	2	5.6	1	2.8	8
Total	**7**	**19.4**	**8**	**22.2**	**7**	**19.4**	**8**	**22.2**	**6**	**16.7**	**36**

Source: Field survey 2026

While on the other hand in medium size cow farms, 15.6% had open yard, 18.8% has well ventilated, 25.0% had good waterer, 28.1% had full of sunlight and 12.5% had temperature controlling system. Similarly, out of the buffalo farmers 18.2% each had open yard and ventilated shed, 24.2% had good waterer, 21.2% had full of sunlight and 18.2% had temperature controlling system in their farms.

Table 39: Housing management in medium size dairy farms by province

Cow											
Province	**Open Yard**	**%**	**Venti lated**	**%**	**Good Wat erer**	**%**	**Full Sun light**	**%**	**Temp Main tain**	**%**	**Total**
Koshi	3	3.1	3	3.1	6	6.3	5	5.2	3	3.1	20
Madhesh	3	3.1	4	4.2	4	4.2	6	6.3	2	2.1	19
Bagmati	3	3.1	3	3.1	5	5.2	5	5.2	3	3.1	19
Gandaki	4	4.2	4	4.2	4	4.2	6	6.3	2	2.1	20
Lumbini	2	2.1	4	4.2	5	5.2	5	5.2	2	2.1	18
Total	**15**	**15.6**	**18**	**18.8**	**24**	**25**	**27**	**28.1**	**12**	**12.5**	**96**
Buffalo											
Koshi	4	4	4	4	5	5.1	4	4	4	4	21
Madhesh	3	3	4	4	6	6.1	5	5.1	4	4	22
Bagmati	4	4	3	3	4	4	3	3	3	3	17

	Buffalo										
Province	**Open Yard**	**%**	**Venti lated**	**%**	**Good Wat erer**	**%**	**Full Sun light**	**%**	**Temp Main tain**	**%**	**Total**
Gandaki	3	3	4	4	5	5.1	5	5.1	4	4	21
Lumbini	4	4	3	3	4	4	4	4	3	3	18
Total	**18**	**18.2**	**18**	**18.2**	**24**	**24.2**	**21**	**21.2**	**18**	**18.2**	**99**

Source: Field survey 2026

In case of small size cow farms 21.6% had open yard, 18.9% has well ventilated, 21.6% had good waterer, 18.92% each had full of sunlight and temperature controlling system in the sheds. Similarly, out of the buffalo farmers 19.8 % had open yard, 17.28% each had ventilated shed, 19.8% had good waterer, 24.7% had full of sunlight and 18.52 had temperature controlling system in their farm sheds.

Table 40: Housing management in small size dairy farms by province

Cow											
Province	**Open Yard**	**%**	**Venti lated**	**%**	**Good Wat erer**	**%**	**Full Sun light**	**%**	**Temp Main tain**	**%**	**Total**
Koshi	7	4.73	6	4.05	6	4.05	5	3.38	5	3.38	29
Madhesh	6	4.05	5	3.38	7	4.73	6	4.05	5	3.38	29
Bagmati	7	4.73	5	3.38	6	4.05	6	4.05	6	4.05	30
Gandaki	6	4.05	5	3.38	5	3.38	5	3.38	6	4.05	27
Lumbini	6	4.05	7	4.73	8	5.41	6	4.05	6	4.05	33
Total	**32**	**21.6**	**28**	**18.9**	**32**	**21.6**	**28**	**18.9**	**28**	**18.9**	**148**
Buffalo											
Province	**Open Yard**	**%**	**Venti lated**	**%**	**Good Wat erer**	**%**	**Full Sun light**	**%**	**Temp Main Tain**	**%**	**Total**
Koshi	6	3.7	6	3.7	7	4.32	7	4.32	5	3.09	31
Madhesh	6	3.7	5	3.09	6	3.7	8	4.94	6	3.7	31
Bagmati	7	4.32	6	3.7	7	4.32	9	5.56	6	3.7	35
Gandaki	6	3.7	5	3.09	7	4.32	8	4.94	8	4.94	34
Lumbini	7	4.32	6	3.7	5	3.09	8	4.94	5	3.09	31
Total	**32**	**19.6**	**28**	**17.3**	**32**	**19.8**	**40**	**24.7**	**30**	**18.5**	**162**

Source: Field survey 2026

5.7 Disease prevalence in the dairy farms by animal type, farm size and province

From the study, Mastitis was major disease that exert highly economic loss in the farms. It was found that, 40.91 farms reported mastitis, and 59.01% told other diseases occurred in large size cow farms. While on the other hand, large size buffalo farm farmers reported 38.46% mastitis and other disease in 61.54% in farms.

Table 41: Disease occurrence in large size dairy farms by province

Province	Cow					Buffalo				
	Mastitis	%	Other	%	Total	Mastitis	%	Other	%	Total
Koshi	3	6.82	5	11.36	8	3	7.69	4	10.26	7
Madhesh	3	6.82	4	9.09	7	4	10.26	6	15.38	10
Bagmati	4	9.09	6	13.64	10	3	7.69	4	10.26	7
Gandaki	4	9.09	6	13.64	10	2	5.13	5	12.82	7
Lumbini	4	9.09	5	11.36	9	3	7.69	5	12.82	8
Total	18	40.91	26	59.09	44	15	38.46	24	61.54	39

Source: Field survey 2026

Prevalence of mastitis in medium size cow farm was mastitis 35.94%and other disease 64.06% in their farms. While on the other hand, in medium size buffalo farm mastitis occurrence was in 35.48 and other disease in 64.52% farms.

Table 42: Disease occurrence in medium size dairy farms by province

Province	Cow					Buffalo				
	Mastitis	%	Other	%	Total	Mastitis	%	Other	%	Total
Koshi	9	7.03	14	10.94	23	8	6.45	17	13.71	25
Madhesh	8	6.25	15	11.72	23	9	7.26	13	10.48	22
Bagmati	10	7.81	17	13.28	27	9	7.26	16	12.90	25
Gandaki	10	7.81	18	14.06	28	8	6.45	17	13.71	25
Lumbini	9	7.03	18	14.06	27	10	8.06	17	13.71	27
Total	46	35.94	82	64.06	128	44	35.48	80	64.52	124

Source: Field survey 2026

Prevalence of mastitis in small size cow farm was 34.18% and other disease occurred in 65.82% farms. While on the other hand, in small size buffalo farm 33.8% each farm prevails mastitis and other diseases in 66.2% farms.

Table 43:Disease occurrence in small size dairy farms by province

	Cow					Buffalo				
Province	Mastitis	%	Other	%	Total	Mastitis	%	Other	%	Total
Koshi	12	7.59	21	13.29	33	12	8.45	19	13.38	31
Madhesh	10	6.33	22	13.92	32	9	6.34	21	14.79	30
Bagmati	11	6.96	20	12.66	31	10	7.04	20	14.08	30
Gandaki	10	6.33	21	13.29	31	9	6.34	15	10.56	24
Lumbini	11	6.96	20	12.66	31	8	5.63	19	13.38	27
Total	54	34.18	104	65.82	158	48	33.80	94	66.20	142

Source: Field survey 2026

5.8 Reproductive disease prevalence in the dairy farms by animal type, farm size and province

Major reproductive disease were repeat breeding, anestrus and other diseases. It was found that 33.33% each large cow farms suffered from repeat breeding and anestrous while 33.33% farms suffered from other reproductive diseases. Similarly, on the other hand repeat breeding was 40.74%, anestrous in 29.63% and other reproductive disease happened in 29.63% large size buffalo farms.

Table 44: Reproductive disease occurrence in large size dairy farms by province

Province	Cow							Buffalo						
	Repeat Breeding	%	Anes trous	%	Other	%	Total	Repeat breeding	%	Anes trous	%	Other	%	Total
Koshi	2	7.41	2	7.41	1	3.70	5	1	3.70	0	0.00	1	3.70	2
Madhesh	1	3.70	1	3.70	2	7.41	4	3	11.11	2	7.41	1	3.70	6
Bagmati	2	7.41	3	11.11	2	7.41	7	3	11.11	2	7.41	3	11.11	8
Gandaki	1	3.70	1	3.70	2	7.41	4	3	11.11	2	7.41	2	7.41	7
Lumbini	3	11.11	2	7.41	2	7.41	7	1	3.70	2	7.41	1	3.70	4
Total	**9**	**33.33**	**9**	**33.33**	**9**	**33.33**	**27**	**11**	**40.74**	**8**	**29.63**	**8**	**29.63**	**27**

Source: Field survey 2026

Prevalence of repeat breeding was 41.67%, anestrous 22.92% and other reproductive diseases in 35.42% medium size cow farms. While on the other hand repeat breeding was observed in 41.67%, anestrous in 27.78% and other reproductive disease in 30.56% medium size buffalo farms.

Table 45: Reproductive disease occurrence in medium size dairy farms by province

	Cow							Buffalo						
Province	Repeat Breeding	%	Anes trous	%	Other	%	Total	Repeat breeding	%	Anes trous	%	Other	%	Total
Koshi	4	8.33	1	2.08	4	8.33	9	3	8.33	2	5.56	3	8.33	8
Madhesh	5	10.42	2	4.17	3	6.25	10	2	5.56	1	2.78	3	8.33	6
Bagmati	4	8.33	3	6.25	4	8.33	11	4	11.11	3	8.33	1	2.78	8
Gandaki	4	8.33	3	6.25	3	6.25	10	2	5.56	1	2.78	2	5.56	5
Lumbini	3	6.25	2	4.17	3	6.25	8	4	11.11	3	8.33	2	5.56	9
Total	**20**	**41.67**	**11**	**22.92**	**17**	**35.42**	**48**	**15**	**41.67**	**10**	**27.78**	**11**	**30.56**	**36**

Source: Field survey 2026

Prevalence of repeat breeding was in 37.61%, anestrous was in 31.19% and other reproductive diseases in 31.19% small size cow farms. While on the other hand repeat breeding was observed in 35.11%, anestrous in 30.85% and other reproductive in 34.04% in small size buffalo farms.

Table 46: Reproductive disease occurrence in small size dairy farms by province

Province	Cow							Buffalo						
	Repeat breeding	%	Anes trous	%	Other	%	Total	Repeat Breeding	%	Anes trous	%	Other	%	Total
Koshi	7	6.42	4	3.67	4	3.67	15	3	3.19	1	1.06	3	3.19	7
Madhesh	6	5.50	4	3.67	4	3.67	14	3	3.19	3	3.19	1	1.06	7
Bagmati	9	8.26	7	6.42	10	9.17	26	9	9.57	8	8.51	10	10.64	27
Gandaki	10	9.17	9	8.26	9	8.26	28	10	10.64	8	8.51	10	10.64	28
Lumbini	9	8.26	10	9.17	7	6.42	26	8	8.51	9	9.57	8	8.51	25
Total	**41**	**37.61**	**34**	**31.19**	**34**	**31.19**	**109**	**33**	**35.11**	**29**	**30.85**	**32**	**34.04**	**94**

Source: Field survey 2026

5.9 Climate change effect in the dairy farms by animal type, farm size and province

Climate change effect was observed differently in the dairy farms. The effect was sharply affected in reduce feed intake, breaking breeding cycle and new disease prevailing. Reduction in feed intake was observed in 31.4%, breaking in the breeding cycle was in 35.3% and prevalence of new disease was observed in 33.3% large size cow farms. While on the other hand breaking the breeding cycle was said in 34.7%, reduce in feed intake in 32.7% and new disease prevalence in 32.7% large scale buffalo farms in the study area.

Table 47: Effect perceived by the respondents due to climate change in large scale dairy farms by province

Province	Cow							Buffalo						
	Feed intake low during April may	%	Breeding cycle break-April May	%	New disease-April May	%	Total	Feed intake low during April may	%	Breeding cycle break-April May	%	New disease-April May	%	Total
Koshi	3	5.9	4	7.8	3	5.9	10	4	8.2	5	10.2	3	6.1	12
Madhesh	4	7.8	3	5.9	4	7.8	11	2	4.1	3	6.1	4	8.2	9
Bagmati	3	5.9	4	7.8	3	5.9	10	3	6.1	3	6.1	4	8.2	10
Gandaki	3	5.9	3	5.9	4	7.8	10	3	6.1	3	6.1	2	4.1	8
Lumbini	3	5.9	4	7.8	3	5.9	10	4	8.2	3	6.1	3	6.1	10
Total	**16**	**31.4**	**18**	**35.3**	**17**	**33.3**	**51**	**16**	**32.7**	**17**	**34.7**	**16**	**32.7**	**49**

Source: Field survey 2026

Due to climate change effect, reduction in feed intake was observed in 32.2%, breaking in the breeding cycle was in 33.9% and prevalence of new disease was observed in 33.9% medium size cow farms. While on the other hand breaking the breeding cycle was said in 35.7%, reduce in feed intake in 33.3% and new disease prevalence in 31.0% medium scale buffalo farms in the study area.

Table 48: Effect perceived by the respondents due to climate change in medium scale dairy farms by province

Province	Cow							Buffalo						
	Feed intake low during April may	%	Breeding cycle break-April May	%	New disease-April May	%	Total	Feed intake low during April may	%	Breeding cycle break-April May	%	New disease-April May	%	Total
Koshi	11	6.2	12	6.8	13	7.3	36	8	6.3	9	7.1	9	7.1	26
Madhesh	12	6.8	12	6.8	12	6.8	36	9	7.1	10	7.9	8	6.3	27
Bagmati	11	6.2	12	6.8	11	6.2	34	9	7.1	8	6.3	6	4.8	23
Gandaki	12	6.8	12	6.8	13	7.3	37	8	6.3	9	7.1	9	7.1	26
Lumbini	11	6.2	12	6.8	11	6.2	34	8	6.3	9	7.1	7	5.6	24
Total	**57**	**32.2**	**60**	**33.9**	**60**	**33.9**	**177**	**42**	**33.3**	**45**	**35.7**	**39**	**31.0**	**126**

Source: Field survey 2026

Reduction in feed intake was observed in 31.7%, breaking in the breeding cycle was in 33.3% and prevalence of new disease was observed in 34.9% small size cow farms due to climate change. While on the other hand reduced in feed intake was observed in 34.1%, breaking the breeding cycle was said in 31.7%, and new disease prevalence in 34.1% small scale buffalo farms in the study area due to climate change.

Table 49: Effect perceived by the respondents due to climate change in small scale dairy farms by province

Province	Cow							Buffalo						
	Feed intake low during April may	%	Breeding cycle break-April May	%	New disease-April May	%	Total	Feed intake low during April may	%	Breeding cycle break-April May	%	New disease-April May	%	Total
Koshi	17	6.7	17	6.7	17	6.7	51	12	7.3	11	6.7	12	7.3	35
Madhesh	15	6.0	17	6.7	18	7.1	50	11	6.7	11	6.7	11	6.7	33
Bagmati	16	6.3	17	6.7	18	7.1	51	12	7.3	11	6.7	12	7.3	35
Gandaki	16	6.3	17	6.7	18	7.1	51	12	7.3	10	6.1	11	6.7	33
Lumbini	16	6.3	16	6.3	17	6.7	49	9	5.5	9	5.5	10	6.1	28
Total	**80**	**31.7**	**84**	**33.3**	**88**	**34.9**	**252**	**56**	**34.1**	**52**	**31.7**	**56**	**34.1**	**164**

Source: Field survey 2026

5.10 Calving interval in the dairy farms by animal type, farm size and province

Average calving interval in large size cow farm was 12.5 months and it was 13.6 months in buffalo. In medium size cow farms calving interval was 12.4 months while it was 14.5 in medium size buffalo farms. On the other hand, average calving interval was 12.3 months in small cow farm and 14.1 months in small buffalo farm. Thus, there is no significant difference between the farm size while difference was observed between cow and buffalo.

Table 50: Average calving interval (Month) in large size dairy farms by animal type and province

Province	Large		Medium		Small	
	Cow	Buffalo	Cow	Buffalo	Cow	Buffalo
Koshi	12.7	13.6	12.3	14.7	12.5	14.4
Madhesh	12.6	13.5	12.3	14.5	12.3	14.7
Bagmati	12.3	13.6	12.3	14.2	12.4	14.5
Gandaki	12.3	13.5	12.3	14.7	12.5	14.2
Lumbini	12.5	13.6	13.0	14.6	12.3	14.1
Average	**12.5**	**13.6**	**12.4**	**14.5**	**12.3**	**14.1**

Source: Field survey 2026

5.11 Average lactation period in the dairy farms by animal type, farm size and province

Average lactation period in large size cow farm was 10.1 months and it was 9.4 months in large size buffalo farms. While on the other hand in medium size cow farm average lactation period was 10.0 month which was 9.0 in medium size buffalo farms. In small size cow farm lactation period was 10.2 months and it was 9.3 months in small size buffalo farms.

Table 51: Average lactation period (Month) in large size dairy farms by animal type and province

Province	Large		Medium		Small	
	Cow	Buffalo	Cow	Buffalo	Cow	Buffalo
Koshi	10.2	9.7	9.9	9.0	10.3	9.6
Madhesh	10.2	9.5	10.0	9.1	10.2	9.2
Bagmati	10.1	9.3	9.9	9.0	10.2	9.5
Gandaki	9.9	9.4	10.2	9.0	10.1	9.2
Lumbini	10.0	9.3	10.0	9.2	10.1	9.2
Average	**10.1**	**9.4**	**10.0**	**9.0**	**10.2**	**9.3**

Source: Field survey 2026

5.12 Milk production per day by season and province

From the collected data it was observed that out of total annual milk production from large size dairy farm, 56.1% was produced in flush and 43.9% in lean season from large size dairy farms. This comprise of 30.1% cow milk and 26.0% buffalo milk in flush and 24.3% cow and 19.6% buffalo milk in lean season. By province out of total milk produced in flush season, 11.6% from Koshi, 11.2% from Madhesh, 11.3% from Bagmati, 11.1% from Gandaki, 10.9% from Lumbini province. By province, in lean season out of total milk produced, 9.2% was from Koshi, 8.9% was from Madhesh, 8.8% from Bagmati, 8.5% in Gandaki and 8.5% in Lumbini province.

Table 52: Milk production in large farm per day by season and province

Province	Flush season						Lean season						GT
	Cow	%	Buffalo	%	Total	%	Cow	%	Buffalo	%	Total	%	
Koshi	60.0	6.1	54.0	5.5	114.0	11.6	50.5	5.1	40.5	4.1	91.0	9.2	205.0
Madhesh	59	6.0	51.2	5.2	110.2	11.2	48	4.9	39.5	4.0	87.5	8.9	197.7
Bagmati	59.9	6.1	51.7	5.3	111.6	11.3	47	4.8	39.2	4.0	86.2	8.8	197.8
Gandaki	59.50	6.0	49.5	5.0	109.0	11.1	46.70	4.7	37.0	3.8	83.7	8.5	192.7
Lumbini	**57.6**	5.9	50.0	5.1	107.6	10.9	**47.5**	4.8	36.3	3.7	83.8	8.5	191.4
Total	**296**	**30.1**	**256.4**	**26.0**	**552.4**	**56.1**	**239.7**	**24.3**	**192.5**	**19.6**	**432.2**	**43.9**	**984.6**

Source: Field survey 2026

It was observed that out of total annual milk production from medium size dairy farm, 56.5% was produced in flush and 43.5% in lean season from medium size dairy farms. This comprise of 30.8% cow milk and 25.7% buffalo milk in flush and 24.4% cow and 19.1% buffalo milk in lean season. By province out of total milk produced in flush season, 11.8% from Koshi, 11.3% from Madhesh, 11.2% from Bagmati, 11.1% from Gandaki, 11.1% from Lumbini province. By province, in lean season out of total milk produced, 8.9% was from Koshi, 8.6% from Madhesh, 8.6% from Bagmati, 8.7% from Gandaki and 8.7% in Lumbini province.

Table 53: Milk production in medium farm per day by season and province

Province	Flush season						Lean season						GT
	Cow	%	Buffalo	%	Total	%	Cow	%	Buffalo	%	Total	%	
Koshi	181.50	6.3	158.4	5.5	339.9	11.8	141.10	4.9	116.2	4.0	257.3	8.9	597.2
Madhesh	177.90	6.2	149.5	5.2	327.4	11.3	137.90	4.8	109.7	3.8	247.6	8.6	575.0
Bagmati	177.30	6.1	146.3	5.1	323.6	11.2	138.20	4.8	111.3	3.9	249.5	8.6	573.1
Gandaki	176.00	6.1	144.5	5.0	320.5	11.1	141.50	4.9	109.0	3.8	250.5	8.7	571.0
Lumbini	**177.70**	6.2	143.6	5.0	321.3	11.1	**144.80**	5.0	106.1	3.7	250.9	8.7	572.2
Total	**890.4**	**30.8**	**742.3**	**25.7**	**1632.7**	**56.5**	**703.5**	**24.4**	**552.3**	**19.1**	**1255.8**	**43.5**	**2888.5**

Source: Field survey 2026

It was observed that out of total annual milk production from small size dairy farm, 56.5% was produced in flush and 43.5% in lean season from small size dairy farms. This comprise of 30.8% cow milk and 25.7% buffalo milk in flush and 24.9 % cow and 18.6% buffalo milk in lean season. By province out of total milk produced in flush season, 11.6% from Koshi, 11.3% each from Madhesh, Bagmati and Gandaki and 111.4% from Lumbini province. By province, in lean season out of total milk produced, 8.8% was from Koshi, 8.7% each from Madhesh, Bagmati, Gandaki and Lumbini province.

Table 54: Milk production in small farm per day by season and province

Province	Flush season						Lean season						GT
	Cow	%	Buffalo	%	Total	%	Cow	%	Buffalo	%	Total	%	
Koshi	236.00	6.2	197.2	5.2	433.2	11.3	191.30	5.0	144.1	3.8	335.4	8.8	768.6

Province	Flush season						Lean season						GT
	Cow	%	Buffalo	%	Total	%	Cow	%	Buffalo	%	Total	%	
Madhesh	234.80	6.1	196.1	5.1	430.9	11.3	190.60	5.0	141.3	3.7	331.9	8.7	762.8
Bagmati	235.20	6.1	195.7	5.1	430.9	11.3	192.10	5.0	140.3	3.7	332.4	8.7	763.3
Gandaki	235.30	6.1	196.6	5.1	431.9	11.3	189.50	4.9	141.7	3.7	331.2	8.7	763.1
Lumbini	**239.70**	6.3	197.4	5.2	437.1	11.4	**188.90**	4.9	144.6	3.8	333.5	8.7	770.6
Total	**1181**	**30.8**	**983**	**25.7**	**2164.0**	**56.5**	**952.4**	**24.9**	**712.0**	**18.6**	**1664.4**	**43.5**	**3828.4**

Source: Field survey 2026

The seasonal difference was found improving due to adoption of new technology, improvement in feed and feeding, breed improvement through AI, availability of technical services, improving housing management and animal health management. Replicating this practice to other districts, the seasonality of milk production could reduce tangibly.

It was said that, farmers prefer to sale their milk in local market as it allow good price and regular payment. Due to this reason, dairy industries are in pressure in both season for milk procurement, in one side during lean season they thrive for raw milk in lean season and compel to procure more during flush season. The private medium and small dairy industries are safer compared to large dairies. It was said that DDC's procurement is reduced by 20% in lean period (May and August) while other dairies felt 5-7% fluctuation. It was also said that, in lean months gradual reduction in procurement felt which is 2.5% to 20% and the aggregated lean season procurement is less than 15% in aggregate lean season.

5.13 Average milk yield (Lits/day) of cow and buffalo by province, season and size of farm

Average milk yield per day of large size cow farm in flush season was 11.8 liters and that of buffalo was 10.3 liter while in lean season it was 9.6 liter per day of cow and 7.7 liter per day of the buffalo. Average milk yield per day of medium size cow farm in flush season was 11.9 liters and that of buffalo was 9.9 liter while in lean season it was 9.4 liter per day of cow and 7.4 liter per day of the buffalo. Average milk yield per day of small size cow farm in flush season was 11.8 liters and that of buffalo was 9.8 liter while in lean season it was 9.5 liter per day of cow and 7.1 liter per day of the buffalo. The average milk yield was found very similar because all size farms apply similar dairy animal management practices. The profitability of the farm was very similar, as the small and medium size farms normally operated by family members and hire very limited labor, while the large size farms mainly depend on hired labor that increase the cost for labor. Additionally, the small and medium size farmers also use the leftover food, crop by products for their animal, which is not accounted in cost by farms.

Table 55: Average milk yield (Lits) per animal per day in different size farm and season by province

Province	Large farm				Medium farm				Small Farm			
	Flush Season		Lean Season		Flush Season		Lean Season		Flush Season		Lean Season	
	Cow	Buffalo	Cow	Buffalo	Cow	Buffalo	Cow	Buffalo	Cow	Buffalo	Cow	Buffalo
Koshi	12.0	10.8	10.1	8.1	12.1	10.6	9.4	7.7	11.8	9.9	9.6	7.2
Madesh	11.8	10.2	9.6	7.9	11.9	10.0	9.2	7.3	11.7	9.8	9.5	7.1
Bagmati	12.0	10.3	9.4	7.8	11.8	9.8	9.2	7.4	11.8	9.8	9.6	7.0
Gandaki	11.9	9.9	9.3	7.4	11.7	9.6	9.4	7.3	11.8	9.8	9.5	7.1
Lumbini	11.5	10.0	9.5	7.3	11.8	9.6	9.7	7.1	12.0	9.9	9.4	7.2
Average	**11.8**	**10.3**	**9.6**	**7.7**	**11.9**	**9.9**	**9.4**	**7.4**	**11.8**	**9.8**	**9.5**	**7.1**

Source: Field survey 2026

Based on the data from Department of Livestock Services, the yield of improved cross-bred cattle is 11.7 liters/ day while it is only 2.9 liter/ day of local cow. Similarly, improved crossbred buffalo yield 7.9 liter/day and local buffalo yield is only 3.2. This data represents nationwide and in most of the rural areas, both cow and buffalo breed are local. In large, medium and small size cow farm per lactation milk production was 3161 liters, 3117 liters and 3099 liters respectively. While in case of buffalo per lactation milk production was 2478 liters, 2401 liters and 2390 liters respectively.

5.14 Commonly used feed cost per kilogram by province

Commonly used feed stuffs are green and dry roughages, silage and concentrate. Average price of green forage was NRs. 2.4, dry forage was NRs. 6.9, silage was NRs. 12.0 and concentrate was NRs. 44.8 kg. Concentrate feed cost was more in Gandaki i.e. NRs 46.0 and least was in Madhesh i.e. NRs. 43.5/kg.

Table 56: Feed cost by province (NRs/Kg)

Province	Green	Dry	Silage	Conc
Koshi	2.4	6.5	12.1	45.1
Madesh	2.4	6.4	12.0	43.5
Bagmati	2.4	7.1	12.1	44.5
Gandaki	2.5	7.7	11.9	46.0
Lumbini	2.5	6.8	11.8	44.9
Average	**2.4**	**6.9**	**12.0**	**44.8**

Source: Field survey 2026

5.15 Feed expenses (NRs) of lactating dairy cows and buffaloes per day

Based on the data collected from different size cow and buffalo farmers, large, medium and small size cow farmers, feed cost per day for lactating cows was NRs. 352.1, NRs. 312.5 and NRs 312.6 respectively. While in lean season large, medium and small size dairy cow farmers expend NRs. 320.7, NRs 325.2 and NRs 355.4 per day respectively for feed.

Table 57: Feed expenses (NRs) of lactating dairy cows and buffaloes per day

Farm size	Cow		Buffalo	
	Flush	Lean	Flush	Lean
Large	352.1	320.7	282.1	293.6
Medium	312.5	325.2	281.9	301.7
Small	312.6	355.4	276.6	304.2

Source: Field survey 2026

Similarly, large, medium and small size buffalo farmers expend NRs. 282.1, NRs. 281.9 and NRs.276.6 per day in flush season. While in lean season large, medium and small size buffalo farmers expend NRs. 293.6, NRs. 301.7 and NRs. 304.2 per day respectively.

This data indicated that, the different size cow and buffalo farmers expend more money for feed during lean season as compared to flush season. It was because, in lean season farmers feed more concentrate feed and in flush season more green feed.

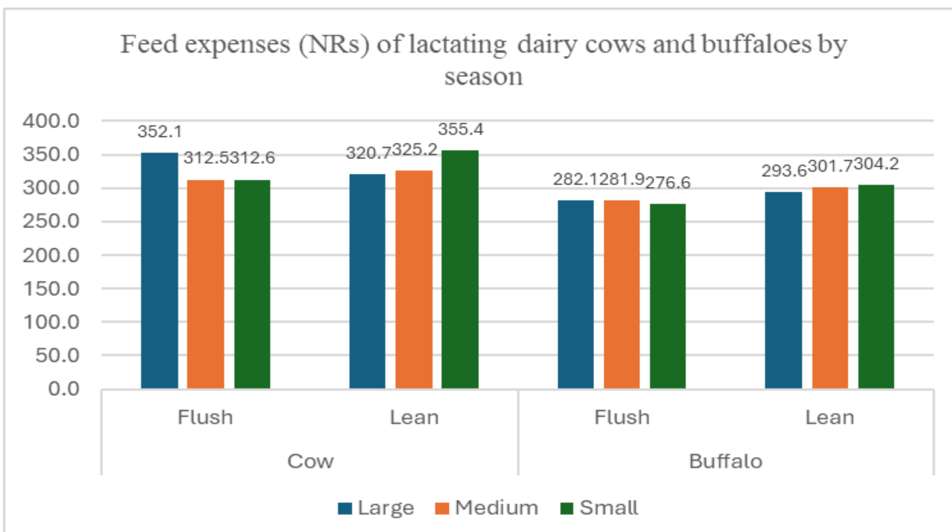

Figure 3: Feed expenses (NRs) of lactating dairy cows and buffaloes by season

CHAPTER VI

POLICIES AND PROGRAMS FOR REDUCING SEASONAL MILK PRODUCTION IN NEPAL

6.1 Policies and programs for minimizing seasonality of milk production in Nepal

Government of Nepal has introduced several policies, strategies, plans, and legal provisions to address the chronic problem of seasonal milk production fluctuation across the country. Most of these policies focus on improving year-round feed and forage availability, strengthening dairy infrastructure, promoting breed improvement, improving milk marketing systems, and enhancing climate resilience practices. The major policies and laws related to reducing seasonal milk production in Nepal are align to:

- Year-round forage and fodder production
- Silage and hay conservation
- Breed improvement
- Expansion of chilling and processing facilities
- Dairy commercialization
- Livestock insurance and soft credit
- Climate-resilient dairy production systems
- Strengthening dairy cooperatives and market systems

The policies/ law/strategies its provision and limitation are described in following table:

Policy / Law / Strategy	Major Provisions Related to Reducing Seasonal Milk Production	Key Contribution / Limitation
1. Production enhancement policies		
National Dairy Development Board Dairy Development Policy, 2007 (2064 BS)	This is the foundational policy aimed at increasing year-round productivity through improved genetics, veterinary services, and pasture development. It encourages the development of dairies through cooperatives and provides incentives for private sector investment to stabilize supply.	This is the most important dairy-sector-specific policy addressing seasonality. However, implementation remains weak, particularly in forage conservation, milk market management, and export promotion.

Policy / Law / Strategy	Major Provisions Related to Reducing Seasonal Milk Production	Key Contribution / Limitation
	Focuses on increasing milk production and productivity through year-round pasture and feed availability, forage promotion, livestock insurance, soft loans, chilling centers, milk transportation, and dairy infrastructure development. It also emphasizes technologies for increasing milk production during the lean season.	
National Livestock Breeding Policy (2021):	Mandates the use of modern breeding technologies, such as artificial insemination (AI) and sexed semen, to improve dairy breeds and ensure consistent productivity throughout the year and genetic selection to create higher-yielding dairy breeds that are more consistent in production across seasons. [1, 2, 3, 4, 5]	Interventions are going positively. Nucleus herd management has been proceeded. Cross breeding through AI is also massively going on. But the recording system of the AI to specific cow is still to be improved.
Ministry of Agriculture and Livestock Development Agriculture Development Strategy (ADS) 2015–2035	Agriculture Development Strategy (ADS) 2015-2035: Focuses on commercializing the dairy sector, promoting self-reliance, and improving productivity to meet the growing year-round demand. Identifies dairy as a priority commodity and promotes commercialization, improved breeds, forage development, irrigation, climate-smart agriculture, value chains, and private sector participation. ADS also encourages silage, hay making, and feed resource management.	Provides a long-term framework for reducing production gaps and improving resilience, but progress in coordinated implementation remains limited.
National Agriculture Policy, 2004	Encourages commercialization of livestock and dairy farming, improved fodder cultivation, animal nutrition management, and productivity enhancement.	Helped expand commercial dairy farming, but seasonal feed deficits still persist in most dairy pockets.

Policy / Law / Strategy	Major Provisions Related to Reducing Seasonal Milk Production	Key Contribution / Limitation
Livestock Development Programme Operation Procedure, 2019	Promotes commercial dairy farms, resource centers, breed improvement, collective farming, and access to services and subsidies.	Encouraged scaling-up of dairy enterprises, but smallholder farmers still face seasonal feed shortages and liquidity problems.
Five-Year Dairy Development Plan (2021 onward)	Prioritizes improved fodder and forage development, breed improvement, animal health, milk chilling infrastructure, insurance, and partnership among government, cooperatives, and private sector actors.	Attempts to reduce seasonal imbalance through integrated dairy value chain strengthening, though implementation coverage remains uneven.
Climate Resilience and Livestock Adaptation Programs	Promote climate-adaptive forage species, pasture conservation, shed improvement, fodder trees, vaccination, and local adaptation measures in climate-sensitive dairy regions.	Increasingly important due to climate variability affecting milk production patterns and forage availability.
Right to Food and Food Sovereignty Act, 2018	Recognizes food and nutrition security rights and supports domestic agricultural and livestock production systems.	Indirectly supports stable milk supply and dairy sector development through food security commitments.
National Dairy Development Policy (2021) & Dairy Development Policy (2064):	Focus on increasing milk productivity in rural areas, strengthening cold chain infrastructure, and enhancing quality to make Nepali dairy competitive.	Progress has been observed in increasing milk production and strengthening cold chain but not resulted as anticipated.
2.Fodder and Nutritional Support	National Agroforestry Policy (2019): Encourages the cultivation of fodder trees and improved forages to provide high-quality feed during the winter lean season.	Efforts have been done, but after the federal system endorsed, the service delivery and technical inputs are scares in local levels.
Forage Mission Programme- 2012-2018	The Department of Livestock Services has launched forage improvement programs in 45 districts to ensure adequate feeding, directly reducing production drops during lean periods. To complement feed deficits through promotion of oat, berseem, stylo,	Directly targets the root cause of milk seasonality by improving year-round feed availability. Adoption is increasing but still insufficient at national scale.

Policy / Law / Strategy	**Major Provisions Related to Reducing Seasonal Milk Production**	**Key Contribution / Limitation**
	napier, vetch, silage, pasture improvement, and forage technologies.	
	Forage Development Programs: The Department of Livestock Services (DLS) provides subsidies for planting improved fodder, grasses, and legumes, and promotes urea-molasses mineral block (UMMB) supplementation to keep cows lactating longer during dry periods. [1, 2, 3, 4, 5]	The mission was implemented with enthusiasm. But after the endorsement of federal system, linkage between three government is visually insignificant. Efforts are to be done to boost up the technical capacity of local level technical staff with adequate budget.
Improved Feeding Guidelines: 2010	Policies promoting the use of Urea Molasses Mineral Block (UMMB) during winter, which significantly increases milk production and reduces infertility in hilly areas. [1, 2, 3, 4]	“
Subsidies, Incentives, and Support		
Production-Based Incentives (started 1990 intensify 2016)	Provincial governments (e.g., Gandaki Province) offer subsidies directly to farmers based on litres produced through cooperatives. For example, a subsidy of Rs 2.50 per litre was provided to incentivize consistent production.	This is practiced by province and local governments but, it lacks inconsistency. IN few instances there is overlapping between local and province government, while in most of the places not implemented.
Agribusiness Promotion Policy, 2006	Supports private investment in dairy enterprises, processing industries, milk collection systems, and market expansion.	Improved dairy commercialization and processing capacity but did not adequately address seasonal market absorption and export management.

Policy / Law / Strategy	**Major Provisions Related to Reducing Seasonal Milk Production**	**Key Contribution / Limitation**
Subsidized Interest Rates (1990):	Policies mandate providing bank loans at low-interest rates for setting up large-scale commercial dairy farms (targeting 100+ cows or 60+ buffaloes).	This is not effectively implemented. The is gap between the understanding of bankers and government.
Livestock Insurance: 2013	A 75% subsidy on insurance premiums is offered to farmers for dairy animals to mitigate the financial risk of disease or sudden, low productivity. [1, 2, 3, 5]	This is in practice. But required more awareness among the farmers and simplify the insurance claim system.
Regulatory Measures: Import Restrictions/ Regulation- 1970, stronger 2000	The government sometimes implements temporary bans on importing milk powder during peak production times, and increases customs duties on ghee to 20% to prioritize the sale of domestic products, thus supporting local, year-round production.	These policies aim to move the industry from a subsistence-based model to a commercial one, reducing the sharp fluctuations between the peak production season (mid-August to mid-October) and the lean season (mid-April to mid-August). [1, 2, 3]
Vaccination and Health Management: Campaign (1960-1970)- continue	Mandatory FMD (Foot and Mouth Disease) and HS/BQ vaccination campaigns in dairy pockets to ensure that health issues do not contribute to seasonal drops in milk production. [1, 2, 3, 4]	Vaccination is going on satisfactorily as the farmers in commercial farms are well aware on it. However, awareness among the small holders in remote areas are still to improve.
3. Marketing and Post-Harvest Management (Reducing "Milk Holidays") and Supply Stabilization (1980) & Infrastructure Measures- 2000 and continue	Milk Powder Production Strategy: To address the "milk holidays" (when dairies refuse to buy milk from farmers), the government is focusing on processing rather than just buying fluid milk: [1] The Ministry of Agriculture and Livestock Development (MoALD) is actively pushing for the conversion of excess flush-season milk into	Many SMP plants (9 are operational) with 46-ton capacity per day. But they are only operating for processing flush season milk, which is not more cost effective.

Policy / Law / Strategy	**Major Provisions Related to Reducing Seasonal Milk Production**	**Key Contribution / Limitation**
	skimmed milk powder (SMP) and butter, with state-owned DDC managing powder plants to handle surplus It aims to tackle the oversupply during the flush season (August–February), the Ministry of Agriculture promotes the conversion of excess fluid milk into milk powder and butter (using Skimmed Milk Powder Plants - SMPP in places like Biratnagar, Kaski, and Chitwan).	
Strengthening Cooperatives	Strengthening Cooperatives: Under the Cooperative Act, 2017, the government supports milk producers' cooperatives to ensure a guaranteed market for farmers, reducing the temptation to abandon dairy during lean periods.	It is practiced, but not spread widely.
	Cold Chain Infrastructure: The government incentivizes the establishment of milk collection and chilling centers in strategic locations, facilitating the transportation of milk from rural areas to urban centers, reducing wastage. [1, 2, 3, 4, 5]	Chilling centers are established at different locations but the holding and buffering lean season demand is not met.
Seasonal Pricing/Marketing Structure: 2000	The National Dairy Development Board (NDDB) is tasked with formulating pricing policies that encourage the supply of milk during the lean season while managing surplus during the flush season.	Exercise have been done, but it felt required political commitment
Mandatory Purchase Agreements -1980	Agreements have been enforced requiring dairy industries to purchase milk from cooperatives without arbitrary reductions in quantity, ensuring stability. [1, 2, 3, 4]	Some MPCs are practicing with dairy processors, but not more effective

Policy / Law / Strategy	Major Provisions Related to Reducing Seasonal Milk Production	Key Contribution / Limitation
Financial and Health Support	Subsidized Loans & Insurance: The government provides subsidized bank loans to farmers for purchasing improved breeds and investing in shed improvements.	*Despite these policies, a significant gap remains between demand and production, leading to the necessary importation of dairy products during the lean season.* [1]
Animal Insurance Policies:	To encourage commercialization, livestock insurance programs cover high-yield dairy animals.	Practicing, but not widely spread across the country.
Vaccination Campaigns- 1998:	The Animal Health and Livestock Services Act (1998) and national FMD (Foot and Mouth Disease) control projects reduce animal mortality and health-related dips in production. [1, 2, 3, 4, 5]	It is practicing, but not enough to cover the demand.

The dairy related policies particularly to address the structural problems of seasonal milk production are related to overall increase in production and productivity of milk and dairy products. It includes, increasing quality and quantity of feed and feeding stuffs, feeding practices, forage and fodder production, breed and breed development endeavors, market and market stabilization apparatus including post production management, financial management and utilization of the surplus milk. It also included the climate change impacts in animal production and mitigation measures. Safeguard the dairy industries and increase efficiency of industries fostering processing capacity, improve cold-chain infrastructure, and climatic variability.

However, there is bit gap between the policy/ law/ strategies and real implementation status, followed by achievement of the anticipated goal. It is found that there is weak coordination among institutions, inadequate investment in forage production, conservation and management technologies, poor export management, delayed payment against the milk procure to the farmer, and limited cold-chain infrastructure. As a result, desired improvement in seasonality of milk production is not achieved. Recent policy reviews also indicate that existing provisions are often insufficient to fully address the practical needs of dairy farmers and processors that demand revision in the policy and result oriented implementation plan.

CHAPTER: VII

PERFORMANCE (SUSTAINABILITY/ FEASIBILITY ASPECTS) OF POWDER PLANT OPERATION

7.1 Current picture

SMP plant in Nepal have been established to absorb the milk produced by the farmers and replace the import of SMP and butter. It was also aimed to retain the farmers in dairy animal keeping assuring market and convert storable products which otherwise should import.

Table 58: Current SMP plants.

Facility	Approximate Installed Capacity (tonnes/day)	Average production at present
Biratnagar MSS (DDC)	Embedded in wide product line; SMP share limited within milk processing capacity. dairydev.com.np 5 ton/day	2 ton/ day
Sujal Dairy, Pokhara	20 tons/day (industrial scale)	3.5 ton/ day
Chitwan Milks, Bagmati Province Chitwan	18 tons/day design	7.5 tones/day
Suryodaya Milk and Beverage Industry Pvt.Ltd.	3 ton/day	1.5 tonne/day
Sagarmatha Bisistikrit Sahakari Sang Limited, Sunsari, Nepal	6 ton/ day	3.5 tonne/day
Shivapuri Dairy Pvt. Ltd, Kharipati, Bhaktapur	6 ton/day	3.5 tonne/day
Bagmati Skim Milk Powder Plan, Hetauda	5 tons/day	1.5 tonne/day
Kohalpur Skim Milk Powder Plant	Planned/initiation	Plan to establish
Mata Manakamana Dairy, Kavre	3 ton	
Sigdel Dairy (Cow Farm)	1 ton/day	Under construction-
Surkhet Dairy	1 tone/day	Under construction-
Sudurpaschim Province SMP plant	Planned	Under planning phase
Total	68.0	23

Source: National Dairy Development Board, 2023 and field survey 2026

Note: Some are in trial/under-development stages. Exact updated figures for new and proposed plants are *pending.*

Based on the information collected from secondary source and the key informants, the SMP plant are operating 33.82% of their installed capacity.

- Based on national production estimates, it is estimated that a total of 4,516 MT SMP is produced per annum. Combined processing potentials, it is observed that actual utilization of government-managed units shows moderate activity but lower than optimum levels. This is due to operational modality and market constraints at large.

- Capacity of utilization is basically depending on the seasonal milk availability, cost of production, and domestic and export market demand

It was learnt that the SMP plants were established with in adequate strategic manner e.g. milk procurement plan, procurement process, assessment of alternative market options including export, storage and cold chain establishment. The foreseeable stock, stock management, liquidity management, financing facility, working capital requirement and its management and required support from the government.

It has been observed that, large volume of SMP and butter is produced but domestic consumption is weak, institutional demand is low, quality is not compliance to international market/ low competitiveness, and imported dairy products are cheaper. Due to these reasons stock remain unsold increasing cost for cold chain.

On the other hand, dairy industries procure farmer's milk but not been able to recover quick cash from the products. Due to these reasons, industries delayed the farmer's payment, stop the cash flow, farmers could not get capital to purchase raw materials (feed, medicine, feed additives, disease management etc) followed by poor milk quality and decline productivity.

It is well understood that processing and storage cost for SMP and butter is bit high. It requires high electricity, fuel/diesel etc, packaging, operation and maintenance, storage and finance. When the product could not sell, the SMP plants become financially troublesome.

Despite the efforts done in the past to reduce the seasonal difference, the result is not as per anticipation. When excessive milk enters in the industry system in short period, the plant become overloaded. It is however, required to rationalize and optimize existing plants, stop unnecessary expansion, convert SMP plants into strategic balancing facilities and reform the dairy market system and market diversification.

7.2 Feasibility of SMP plants

Technical feasibility studies conducted on SMP plants have consistently returned favorable results, indicating that the technology is technically viable under studied conditions. It is also found that there is potential for increasing milk production across the country and these plants are distributed to cover every province, which is a policy of government. Furthermore, the plants help absorb flush season milk, reduce and prevent milk dumping, ensure stabilized milk collection and support farmers during surplus season and retain them in dairy animal rearing.

While considering economic and financial perspective, they are partially or conditionally feasible. It is because, many of the plants are run below optimal efficiency, processing cost is high, products remain unsold. While, butter and SMP stock accumulate when the industries cannot recover cash and hence farmer payment liabilities increase drastically. This might be due to quick policy implementation in increasing the milk and reduce the seasonality of production. It also realizes weak marketing strategies of SMP plants to seek the market of butter and SMP. It might be because Nepal has not implemented the international treaties, rules and regulations to export these products. It also envisioned that the powder plants are not fully operated due to seasonal milk production variation. It increases the overall overhead costs per unit of output for operating plants.

Creating stable demand, assure required finance, manage the inventory well and stabilize the milk flow throughout the seasons articulating proper dairy animal management system.

Suggested plan of action for making SMP plants feasible:

Time frame	Action to be taken	Expected output	Responsibilities
Immediate Strategy (0–6 Months)	• Clear the farmer's payment. • Create emergency fund for dairy stabilization • Provide soft working capital to dairy industries	• Increase farmer's confidence • Prevent sale of animal • Continuous milk production flourish	Government of Nepal, NDDB, Dairy cooperatives, commercial bank/ financial institutions
	• Stop excessive SMP production: Temporarily reduce SMP conversion and prioritize fresh dairy product consumption • Limit procurement expansion in highly surplus areas	• Reduce stock • Reduce cash blockage	Dairy industries, Cooperatives, Provincial governments
	Institutional use of SMP and Butter: school feeding program, public institutions (civil and	• Immediate stock reduction, cash flow increase	Federal, provincial and local governments, Army, police, schools,

Time frame	Action to be taken	Expected output	Responsibilities
	arm force), nutrition program, disaster reserve food	• Market stabilization	hospitals,
Medium term strategy (6 months to 3 years)	Convert the SMP plants to seasonal balancing facility: • operate SMP plants mainly during flush season,	• Lower operational cost, • better efficiency, • reduce unnecessary inventory	NDDB, dairy industries, cooperatives,
	Product diversification mechanism: • Shift part of milk into cheese, yoghurt, mozzarella, paneer, UHT milk, ice-cream and fermented products	• High value realization, • cash flow become faster, • SMP dependence will be lower down.	Dairy Development Corporation (DDC), private dairies, cooperatives
	Establish inventory financing system • SMP and butter in the stock can be collateral • provide subsidized loan, • warehouse/store receipt financing to be introduced	• Industry's liquidity improved, • assure timely payment to farmers.	Nepal Rastra Bank, commercial bank/ financial institutions, Ministry of Finance
	Steady milk production strategies round the year: • increase silage production, manage year-round green forage production increasing irrigation facility, • promote AI and heat synchronization/ reproductive planning, • Use of balance ration, climate resilient feed and feeding, reduce calving	• Reduce flush and lean season milk production gap, • stabilize annual milk supply	MoALD, provincial directorate of livestock and fishery office, local governments, dairy cooperatives
Long term (3-10 years plan)	Increase competitiveness of industry for import export management: • improve milk quality,	• Improve for current regional export potential, • Access to good	GoN, export promotion center, dairy industries

Time frame	Action to be taken	Expected output	Responsibilities
	• establish protocol: SPS certification and reduce cost of milk production • improve cold chain logistics. • Export should be taken as long-term plan/strategy	external market	
	Rationalize SMP plant capacity. • Conduct technical and financial audit of SMP plants: • ensure actual capacity of utilization, proper energy management-energy efficiency, procurement areas, transportation cost. • Also start merger, restructure and or shift towards diversified dairy processing	• Increase optimal efficiency • Increase cash flow • Stronger institutional growth of SMP plants	NDDB, GoN, dairy sector stakeholders

Thus, it can be concluded that, SMP plants are not wrong to establish, it requires through study of market demand, strong financing mechanism, improving export system and product stabilization could be tools for better use of these plants. It is therefore, SMP plants are strategic seasonal balancing tool but at the same time it is also required to understand that, SMP only may not be the only solution.

Real long-term solutions could be: reduce seasonality of milk production at farm level, strengthen dairy market system with through market assessment with alternative plans. Improve cash flow and emergency fund management, diversify the dairy products and assuring financially disciplined dairy industries

CHAPTER: VIII
SEASONALITY OF MILK PRODUCTION AND ITS IMPACT

8.1 Drivers of the Seasonality of milk production

8.1.1 Technical & Breeding Management

Lactation Cycle: In pasture-based systems, calving is synchronized so cows' lactate during the spring to match lush grass growth. Production naturally peaks in mid-lactation and steadily declines towards late lactation, creating a bell-curve of supply.

Breeding & Heat Stress: High temperatures trigger hormonal changes that decrease reproductive efficiency, leading to irregular breeding intervals and shifting the lactation cycle out of optimal alignment. [1, 2, 3, 4, 5]. Climate stress (especially heat and humidity) severely disrupts livestock breeding cycles and prolongs calving intervals. It suppresses reproductive hormones, impairs egg and sperm quality, increases embryo mortality, and lowers feed intake. This combination forces a prolonged period of "days open" and shifts the ideal 365-day calving cycle. [1, 2, 3, 4, 5, 6]

8.1.2 Finance & Management Strategies

Feed Cost & Availability: Summer pastures yield highly nutritious green forage, increasing solids-not-fat (SNF). Conversely, dry, stalky winter forage results in lower protein and fat, requiring expensive concentrate supplementation to maintain yield.

Resource Allocation: Managing a dairy farm requires cash flow for herd health and feed stockpiling before seasonal drops in supply occur. [1, 2, 3, 4, 5]

8.1.3 Environment & Climate Change

Heat Stress:

The optimal Temperature-Humidity Index (THI) is crucial for dairy cows. When heat and humidity rise, cows reduce dry matter intake to avoid metabolic heat generation. This causes a drastic drop in milk volume and alters milk composition (e.g., lower fat percentages).

Extreme Weather:

Extended droughts or heavy monsoons affect grass growth rates and farm water availability.

Climate Change Impact:

Shifting global weather patterns make seasonal forage planning increasingly volatile, reducing overall agricultural productivity. [1, 2, 3, 4, 5, 6, 7, 8]. Climate stress, particularly extreme heat and water scarcity, negatively impacts lactation by reducing milk volume, altering milk composition, and shortening breastfeeding duration. It triggers physiological stress and dehydration in the lactating individual, which disrupts the hormones needed to produce and release milk. [1, 2, 3, 4]

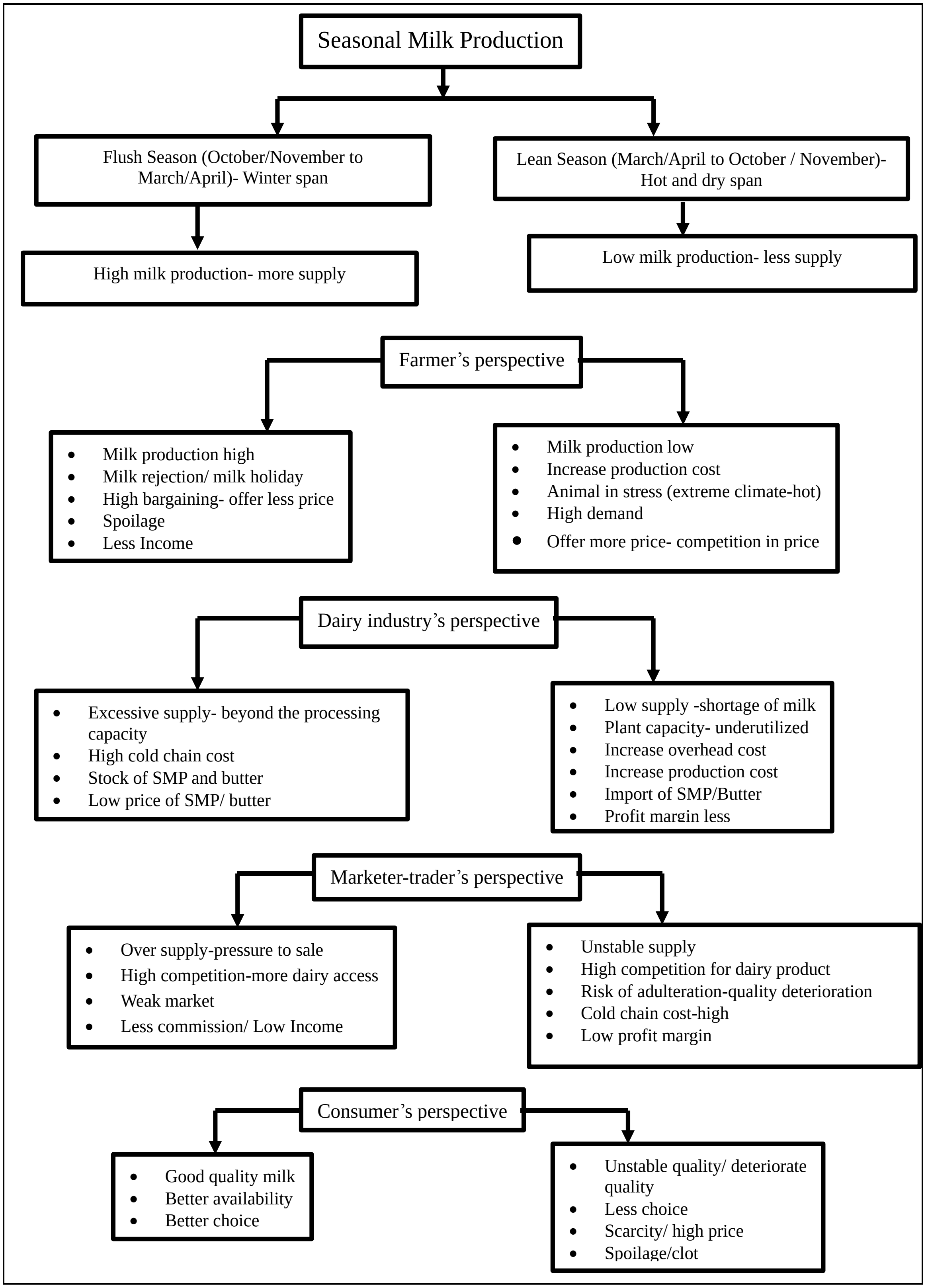

Figure 4: Impact of seasonal milk production

8.2 Economic & Financial Impacts Across the Dairy Value Chain

8.2.1 Production Stage (Farmers)

Revenue Volatility: During the wet season or spring, farmers experience a flush in production which can saturate local markets, potentially driving down farm-gate prices. Conversely, winter or summer scarcity pushes prices up, but total revenue drops due to lower milk volumes.

Dairy cattle are susceptible to the direct and indirect effect of heat stress, which can impact milk production and milk quality. As temperatures and/or humidity rise, animals consume less feed, which leads to a decline in most production events (Pragna et al., 2017).

During the dry season, heat stress has an effect on mammary gland development and proliferation, which lowers milk production (Tao and Dahl, 2013). Milk production can significantly decrease due to the heat stress in dairy cattle, particularly high producers. On farms that use cooling techniques, milk production can fall by 10-15%, and on farms without cooling techniques, it can fall by 40–50%. In a climatic chamber, 12 lactating dairy goats were exposed to heat stress, and a study found that on the fourth day of exposure, milk production dropped by 53% (Garner et al., 2017). Both the quantity and the quality of milk can suffer from heat stress (Sheikh et al., 2017). In a study by Bernabucci et al. (2002), it was discovered that the summer months had lower milk yield, casein percentage, and casein number (-10%, 2.18% vs. 2.58%, and 72.4% vs. 77.7%, respectively) than the spring months.

This suggests that hot weather might have an adverse impact on milk quality and production. According to Liu et al. (2017), significant changes in the levels of triacylglycerols and polar lipids indicate that heat stress can change the composition of milk fat as well. As a result, it is crucial to take the necessary steps to create heat-resistant cattle breeds in order to protect the productive achievements of cattle from the negative effects of climate change. https://doi.org/10.30564/vsr.v2i2.2624

Input Costs: When forage is scarce, reliance on expensive commercial feed and veterinary care for heat-stressed cows heavily inflates the cost of production per liter. [1, 2, 3, 4]

8.3 Processing & Manufacturing Stage (Dairies)

8.3.1 Capacity Utilization:

Seasonality causes underutilization of processing facilities during the "trough" (low season) and capacity bottlenecks during the "flush" (peak season).

8.3.2 Manufacturing Adjustments:

Dairies must constantly alter production processes. Summer milk with lower protein and fat limits cheese yields, whereas winter milk is more suited to butter or powders. Plant logistics require sophisticated supply and demand forecasting models to optimize processing. [1]

8.4 Distribution & Retail Stage

8.4.1 Cold Chain & Spoilage:

Higher ambient temperatures in the summer rapidly escalate total bacterial count (TBC) and somatic cell count (SCC), which increases spoilage rates. Distributors must invest more in refrigeration, which drives up logistics and financial costs.

8.4.2 Market Pricing:

Retail prices often face upward pressure during low-supply periods, straining household budgets and altering consumer demand. [1, 2, 3, 4, 5]

8.5 Socio-Economic Impact

8.5.1 Food Security:

In developing and agrarian economies—like rural areas in Nepal—dairy is a vital daily cash crop that ensures nutritional security. Seasonal dips in milk mean a loss of regular daily income for rural households, increasing economic hardship.

8.5.2 Gender Empowerment:

Because women predominantly handle on-farm dairy production, seasonal fluctuations directly impact female-driven household income. Severe seasonal drops can strip women of financial independence. [1, 2, 3, 4, 5]

8.6 Structural issues

Dairy sector is characterized by several structural and systemic constraints that contribute to recurrent fluctuations in milk production and unstable market. One of the major challenges is the extensive dependency on seasonal green fodder and forage resources. Since dairy production largely relies on natural pasture and poor forage cultivation practice, lack of irrigation facility resulting seasonal forage availability. Dairy farms concentrated in peri-urban area where land is costly due to these reasons milk production increases significantly during the flush season and declines sharply during the lean season.

The situation is further aggravated by the weak practice of forage preservation, particularly limited adoption of hay and silage production technologies. As a result, dairy farmers face acute shortages of quality green fodder and balanced feed during the lean season, which directly affects animal nutrition, productivity, and reproductive performance. The lack of feed security remains one of the core causes of seasonal milk deficits in the country.

Market and processing-related limitations also contribute to instability within the dairy value chain. Export of dairy products, especially skimmed milk powder (SMP) and butter, is not practiced regularly or systematically. Consequently, during periods of surplus milk production, dairy industries accumulate excessive stocks of processed dairy products, increasing storage and operational costs and placing additional financial pressure on processors.

Structural Issue	Effect
Extensive dependency on seasonal fodder/ forage	Tangible gap between flush and lean season milk production/ high degree fluctuation.
Forage preservation viz: hay, silage production and conservation are weak	Shortage of green forage/ fodder in quality feed in lean season
Export of dairy products specially, SMP, butter is not usual	Stock of dairy products accumulated excessively adding cost of products.
Purchasing power is limited and consumption is increasing in urban center but limiting in peri-urban and rural setting	Demand of milk and products is weak but need for good health is not meet.
Poor cold-chain infrastructure across the production and transportation sites	Danger of spoilage of milk and products and inefficient milk and products and economic loss.
Payment system is slow against the procured raw milk	Liquidity crisis to the farmers and could not expand the business due to uncertainty.
Dairy policies are across the dairy value chain is not coordinated.	Creating cyclical instability across the chain
Climatic diversity and variability across the dairy pockets	Heavy fluctuation in milk production between the season

Demand-side limitations are equally significant in dairy value chain. Although milk and dairy product consumption is gradually increasing in urban centers, milk producers tended to sale most of milk produced that reduces HH consumption of the farmers. This creates an imbalance where nutritional demand exists in rural and peri-urban areas, but actual consumption remains low. Such weak market absorption reduces incentives for sustained production expansion and limits improvements in household nutrition alternatively.

Infrastructural weaknesses further intensify sectoral inefficiencies. Poor cold-chain facilities across milk collection, transportation, and processing systems increase the risk of spoilage and quality deterioration of milk and dairy products. This not only leads to economic losses for producers and processors but also undermines consumer confidence in dairy quality and safety.

Financial management within the dairy value chain also remains problematic due to seasonality of milk production. Delayed payment systems for procured raw milk often create liquidity shortages to farmers, limiting their ability to invest in feed, animal health, herd expansion and improvement. The uncertainty associated with irregular payments discourages commercialization and weakens the resilience of dairy farming households weaking overall dairy sector growth.

8.7 Policy gap among the value chain actors in Nepal

Dairy-related policies and interventions across production, processing, marketing, and trade are often fragmented and poorly coordinated each other. The absence of an integrated value chain approach contributes to cyclical instability in production, pricing, and market management of dairy sector. The data/information have been made as per collected data during study period.

8.7.1 Dairy farmers

Climatic diversity and increasing climate variability across major dairy production pockets further exacerbate the problem by creating substantial seasonal and regional fluctuations in feed availability and milk production. Thus, these interconnected structural, market, infrastructural, financial, and climatic factors collectively reinforce the persistent seasonality and instability of Nepal’s dairy sector, affecting farmers, dairy industries, and consumers alike.

Based on the information collected from Key Informants and FGD participants, seasonal milk production is one of the most critical structural challenges in Nepal’s dairy sector development. It was said that, distinct flush season, generally observed from October to March, when milk production increases substantially. While on the other hand and a lean season started from April till September, when milk production and declines sharply and currently there is shortage of milk. This imbalance between production and market demand has repeatedly created cyclical dairy crises in and this situation repeated at an interval of three to five years. The problem affects not only dairy farmers, but also dairy industries and consumers, creating instable dairy value chain across the country.

The seasonality of milk production is primarily influenced by dependence on rainfed forage systems, seasonal availability of green forage/fodder, climatic stress (severe heat, alteration in precipitation) and dominated traditional livestock management practices. During the post monsoon and winter months, availability of green forage and favorable climatic conditions is said improve milk productivity, that resulted in surplus milk production specially in milkshed area. Conversely, during the summer and dry months, shortage of quality fodder, heat stress, and inadequate feeding practices rampant that reduce milk yield sharply. Dairy processors and Dairy Development Corporation (DDC) said, the lean-to-flush production variation is substantial, and the seasonal production ratio has historically ranged from approximately 65:35 to 55:45 over recent years and at present too. Such fluctuations create instability in milk production, collection, processing, and marketing systems.

According to FGD participants, milk seasonality creates serious economic and livelihood challenges to them to the farmers. They told during flush seasons, dairy industries often collect more milk than the market can absorb and convert the fluid milk to SMP. Farmers frequently face delayed payments for several months. This directly affects smallholder farmers who rely on daily milk income for household expenses, livestock feed, child education, and healthcare. Farmers also claimed that, these delayed payments reduce their ability to purchase concentrate feed affecting proper animal nutrition, ultimately lowering productivity and discouraging them for further investment in dairy animal farming.

The FGD participants also told that, farmers are insecure market and distress milk sales. They also said during severe flush periods, some dairies either limit milk collection or temporarily refuse additional milk showing the reason excess stock accumulation. FGD participants further said farmers are forced to sell milk even at lower prices or dispose of unsold milk. They said that the recurring crises weaken their confidence in dairy farming as a reliable income source and mentioned the situation compel farmers for gradual withdrawal from commercial dairy farming.

8.7.2 Dairy industries

Key Informants/dairy industries have their own issues. The industries told that they are affected by seasonal fluctuations in milk supply and facing difficulties in milk management. During flush seasons, they face excess milk collection beyond market demand and their processing capacity. While other said, this situation led to accumulation of unsold dairy products such as butter and skimmed milk powder. They also said, the storage and inventory management increase their operational costs and created liquidity problems to procure other materials and pay the staff. On the other hand, during lean seasons, dairy industries operate below capacity resulting inefficient utilization of processing infrastructure and higher production costs per unit occurs. Some industries told they seldom depend on imported SMP or dairy products to meet consumer demand during shortage of milk supply i.e. lean season. They also said, such fluctuations reduce profitability and create financial instability across the dairy value chain.

While on the other hand, milk processors told because due to accumulate large stocks of butter and milk powder in last year weakens their cash flow position and could not pay for farmers against milk procure. They also agree that, farmers frequently face delayed payments for several months. DDC Recent reports indicated that unpaid dues to farmers by DDC and private dairies reached hundreds of millions of rupees during flush seasons, with some years exceeding NPR 1 billion while the farmers leaders claim due payment is nearly 2.6 billion during the study time.

8.7.3 Dairy scholars

Key informants- dairy scholars said, repeated dairy crises occurring every few years are largely associated with structural weaknesses in dairy production and processing system. Expansion of milk production through improved breeds and commercialization has not been matched by corresponding growth in processing capacity, cold-chain infrastructure, value addition, or market expansion. They also said, domestic demand growth remains relatively slow, while export opportunities for dairy products are limited in the country. Consequently, surplus milk during flush seasons cannot be effectively absorbed by the market, resulting in recurring stockpiling and payment crises observed.

8.7.4 Consumer perspective

The dairy consumers said, they are also adversely affected by seasonal milk production juncture. The loose milk consumers said, during lean seasons, milk shortages lead to reduced market availability and they are charged higher retail prices. Urban consumers, particularly in Kathmandu Valley and major cities, claim that they frequently face poor quality milk (reconstituted from SMP and butter) and milk clotting. In some segment of the consumer, seasonal shortages encourage informal marketing practices and increase risks related to milk adulteration and quality control. While on the other hand, despite low farmgate prices during flush periods, consumers often continue to pay higher prices.

In summary, From the information provided by the farmers regarding seasonality of milk production, dairy processors and consumers, it was found that the seasonality of milk production represents a systemic challenge affecting production, processing, marketing, and consumption simultaneously. The recurring cycle of milk surplus during flush seasons and shortage during lean seasons creates financial distress to farmers, operational inefficiencies for dairy industries, and quality instability for consumers.

Availability of year-round green forage/fodder, silage promotion, improved breeding and feeding practices, expansion of milk processing and storage facilities, and stronger market management systems could be a roadmap for reducing seasonal milk production. In addition, policy measures such as seasonal premium milk pricing, milk pricing based on the total solid, endorsing code of conduct between the value chain actors, establishing code of conduct on flexibility of milk sale to other traders by the cooperatives/farmers other than mentioned in agreement between dairy industries and cooperatives/farmers, uniformity in subsidy across the dairy farmers in the country, liquidity stabilization funds, export promotion, and institutional demand creation cold also support for reducing seasonal imbalances and strengthening the long-term sustainability of dairy value chain in the country.

CHAPTER VIX
CONCLUSION AND WAY FORWARD

9.1 Conclusion

Seasonal milk production is elsewhere in south Asia that is creating gap between the demand and gap of the milk and its products. Despite the promulgation of different acts, guideline and programmatic simulation to narrow down the gap between flush and lean season milk production, efforts are yet to be done to fully capture the situation.

Major problems of the seasonality of milk production are attributed to seasonal forage/fodder production, high feed cost, delay payment of the sold milk to the farmers, poor cold chain infrastructure, low productivity dairy animals, high bacterial contamination of milk, lack of production and processing technology, high labor cost, inadequate technical services, seasonal breeding in buffalo, regional demand spike (religious rituals and festivals), change in disease pattern, climate change and environmental factors.

Climate change effect the animals are rampant at present. Winter forage production is very low as compare the nutritional demand and the raw materials production for the feed is sharply declining. While during the lean season farmers are compelled to feed more concentrate to maintain the production.

Due to lack of irrigation facility, farmers are unable to grow winter season, while the natural springs are dried when the animals are not getting enough water. This resulted in reduced feed intake followed by low milk production. Housing system is traditional type, dairy animals are compelling panting during hot season and suffered from externe cold during winter.

Farmers are struggling to maintain calving interval and increasing lactation period to increase profitability. Climate change effect has distorted the estrous cycle, reduce conception rate. New diseases are incepted resulting higher economic loss.

After the endorsement of federal structure, there is communication gap between the three-tier government, while the at the main production site i.e. local government, there is lack of technical manpower, budget while institutional memories are not transferred.

Raw milk price has been fixed by the federal government and price is uniform to all parts and season. While on the other hand, cost of milk production varied between the season and location specific. Cold chain infrastructure is limited and their raw milk holding capacity is not adequate.

Different policies have been designed and endorsed and due to the implementation of different policies and programs in reducing seasonal milk production, improvements have been observed but not as intended. Policy implementation is weak and seldom implemented in ad hoc basis. The subsidies are not reached to the intended segment of the farmers and is not transparent. Subsidized loan is not reached to the intended farmers while, insurance policy is not widely spread across the country.

Until the date Nine SMP plants are operational with 68-ton capacity per day. But mostly they are only operating for processing flush season milk, which is not more cost effective. While the SMP and butter are in stocked inventory and the farmers are not getting the money out of milk sold to the dairy industries. On the other hand, export of SMP and butter is not efficiently materialized.

Despite the different problems, farmers in the survey areas are working to minimize the seasonal variation of milk production in large, medium and small size farms. There is common dairy animal farming procedure as the management system are equally applied same approach irrespective of farm size. In the past it was mentioned that the annual total milk production in flush season was 65% and lean it was said 35.0%. Present study finds out that out that of total annual production 55.0% milk is produced in flush and 45.0% produced in lean season where 10.0% improvement is observed. However, this study was done in the commercial milk pocket areas where farmers use improved technology and this scenario may be different in overall national perspective.

SMP plants have been established in different parts of the countries assuring provincial balance. These plants are only functional during flush season and the capacity of utilization is weak. It increases the operational cost and SMP become expensive too. Farmers are not getting payment over 3-4 months exerting liquidity pressure to farmers to manage their dairy farm while on the other hand huge stock of the processed product could not sold by the dairy industries and face liquidity problem.

9.2 Way forward/mitigation measures to be adopted to reduce the seasonal milk production system

Seasonality of milk production is one of the structural issues in dairy sector. It is associated to different aspects including technical, climatic, management and market system. There is no way to sustain dairy sector managing these factors assuring consistent milk production round the year. Following is the recommended result oriented national action plan to reduce the seasonal milk production (2026–2031)

Strategic Area	Focused Activities	Time Frame	Responsibility	Implementation Strategy	Estimated Budget (NRs.)
1. National Feed and Forage Security Program	Establishment of forage production zone, supper zone, clusters, silage pits, hay making units, fodder seed multiplication and forage irrigation facility	Year 1–5	Ministry of Agriculture and Livestock Development, Provincial Ministries, Local Governments, Dairy Cooperatives	Target major milk pocket areas; cooperative-based zoning the forage production establish silage centers; subsidy for forage seed and mechanization and trading	NPR 5–7 billion
	Perennial fodder species (Napier, oats, berseem, stylo, fodder trees) promotion in specific zones	Year 1–5	Local Governments, Livestock Service Centers	Contract fodder farming and using both public and private land	Included above
	Establish community feed banks in drought-prone dairy zones to buffer the feed requirement	Year 2–5	Cooperatives, Provincial Governments	Community or private sector-managed storage and revolving feed systems augmenting farmer friendly guideline for operation	NPR 0.5 billion
2. Incentive schemes for lean season milk production	Workout and implement differential milk pricing system during lean season and anchor it with cloud-based data management	Pilot Year 1–2; Scale-up Year 3–5	National Dairy Development Board, Dairy Industries, Cooperatives	Create government-led, cooperative and private sector supported seasonal milk incentive fund	NPR 1 billion-annual

	system				
	Provide premium price/ bonus to the farmers who supply milk for year-round and revise the quality standard of milk at farm gate (e.g. 4% fat and 8% SNF)	Year 2–5	Dairy Cooperatives & Industries	Cloud based digital milk recording and performance-based payment system	Included above
3. Establish buffer stock of dairy product and export promotion	Establish national SMP and butter stabilization reserve center-oversight by GON	Year 1–3	Dairy Development Corporation, Private Dairy Industries	Procure surplus flush season milk and process into long shelf-life products-government oversight	NPR 3 billion
	Develop export protocols align to regional and international dairy trade agreements	Year 2–5	Ministry of Industry, Commerce and Supplies	Bilateral/ multilateral trade negotiation and export incentives initiatives	NPR 100 million
4. Manage infrastructure for cold chain and milk collection	Establish chilling centers at strategic milkshed area and refrigerated transportation systems	Year 1–5	Provincial Governments, Dairy Cooperatives, Private Sector	Priority to high milk surplus districts across the Mahendra highway	NPR 6–9 billion
	Establish solar-powered milk cooling infrastructure in remote areas	Year 2–5	Local Governments, Development Partners	Green energy used climate-resilient decentralized milk cooling at strategic locations.	NPR 1 billion

5. Dairy animal reproductive health and herd management improvement	Using cloud-based information system establish controlled breeding calendar and AI expansion with sexed seme/ registered bull	Year 1–5	Livestock Directorate, Veterinary Hospitals and Livestock Expert Center	Use cloud-based herd management and synchronize calving distribution round the year	NPR 1.5 billion
	Using the cloud-based information technology, administer animal specific feeding allowing mineral mixture, balanced ration and heat stress management system	Year 1–5	MPCs/cooperatives, feed industries/ suppliers	Subsidized mineral supplementation, farmers training on feed management training to farmer	NPR 1 billion
6. Introduce and utilize cloud-based climate-resilient dairy production system	Aware the farmers on climate change effect, promote climate-smart dairy sheds, water harvesting, drought-resilient fodder promotion and economic irrigation technology.	Year 2–5	Ministry Agriculture and Livestock Development (MoALD) of Forests and Environment (MoFE), Local Governments	Establish matching fund for climate change adaptation and loss revitalization	NPR 2 billion

	Establish cloud based weather advisory system for dairy farmers.	Year 2–4	Department of Hydrology and Meteorology	SMS and mobile-based early warning services	NPR 250 million
7. Reform Dairy Governance and Coordination practice	Formulate and enacted National Seasonal Milk Stabilization Taskforce to manage quick response for immediate need of the farmers	Year 1	Ministry of Agriculture and Livestock Development	Establish / formulate multi-stakeholder platform with quick communication system using cloud-based system.	NPR 30 million
	Establish annual milk balance forecasting and monitoring system using cloud-based information technology	Year 1–5	National Dairy Development Board	Undertake real-time milk supply-demand monitoring system with cloud-based information technology	NPR 250 million
8. Stimulate and facilitate dairy financing and reform payment system	Introduce mandatory 15-day milk payment regulation using automatic online payment system	Year 1	GoN , NDDB, MoALD, DDC and private sector dairy industries	Apply cloud-based regulatory enforcement mechanism and financing	Administrative cost
	Manage seasonal working capital for subsidized loan for dairy sector	Year 1–5	Agricultural Development Bank, Commercial Banks	Subsidy in interest and self-propel revolving funds	NPR 3.5 billion

9. Capacity Building and Extension on Dairy Sector	Farmer training on IT based dairy management, silage production, balanced feeding, and consistent milk production round the year	Year 1–5	Provincial & Local Governments	Campaign in-situ training/ farmer field schools and cooperative extension operationalize	NPR 1.0 billion
	Operationalize problem based functional, professional technical and management training for dairy cooperatives and processors	Year 2–5	National Dairy Development Board	Provision of certification and management training	NPR 300 million

Annex: 1 Survey questionnaire

National Dairy Development Board (NDDB)

Nepal Environment Protection Center (NEPC)

Study on seasonality of milk Production in Nepal and way Forward to Mitigate the effect

Structured (HH) questionnaire for face-to-face interview with dairy farmers

General information
1.Name:…………………………..
2.Address: District:……………. Palika:……….NP…………..GP……………Milk Producers Cooperative (MPC)

3. Number of dairy animals kept:
a) Cow: Milking…………… Pregnant………Heifer………Calf……..Dry……. Bull
b) Buffalo: Milking…………… Pregnant………Heifer………Calf……..Dry……. Bull

4. Breed type by animal number
a) Cow: Pure Jersey………….Jersey cross…….. HF………….HF cross………..Local……Others…..
a) Cow: Pure Murrah………….Murrah cross…….. Local……Others….

5.Breeding management: and semen type (Nepali, foreign)
a) Cow: AI………, Natural…(improved bull…………, Local bull…..)
b) Buffalo: AI………, Natural…(improved bull…………, Local bull…..)

6. Calving interval
a) Cow: …… Mating/conceiving month…………
b) Buffalo: ……. Mating/conceiving month…….

7. Lactation days
a) Cow: ……
b) Buffalo: …….

8. Average daily milk production (Lits)
a) Asoj- Fagun
b) Chait- Bhadra

9.Feeding management for milking animal
a) Proportion of roughages per day Cow (Kg): (Asoj- Fagun): (Green …. Dry (Kg)……Silage…. Conc…….
b) Proportion of roughages per day Buffalo (Kg): (Asoj- Fagun): (Green …. Dry

(Kg)……Silage…. Conc…….

10.Feeding management for breeding animal
a) Proportion of roughages per day Cow (kg): (Asoj- Fagun): (Green …….Dry…… Silage…..Conc …….
b) Proportion of roughages per day Buffalo *Kg) (Asoj- Fagun): (Green ….Dry …… Silage…….Conc…. ……

11. Cost (NRs) per kg of: dry fodder…………Green fodder……, Silage………, conce……….

12. Proportion of legume and non-legume in the feed

13. Health care management
a) Prevalence of mastitis cow:
b) Prevalence of mastitis buffalo
c) Prevalence of FMD cow:
d) Prevalence of FMD buffalo
e) Prevalence of other diseases cows:
f) Prevalence of other diseases buffalo:
g) On time availability of animal health services (Vaccination, drenching, diagnosis, treatment)
h) On time administer medicine/ drugs

14. Reproductive health
a) Repeat breeding in Cow…….
b) Repeat breeding in Buffalo…..
c) Anoestrous in cow
d) Anoestrous in buffalo
e) other reproductive disease in cow
f) Other reproductive disease in buffalo

15. Housing management
a) Have open yard to animal for mobility
b) Have well-ventilated shed
c) Have facility for water and feed manger and not access for trampling
d)Have facility access to sunlight enough
e) Have facility to maintain temperature during extreme weather variables

16. Prolonged hot climate and its effect
a) Feed intake low during ………… months

b) Heat cycle break during ………. months
c) New disease prevail during……. months

17. Place of selling milk and price per liter

a). Dairy Cooperative (Lits)……….., (Asoj-Fagun) Price (NRs)…..(Chait-Bhadra) LIts)…… Price (NRs)…..
b). Private collector (Lits)……… (Asoj-Fagun) Price (NRs)…..(Chait-Bhadra) LIts)…… Price (NRs)…..
c) Self sell to local market (Lits)…… (Asoj-Fagun) Price (NRs)…..(Chait-Bhadra) LIts)…… Price (NRs)…..

18. Payment of milk sale
a). Dairy Cooperative ………..,days. (Asoj-Fagun) ……..(Chait-Bhadra) LIts)……

b). Private collector……… days (Asoj-Fagun) ……..(Chait-Bhadra) LIts)……
c) Self sell to local market … ….days (Asoj-Fagun) ……..(Chait-Bhadra) LIts)……

18. Do you feel comfortable when seasonal pricing system for milk? give reasons

19. Your suggestions for solving the seasonality of milk problem ?

Thank you

National Dairy Development Board (NDDB)

Nepal Environment Protection Center (NEPC)

Study on seasonality of milk Production in Nepal and way Forward to Mitigate the effect

Checklist for Key Informant's Interview

General information

1.Name:…………………………..

2.Address: District:……………. Palika:……….NP…………..GP……………Milk Producers Cooperative (MPC)

3. What are the main reasons for seasonality of milk production?

4. What is the proportion of milk production lets say flush and lean seasons) ? which animal's milk production fluctuate more (cow or buffalo)

5. What is the impact of seasonality of milk production for farmers and dairy industries?

6. What is the price of milk in flush and lean season? Is there any difference?

7. Do you find difference on the total gross return of farmers in lean and flush season? (may be more fat in lean season)

8. Do you have any experiences of unsold milk in flush season in last five years? If yes what actually farmers manage that unsold milk?

9. Do you think, established SMP plant is game changing endeavor for consumption of unsold milk? Or you have other way out in your mind? Pleases…

10. Do you think it is possible to reduce the fluctuation of milk production between the seasons? If yes how it can be done? Who should do what to administer it?

11. What you think seasonality of milk production is it weakness or is threat? Give reasons

12. Who are more affected due to seasonality in milk production in dairy value chain? Farmers, dairy industries, consumers or the milk production raw materials providers?

Give you opinion in for of your statement

13.What challenges you observed from seasonal surplus and shortage? Mention your opinion

14. What are the ways you observed to mitigate the effect of seasonality on farmers, dairy industries, and consumers.

Thank you

National Dairy Development Board (NDDB)

Nepal Environment Protection Center (NEPC)

Study on seasonality of milk Production in Nepal and way Forward to Mitigate the effect

Focus Group Discussion (FGD) Guide

1.General information

Urban/Rural Municiplaity………………………….. Ward………………………… Tole

Date: Time: From……AM/PM… to…….AM/PM

List of Participants

SN	Name	Address/ organization	Position	Contact number
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

2. What are the main reasons for seasonality of milk production?

3. What is the proportion of milk production lets say flush and lean seasons) ? which animal's milk production fluctuate more (cow or buffalo)

4. What is the impact of seasonality of milk production for farmers and dairy industries?

5. What is the price of milk in flush and lean season? Is there any difference?

6. Do you find difference on the total gross return of farmers in lean and flush season? (may be more fat in lean season)

7. Do you have any experiences of unsold milk in flush season in last five years? If yes what actually farmers manage that unsold milk?

8. Do you think it is possible to reduce the fluctuation of milk production between the seasons? If yes how it can be done? Who should do what to administer it?

9. Who are more affected due to seasonality in milk production in dairy value chain? Farmers, dairy industries, consumers or the milk production raw materials providers? Give you opinion in for of your statement

10.What challenges you observed from seasonal surplus and shortage? Mention your opinion

11.What are the ways you observed to mitigate the effect of seasonality on farmers, dairy industries, and consumers.

Thank you

Annex: 2 Some photographs