Human Resource for Sustainable Dairy Sector Development

# PROCEEDINGS

## One-Day Workshop

on

# Availability and Requirement of Dairy Science and Technology Related Human Resources in Nepal


**11 June, 2019 (28 Jestha, 2076)**
**Kathmandu, Nepal**

**Human Resource for Sustainable Dairy Sector Development**

**PROCEEDINGS**

## One-Day Workshop
## on

# Availability and Requirement of Dairy Science and Technology Related Human Resources in Nepal

11 June, 2019 (28 Jestha, 2076)

Kathmandu, Nepal


**Edited by:**

Tek Bahadur Thapa

Uttam K. Bhattarai

Bimal Kumar Dahal



**Organized by:**

College of Applied Food and Dairy Technology (CAFODAT)

Department of Food Technology and Quality Control (DFTQC)

National Dairy Development Board (NDDB)

Dairy Development Corporation (DDC)

Nepal Dairy Association (NDA)

Dairy Industries Association (DIA)

Nepal Dairy Science Association (NDSA)

Nepal Food Scientist and Technologist Association of Nepal (NEFOSTA)

**Supported by:**

Food and Agriculture Organization (FAO)

Nepal Livestock Sector Innovation Project/GoN

2019 (2076)

DFTQC CAFODAT NDDB DDC NDA

DIA KDPL SGMKPL NDSA NEFOSTA

Food and Agriculture Organization of the United Nations

**Nepal Livestock Sector Innovation Project**
**GoN 2076 (2019)**

---

# PROCEEDINGS
# ONE-DAY WORKSHOP ON
# AVAILABILITY AND REQUIREMENT OF DAIRY SCIENCE AND TECHNOLOGY RELATED HUMAN RESOURCES IN NEPAL


| | | |
|---|---|---|
| Published by | : | College of Applied Food and Dairy Technology (CAFODAT)<br>Department of Food Technology and Quality Control (DFTQC)<br>Nepal Dairy Science Association (NDSA) |
| No. of Copies Printed | : | 500 pcs |
| Copyrights | : | CAFODAT, DFTQC & NDSA |
| Price | : | NRs. 400.00<br>US$ 15.00 |
| Year of Publication | : | 2076 BS (2019 AD) |
| Printed at | : | Print and Art Service<br>Bagbazar, Kathmandu<br>Tel: 01-4244419, 4239154 |

**RECOMMENDED CITATION:**

Thapa, T.B., Bhattarai, U.K. and Dahal, B.K. (2019). Proceedings of One-day Workshop on Availability and Requirement of Dairy Science and Technology Related Human Resources in Nepal; jointly organised by CAFODAT, DFTQC, NDDB, DDC, DIA, NDA NDSA and NEFOSTA; 11 June, 2019 Kathmandu, Nepal.


**Cover Photo** : Cross section of workshop participants posing for photo session.

# TABLE OF CONTENTS

## ACRONYMS

| | |
|---|---|
| AEC | Agro-Enterprises Centre |
| AFU | Agriculture and Forestry University |
| B.S. | Bikram Sambat |
| CBS | Central Bureau of Statistics |
| CDCAN | Central Dairy Cooperatives Association of Nepal |
| CIP | Cleaning-in-place |
| DDC | Dairy Development Corporation |
| DFTQC | Department of Food Technology and Quality Control |
| DIA | Dairy Industries Association |
| DLS | Department of Livestock Services |
| DoC | Department of Cooperatives |
| DT | Dairy Technology |
| FAO | Food and Agriculture Organisation |
| GDP | Gross Domestic Product |
| GoN | Government of Nepal |
| HRD | Human Resource Development |
| MIS | Management Information System |
| MOALD | Ministry of Agriculture and Livestock Development |
| NARC | Nepal Agriculture Research Council |
| NASA | Nepal Animal Science Association |
| NDA | Nepal Dairy Association |
| NDDB | National Dairy Development Board |
| NDSA | Nepal Dairy Science Association |
| NEFOSTA | Nepal Food Scientists and Technologists Association |
| NPC | National Planning Commission |
| NVA | Nepal Veterinary Association |
| NVC | Nepal Veterinary Council |
| P.U | Purbanchal University |
| PSC | Public Service Commission |
| R&D | Research and Development |
| SAP | System Application & Product |
| SMP | Skimmed Milk Powder |

# FOREWORD

Production and marketing of milk and milk products is on the increasing trend due to increased market access, and change in the consumer habits and demand. It is mainly due to the improved government interventions and support services through number of livestock development programme and projects. However, per capita requirement of milk, as recommended by WHO, is yet to be achieved in the country. It can be expected that this lacking will be met within couple of years.

Development of agriculture is a pre-requisite to the overall economic growth of Nepal. Production of safe and quality raw materials for industrial processing should be the main goal of agricultural production, and safety and quality assurance of processed agro-products is must for sustainable agriculture development. Till date, Nepalese agriculture is seriously lacking in achieving sustainability by assuring the safety and quality. Dairy sector is not the exception to this reality.

Major problem is inadequate number of technical human resources providing services in the dairy value chain across the country. Furthermore, there is no clear action plan to integrate dairy value chains with the academic programs producing technical dairy human resources.

To help resolve HR problem, this one-day workshop on **Availability and Requirement of Dairy Science and Technology Related Human Resources in Nepal** with the theme **Human Resource Development for Sustainable Dairy Sector Development** is a timely effort. We hope the compilation of workshop recommendations, full papers presented in the event and other details in the form of this Proceeding would be a milestone for the dairy sector development.

We hope this publication will be a reference document for the planners and decision-makers, entrepreneurs, academia and other dairy value chain stakeholders.

We want to express our sincere thanks to the editorial team, especially Mr. Tek Bahadur Thapa, Chairman, Nepal Dairy Science Association, for his efforts bringing out this proceeding.

Adj. Prof. Uttam K. Bhattarai
**Member Secretary**

Prof. Jagat Bahadur K.C.
**Chairperson**

**Workshop Organizing Committee**

Date: 2076/07/07 (24th October, 2019)

# PREFACE

Dairy development is one of the key drivers of the national economy, and the share of dairy (milk) in the national economy (GDP) is around 9 % which is very significant. According to the Ministry of Agriculture and livestock development, Nepal produced 1,911,239 MT of milk during fiscal year 2073/74 (2016/17). Most of the milk is consumed or passes through informal channel, and only around 17% of the total production passes through formal channel or through the public and private sector dairy plants.

Significant quantities of value-added dairy products are imported such as milk powders, baby foods, cheeses, long-life milk and cream, butter, ghee etc which could be produced in the country provided adequate processing facilities and trained dairy manpower is available. One of the major gaps in the dairy sector development is inadequate appropriately trained and skilled human resources for the entire value chain of the dairy processing industries. Buzz word for dairy value chain is from *farm/shed to fork/table (Goth Dekhi Oth Samma).*

In order to identify the HR dairy sector issues and recommend the way forward, a ***"One-Day Workshop on Availability and Requirement of Dairy Science and Technology Related Human Resources in Nepal"*** was planned and jointly organised by College of Applied Food and Dairy Technology (CAFODAT; Department of Food Technology and Quality Control (DFTQC); National Dairy Development Board (NDDB); Dairy Development Corporation (DDC); Nepal Dairy Association (NDA); Dairy Industries Association (DIA); Nepal Dairy Science Association (NDSA) and Nepal Food Scientist and Technologist Association of Nepal (NEFOSTA). The objective was to assess existing scenario and future requirements of dairy science & technology related human resources in Nepal, and to develop strategies to fulfil the HRD gap.

I would like to thank the Chief Guest and special guests who attended the opening and closing ceremony. Special thanks goes to Prof. Dr. Bhesh Bhandari of University of Queensland, Australia for his valuable participation and thought-provoking presentation on R&D for dairy sector development. I also would like to thank the organising committee chairman and the organisers, resource persons, various sub-committee members, rapporteurs, participants, media persons, CAFODAT staffs for their respective contributions to make this event successful. Special appreciation goes to Food and Agriculture Organization (FAO) and Nepal Livestock Sector Innovation Project/GoN for their financial and moral support.

Mr. Man B Shrestha, Ms. Sneha Shrestha and her team from CAFODAT worked very hard. Mr. Uttam K. Bhattarai, Member-secretary, Organising Committee worked very tirelessly to coordinate the workshop planning and organisation to bring everyone on-board; and deserves a high appreciation. Appreciation goes to Bimal K. Dahal for his contribution to finalise this proceeding. Thanks to the Chairman, Nepal Dairy Science Association who worked very closely with member-secretary for the successful outcome.

**Tek Bahadur Thapa**
Co-ordinator
Editorial and Publication sub-committee
11 November 2019,
Kathmandu

# CHAPTER 1: WORKSHOP RATIONALE

## BACKGROUND

In Nepal formal sector dairy development activities started in 1952 with the establishment of a first Yak cheese factory in Langtang, Rasuwa district. Thereafter, Dairy Development Section (DDS) was established in 1954 within the Department of Agriculture (DoA) under the Ministry of Food, Agriculture and Irrigation. In the same year, with the initiation of DDS a small-scale milk processing plant was established in Tusal of Kavre district. In 1955, the Government of Nepal formed a Dairy Development Commission with mandate of recommending ways of improving dairy sector in Nepal.

Provision of establishing a modern dairy industry in the country was made in the First Five Year Plan (1956-61).Accordingly, in 1956, a Central Dairy Plant; with average milk processing capacity of 500 litres/ hour was established in Lainchaur, Kathmandu. In 1960, some efforts were made to produce cheese along with establishment of a Cheese Production and Supply Scheme. The Dairy Development Commission was later converted to the Dairy Development Board in 1962. In order to meet the growing demand of milk in Kathmandu valley, the Board was converted to Dairy Development Corporation (DDC) in 1969. Later in 1992, National Dairy Development Board was established by the government with the mandate of advising and recommending policy level matters related to milk production, processing, marketing and quality control issues along with research and development.

Currently, there are number of institutions working in the dairy sector which are: Dairy Cooperatives, Dairy Development Corporation (DDC), National Dairy Development Board (NDDB), Department of Livestock Services (DoLS), Department of Food Technology and Quality Control (DFTQC), National Animal Science Research Institute and Food Research Division of Nepal Agriculture Research Council (NARC), Department of Cooperatives (DoC), Agriculture and Forestry University (AFU), Nepal Veterinary Council (NVC), Dairy Industries Association (DIA), Nepal Dairy Association (NDA), Central Dairy Cooperatives Association of Nepal (CDCAN), Agro-Enterprises Center (AEC)/ FNCCI and private industries. Similarly, professional organizations such as Nepal Dairy Science Association (NDSA), Nepal Food Scientists and Technologists Association (NEFOSTA), Nepal Animal Science Association (NASA), Nepal Veterinary Association (NVA) have also been contributing in developing dairy sector in Nepal.

## INTRODUCTION

Dairy sector contributes around 9 % in the national Gross Domestic Production (GDP), which indicates its importance in the national economy. However, the issues on quality and safety of dairy products surfaces from time and again due to poor level of hygiene and sanitation. FY 2072/73 data published by DFTQC showed that 24% of milk and milk products sample were either substandard or contaminated. Most of the dairy processing industries have yet to obtain Good Hygienic Practice (GHP), Good Manufacturing Practices (GMP) and Hazard Analysis and Critical control Points (HACCP) certification that guarantees the safety and quality of dairy products being produced by the processing industries.

Despite long history of dairy development in Nepal, manpower development, especially technical manpower development activities have not been taken up seriously. Some private technical institutions affiliated with the Centre for Technical Education and Vocational Trainings (CTEVT) and two Purbanchal University affiliated colleges namely College of Applied Food and Dairy Technology (CAFODAT) and Himalayan College of Agricultural Science & Technology (HICAST) are running the dairy technology programs to produce diploma/middle and high-level technical manpower for the dairy industries. These are private sector initiatives and investments. However, dairy technology related programs of CAFODAT and HICAST are not running regularly due to different reasons. It can be said that HR development programs in dairy sector are not getting due attention and priority.

Taking into account of HR issues in the dairy sector, there is an immediate need to strengthen the educational system focusing on dairy technology related manpower production and their utilization in the government and the private sector, so that dairy sector could be developed and strengthened in a sustainable manner. Therefore, this workshop has been planned to bring private sector, cooperatives sector, policy makers, academicians, professionals and other dairy value chain stakeholders to discuss the issues and constraints, and make clearer recommendations to develop stronger, competitive and sustainable dairy sector in the country.

## OBJECTIVE

Major objective is to assess the existing scenario and future requirements of dairy science & technology related human resources in Nepal, and to develop strategies to fulfil the HRD gap.

## OUTCOME

Proceedings will be published with findings, conclusions and recommendations covering the strategies and programs to be implemented by various dairy sector stakeholders. As well, full technical papers presented by the experts and resource persons will be part of the proceedings.

## PAPER PESENTATIONS

In the workshop, following working papers will be presented by the industry stakeholders, professional and policy bodies;

a) National Dairy Development Board (NDDB) – Government Policies and Programs in developing dairy sub-sector focusing on Human Resources with respect to processing and marketing.

b) Department of Food Technology and Quality Control (DFTQC) / GoN – Regulatory System of Dairy Businesses in Nepal – Challenges and Way Forward.

c) NDA/DIA/AEC/FNCCI – Private Sector Perspective on Requirement and Availability of Technical Human Resources in Milk Processing Industries.

d) Nepal Dairy Science Association (NDSA) – HRD for Nepalese Dairy Sector: Current Status, Issues and Way Forward.

e) CAFODAT – Academic Programs and Capacity Building of Technical Manpower in Operation and Management of Dairy Sector in Nepal.

**WORKSHOP DELIBERATION**

After the paper presentation session, there will be session for Group Works so as to make recommendation as outcomes of the Workshop. Following groups will be formed: Group A - Policies and Programs; Group B - Technical Human Resources; Group C - Industrial Environment. Within each group, deliberation will be made focusing on the following: Existing situation, Requirements for another 20 years, Gap analysis, and Recommendations i.e. Strategies and Programs interventions to fulfil the gaps. ■

# CHAPTER-2: OPENING/INAUGURAL SESSION

The inaugural session of the *"One day workshop on Availability and Requirement of Dairy science and Technology Related Human Resource in Nepal"* started with national anthem followed by opening of the workshop by announcing the theme of workshop by the **Chief Guest Hon. Chakra Pani Khanal,** Minister of Agriculture and Livestock development. **Prof. Jagat Bahadur K.C., Chairperson, Workshop Organizing Committee** chaired the opening session. Before the inaugural or opening session, there was a provision of registration of participants followed by breakfast facilitated by workshop volunteers. Thereafter, formal program started with the arrival of guests, media persons and participants.

After taking seats by the Chairperson and the Chief guest. M. C. Mr. Purna Chandara Wosti invited Special Guests and other dignitaries on the Dias. Thus, invited dignitaries were: Prof. Dr. Ghanashyam Lal Das, V.C., P.U. as Special Guest; Dr.Yubak Dhoj G.C., Agriculture Secretary, MOALD as Special Guest; Prof. Dr. Bhesh Bhandari, University of Queensland, Australia, as Special Guest and Mr. Sanjeev Kumar Karn, DG, DFTQC. Workshop Badges were distributed by volunteers to all the guest and dignitaries on the dais. Mr. Niranjan Timilsina took a note of deliberation as rapporteur.

**Welcome Address** and objective of workshop was delivered by **Mr. Uttam K Bhattarai**, Member Secretary of the Workshop Organizing Committee welcomed the Chief Guest, special Guest, Guest and other Dignitaries, participants, journalist and everyone who attended the program. Then he highlighted the Objective of workshop, and went on explaining the annual growth rate of 4.4% milk due to various interventions of the government program; Hygienic condition and raw quality milk is relatively poor; lack of investment in the Dairy sector specially expanding the much-needed milk chilling network and processing infrastructures and facilities, and lack of Trained Manpower is a major bottleneck for diversifying the dairy industries in the country. In order to resolve the pressing dairy manpower problem, implementable strategy is needed to address the demand of technical manpower for next 20 years period. The HRD dairy workshop findings and recommendations will be submitted to relevant government authorities along with agriculture ministry, and technical universities and CTEVT to address these issues.

**Paper presentation**: During the inaugural session, an international paper entitled "**Needs of skill and innovation through R&D for the dairy industry growth**" was presented by Prof. Dr. **Bhesh Bhandari, University of Queensland, Australia.**

He thanked the organizers for the invitation and opportunity for sharing the experience with the Nepalese stakeholders. He said, we are more hypothetical rather than fact based. He explained that there is great importance of R&D in dairy industry development. Globally, big companies invest heavily on Research and Development up to 22-10% of its revenue. Food industries invest up to 1.6% of their total revenues. In world scenario government promote R&D by tax credit in the range of 100-200% tax credit promotion. In Australia farmers contribute 10 cents/kg of milk solids. Price of raw milk 40 cents/litres, after processing in store up to 126 cents/ltrs. R&D provides knowledge and skills for innovation. R&D for profit and Growth; Quality for competition. Quality to Quality formula; Quality raw materials gives Quality products. Packaging; most important for consumer perception. Industry priority; cheap process, low raw material, price, cheap man power and more sales price.

Prof Bhesh Bhandari also advised on how to carry out R&D in a sustainable way. He said, involve the students; develop new products, improve current products & packaging. For R&D, the commitment from the industry is very necessary, thus the products could be improved and innovation product developed. Reverse engineering is one of ways of improving products through duplication, copying and improving. One of the examples is JUJU DHAU (king of yoghurt), it is popular product despite there are issues of hygiene and safety. R&D can help to improve the product and expand the market to various parts of the country, as well outside. JUJU DHAU Bhaktapur technology can be upgraded and produced as Greek style yogurt which is marketed in Europe and outside. He also mentioned the potentiality of producing plant sterol fortified milk, yogurt, butter, ghee, etc. which can help to cut off 10-15% of cholesterol and lowers the risk of heart attack by 40-50%.

In his presentation Prof. Bhandari highlighted the importance of research and development (R &D), role of different stakeholders in R & D and how to carry out research for industrial growth and ultimately the dairy sector growth. The detail of PowerPoint presented is in the annex-3.1.

**ADDRESS BY THE GUESTS AND DIGNITARIES:**

**Dr. Yubak Dhoj G.C**., Agriculture Secretary, MOALD as Special Guest addressed the session with his commitment for improving the dairy sector. Dr G. C. further highlighted on the minimum level of value addition in agricultural commodities including dairy sector in Nepal. He also emphasized on developing fancy products with appropriate branding. He opined that research should improve the livelihood and living standard of the farmers. For the overall improvement of the agriculture and dairy sector, practical, hands-on and field basedR&D, education is necessary. Dr G. C. also informed about Ministry's program and projects that focuses on education, especially with Agriculture and Forestry University.

**Prof. Dr. Ghanashyam Lal Das,** V.C., P.U, as Special Guest addressed the session with his commitment to support programs related to human resource development. He further highlighted the need of agriculture related education so as to minimize the trade deficit in the country. Prof. Das also informed that Purbanchal University has been giving affiliation to private academic institutions for agriculture, livestock & veterinary science, as well as food and dairy technology related programs. As well, he expressed PU, s willingness and commitment to support continuing the discontinued graduate B.Tech. Dairy programme under CAFODAT.

**Inaugural Speech:** Hon. Minister for Agriculture and Livestock Development Mr. Chakra Pani Khanal, as the Chief Guest delivered his inaugural speech. Hon Minister praised the opinion expressed by Prof Dr. Bhesh Bhandari for the development and strengthening of the dairy sector in Nepal, which was technically

sound and complete. He further highlighted that quality and consumer acceptability of product is the most important aspect required for marketing. A proper & competitive R&D model is very much needed in overall in agricultural sector including dairy i.e. dairy value chain. He further expressed his views that education system in Nepal is more theoretical than practical based. Thus, needs immediate improvement. Lastly, he committed his support in improving technical education system in dairy sector in order to produce competent human resources for the industries.

**Vote of thanks:** Mr. Sanjeev Kumar Karn, DG, DFTQC, as one of the organizers of the workshop, extended gratitude to Hon. Minister Mr. Chakra Pani Khanal, Ministry of Agriculture and Livestock Development (MoALD) for his gracious presence for encouraging the organizers. Similarly, Mr. Karn also expressed his gratitude to Prof. Dr. Ghanashyam Lal Das, V. C. P.U.; Dr.Yubak Dhoj G.C., Agriculture Secretary, MoALD; and Prof Dr. Bhesh Bhandari, University of Queensland, Australia for their presence and contribution in the workshop.

Mr. Karn heartily thanked Mr. Somsak Pipoppinyo, FAO representative in Nepal and Dr. Dilli Ram Sedhain, Project Director, Nepal Livestock Sector Innovation Project, Government of Nepal for their technical and financial support to the workshop.

Mr. Karn also thanked team members of workshop organizing committee for their joint effort in materializing the workshop event a successful one. He further thanked media persons, participants, volunteers, hotel Himalaya and all other concerned persons who helped in one or other ways to organize the workshop successfully.

**CHAIRMAN REMARKS:**

Prof. Jagat Bahadur K.C., Chairperson of the Inaugural Session and Workshop Organizing Committee, in his remarks highlighted the history of dairy and food technology education in Nepal. He expressed his views on difficulties faced by private institutions in getting affiliation from the universities. Without prior notice, PU has discontinued the admission of B.Tech. Dairy programme, thus requested immediate approval to continue the much-needed course. As well, requested dairy industries, to support college by providing few quotas to dairy students attending in plant training. Prof. K. C. further emphasized on the need and importance of dairy and food technologists and technicians for the country. Without the availability of trained dairy HRD, sustainable and competitive development of dairy sector is almost impossible in Nepal. Lastly, Prof K.C. urged everyone to put their hands together to support the production of quality dairy HR which are very much needed for dairy sector development which has a significant share (9%) in the national economy. !!!!! ■

# CHAPTER 3 : TECHNICAL SESSION AND GROUP DISCUSSION

After the inaugural session, technical deliberation was started wherein key industry stakeholders presented the current scenario, issues and constraints and way forward for the dairy sector specially in relation to human resource development for the dairy value chain and dairy processing industries. The session was chaired by the Tek Bahadur Thapa, Chairman of Nepal Dairy science Association supported by two rapporteurs namely Krishna Kumar Rai, SFO, DFTQC and Damodar Dhakal, Dairy Technologist, Biratnagar Milk Supply Scheme under Dairy Development Corporation, as well Pradesh-1 representative of Nepal Dairy science Association. During the session following technical papers were presented;

a) National Dairy Development Board (NDDB) – Government Policies and Programs in developing dairy sub-sector focusing on Human Resources with respect to processing and marketing by Mr. Babu Kaji Pant, Executive Director a.i, NDDB

b) Department of Food Technology and Quality Control (DFTQC) / GoN – Regulatory System of Dairy Businesses in Nepal – Challenges and Way Forward, by Mr. Sanjeev Kumar Karn, DG, DFTQC

c) Nepal Dairy Association (NDA): Technical Human resources in Milk Processing Industries by Radhakrishna Sapkota, President, NDA

d) Dairy Industry Association-Nepal (DIA) – Current Status, Requirement and Availability of Technical Human Resources in Dairy Industries by Mr. Arniko Rajbhandary, President, DIA

e) Nepal Dairy Science Association (NDSA) – HRD for Nepalese Dairy Sector: Current Status, Issues and Way Forward by Mr. R.T. Chaudhary, Vice-chairman, NDSA.

f) Dairy Development Corporation (DDC) - DDC Perspective: Technical Manpower Constraints and Way Forward by Mr. Govind Raj Joshi, Senior Technical officer, DDC

g) CAFODAT – Availability of Technical Manpower and Academic Courses in Food and Dairy Technology in Nepal by Mr. Uttam K Bhattarai, Vice-Principal, CAFODAT and Former Agriculture Secretary, GoN

During the deliberations, the resource persons representing industries, policy and regulatory bodies, professional forums emphasized the industry status, issues and constrains faced by the industries and the sector highlighting the technical human resources constraints of all levels namely floor level, supervisory or mid-level and highly skilled level. The full text of papers presented are presented in this chapter along with PowerPoint's in the annexes.

**The major issues highlighted during the presentations were;**

- Need for Establishment of National Dairy Research Center (NDRC)
- High risk of zoonotic disease and safety issue of animal origin food products
- Proper implementation of existing policies and plan for the development of dairy sector
- Lack of trained technical human resource and retention problem as well
- Lack of highly skilled human resource for maintenance of dairy plant and equipment
- Challenges in implementation of GMP/GHP in dairy sector largely due to manpower constraints.
- Urgent need of Upgrading and updating the current food and feed Acts and Regulations.
- Harmonization of quality and safety standard with Codex or other countries
- Lacking of technical human resources and coverage of surveillance
- Capacity development for laboratory and its staff.
- Need of strengthening NDDB for development of dairy sector.
- B. Tech Dairy programme and diploma in dairy technology programme as approved by University, CTEVT should continue regularly, and graduated technologists should be employed with priority in the industries, DDC, NDDB, DLS, DFTQC and relevant organizations.
- Basic training on dairy hygiene and sanitation must be made mandatory for dairy personnel who start a basic job in the dairy plants.
- Investment in R&D
- Retention of skilled HR in dairy sector
- High risk of zoonotic pathogens to human health
- Dairy Policy should be implemented with time line
- Huge HR gaps between existing and required technical human resource in dairy sector

**FLOOR DISCUSSION:**

During the questions, comments and suggestions session, Prof. Dr. Tika Bahadur Karki from Kathmandu University emphasized on;

- Raw milk quality should be standardized and dairy hygiene training should be compulsory to dairy personnel
- Capacity building in research and surveillance of Antibiotic residue, mycotoxin and other contaminants in dairy products should be strengthened.

Mr. Jagat Bahadur KC, Professor suggested;

- Academic curriculum should be updated and upgraded in regular basis in consultation the industry stakeholders;
- The duration of on the job training should be extended like the one implemented by dairy institutions in the neighboring countries.
- Develop and amend curriculum of Lok Sewa Ayog (PSC) for facilitating the entry of dairy technologists as dairy development officer in DLS and Dairy research officer in DFTQC. The qualification B. Tech Dairy/dairy technologist should be added in the positions like food officer/ dairy officer/livestock officers etc. in Lok Sewa Ayog (PSC) mandatory qualifications. Add Dairy Technology in PSC qualification

Prof. Bhesh Bhandari suggested the continuation of Academic course on Dairy Technology in diploma, Bachelors and Master's degree level since in some courses, students are not regularly admitted. As well, Dairy training facility should be developed in the Pradesh also.

Similarly, Senior dairy specialists Arun Shrestha and Ajab Lal Yadav highlighted the need and importance of trained HRD need for strengthening the dairy sector. Bishworam Khadka, Chairman of Kharipati dairy expressed to willingness to support dairy college for internship of their DT students. Mr. Nawaraj Upadhyaya, President, NEFOSTA strongly recommended that every dairy industry should hire dairy/food professional to ensure the safety and quality of dairy products.

**CHAIRMAN REMARKS:**

Session Chair Tek B Thapa offered the Token of Love to all the resource persons namely Sanjeev Karn, Babu Kaji Pant, Uttam K. Bhattarai, Ram Tapeshwar Chaudhary, Arniko Rajbhandari, Radha Krishna Sapkota and Govinda Raj Joshi who delivered their presentation, as a gesture of appreciation. In his concluding remarks, Mr. Thapa thanked the resource persons for their presentations; as well to the floor for their patience, valuable comments and suggestions. He also requested the MoALD and other relevant policy bodies and educational institutions to implement the recommendations of this workshop, thereby dairy sector can benefit. ■

# 3. PRESENTED PAPERS

# 3.1 Government Policies and Programs in Developing Dairy sub-sector focusing on Human Resources with respect to Processing and Marketing

**Babu K. Pant**
**Balak Chaudhary**
National Dairy Development Board

**ABSTRACT**

*Dairy is one of the most important livestock sub components creating employment and income generating opportunities and ensuring food and nutrition security. This sector contributes nearly two third of the livestock contribution to GDP.The sector provides direct employment to more than ½ million farm families in production and more than 10000 in processing sector. This also ensure regular flow of money from urban to rural sector contributing balanced development in the country. Annual production of milk at present stands at 2.09 million metric ton of which 2/3 is produced by buffaloes and remaining by the cattle.*

*Human Resource (HR) is one of the major and essential components for proper development of dairy sector. A lack of skilled manpower is major constraint particularly in dairy processing sector in Nepal. HR planning depends on capacity and size of dairy plant, products and production technology, level of automation, equipment requirements, number of shift operation, legal provision in terms of labour welfare, seasonal variations, centralized or decentralized operations, degree of contractual arrangement etc.The need for skilled manpower in the processing sector has been mentioned in Dairy Development policy (2064), Ten Year Dairy Development Plan (2074-2084) and Dairy Development Strategy (2014-2034) that needs to be implemented. There is policy gap which need to be updated on time for dairy sector development.*

**Key word:** Dairy policy, Human resource, Processing, marketing, policy

**Corresponding author:** B.K. Pant, email: bkpant2009@gmail.com

## 1. INTRODUCTION

Nepal is predominantly an agricultural country; more than 65% of active population are involved in this sector, which provides about 26.24% to the Gross Domestic Products (GDP). Livestock is an integral and important component of mixed farming system in Nepal. The dairy sub sector is the most important component of livestock sector and contributes almost two third of the livestock GDP shares. The sector ensures flow of money from urban to rural sectors. Above 500,000 dairy farmers deliver milk, with a large number engaged in the milk processing industry in both rural and urban areas. Similarly, thousands of people are engaged in production and marketing of indigenous dairy products like Ghee, Chhurpi and Hard Cheese. Cattle and buffaloes are the major dairy species in the country and yak to some extent in the high mountain region of Nepal. Almost three fourth and one half of the households in Nepal keep cattle and buffaloes respectively. Despite larger cattle population, the buffalo contributes around 64% of

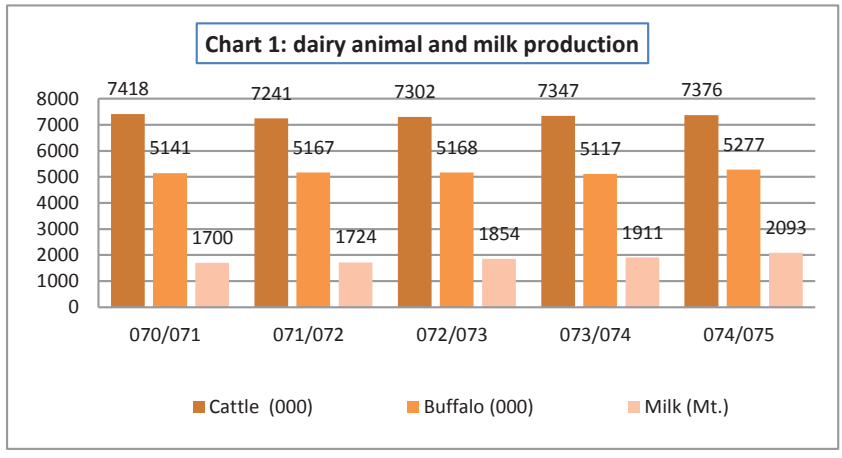
the annual milk production and rest 36% by cattle. This is mainly due to extremely low productivity of non-descript indigenous cattle as compared to the productivity of buffaloes. The dairy sector is gradually emerging as commercial/ semi commercial enterprise particularly in the peri urban areas of the country.

The history of dairy development in Nepal goes back to 6 decades. In the beginning, the sector was led by Dairy Development Corporation (DDC) and gradually the private dairies came in to scenario. At present the private dairy sector shares about 60% of the total volume of milk processed and marketed, whereas remaining 40% is still under DDC. It is estimated about 30 billion rupees have invested in dairy industries. Milk and milk products are being processed by small dairy (1000 to 10000 litre), medium dairy (more than 10 thousand to 50 thousand litre) and large dairy (more than 50 thousand litre capacity) in Nepal.

Dairy sector growth is a function of many factors including policy. National Agriculture Policy (2061), Agriculture Business Promotion Policy (2063), Dairy Development Policy (2064), Ten Years Dairy Development Plan (2074-2084), Dairy Development Strategy (2014-2034), are the key policies guiding to the promotion for dairy development sector and living standard of the people.

Human resource is the key factor for proper development of dairy industries in the country ensuring the quality dairy products to the consumers. Recent studies have identified that there is grossly insufficient trained human resources working in the dairy industries of various capacities. Also the country lacks an academic and training institution that focuses on the development of human resources in dairy sector as per the need of industries. Considering potential of growth of the dairy sector, it has been felt essential to develop trained human resources in dairy sector within the country.

## 2. MILK PRODUCTION AND PER CAPITA CONSUMPTION




Cattle, buffaloes, Yak and their crossbred are important dairy animals being reared in the country. Yak and Chauri are the identity of high mountain domesticated livestock animal. But production and productivity is marginalized one. Cheese and Chhurpy are main product from the milk of Yak and Chauri. Cattle and buffalo are main livestock animal of Terai to high hill for producing milk. The trend of cattle and their milk production are increasing annually. Population of buffalo is also increasing except the year of 2073/074 (Chart-1). Data shows percentage increment of milk from the year 071/072 to 074/075 is 1.4, 7.5, 3 and 9.5 percent. Compared of milk production and total population of Nepal is 2093000 Mt.: 20751099 (2019). This figure reflects consumes about 73 liter per person annually which still 19 liter deficit to reach the target set by the government of Nepal. The lactation performance of dairy animals are gradually increasing and is attributable to the government and farmers efforts such as AI mission in cattle and use of sexed semen, but still the burden of unproductive and old cattle and calf is prominent that largely hampers the smooth growth of the dairy sector.

## 3. MILK DEMAND AND SUPPLY

Per-capita consumption of milk is estimated about 73 liter which is targeted to reach 92 liter. It is estimated that about 15 to 20% of the total milk produced is collected and processed (0.86 million liter/day) by formal sector (dairies), 30-35% by the informal sector (shop, bar, hotel etc.) and rest is consumed by farmers themselves. This reflects about 43 million NRs. goes from city to rural areas daily. Dairy Development Corporation and its milk supply scheme established in different parts of the country has the capacity to process 250 Mt. per day whereas private dairies have installed capacity of processing 1400 Mt. milk per day but are operating at 50-60% of the installed capacity. Their demand of milk in flush season is assumed about 1050 Mt. daily. Due to over production at flush season there has been shown 150 Mt. surpluses (Fig-2) to the dairies.

Regarding the lean season, demand is same but being the low production there is deficit about 325 metric ton daily.

**Table 1: Demand and supply at formal sector**

| Dairy Industry | Capacity/ Shift | Flush season | | | Lean season | | |
|---|---|---|---|---|---|---|---|
| | | Demand | Availability | surplus | Demand | Availability | surplus |
| DDC | 250 | 250 | 300 | 50 | 225 | 100 | -125 |
| Private dairies (formal sector) | 1400 | 800 | 900 | 100 | 800 | 600 | -200 |
| Total | 1650 | 1050 | 1200 | 150 | 1025 | 700 | -325 |

*Source: NDDB study report, 2019*

## 4. HUMAN RESOURCE (HR)

Human resource deals with issues related to compensation, performance, management organizational development, safety, wellness, benefits, employee motivation, training and others. HRM plays a strategic role in managing people and the workplace culture and environment.

As, dairy is one of the growing industries in Nepal, there is a great scope to generate employment opportunity especially for the youth and serve consumers supplying different dairy products and it is most important to run the dairy industries as a profitable service motive business operating through skilled and trained human resources.

A sampling survey of different dairy industries revealed that the technical human resources in dairy industries are grossly inadequate. Considering HR at dairy industry (Table-2) that out of total technicians, 91.79% work in large dairies handling average of 67,000 liter milk daily. While medium dairies absorbed 4.59 percent. On the other hand, small dairies and Cheese are absorbing 2.54 percent and 1.09 percent respectively. Small dairy on an average are handling 2062 liter milk in a day. Out of technical HR, 92.63% are undergraduates and rest (7.37%) is graduates. They are either from Dairy Technology, Food Technology, Veterinary or Agriculture science among graduates while undergraduates are JT/As in agriculture or livestock. Technicians of large dairies are relatively large in number than medium and small dairies. The non-technical staff was higher in number in small and medium dairies compared to large scale dairies.

| Table 2 : Available HR at dairy industry | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Types of dairy** | | | | | | | | |
| | **Small** | | **Medium** | | **Large** | | **Cheese** | | **Total** |
| | **No** | **%** | **No** | **%** | **No** | **%** | **No** | **%** | **No** |
| M.Sc. Dairy Tech. | 0 | 0.00 | 0 | 0.00 | 2 | 0.24 | | 0.00 | 2 |
| B.SC. Dairy Tech. | 0 | 0.00 | 0 | 0.00 | 25 | 3.02 | | 0.00 | 25 |
| MSc. Food Tech. | 1 | 0.12 | 1 | 0.12 | 9 | 1.09 | 1 | 0.12 | 12 |
| B.Sc. Food Tech. | 3 | 0.36 | 9 | 1.09 | 10 | 1.21 | | 0.00 | 22 |
| JT/As | 17 | 2.05 | 28 | 3.38 | 714 | 86.23 | 8 | 0.97 | 767 |
| **Total** | **21** | **2.54** | **38** | **4.59** | **760** | **91.79** | **9** | **1.09** | **828** |
| MBA/M.com | 5 | 0.29 | 12 | 0.69 | 27 | 1.55 | 2 | 0.12 | 46 |
| MPA | 4 | 0.23 | 8 | 0.46 | 12 | 0.69 | 0 | 0.00 | 24 |
| MA (Eco) | 2 | 0.12 | 19 | 1.09 | 34 | 1.96 | 15 | 0.86 | 70 |
| BBA | 5 | 0.29 | 37 | 2.13 | 15 | 0.86 | 11 | 0.63 | 68 |
| BBS/B.Com | 8 | 0.46 | 49 | 2.82 | 48 | 2.76 | 2 | 0.12 | 107 |
| Plus 2/IA | 53 | 3.05 | 125 | 7.20 | 65 | 3.74 | 8 | 0.46 | 251 |
| SLC | 201 | 11.57 | 189 | 10.88 | 102 | 5.87 | 48 | 2.76 | 540 |
| Below SLC | 309 | 17.79 | 168 | 9.67 | 97 | 5.58 | 57 | 3.28 | 631 |
| **Total** | **587** | **33.79** | **607** | **34.95** | **400** | **23.03** | **143** | **8.23** | **1737** |
| **Grand Total** | **608** | **23.70** | **645** | **25.15** | **1160** | **45.22** | **152** | **5.93** | **2565** |
| *Source: NDDB, 2019* | | | | | | | | | |

Trained and or experienced HR in any commercial environment will give good insight into how organizations operate. Small dairies have more trained (38.1%) technicians compared to non technicians (8.01%). In case of medium dairies, percentage of trained and un-trained between technician and non-technician (Table-3) are about to same. Considering the large dairies in both condition (technical and non-technical) are about equal. In total it is necessary need to train to the technicians as well as non-technicians.

| Table 3 : Trained HR at dairy industry | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Type of Dairy** | **Technical** | | | **Non-Technical** | | | **Total** | | |
| | **Total** | **Trained** | **% Trained** | **Total** | **Trained** | **% Trained** | **Total** | **Trained** | **% Trained** |
| Small | 21 | 8 | 38.1 | 587 | 47 | 8.01 | 608 | 55 | 9.05 |
| Medium | 38 | 15 | 39.47 | 607 | 68 | 11.2 | 645 | 83 | 12.87 |
| Large | 760 | 189 | 24.87 | 400 | 109 | 27.25 | 1160 | 298 | 25.69 |
| Cheese | 9 | 7 | 77.78 | 143 | 11 | 7.69 | 152 | 18 | 11.84 |
| **Total** | **828** | **219** | **26.45** | **1737** | **235** | **13.53** | **2565** | **454** | **17.70** |
| *Source: NDDB, 2019* | | | | | | | | | |

## 4.1 HUMAN RESOURCE REQUIREMENT

It is difficult to find any thumb rule to project exact number of HR for any type of dairy industry. Number of technician, maintenance & operators, administrative, marketing and other type of manpower depend on capacity of the dairy plant, level of automation, volume of fluid milk handling, number and volume of milk products like ice-cream, Dahi, Paneer, butter, cheese, SMP and others influences the exact HR required. Based on the research findings and knowledge of the experts,' minimum requirement of manpower for various type of dairy (Table-4) has been projected. Research findings shows that the small dairies are handling 2062 litre fluid milk in a day by 12 staffs. On the other hand, medium dairies on an average are handling only 8308 lit/day i.e. they are operating below the minimum level. The large dairies are handling 66,667 lit/day mobilizing 230 staff. It is found that the private sector has less manpower compared to DDC.

**Table 4 : Required HR for dairy industry**

| Sections | HR | Dairy Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Available (No) | | | | Required (No) | | | |
| | | Small | Medium | Large | Cheese | Small | Medium | Large | Cheese |
| Milk reception | Technical | 1 | 2 | 12 | 2 | 1-2 | 2-3 | 3-6 | 1-2 |
| Milk Processing | Technical | 1 | 2 | 12 | 2 | 1-2 | 2-3 | 3-4 | 1-2 |
| Milk packaging | Technical | 2 | 4 | 60 | 0 | 3-8 | 6-24 | 24-36 | 1-3 |
| Butter and Ghee | Technical | 1 | 2 | 14 | 1 | 1-2 | 3-6 | 6-8 | |
| Maintenance | Technical | 1 | 2 | 16 | 1 | 1-2 | 2-6 | 6-10 | 1-2 |
| Chemical analy. | Technical | 1 | 1 | 22 | 0 | 1-2 | 2-3 | 6-9 | |
| Micro-biology | Technical | 0 | 1 | 10 | 0 | 0-1 | 1-2 | 2-3 | |
| Marketing | Others | 1 | 1 | 40 | 1 | 1-2 | 2-5 | 5-12 | |
| Administration | Others | 1 | 2 | 18 | 1 | 0-1 | 2-3 | 3-4 | 1-2 |
| Account/Finance | Others | 1 | 1 | 16 | 1 | 1-2 | 2-4 | 4-6 | |
| General store | Others | 1 | 1 | 10 | 0 | 0-1 | 1-3 | 3-4 | |
| Maintenance | Others | 1 | 2 | 16 | 1 | 1-2 | 2-3 | 3-5 | 1-2 |
| Chilling centre | | | | 108 | 0 | | | | |
| SMP | | | | 33 | 0 | | | | |
| Total | | 12 | 21 | 387 | 9 | 11-27 | 27-65 | 68-107 | 6-13 |

Note: This estimate is excluded of chilling centre manpower. At the current situation, dairy industries normally purchase milk from privately or cooperative owned chilling centre operated by 1-2 staff

*Source: NDDB, 2019*

## 5. POLICIES RELATED TO DAIRY SECTOR

A policy is generally defined as a deliberate action by a government or public authority to alter a naturally occurring condition or a condition shaped by past actions to optimize or maximize common good or welfare of citizens in general or a specific targeted part of the economy or segment of the population. A policy targeted to a specific segment of the economy or population to achieve certain goal may indirectly affect other segment(s) of the economy or population with positive or negative consequences, so the net outcome of any policy action may be larger or smaller than the immediate or direct outcomes.

Dairy sector growth is a function of many factors including policy. Technology and policy interventions can contribute to growth in dairy production by altering the opportunities and incentives for changes in the dairy system from semi-subsistence to market oriented production even for smallholders owning one or two cows. Technologies in relation to feed and veterinary inputs and services are essential for improving productivity and reducing per unit cost of production. General macro-economic and dairy sector related economic policies, especially tariff and taxation policies, can contribute to growth by influencing competitiveness of the domestic producers. Policies for technology delivery, regulation of input and output markets and investment in infrastructure can alter market institutions and transactions costs. Critically, policies can partially determine the winners and losers of structural changes in the sector, determine market participation of smallholder vs larger producers, and employment generation and incomes at both farm and market level.

## 5.1 DAIRY DEVELOPMENT POLICY (DDP)

The major thrust of dairy policy is to increase milk production and productivity in the rural areas; minimize import of milk and milk products by product diversification; increase the export of quality milk products and supply adequate amount of hygienic milk and milk products to the consumers. Dairy Development Policy, 2064 (2008), has been approved by the government, and is the guiding policy document for overall development of the dairy sector in the country. This policy document was prepared in accordance with the spirit of Agriculture Perspective Plan (APP, 1995-2015); National Agriculture Policy, 2061; National Milk Marketing and Strategy Study, 2001; and Agriculture Business Promotion Policy, 2063. Being based on these documents, all aspects relating to dairy development have been incorporated in the policy. The long-term vision of the policy is to contribute to national economic development by developing the dairy sector for employment generation and poverty reduction with the participation of government, cooperative and private sector and extending the programs to produce good quality milk and dairy products easily available to the consumers. The policy aims for increasing milk production and productivity; extending milk collection, transport logistics and processing industries; substituting import and promoting export of the dairy products with quality improvement and regulation; production and easier availability of milk and dairy products to the consumers.

## 5.2 NATIONAL AGRICULTURE POLICY

National Agriculture Policy, 2061 is the guiding policy for agriculture sector. It aims to improve living standard through sustainable agriculture development by transforming subsistence agriculture system to commercial and competitive. In order to contribute for food security and poverty reduction through commercial and competitive agriculture system the policy intends to increase agriculture production and productivity, make agriculture competitive with regional and global market by developing bases for commercial and competitive agriculture system, and conserve and utilize natural resources, environment and bio-diversity.

## 6. CONCLUSION

The dairy industries are currently running with grossly insufficient trained human resources

- Academic institutions should continue the academic programs in Bachelors and Masters Degree in Dairy and Food Technology.
- Assess the reasons on discontinuation of academic program by the academic institutions
- Conduct Training Need Assessment (TNA) of the HR working in dairy industries
- Employ at least 75 percent qualified technical HR by dairy Industries.
- Government of Nepal should strictly follow the provisions with respect HR planning and management mentioned in Dairy Development Policy, 2064 BS, Dairy Development Strategy 2071-2091 BS and 10 Years Dairy Development Plan 2075- 2084 BS
- Establish dairy research institute to develop research and extension in this sector.

## REFERENCES

NDDB, 2019. Study on assessment manpower involved in dairy industries with special reference to product development quality of dairy products and managerial and financial performance, Harihar bhawan, Nepal

NDDB, 2069. Milk marketing and strategy study, Hariharbhawan, Nepal

NDDB, 2074. Ten years dairy development plan (2074-2084), Hariharbhawan, Nepal

NDDB, 2064. Dairy Development Policy, Hariharbhawan, Nepal ■

# 3.2 Regulatory System of Dairy Businesses in Nepal – Challenges and Way Forward

**Sanjeev K. Karn**
**Dr.Matina J. Vaidya**
**Kishor KC**
**Mohan K. Maharjan**
**Bimal K. Dahal**
Department of Food Technology and Quality Control, Kathmandu

*Department of Food Technology and Quality Control (DFTQC) is the competent government authority of food safety and quality control to implement food act and regulation. DFTQC and its network across the country is doing its best efforts in this direction. The existing manpower working at DFTQC is inadequate to enforce food regulation effectively. The competencies of manpower should be updated by providing frequent trainings. The laboratory at DFTQC has been accredited in accordance with ISO/IEC 17025:2017. Other food laboratories under DFTQC also need to be strengthened and accredited in specific parameters. DFTQC and offices under it have been working inspection works at dairy factory and market with respect to mandatory standards and the dairy directive. The inspection surveys of some chilling centres, dairy shops and industries showed a poor compliance with the mandatory standards and the directive. The present situation should be improved. All efforts in this regard, should be focused to achieve safety and quality in dairy products, satisfy our consumers and develop us in order to compete with the international dairy market.*

**Key words:** Food control system, food safety, technical regulation, food license and stakeholders.

**Corresponding author:** Bimal K. Dahal, email: bimaldahal16@yahoo.com

## 1. INTRODUCTION

Mandatory or regulatory activities enforced by national or local authorities called “Food Control”. It is to ensure that all foods during production, handling, storage, processing and distribution are safe, wholesome and fit for human consumption. It also helps to confirm that food safety and quality requirements are honestly maintained as prescribed by law. The principles of food control system are rule of law, risk reduction across the food chain, establishing procedure for dealing with particular hazards (eg., recall of product, food borne epidemics), science-based, multi-disciplinary and multi-sectoral approaches. Food control is a widely shared responsibility that requires positive interaction between all stakeholders. To effectively run the food control system in a country, the followings are the fundamental requirements.

1. Laws and regulations,
2. Implementing organization with clear mandate,
3. Inspection and laboratory services and
4. Information, education, communication and training.

## 2. ACTS AND REGULATION

Food Act 1967 and Food Rule 1970 are the main legal documents to regulate foods including milk and milk products in Nepal. Food Act 1967 has been enforced in all districts and across the country. The main objectives of Food Act 1967 are as follows:

1. to prevent any undesirable adulteration in food or subtraction or extraction of any natural quality or utility from food.
2. to maintain food quality by establishing mandatory standard.
3. to maintain the health and convenience of the general public.

Food Act 1967 includes 13 articles, which makes the provisions to regulate foods including milk and milk products. The act has defined food, adulterated food and sub-standard food. It has prohibited on production and sale of adulterated food or sub-standard food. It has prohibited on sale of food by lying or misleading. The act has given powers to withhold food. Food industries including dairies have to obtain food license from Department of Food Technology and Quality Control (DFTQC). If the producer or seller violates the provisions of this act, they will be punished as per this act.

If any person who violates the provision of section 3 and 4 of this act may be punished with imprisonment for a term five years or fine of Rs. 50,000 or both. Section 3 states about adulterated or sub-standard food and section 4 states about sale of food by lying or misleading. In the same way, if any person who violates any provision of this act or any matter contained in a rule or order framed or issued under this act, other than the matters as mentioned before, may be punished with a fine not exceeding Rs. 10,000. If, any person who violates any provision of this act harms the consumer after consuming any adulterated food, such producer or seller has to provide a reasonable compensation to the victim.

This act also gives clear guidelines about the liability of offense committed by firm or body corporate. It has given mandate to specify quality standard of food. Test of food samples shall be done at the laboratory of DFTQC. It includes provisions of food standard fixation committee. The local body and provincial government also have some power for monitoring food businesses within their confined area. The cases under this act shall be the state cases. The district court shall have the authority for cases under sub-standard, adulterated and lying or misleading crimes, whereas the chief district officer shall have the authority for other punishments to originally try and settle cases under this act.

Decisions made by district court may be filed an appeal in the appellate court and decisions made by the chief district officer may be filled an appeal in the district court within thirty-five days after the date when the decision was made. This act has also given mandate to frame rules, with this mandate Food Rule, 1970 and different technical regulations of foods have been formulated.

Under Food Rule, 1970 many food regulation provisions have been documented. It includes provision about food inspector, sampling procedures, public analyst, case filing procedures, appeal, food licenses to be obtained. It also includes about labelling provisions which states that no packed food shall be sold or kept for sale unless and until a label is put on the wrapper of container of that food specifying the fact or description as in table 1. Food Rules, 1970 rule number 33a states about directive issuance. With this mandate, Ministry of Agriculture and Livestock Development has issued directive on milk and milk products.

**Table 1. label information**

| |
|---|
| Name of food product, weight or volume of product, batch number, manufacturing date, expire date, ingredients used: in decreasing order of weight or volume, the name and address of the entrepreneur/manufacturer, DFTQC license number. The description has to be specified in a label shall be in the Nepali or English language. |

## 3. TECHNICAL REGULATIONS

By the mandate given by article 7 of Food Act 1967, Government of Nepal has formulated 122 generic food standards and 3 horizontal standards for melamine, preservatives and heavy metals, including 22 for milk and milk products. The names of these 22 technical regulations have been given in table 2.

**Table 2. Technical regulations of milk and milk products**

| |
|---|
| Milk, cow milk, buffalo milk, ghee, processed milk, evaporated milk, evaporated skimmed milk, sweetened condensed milk, skimmed sweetened condensed milk, partly skimmed sweetened condensed milk, butter, cream, curd, infant milk food, infant food, whole milk powder, skimmed milk powder, paneer, processed full cream milk, processed low fat milk, processed skimmed milk, processed flavoured milk. |

## 4. DAIRY DIRECTIVE 2075

Milk and milk products are highly perishable food. Under regular monitoring program, DFTQC has found sub-standard milk and milk products due to microbial contamination, recontamination, adulteration and other many quality and safety issues. DFTQC has filed significant number of cases in the court every year but there is no satisfactory improvement in quality of marketed dairy products. The main reason behind it is Food Act 1967, Rule 1970 and Technical regulations of milk and milk products are based on end product testing. Actually, food safety and quality issue is a farm to fork concept. In this rationale, Ministry of Agriculture and Livestock Development has issued directive entitled *"Milk and Milk Products Safety and Quality Directives 2075"*. There is vital role of each stakeholder associated in dairy value chain. The directive has specified the role of each stakeholder in the entire dairy value chain. The roles of farmer, collection centre, chilling center, processor and dairy shop have been clearly mentioned in this directive.

The article 26 of this directive states about the manpower requirement to maintain food safety and quality for dairy industries. Skilled technical manpower is required to increase the compliance rate of dairy industries with respect to the standards and directive. During a survey, the dairy entrepreneur says that the skilled technical manpower as demanded by this directive is not enough for dairy industries in Nepalese market.

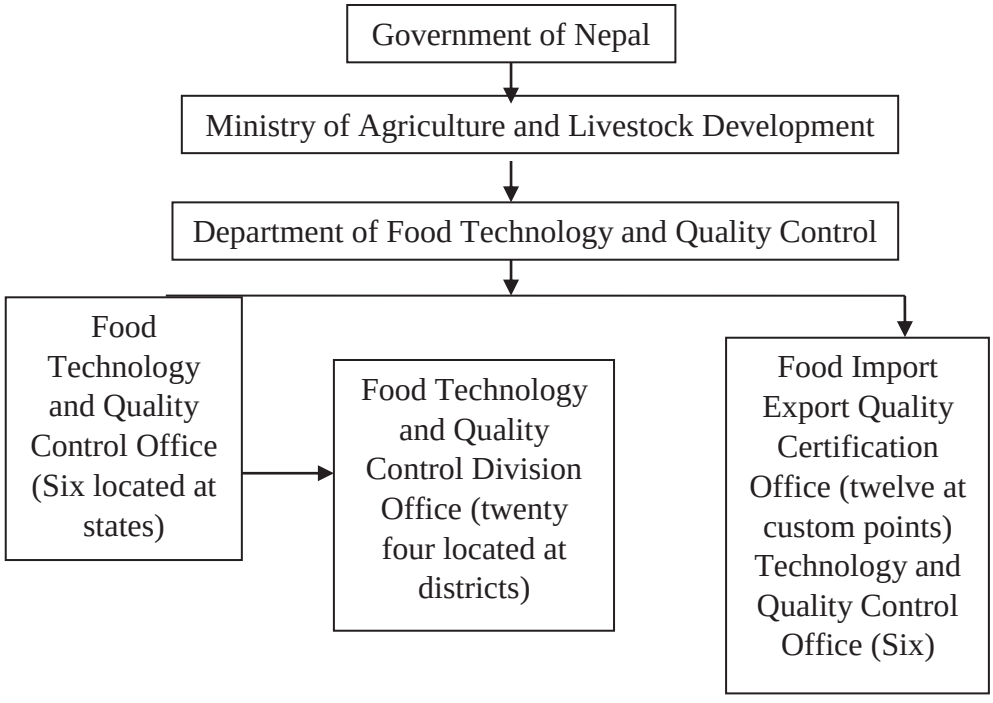
## 5. IMPLEMENTING ORGANIZATION

The Food safety and quality regulating authority or organization in Nepal is the DFTQC and other offices under it. From the start of fiscal year 2075/076, the network under it has been extended. Ten offices under DFTQC are extended to 42. Presently, we have 6 Food Technology and Quality Control Offices (Biratnagar, Janakpur, Hetauda, Bhairawa, Nepalgunj and Dhangadhi), 12 Import Export Quality Certification Offices (Kakarvitta, Biratnagar, Jaleshwar, Birganj, Bhairawa, Kapilbastu, Nepalgunj, Dhangadhi, Gaddachauki,

Tatopani, Rasuwa and Tribhuwan International Airport) and 24 Divisional offices (Jhapa, Sunsari, Dhankuta, Udayapur, Saptari, Mahotari, Sarlahi, Parsha, Chitwan, Sindhuli, Kavre, Kathmandu, Nuwakot, Kaski, Tanahu, Baglung, Kapilvastu, Palpa, Dang, Surkhet, Jumla, Dadeldhura, Doti, Baitadi). After this office extension, 103 technical food professional posts starting from non-gazetted class one to gazetted class second have been created totaling the posts to 340. Although, this extension is not sufficient to deal the food safety issues arising in Nepalese food and dairy sector, the authors are thankful to the Government of Nepal for this remarkable decision about the extension of DFTQC network. With this extension, it has extended its approach up to 77 districts of the country. The organizational structure of DFTQC has been shown in fig 1.

## 6. INSPECTION

Food Act 1967 and Food Rule 1970 has delegated powers and responsibilities to the food inspectors to carry out monitoring activities at markets, industries, hotels, restaurants and streets. Around 43 food inspectors are working under DFTQC. The number of food inspector is inadequate to monitor these sectors and for addressing the increasing trends of food adulteration, food safety and other malpractices in production and market areas. With these limited manpower, 32 cases were filed on milk and milk products in the fiscal year 2074/75 as per food law.




Inspection campaign program has been initiated for the fiscal year 2075/ 2076 to ensure safety and quality of milk & milk products, edible oils and processed drinking water. Under this inspection campaign, different samples of milk products were collected as shown in the figure 2.

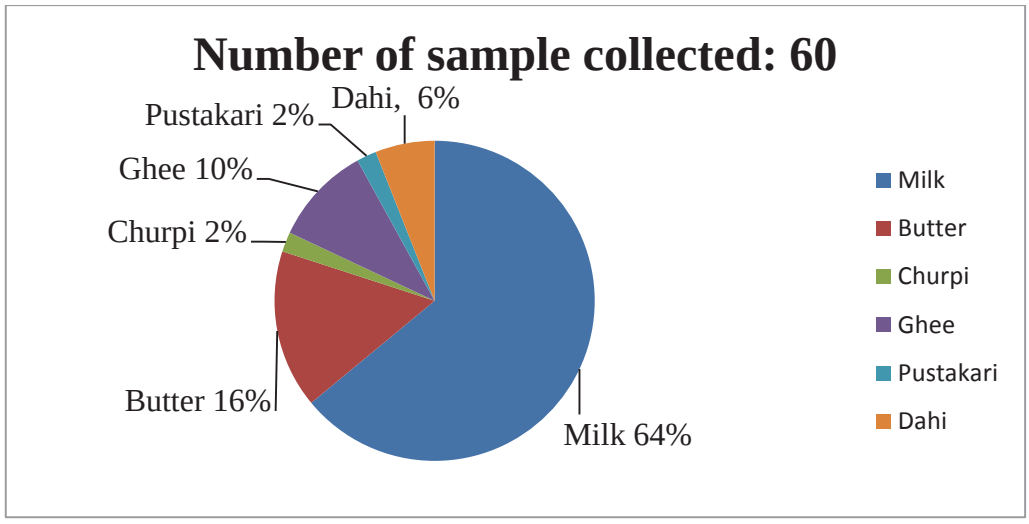



**Fig. 2 Sample collection**

Under the same campaign program, dairy shops were inspected on cleanness, storage condition, registration, licensing, labelling of products as well as presence of skilled manpower as per directives in 6 districts near Kathmandu valley. The dairy shops so inspected have been shown as in figure 3. Other similar programs were also conducted by DFTQC and offices under it.

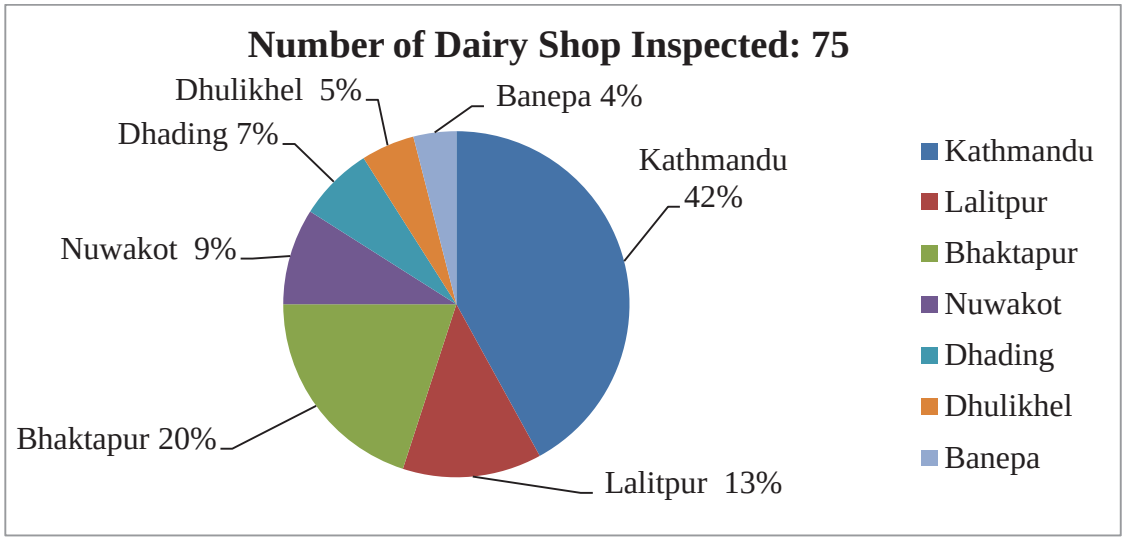



**Figure 3 Dairy shop inspections at different places**

Under the same campaign program, DFTQC has conducted a survey on implementation of Dairy Directive 2075 by chilling centers, processors and dairy shops at different parts of the country (Table 3 and 5). The compliance rate was found very poor in case of dairy shops. Most of them are lacking with trained personnel, surrounding cleanliness, licenses from DFTQC, product label, personal hygiene and sanitation.

**Table: 3 Compliance status of dairy shop (% compliance)**

| Criteria | Lalitpur | Bhaktapur | Kathmandu | Kabhre | Dhading | Nuwakot |
|---|---|---|---|---|---|---|
| Trained Personnel | 17 | 0 | 2 | 1 | 0 | 0 |
| Surrounding Cleanliness | 35 | 45 | 3 | 27 | 17 | 25 |
| Personal Hygiene | 50 | 55 | 65 | 32 | 39 | 50 |
| Storage Condition | 80 | 75 | 85 | 60 | 7 | 65 |
| License from DFTQC | 0 | 0 | 0 | 0 | 0 | 13 |
| Registration with local government (Pan Number) | 92 | 95 | 98 | 98 | 98 | 99 |
| Product label of fluid milk | 0 | 0 | 0 | 0 | 0 | 0 |
| Product label of other dairy products | 4 | 5 | 10 | 2 | 2 | 3 |

Source: DFTQC, 2019

There is mandatory provision of food industry licensing as per existing food law. The status of license issuance, renew and recommendation of dairy industries from DFTQC and offices under it during the fiscal year 2074/075, have been shown table 4.

**Table 4 Food license issuance, renew and recommendation**

| Office | Number | | | |
|---|---|---|---|---|
| | Issuance | Renew | Recommendation | Total |
| Kathmandu | 3 | 24 | 22 | 49 |
| Biratnagar | 15 | 24 | 55 | 94 |
| Hetauda | 17 | 33 | 51 | 101 |
| Bhairawa | 12 | 17 | 34 | 63 |
| Nepalgunj | 5 | 18 | 28 | 51 |
| Dhangadhi | 0 | 3 | 0 | 3 |
| Total | 52 | 119 | 190 | 361 |

Source: DFTQC, 2017/018

Furthermore, food license issuance and renew status of dairy industries in different offices of DFTQC, till the second trimester of fiscal year 2075/076 is given in table 5.

**Table 5 Food License issuance and renew**

| Offices | Number | | |
|---|---|---|---|
| | Issuance | Renew | Total |
| Kathmandu | 3 | 4 | 7 |
| Biratnagar | 13 | 31 | 44 |
| Janakpur | 7 | 2 | 9 |
| Hetauda | 2 | 11 | 13 |
| Bhairawa | - | 8 | 8 |
| Nepalgunj | - | 14 | 14 |
| Dhangadhi | 28 | 2 | 30 |
| Total | 53 | 72 | 125 |

Source: DFTQC, 2019

## 7. FOOD LABORATORY

Food laboratories have a key role to identify the food safety and quality issues. Establishing and functioning of a food laboratory is expensive and purely a technical work. To get the confidence of the service seeker (entrepreneur, business houses and consumer), the laboratory activities should be transparent, documented and systematic. A term "Accreditation" has been coined to address these issues. The National Food and Feed Reference Laboratory (NFFRL) at DFTQC, Kathmandu has been accredited in accordance with ISO/ IEC 17025:2017 for 101 parameters including chemical, microbiological and contaminants of 26 food commodities in January 2019. However, there is further need of scope extension for more parameters of various primary agriculture produce and processed food commodities. Other food laboratories under DFTQC also, should be started for the accreditation process. The present manpower working at laboratory is not sufficient to address the food safety issues. The competencies of these manpower should be updated by providing frequent trainings. Periodic transfer as per the Public Service Act is one of the main hurdles to retain the competencies of trained manpower for the laboratories.

## 8. COMMUNICATION AND TRAINING

Communication is the important part of food control system. The findings of monitoring and laboratory activities should be correctly disseminated to the consumer on time. DFTQC is disseminating the monitoring activities, case filing and laboratory finding to its stakeholders through press meet, press notes and its website.

DFTQC is organizing different training programs to the consumers, small food entrepreneurs and processors. It helps the processors to produce safe and standard products. It helps the consumers to aware about unsafe and sub-standard products. In the broad sense, it helps to aware all stakeholders involved in the entire dairy value chain. Although these activities are not enough, we are doing the best on communication and training activities as per the budget constraints.

## 9. CHALLENGES

Milk and milk products are highly perishable. To manage food safety in the entire dairy value chain, the followings are some challenge. To maintain food safety in milk and milk products, we need to manage the following challenges.

1. Long dairy value chain: Due to its very long value chain, all stockholders involved in the chain should be responsible for safety and quality.
2. Highly perishable: The nature of the dairy products is highly perishable. Two times milk collection, cold chain management, improvement in road connectivity, establishment of dairy industry, enforcement of food law, recruitment of skilled and trained manpower are some important ways out for solving these challenges.
3. Technological change: Rapidly changing technologies in milk production, processing, and marketing are important challenges. If one can adopt the changing technology, he or she can lead the dairy market share.
4. Science based control system: To achieve food safety in milk and milk products, the entrepreneur needs to develop science based food control system focusing on the consumer protection.
5. Harmonization: As Nepal is a member of World Trade Organization, our dairy products can enter into international market. For this, there is the need of quality improvement. Also, it needs harmonization of food safety and quality standards with the importing countries more preciously with the codex standards.
6. Urbanization: Changing in lifestyles and rapid urbanization can be taken as challenge as well as opportunities for the development of dairy sector. It helps to change us from the sustainable to entrepreneur dairy business.
7. Consumer awareness: Growing consumer awareness for food safety and quality issues helps to increase market share for the quality dairy products.

## 10. WAY FORWARD

Effective food control systems are essential to manage safety and quality of dairy products. There is the need for updating the existing Food Act, 1967 and regulation. We should take the challenges mentioned above as opportunities. All efforts in this regard, should be focused to achieve safety and quality in dairy products, satisfy our consumers and develop us in order to compete with the international dairy market. Different quality assurance activities are required at different stages of dairy production as under.

1. Farming: Good veterinary practices (GVP).
2. Manufacturing: Good Manufacturing Practices (GMP), Hazard Analysis and Critical Control Points (HACCP), Good Hygienic Practices (GHP).
3. Handling and Transportation: Good Handling and Transportation Practices.

**REFERENCES:**


1. Dahal, B.K., 2018. Regulation of Milk and Milk Products in Nepal. Paper presentation made in the Workshop entitled "Quality Milk for Good Health and Prosperity, organized by Nepal Dairy Science Association, Kathmandu on 10, October 2018.
2. Dahal, B.K., 2019. DudhTatha Dugdha Padarthako Aniwarya Gunastar Mapadand (in Nepali). An article published in NDSA Newsletter Vol.5 and 6, No.1, April 2019.
3. DFTQC, 2017/018. Annual Bulletin, Published by Department of Food Technology and Quality Control.
4. DFTQC, 2019. A Survey Report on Dairy (unpublished), Draft prepared by Department of Food Technology and Quality Control.
5. Food Act, 1967. Nepal law Commission, website: www.lawcommission.gov.np
6. Food Regulation, 1970. Nepal law Commission, website: www.lawcommission.gov.np
7. Milk and Milk Products Safety and Quality Directives 2075. Department of Food Technology and Quality Control. Website: www.dftqc.gov.np
8. Nepal gazette, published date: 2057.10.23, Notice of Ministry of Agriculture and Cooperative.
9. Nepal gazette, published date: 2074.10.22, Notice of Ministry of Agriculture Development.
10. Nepal gazette, published date: 2075.01.05, Notice of Ministry of Agriculture, Land Management and Cooperative.
11. R.R. Gautam and Yadav K.C, 2072. An Introduction to Food Quality Assurance, Samudayik Prakashan Pvt. Ltd. ■

# 3.3 Current Status, Requirement and Availability of Technical Human Resources in the Dairy Industries.

**Er.Arniko Rajbhandary**
*Dairy Industry Association (DIA)*

**ABSTRACT**

*Dairying is an integral part of farming system and has created both direct and indirect employment opportunity, improved food security and enhanced supply of quality food contributing to economic growth of Nepal. The project aims to deliver present status, challenges and avenues of improvement in dairy sector in Nepal. Dairy sector contributes 9% GDP. Total annual milk production is 2.082 million metric ton milk (65% buffalo milk and 35% cow milk) throughout the country, out of which around 17% goes to organized dairy sector, 33% to indigenous dairy products producers (informal channel), and remaining 50% to home consumption. The organized sector includes government affiliated Dairy Development Corporation (DDC), private dairy industries and cooperative run dairy processors that encompasses the market share of 38%, 57% and 5% respectively. Formal dairy sector benefits around 550,000 farm families who receive more than NRs 33 million from urban areas daily. Dairy industries have generated more than 20,000 direct employments.*

*The per capita milk consumption is 72 liters in Nepal whereas FAO recommends 92 liters milk per annum per person. In order to fulfil the requirement, the government has already targeted to achieve the recommended per capita milk consumption by the end of 2020/21.*

*Formal dairy sector produces 77% fluid milk (market milk), 8% dahi, 7% skim milk powder,3% paneer, and remaining 5% other dairy products (butter/ghee, ice cream, cheese, sweets). Milk availability to formal dairy sector is grossly divided into two; flush season (September to February) and lean season (March to August). In order meet the demand of milk for the lean season, dairy industries have to use imported milk powder (3200 MT) from India and third countries.*

*Dairy sector has very high demand of technical/skilled human recourses to produce good and hygienic quality dairy products. It is estimated that 140 dairy/food technologist and 1700 skilled CTEVT L-1, 2 junior dairy technicians are required throughout the country.*

*The main challenges faced by the dairy farmers are i) low productivity of dairy animal ii) high cost of milk production iii) unhygienic milk production iv) poor knowledge about commercial dairy farming v) seasonality of milk production; and challenges faced by dairy industries are i) inadequate cold chain system ii) lack of skilled and trained dairy manpower iii) unfair price competition due to non-registered dairy entrepreneurs iv) lack of implementation of quality assurance measurers.*

*Avenues of improvement of dairy sector are i) implementation of genetic improvement program as a mission backed by forage development mission in dairy pocket areas ii) preparing and execution of raw milk standards iii) encouraging commercial dairy farming through low interest rate financing with livestock insurance iv) strictly adoption of proper cold chain system in dairy value chain v) providing short and long-term training to mid-level dairy personnel for their skill development vi) need for compulsory registration of dairy entrepreneurs in the government net at least in municipality areas vii) execution of GMP, GHP, HACCP and ISO 22000.* ■

# 3.4 Human Resource Development for Nepalese Dairy Sector: Current Status, Issues and Way Forward

**Tek B. Thapa**
**Siyaram P. Singh**
**Ram T Chaudhary**
**Niranjan Timilsina**
*Nepal Dairy Science Association, Kathmandu*

**ABSTRACT**

*Dairy development is one of the key drivers of the national economy, and the share of dairy (milk) in the GDP is around 9 % which is significant. According to the Ministry of Agriculture and livestock development, Nepal produced 1,911,239 MT of milk during fiscal year 2073/74 (2016/17). Most of the milk is consumed or passes through informal channel, and only around only 17 % of the total production passes through formal channel or through the public and private sector dairy plants. Significant quantities of value-added dairy products are imported such as milk powders, baby foods, cheeses, long-life milk and cream, butter, ghee etc. which could be produced in the country provided adequate processing facilities and trained dairy manpower are available. One of the major gaps in the dairy sector development is inadequate appropriately trained and skilled human resources for the entire value chain of the dairy processing industries. Buzz word for dairy value chain is from farm/shed to fork/table (GOTH DEKHI OTH SAMMA).*

*Basically, three level of manpower namely floor level dairy technicians, supervisory diploma level dairy technologists (JT level) and highly skilled technologists (technical officers' level) are required for operating and managing the dairy value chain and the dairy industries in the country.*

*Floor level manpower are required in Milk Collection Centre (MCC) and Milk Producers cooperative Societies (MPCS), Chilling Centre (CC) operation, Plant operators/dairy girls & boys in the processing plants; milk Transportation: manage the milk transportation by cans, tankers, cleaning and sanitization etc.*

*Supervisory level manpower (diploma level) are required to manage a MCC/milk chilling Centre 1000 LPD or above milk handling; manager of chilling center; supervisor of processing plants and marketing functions. Highly skilled manpower is needed as Plant supervisor, quality controller, marketing manager, dairy plant assistant manager and manger etc.*

*Many campuses under government supported universities are offering graduate and post-graduate program in Animal sciences and veterinary sciences which are equipped with facilities. However, there is single college offering graduate programme is dairy technology; and few CTEVT approved training institutes offering diploma program in dairy technology established under private ownership. These facilities are not sufficiently equipped and needs support to strengthen labs/pilot training dairy plant. Thus, government should support such specific and specialized campuses of national importance, rather than establishing new facilities under state funded universities.*

*It is worth taking lessons from Vidya dairy Anand or Model Dairy Karnal model wherein dairy technology graduate students undergo 12 months hands-on practical learning on 12 modules which*

*includes milk processing, CIP and automation, milk packaging, cheese and paneer, ice-cream, ghee and fermented milks, quality assurance, engineering services and plant maintenance, commercial functions (purchase, stores, accounts), marketing and dispatch, MIS, SAP and house-keeping. In addition to these, several guest lectures from successful entrepreneurs and industry professionals are also organized (JB Prajapati and Gujar MD, DIC,2019).*

*In addition, many household-scales dairy business are operated in the peri-urban area and currently emerging small market centers due to increasing road access. To help them produce safe local dairy products, a three to six months comprehensive dairy training programme named "How to Start and Operate Household Dairy Business" should be conducted.*

*As well, to encourage the students to enrol and participate in dairy technology related trainings, diploma and graduate programmes through fellowships from the government institutions like NDDB, DLS projects, DDC, Pradesh government to study within the existing institutes of Nepal, as well request Colombo plan scholarships and bilateral government fellowships to supplement the much needed manpower for dairy industry development.*

**Key words:** HRD, dairy technology, academic institution, dairy value chain, human resource, NDSA.

**Corresponding Author:** Tek B Thapa, tthapa2013@gmail.com

## 1. BACKGROUND:

Dairying is a part and parcel of mixed farming system in Nepal. Livestock and its products like milk, meat, and hides, contribute 11.5 % of national GDP (CBS, 2011), and 25.68% of the agricultural GDP (MoAD, 2014). Milk and meat are important source of nutrition for the family; thus, dairying is part of overall food systems. According to the Ministry of Agriculture and livestock development, Nepal produced 1,911,239 MT of milk during 2073/74 (MoAD2016/17) fiscal year from 1,029,529 milking cows and 1,509,511 milking buffaloes. The ratio of cow milk and buffalo milk is in the tune of 34.8 % (665,285 MT) and 65.2 % (1,245,954 MT), respectively. The share of dairy (milk) in the GDP is around 9 % which is significant. Around 500,000 dairy farmers are engaged in dairy production and around 30,000 work force is employed by the dairy processing industries in the dairy value chain network. Private sector dairies pay around billion rupees as revenue to the government. However, formal sector dairy processors handle around only 17 % of the production and 33 % passes through informal channel, and remaining 50 % of production is home consumed in the form of milk, tea, dahi, ghee, butter milk and local milk-based preparations. Significant quantities of value-added dairy products are imported such as milk powders, baby foods, cheeses, long-life milk and cream, butter, ghee and so on. One of the major gaps in the dairy sector development is inadequate appropriately trained and skilled human resources for the entire value chain of the dairy processing industries (NDSA 2019). Buzz word for dairy value chain is from *farm/shed to fork/table*.

Based on the information received from the Nepal Dairy Association (NDA 2019) and Dairy Industries Association (DIA 2019), there are 179 registered dairies which are operational. Two of them have processing capacities above 50000 litres per day (LPD); thirty-two plants have capacities ranging from 10,000 to 49,000 LPD, and all remaining are below 10000 LPD handling with a range from 300–10000 LPD installed capacity. In addition, there are number of smallholder processors which are not member of these associations. Table 1 - list of dairies with their processing capacities.

**Table 1 : List of dairy processing plants**

| Name of Dairy Industries | Address | Contact person | Contact No | Processing Capacity | Running Capacity | Major products |
|---|---|---|---|---|---|---|
| Adhunik Dairy Pvt. Ltd | Balaju, Ktm | PurnaDdr. Thapa | 9851024538 | 15000 | 12000 | Process Milk , Dahi, Paneer, Ghee |
| Bhaktapur Dairy Pvt. Ltd | Bhaktapurr | Puspa Ram Sainju | 9851035177 | 10000 | 4000 | Pastuaurised Milk, butter |
| Kalika Dairy Co. Pvt. Ltd | Bhaktapapur | Ram Pd tyata | 9851047469 | 25000 | 19000 | Process Milk , Dahi, Paneer, Ghee, icecream |
| Kathmandu Dairy Pvt. Ltd | Kathmandu | Pradeep Maharjan | 9851035447 | 12000 | 9000 | Process Milk , Dahi, Paneer, Ghee |
| Kharipati Dairy Pvt. Ltd | Bhaktapurr | Vishwa Ram Khadka | 9851045562 | 30000 | 20000 | Process Milk , Dahi, Paneer, Ghee |
| Nava Pravat Dairy Pvt. Ltd | Lalitpur | Kamal Raj Humagain | 9851005204 | 25000 | 18000 | Process Milk , Dahi, Paneer, Ghee, Icecream |
| Nepal Dairy Pvt. Ltd | Lalitpur | Arniko Rajbhandary | 9851040572 | 30000 | 18000 | Process Milk , Dahi, Paneer, Ghee |
| Puspa Dairy Udhyog | Balaju, Ktm | Pushpa Raj Basnet | 9851098368 | 5000 | 3500 | Process Milk , Dahi, Paneer, Ghee |
| Sainju Dairy Pvt Ltd | Bhaktapurr | Surya Rm Sainju | 9841972860 | 25000 | 17000 | Process Milk , Dahi, Paneer, Ghee |
| Rajdhani Dairy Pvt. Ltd | Lalitpur | Raj Kumar Dahal | 9851073098 | 30000 | 18000 | Process Milk , Dahi, Paneer, Ghee |
| Sujal Dairy Pvt. Ltd, Pokhara | Pokhara, Ktm | Niranjan Shrestha | 9856020224 | 80000 | 60000 | Process Milk ,IcecreamSMP, Dahi, Paneer, Ghee |
| Modern dairy I. Pvt. Ltd | Bhaktapurr | Keshav Pd lamichhane | 9851087985 | 15000 | 10000 | Process Milk , Dahi, Paneer, Ghee |
| Integrated Dairy AndAgro Products Ltd. | Panauti | Krishna Kr. Rathi | 9851036233 | 15000 | 7000 | Process Milk , Butter, Ghee |
| Sanjeevani Dairy Udhyog | Bhaktapurr | Omkar Madhikarmi | 9841234055 | 10000 | 9000 | Process Milk , Dahi, Paneer, Ghee |
| Chitawon Milk Ltd., Chitwon | Chitawon | Raju Babu Shrestha | 9851020605 | 0 | | |
| Jagadamba Dairy Pvt. Ltd | Nhaktapur | Shiva CharanTyata | 9851077704 | 15000 | 12000 | Process Milk , Dahi, Paneer, Ghee |

| Name of Dairy Industries | Address | Contact person | Contact No | Processing Capacity | Running Capacity | Major products |
|---|---|---|---|---|---|---|
| Hetauda Dairy I. Pvt. Ltd | Hetauda | Hom Nath Neupane | 9802032095 | 30000 | 22000 | Process Milk , Dahi, Paneer, Ghee |
| Kamadhenu Dairy Coop., | Sunsari | Teeka Pd Ojha | 9852046005 | 20000 | 15000 | Process Milk , Dahi, Paneer, Ghee, icecream |
| Idea Plus Dairy Pvt. Ltd | Lalitpur | Ganesh ghimire | 9851075803 | 0 | | |
| Country Food Pvt. Ltd. | Bhaktapurr | Santosh Lal Shrestha | 9851041873 | 20000 | 12000 | Process Milk , Dahi, Paneer, Ghee |
| Samuhik Krishak Dairy Ltd. | Kathmandu | Rabi Rizal | 9851137007 | 10000 | 5000 | Process Milk , Dahi, Paneer, Ghee |
| Samyukta Dairy Pvt. Ltd. | Lalitpur | Kul Prasad Ghimire | 9851094450 | 30000 | 20000 | Process Milk , Dahi, Paneer, Ghee |
| Tulasa Dairy Pvt. Ltd | Kathmandu | Ram Chandra Thapa | 9851041949 | 20000 | 12000 | Process Milk , Dahi, Paneer, Ghee |
| Shivam Dairy Pvt. Ltd. | Bhaktapurr | Tulsi Ram Sainju | 9851038615 | 15000 | 9000 | Process Milk , Dahi, Paneer, Ghee |
| Himilayan Dairy Pvt. Ltd | lalitpur | Raj Bhai Khadki | 9851021910 | 30000 | 16000 | Process Milk , Dahi, Paneer, Ghee |
| NMC Dairy Coop Ltd | Jhapa | Shyam Mishra | 9852662806 | 20000 | 12000 | Process Milk , Dahi, Paneer, Ghee, icecream |
| Lumbani Milk Limited | Butwol | Bikram Rizal | 9857025335 | 15000 | 10000 | Process Milk , Dahi, Paneer, Ghee, icecream |
| Milan Dairy Pvt Ltd | Saptari | Milan Singh | 9852821900 | 15000 | 10000 | Process Milk , Dahi, Paneer, Ghee |
| Kosheli Dairy | Sindhuli | Nawa Raj Gajurel | | 8000 | 2500 | Process Milk , Dahi, Paneer, Ghee |
| Fishtail Dairy | Pokhara, Ktm | Suresh Dhoju | | 15000 | 10000 | Process Milk , Dahi, Paneer, Ghee |
| Jeena Bikash Dairy | Bitatnagar | Om Prasad Bhandari | 9802796043 | 12000 | 8000 | Process Milk , Dahi, Paneer, Ghee |
| **Total** | | | | **602,000** | **400000** | |

For efficiently operating dairy value chain livestock specialists, veterinarian, feed and fodder specialists are needed at the dairy production to produce quality milk at sustainable cost, and dairy technologists and specialists are required after milk is drawn from the udder, starts movement from farmer- collection point-chilling Centre-transportation to processing units- milk reception-processing and product making-storage-distribution to the retail outlets-consumers. Nepal Dairy Science association (NDSA) is providing the overview of the HRD for the dairy sector development, particularly focusing on the requirement of dairy science and technology related manpower for strengthening the dairy industries.

## 2. WHY HRD REQUIRED FOR DAIRY SECTOR?

To develop any sector, specialized human resource is required.

Why a generalized MBBS medical practitioner is not enough for treating patients?

Why ENT specialists or Eye specialists or cardiologists are required?

In the same way, specialized dairy technologists/dairy engineer/dairy chemist/dairy quality control specialist/dairy business management and marketing specialists are required for the dairy sector and industry development; if the nation wants to strengthen and develop a competitive dairy sector.

Do you want to collect quality milk?

Do you want to follow GMP practices?

Do you want to produce good quality and competitive dairy products that can meet export standards for the regional or international markets?

If your answer for above question is; you want.

In that case, you need trained human resources such as dairy technologist and others.

## 3. HRD REQUIREMENT IN THE DAIRY VALUE CHAIN:

To have a quality dairy production, trained manpower is required in the entire dairy value chain namely milk production and farm management, extension services, Animal health and veterinary care, Milk collection and chilling Centre management, dairy coop society management, quality management, milk transportation, milk processing and product making, plant maintenance, storage, marketing, advertising and promotional campaign, management of entire dairy business. Thus, various types of expertise such as livestock production specialist, vetenarians, extensionist, feed and nutritionist, dairy technologist, Dairy quality controller, dairy and maintenance engineers, marketing and business management and financial experts are required to efficiently run and manage the dairy value chain business. Manpower's specially livestock production, extension, animal health, marketing and business management are adequately available in the market produced by the local universities. However, there is acute shortage of dairy technologists who are required in overall planning and management of dairy industry and business. Specific focus is made to highlight the need of various level of dairy technology related manpower for the dairy processing industries.

## 4. TYPES OF MANPOWER REQUIRED IN THE DAIRY VALUE CHAIN/INDUSTRY:

HRD manpower especially for dairy processing industries were filled through the Colombo Plan scholarships and bilateral fellowships till 1990. Between forties and sixties, many Nepalese studied Indian Dairy Diploma (dairy technology), before graduate programme in dairy technology started

under NDRI campuses. For some time, livestock and veterinary graduates attended additional dairy technology training and filled the HRD requirement. However, exclusive graduate dairy courses started in 2005, under College of Applied Food and Dairy Technology, and post-graduate programme in dairy technology under HICAST, PU.

Type and level of manpower required for the dairy value chain/industry can be summarized as follows.

4.1. *Floor level manpower (basic training):*

These types of manpower are required in following disciplines of work;

a. Milk Collection Centre (MCC) and Milk Producers cooperative Societies (MPCS), to basically organize milk collection, quality management and management of enterprises.

b. Chilling Centre (CC) operation, to basically carry out milk reception, basic rapid quality testing, chilling plant/equipment, accessories and service equipment operation and management.

c. Plant operators/dairy girls & boys in the processing plants.

d. Milk Transportation: manage the milk transportation by cans, tankers, cleaning and sanitization.

4.2. *Supervisory level manpower (diploma level)*:

These types of manpower will perform following;

a. Manage MCC/milk chilling Centre 1000 LPD or above milk handling capacity;

b. Manager of chilling Centre;

c. Supervisor of various processing sections/units in the dairy plant, packaging sections, cheese section, cream and butter section, fermented milks, dispatch and marketing etc.;

4.3. *Highly skilled manpower (graduate/post-graduate level):*

These types of manpower will perform as Plant supervisor, quality controller, marketing manager, dairy plant assistant manager and manger.

4.4. Man-power for small scale dairy: Small-scale cottage dairy enterprises are common features in semi-urban, rural areas as well around district headquarters. Thus, a package training of technology, business and financial management is required for them which can range from one to three months, followed by refresher trainings after one year or so.

## 5. CURRENT MANPOWER DEVELOPMENT INFRASTRUCTURES AND FACILITIES:

Vocational junior technical assistant (JTA) in animal husbandry and veterinary sciences courses, under CTEVT

Diploma courses in dairy and food technology: HS + 3 years, under CTEVT

Graduate program in dairy and food technology: HS + 4 years, university programme

Master's program in dairy technology: BTech + 2 years Master, university programme

Dairy training Centre, Pokhara under DLS/MOALD

Bachelor and master's program in Animal husbandry and veterinary sciences under TU and AFU, PU etc.

Numerous short-term training program organized by NDDB, DLS and various INGOs/NGOs/projects, and the courses are heterogeneous.

Diploma and graduate programme in Dairy technology are only offered by the College of Applied Food and Dairy Technology which started in 2005.

## 6. ISSUES/CURRENT STATUS:

Many campuses under government supported universities are offering graduate and post-graduate program in Animal sciences and veterinary sciences which are equipped with facilities. However, only college like CAFODAT offering graduate and diploma program in dairy technology is the facility established under private ownership. It is not sufficiently equipped and needs support to strengthen labs/pilot plants. Thus, government should support such specific and specialized campuses of national importance, rather than establishing new facilities under state funded universities.

There is a need to form academic/education institution-industry consortium for skilled graduate training. DDC and other major dairy industries should form a consortium to support to develop skills for the graduates in dairy processing field (such as guaranty of 6 months of placement/training by each industry for at least 4-5 students per year). It should be a structured program. This deserves to be discussed during group discussion and a workable modality should be agreed at the end of this workshop.

In this regard, it is worth taking lessons from Vidya dairy Anand or Model Dairy Karnal model wherein dairy technology graduate students undergo 12 months hands-on practical learning on 12 modules which includes milk processing, CIP and automation, milk packaging, cheese and paneer, ice-cream, ghee and fermented milks, quality assurance, engineering services and plant maintenance, commercial functions (purchase, stores, accounts), marketing and dispatch, MIS, SAP and house-keeping. In addition to these, several guest lectures from successful entrepreneurs and industry professionals are also organized (JB Prajapati and Gujar MD, DIC,2019).

Dairy technology diploma and graduates coming out of the colleges are not getting proper jobs in the government and private dairy industries. Thus, incentives are needed for the students to enrol in the agro and livestock processing related technology courses such as dairy technology and so on. In order to encourage the students to enrol and participate in dairy technology related trainings, diploma and graduate programmes, fellowships should be provisioned from the government institutions like NDDB, DLS projects, DDC, Pradesh government to study within the existing institutes of Nepal. As well request Colombo plan scholarships and bilateral government fellowships should be requested to supplement the much needed manpower for dairy industry development.

## 7. WAY FORWARD:

Basically, three level of manpower namely floor level dairy technicians, supervisory diploma level dairy technologists (JT level) and highly skilled technologists (technical officers' level) are required for operating and managing the dairy value chain and the dairy industries in the country.

Floor level manpower are required in Milk Collection Centre (MCC) and Milk Producers cooperative Societies (MPCS), Chilling Centre (CC) operation, Plant operators/dairy girls & boys in the processing plants; milk Transportation: manage the milk transportation by cans, tankers, cleaning and sanitization etc.

Supervisory level manpower (diploma level) are required to manage a MCC/milk chilling Centre 1000 LPD or above milk handling; manager of chilling center; supervisor of processing plants and marketing functions.

Highly skilled manpower is needed as Plant supervisor, quality controller, marketing manager, dairy plant assistant manager and manger etc.

Many campuses under government supported universities are offering graduate and post-graduate program in Animal sciences and veterinary sciences which are equipped with facilities. However, there is single college offering graduate programme is dairy technology; and few CTEVT approved training institutes offering diploma program in dairy technology established under private ownership. These facilities are not sufficiently equipped and needs support to strengthen labs/pilot training dairy plant. Thus, government should support such specific and specialized campuses of national importance, rather than establishing new facilities under state funded universities.

It is worth taking lessons from Vidya dairy Anand or Model Dairy Karnal model wherein dairy technology graduate students undergo 12 months hands-on practical learning on 12 modules which includes milk processing, CIP and automation, milk packaging, cheese and paneer, ice-cream, ghee and fermented milks, quality assurance, engineering services and plant maintenance, commercial functions (purchase, stores, accounts), marketing and dispatch, MIS, SAP and house-keeping. In addition to these, several guest lectures from successful entrepreneurs and industry professionals are also organized (JB Prajapati and Gujar MD, DIC,2019). Also, our graduates can attend three months on the job training in Vidya dairy, and government should support the external in-plant trainings for first five years till the adequate facilities are developed locally.

In addition, many household-scales dairy business are operated in the peri-urban area and currently emerging small market centers due to increasing road access. To help them produce safe local dairy products, a three to six months comprehensive dairy training programme named **“How to Start and Operate Household Dairy Business”** should be conducted.

As well, to encourage the students to enrol and participate in dairy technology related trainings, diploma and graduate programmes through fellowships from the government institutions like NDDB, DLS projects, DDC, Pradesh government to study within the existing institutes of Nepal, as well request Colombo plan scholarships and bilateral government fellowships to supplement the much needed manpower for dairy industry development.

Entry of dairy technologists should be assured in the position of dairy development officer, dairy/ food research officer in the department of livestock services, NDDB, DDC, DFTQC and ministry of agriculture and livestock development.

**ACKNOWLEDGEMENTS:**

Appreciation to NDDB, DDC, DIA, NDA, CAFODAT colleagues who provided the updated information, as well to NDSA colleagues for gathering the information from various sources.

**REFERENCES:**

CAFODAT (2019). http://cafodat.edu.np/

CBS (2011). Central Bureau of Statistics, Kathmandu, Nepal.

DIA (2019). Dairy Industries Association (DIA), Kathmandu.

JB Prajapati and MD Gurjar (2019). Re-aligning dairy technology curriculum for creating entrepreneurial and start-up ecosystem, souvenir, 47th Dairy Industry conference, Indian Dairy Association, Patna, Feb 7-9, 2019.

MoAD (2017). Statistical Information on Nepalese Agriculture. Published by then Ministry of Agricultural Development, Singha Durbar, Kathmandu, Nepal.

NDA (2019). Nepal Dairy Association, Kathmandu.

NDSA (2019). NDSA Newsletter Vol 5 & 6. ■

# 3.5 DDC Perspective: Technical Manpower Constraints and Way Forward

**Govind R. Joshi**
Quality Control & Technology Development
Dairy Development Corporation

**ABSTRACT**

*Dairy Development Corporation (DDC) is established under corporation Act 2021 B.S. It was established in 1st Shrawan 2026. It is fully state owned corporation, initiated for the economic advancement of the farming communities and has flourished into a nationwide movement with an annual collection over 60 million litres of milk from more than 2 lakh milk producers through 1200 milk producing cooperatives spread out in 45 districts. DDC is a precious asset in the economic development of the nation. The organizational structure of DDC and total seats of human resource is managed by board of corporation.*

*The level and standard of human resource in DDC is according to following:*

***Details of Technical Manpower ( Till 2074/75)***

| S.N. | Details | Total Seats | Occupied Seats | Vaccant |
|---|---|---|---|---|
| 1 | Officer (Technical) | 83 | 59 | 24 |
| 2 | Officer ( Adminstrative) | 72 | 47 | 25 |
| | Total | 155 | 106 | 49 |
| 3 | Assistant( Technical) | 674 | 543 | 131 |
| 4 | Assistant( Administrative) | 234 | 162 | 72 |
| | Total | 908 | 705 | 203 |
| | Grand Total | 1063 | 811 | 252 |

***Details of Technical Manpower ( Forecasted 2075/76)***

| S.N. | Details | Total Seats | Occupied Seats | Vaccant |
|---|---|---|---|---|
| 1 | Officer (Technical and admistrative) | 154 | 98 | 56 |
| | Total | 154 | 98 | 56 |
| 3 | Assistant( Technical) | 676 | 535 | 141 |
| 4 | Assistant( Administrative) | 233 | 161 | 72 |
| | Total | 909 | 696 | 213 |
| | Grand Total | 1063 | 794 | 269 |

▪▪▪

# 3.6 Availability and Requirement of Technical Human Resources for Dairy Industries in Nepal

**Uttam K. Bhattarai**
**Man B. Shrestha**
**Jagat B. K.C.**
*College of Applied Food and Dairy Technology*

**ABSTRACT**

*Dairy sector is one of the important contributors in national GDP, owing to its 9 % share. However, recent data on safety and quality of milk and milk products show more than half (52.6 %) of samples do not comply with the mandatory standard of the GoN. These data raise question on sustainable development of dairy sector in Nepal. One of the important reasons of such precarious scenario is inadequate level of availing services of qualified manpower, especially technical manpower in dairy value chain. Considering these facts, the paper aims at analysing production level of technical manpower, their absorption in dairy businesses and reviews the academic programs of concerned universities and CTEVT in the country. The methodology used for the study was basically literature review and discussion with national key stakeholders.*

*Latest figure of milk production in Nepal is 2.092 million tons per year and the average growth rate is 4.4 %. Data reported by DDC, DIA and NDA shows that 289,000 MT of milk is being processed annually. Different estimates show that 17 – 25 % (356,000 – 527,000 M. Ton) of the total production of milk is processed by formal sector. More than half (approximately 54%) of milk producers are either illiterate or general literate or having primary school level education. Most of the dairy processing units do not avail services of dairy technicians or technologists so as to maintain quality and safety of their products. These situations result in higher percentage of non-compliance with the standard. Major cause of non-compliance is the contamination of faecal coliform.*

*Technical institutes affiliated to CTEVT so far have produced 162 diploma holders' food & dairy technicians. Similarly, colleges affiliated to Purbanchal University have produced 24 numbers of B. Tech. level and about 108 numbers (including dairy specialization M. Tech. Food Technology graduates) of master level dairy technologists in the country. The gap of dairy technologists between supply and demand sides is being met by food technology graduates. Around 1,395 such graduates have been produced from the academic institutes in the country. However, most of the cottage and rural level processing units being operated by private and cooperative sectors are reluctant to get services of qualified technical manpower.*

*Policy documents of the government of Nepal, especially education and agriculture related policies have sufficiently given priority in producing technical human resources. But, policy documents have not been properly translated into programs and budgets with timeline targets. Similarly, it seems that there is no proper relation between human resource requirement in public, private and cooperative sectors and the universities.*

*Thus, it can be concluded that one perspective strategic plan with programs, activities and budget along with set time line is to be developed with active participation of public, private and cooperative sectors for the sustainable development of dairy sector in Nepal.*

**Key words:** dairy technology, academic institution, dairy value chain, human resource, processing unit, policy.

**Corresponding Author:** Uttam K. Bhattarai; Mobile: 9851035635, Email: ukbhattarai21@yahoo.com

## 1. BACKGROUND:

In Nepal formal sector dairy development activity was started in 1952 with the establishment of a yak cheese factory in Langtang, Rasuwa district. Later, Dairy Development Section (DDS) was established in 1954 within the Department of Agriculture (DoA) under the then Ministry of Food, Agriculture and Irrigation. In the same year, with the initiation of DDS a small-scale milk processing plant was established in Tusal of Kavre district.In 1955, the Government of Nepal formed a Dairy Development Commission with mandate of recommending ways of improving dairy sector in Nepal.Provision of establishing a modern dairy industry in the country was made in the First Five Year Plan (1956-61).

As provisioned in the plan document, a Central Dairy Plant was established at Lainchaur, Kathmandu in the year 1956.Again, in 1960, other two cheese factories and a Cheese Production and Supply Scheme were established. The Dairy Development Commission was later converted to the Dairy Development Board in 1962. So as to meet the growing demand for milk in Kathmandu, the Board was converted to Dairy Development Corporation (DDC) in 1969. Again in 1992, National Dairy Development Board (NDDB) was re-established. The mandates of NDDB are: suggesting policy level matters related to milk production, processing, marketing and quality control, and research and development.

At present, major institutions working in dairy sector in Nepal are: Ministry of Agriculture and Livestock Development (MoALD), National Dairy Development Board (NDDB), Department of Livestock Services (DoLS), Department of Food Technology and Quality Control (DFTQC), Dairy Cooperatives, Dairy Development Corporation (DDC),Department of Cooperatives (DoC), Dairy Industries Association (DIA), National Dairy Association (NDA), professional associations, Agro-Enterprises Center (AEC)/ FNCCI and private industries

Dairy is one of the most important sectors of national economy. It has created significant numbers of jobs across the country. Furthermore, dairy has become an important means of rural income of Nepal. Dairy sector in Nepal contributes around 9 % in Gross Domestic Production (GDP) [NDA, 2018].

## 2. INTERNATIONAL PERSPECTIVE:

### 2.1. Rotterdam Declaration:

The Dairy Declaration of Rotterdam, declared on 19 October, 2016 in Rotterdam, the Netherlands at World Dairy Summit with the initiation of FAO and International Dairy Federation (IDF)agreed to**:** take an integrated approach to promote the sustainability of dairy systems, jointly taking into consideration social, economic, health and environmental dimensions; give particular attention to the needs of family farmers, small holders and pastoralists; build, implement and disseminate tools and guidelines to facilitate the identification and adoption of sustainable practices in the dairy sector; build

capacity in support of sustainable practices and provide enabling conditions; measure and report on sustainable outcomes; and strengthen multi-stakeholder dialogue for consensus building, reviewing progress and continuous improvement.

### 2.2. International Dairy Sector Facts:

Not only in Nepal but also in the world scenario milk is very much important economic commodity. Milk contributes 27% to the global value addition of livestock and 10% to that of agriculture. The proportion of global milk production is as follows: cow 82.7%, buffalo 13.3%, goat 2.3%, sheep 1.3% and camels 0.4%.

At present average growth rate of global milk production is 2.2 % and it is estimated that it reaches 1.8% growth rate by 2025.

Considering its worldwide consumption volume and quality protein, dairy products are very much important agricultural commodities to achieve food & nutrition security.Studies have shown that every 100 liters of milk traded creates 1.2-5.7 full time jobs.

Dairy business not only impacts positively it also has some negative effects in the environment and human health. Dairy animals produce around 3.1 giga tons of $CO_2$equivalents per year, which is more than the quantity of greenhouse gas produced by poultry and fish farming. Dairy industry has a role in public health because 45 zoonotic bovine pathogens have been identified which can harm humans. (FAO, n.d.).

### 2.3. World Dairy Market:

World dairy market is increasing every year in terms of milk production, per caput consumption and trading of milk and milk products. The following Table 1 gives such data:

**Table 1: Global Milk Production and Trading**

| SN | Criteria | 2017 | 2018 | 2019 (forecast) |
|---|---|---|---|---|
| 1. | Total milk production (Million tons, milk equivalent) | 824.8 | 843.2 | 859.0 |
| 2. | Total trade (Million tons, milk equivalent) | 72.7 | 74.7 | 76.1 |
| 3. | Per caput food consumption – world (Kg/year) | 109.2 | 110.5 | 113.3 |
| 4 | Trade - share of production (%) | 8.8 | 8.9 | 8.9 |
| Ref.: FAO (2019). Food Outlook: Biannual Report on Global Food Markets | | | | |

## 3. DAIRY BUSINESS IN NEPAL:

Dairy business comprises of milk production, collection, transportation, processing, packaging and marketing. In line with the three-pillar strategy of the GoN, dairy business is being carried out by public sector (DDC), private sector (NDA & DIA) and cooperative sector (CDCAN and others). However, there is a significant quantity of milk being produced but not recorded in the formal sector.

### 3.1. Dairy Cooperatives in Nepal:

Central Dairy Cooperative Association, Nepal (CDCAN) Ltd. since its establishment has been trying to organize all milk producers' cooperatives (MPCs) across the country through the formation of District Milk Producers' Cooperative Union (DPMCU). A detail of such information is as given in Table 2 below:

**Table 2 : Milk Production & Processing: Number of MPCs and DPMCUs under CDCAN**

| Province | Registered with CDCAN | | Liquidated | | Existing | |
|---|---|---|---|---|---|---|
| | MPCs | DPMCUs | MPCs | DPMCUs | MPCs | DPMCUs |
| Province 1 | 110 | 6 | 4 | - | 106 | 6 |
| Province 2 | 84 | 5 | 2 | - | 82 | 5 |
| Province 3 | 416 | 11 | 1 | - | 415 | 11 |
| Gandaki | 95 | 7 | 8 | - | 87 | 7 |
| Province 5 | 85 | 5 | 10 | 1 | 75 | 4 |
| Karnali | 17 | 1 | - | - | 17 | 1 |
| S.Paschim | 10 | 1 | - | - | 10 | 1 |
| **Total** | **817** | **36** | **25** | **1** | **792** | **35** |
| : CDCAN (2074). Annual Report, Published by Central Office, Baneswor. | | | | | | |

The above Table shows that there are thirty-five numbers of DPMCUs and 792 numbers of MPCs functioning under the CDCAN. Thus, it can be said that CDCAN coverage is not sufficient to establish and functioning of MPCs in all 77 districts of the country.

Annual report of CDCAN (2074) states that four hundred thousand farmers' families are directly dependent on dairy businesses and Rupees four hundred thousand is being transferred daily from urban to rural areas of Nepal. In this way dairy business has become backbone of Nepalese rural economy.

### 3.2. Milk Production Trend in Nepal:

After the introduction of artificial insemination (AI) program in cattle, growth rate of milk production has been increasing every year. Latest data showed that nearly 2.1 million M. Ton of milk was produced in Nepal in the year 2017/18. Past six years data shows an average milk production growth rate of 4.4%, which is indicated in the following Table 3:

**Table 3 : Milk Production Data in Nepal**

| S. No. | Fiscal Year | Production in '000 M. Ton | Growth Rate % |
|---|---|---|---|
| 1. | 2011/12 | 1622.8 | - |
| 2. | 2012.13 | 1680.8 | 3.6 % |
| 3. | 2013/14 | 1700.1 | 1.2 % |
| 4. | 2014/15 | 1755.7 | 3.3 % |
| 5. | 2015/16 | 1854.3 | 5.6 % |
| 6. | 2016/17 | 1911.2 | 3.1% |
| 7. | 2017/18 | 2092.4 | 9.4% |
| | Average Growth Rate | | 3.4% |
| **Ref.: MoAD (2017) and Krishi Diary (2076)** | | | |

### 3.3. Milk Production & Processing in Private Sector:

In Nepal, Ministry of Agriculture and Livestock (MoALD) produces annual production data of milk across the country. However, there is no system of producing consolidated national data on milk processing. Cooperatives reports data of their dairy processing units run by milk processing cooperatives. Similarly, there are two private associations that work for their member processing units established as limited companies or other forms of companies. The associations are named as Nepal Dairy Association (NDA) and Dairy Industries Association (DIA). These associations produce consolidated data on milk collection and processing. The following Table 4 gives such data, but limited to their members only:

**Table 4 : Private Sector Milk Processing Data**

| S. No. | Criteria considered | NDA Members | DIA Members | Total |
|---|---|---|---|---|
| 1. | Processing units (Number) | 146 | 34 | 180 |
| 2. | Installed capacity (‘000 L/day) | 328.6 | 895.0 | 1223.6 |
| 3. | Average capacity utilization (‘000 L /day) | 235.8 | 420.0 | 655.8 |
| 4. | Capacity utilization percentage (3/2 x100) | | | 53.6 % |

**Ref. Primary data obtained from NDA and DIA records.**

Data presented in the Table above show that there are only 180 processing units with total installed capacity as 1.2 million L per day and average capacity utilization percentage as approximately 54% only.

### 3.4. Formal Sector Milk Collection in Nepal:

Dairy Development Corporation (DDC), a government owned body has been involved in collecting milk from farmers, processing, and marketing of processed dairy products including pasteurized milk among ordinary consumers. It has significant numbers of chilling centres', processing units including milk powder making plants across the country. DDC products marketed as DDC brand are very much popular and trustworthy products in terms of quality, safety and quantity among Nepalese consumers.

Therefore, it is required to consolidate DDC data, private sector data and cooperative sector data to estimate to national data in formal sector. The following Box 1 shows such estimation of formal sector milk collection and processing in Nepal:

**Box 1**

Formal sector milk collection and processing

A. **Formal sector annual milk collection** **289,000 MTon**

Private sector (DIA & NDA members) 655,800 L/day X 360 days
= 236,088 MTon per year

Annual milk collection by DDC = 53,187 MTon per year

B. **Estimation of formal sector milk processing** **356,000 – 527,000 MTon**

[@ Estimates byNDDB 17% and Dairy V.C. study 25%

and taking FY 2017/18 production data of 2,092,000 MTon]

C. **Cooperatives and other (B-A)** **67,000 – 238,000 M Ton ??**

[Ref.: DDC (2074) ; NDDB (2075b) and Discussion with ED of NDDB]

### 3.5. Efficiency of Dairy Industries:

Dairy industries established in Nepal are not efficient in terms of processing capacity, safety level of products and collecting milk from farmers. Study report on Efficiency of Dairy Industries in Nepal has made the following recommendations for improvement: Capacity utilization should be increased to 80-90%; poor cold chain status in the value chain should be improved; milk tankers should be insulated; investment is to be increased so as to produce standard products; and product diversification is to be done (NDDB, 2075a).

### 3.6. Education Level of Farmers:

It is obvious that knowledge about the subject matter is very much essential to achieve sustainable results. A study carried out by NDDB shows that education level of dairy farmers in Nepal is very poor. The following Table 5 further explains about the situation:

**Table 5: Education Level of Dairy Farmers in Nepal**

| S. No. | Education Level | Percentage of Total |
|---|---|---|
| 1. | Illiterate | 16.23 |
| 2. | Literate | 19.37 |
| 3. | Primary | 18.59 |
| 4. | Secondary | 28.53 |
| 5. | Higher Secondary | 11.52 |
| 6. | Bachelors & above | 05.76 |
| | **Total** | **100.00** |
| | | **Ref. NDDB (2075a)** |

The above Table shows that 54.2% of milk producing farmers is either illiterate or simple literate or having primary level education.

### 3.7 Safety and Quality of Dairy Products:

Quality and safety of dairy products of Nepal are always in controversy due to poor level of hygiene and sanitation.Most of the dairy processing industries have not obtained Good Hygienic Practice (GHP), Good Manufacturing Practices (GMP) and Hazard Analysis and Critical Control Points (HACCP) or ISO 22000 certificates. These certificates guarantee the safety and quality of dairy products produced by the processing units.

Department of Food Technology and Quality Control (DFTQC) is the food control agency of the Government of Nepal and as per World Trade Organization (WTO) provisions it is taken as competent authority. DFTQC monitors quality and safety level of food products at different levels and produces reports in their annual bulletin. The safety and quality level of dairy products in the last five years is shown in Table 6 below:

**Table 6 : Trend in Quality and Safety of Dairy Products**

| Fiscal Year | Collected Samples (Nos.) | Non-compliance (Sample Nos.) | Percentage of Non-compliance |
|---|---|---|---|
| 2070/71 | 151 | 38 | 25.2 |
| 2071/72 | 103 | 39 | 37.9 |
| 2072/73 | 141 | 34 | 24.1 |
| 2073/74 | 180 | 49 | 27.2 |
| 2074/75 | 192 | 101 | 52.6 |
| | | | **Ref.:** DFTQC 071, 072, 073, 074 and 075 |

**Note:** In the above table, non-compliance figure indicate both safety and quality parameters.

Furthermore, a study on food safety situation analysis of meat and milk products in Mid and Far Western Region of Nepal carried out by Research Inputs and Development Actions (RIDA)/ Agriculture and Food Security Project (AFSP) for DFTQC shows a significant level of faecal contamination. However, there was no threat found in terms of antibiotic residues in the analyzed milk samples. The details of which is shown in the following Table 7:

**Table 7 : Analytical Data of Milk Samples**

| Parameters | Unit | Milk Samples | |
|---|---|---|---|
| | | Detection Range | Percentage of Non-compliance |
| Total coliform | CFU/ml | 0- 3 x $10^6$ | 72.1 |
| Faecal coliform | CFU/ml | 0- 3 x $10^5$ | 53.5 |
| Penicillin | ppb | 0.5 – 2.49 | 0.00 |
| Oxytocin | ppb | 0.02 – 0.03 | 0.00 |
| Tetracyclin | ppb | 0.3 – 3.2 | 0.00 |

Ref.: DFTQC (2017)

### 3.8 Dairy Value Chain Stakeholders of Nepal:

There are different value chain actors in the country. Ministries, departments and other line agencies as well as National Planning Commission (NPC) as staff function of the government of Nepal are the main actors. Similarly, government boards mainly National Dairy Development Board (NDDB) and corporations mainly Dairy Development Corporation (DDC) is to support line agencies to achieve the set goals. Two departments under the Ministry of Agriculture and Livestock Development (MoALD) have crucial roles in producing and maintaining safety and quality of milk in Nepal. The Department of Livestock Services (DoLS) is mainly responsible for producing safe and quality milk whereas the Department of Food Technology and Quality Control (DFTQC) is responsible for maintaining safety and quality of milk after production from the farm to fork. National Cow and Buffalo Research Programs under Nepal Agricultural Research Council (NARC) are responsible for developing highly productive breeds suitable in Nepalese context.

Dairy Industries' Association (DIA) and Nepal Dairy Association (NDA) are the private sector associations under which dairy processing industries have been organized. These two organizations have the same objective but working separately. This situation sometimes creates confusion in solving private sector problems.

Similarly, third pillar of Nepalese economy, the cooperative sector is also a player in dairy business in Nepal. CDCAN Ltd. is the umbrella organization of dairy cooperatives in Nepal.

Our concern here is the dairy related education system in Nepal. As mentioned previously, Ministry of Education, Department of Education and NPC are the policy making and implementing agencies. Tribhuvan University (TU) and Agriculture & Forestry University (AFU) are producing graduates in Veterinary Science and Animal Husbandry (B.V.Sc. and A.H.), which are related to the milk production side of dairy business only. Two of the Purbanchal University (PU) affiliated colleges namely College of Applied Food and Dairy Technology (CAFODAT) and Himalayan College of Agricultural Science and Technology (HICAST) as well as Central Campus of Technology (CCT) under TU are producing Dairy Technology related graduates in the country. The CCT, CAFODAT and other colleges also produces food technology graduates having dairy technology as one of the important subject. Similarly, Council for Technical Education and Vocational Training (CTEVT) is also a player as it affiliates colleges to produce diploma level manpower in food and dairy technology.

Similarly, Food and Agricultural Organization of the United Nations (FAO), Nepal Food Scientists and Technologists Association (NEFOSTA), Nepal Veterinary Association (NVA), Nepal Veterinary Council (NVC), Nepal Dairy Science Association (NDSA), Nepal Animal Science Association (NASA), Agro-Enterprises Center (AEC)/FNCCI, Consumer Forums, Mass Media and Other stakeholders have also an important role in developing dairy business in Nepal.

## 4. EDUCATION SYSTEMS:

Education systems are of different type's viz non-formal education, formal education and technical education and vocational training (TEVT). These systems can be understood as:

a) **Non-formal education** – generally carried out by Ministries/Departments, Aid organizations, Employers, etc. (Nolker and Shoenfeltd, 1980).

b) **Formal education** – provided by the public educational system and is characterized by sequential structuring, entrance requirement, conferment of authorization and employment of trained teachers (Nolker and Shoenfeltd, 1980).

c) **Technical Education and Vocational Training (TEVT)** – all non-university education and training programs, which are: **technical training** – modular type, one shot; **technical education** – all dimensions of particular technology or vocation; **vocational education** – more academic, career articulation, professional level; and **vocational training** – demand driven, need based and is offered to address the immediate needs of the people or industry and business (Sharma, n.d.).

## 5. DAIRY EDUCATION IN NEPAL

In Nepal there is a practice of educating people through non-formal, formal and TEVT education systems. Non-formal type of education is being practiced in dairy related organizations such as NDDB, DDC, etc so as to enhance capacity of their employees. That is a practice of in-house training.

Dairy related formal education is being offered by universities especially, Tribhuvan University and Purbanchal University. Similarly, TEVT types of trainings are being offered by Council for Technical Education and Vocational Training (CTEVT) under the Ministry of Science, Technology and Education of the government of Nepal. Details of such education systems are elaborated below:

### 5.1 Certificate/Diploma in Food and Dairy Technology:

With the initiation of Prof. Dr. Suresh Raj Sharma, Certificate Level in Food Technology including Dairy Technology as one of the important subjects (a two years course after S.L.C) was started in Dharan Campus (under Institute of Science and Technology, T. U.) in 2030 BS (1973).Later, Prof. Jagat Bahadur K. C. in the year 2057 BS started Diploma in Food and Dairy Technology under CTEVT at Dharan as a private institute. Again, Prof. K. C. started Diploma in Food and Dairy Technology in the year 2010 (2067 BS) in Kathmandu under the CTEVT affiliation. At present two private technical institutions affiliated with CTEVT have been producing middle level (diploma level) food &dairy technicians. So far altogether 162 numbers of diploma holders in food and dairy technology have been produced in the country. Details of which is given in the following Table 8:

**Table 8 : Diploma Level Manpower in Food & Dairy Technology Produced so far in Nepal**

| S. No. | Name of the Institution | Graduates (Nos.) |
|---|---|---|
| 1. | CAFODAT, Minbhawan, Kathmandu | 67 |
| 2. | Dharan Multiple Campus, Dharan | 95 |
| | **Total** | **162** |

**Ref.**: Information collected from Responsible Officials of the respective Colleges.

### 5.2 B. Tech. Food Technology

Bachelor level food technology course in Nepal was started in 2036 BS (1979 AD) at Dharan under T.U. Dairy Technology was one of the important subjects within the course syllabus of Food Technology. First batch of such graduates were graduated in 1984 AD. Before that 40 graduates were trained abroad in this field (Shakya, 1988). Now, 12 food technology colleges under T.U. and Purbanchal University

produce these types of graduates. So far 1395 (one thousand three hundred and ninety-five) graduates have been produced from these 12 colleges, details of which are given in the following Table 9:

**Table 9: Food Technology Graduates Produced so far in Nepal**

| S. No. | Name of the College | Graduates (Nos.) |
|---|---|---|
| 1. | National College of Food Science and Technology (NCFST), Khusibu, Kathmandu. | 166 |
| 2. | Padmashree International College, Kathmandu | 106 |
| 3. | College of Applied Food and Dairy Technology (CAFODAT), Minbhawan, Kathmandu | 143 |
| 4. | Golden Gate International College, Kathmandu | 87 |
| 5. | Lalitpur Valley College, Lalitpur | 98 |
| 6. | Central Campus of Technology (CCT), Dharan | 539 |
| 7. | Nilgiri College, Itahari, Sunsari | 11 |
| 8. | Dharan Multiple Campus, Dharan | 51 |
| 9. | Pokhara BigyanPrabidhi Campus, Pokhara | 51 |
| 10. | Nagarik College, Gaindakot, Nawalparasi | 50 |
| 11. | Birat Multiple College, Bargachhi, Biratnagar. | 08 |
| 12. | Sunsari Technical College, Dharan | 136 |
| | **Total** | **1395** |

Ref.: Information collected from concerned officials of the respective colleges

### 5.3 Higher Level Manpower in Dairy Technology

In 2005, Prof. Jagat Bahadur KC, Tek B Thapa and other food and dairy experts took lead to establish College of Applied Food & Dairy Technology (CAFODAT) to run a B. Tech. Dairy Technology program in Kathmandu with affiliation from Purbanchal University (PU). CAFODAT regularly run this program for some years but at present, unfortunately, there are some problems with P.U. to run this program regularly.

Himalayan College of Agricultural Science and Technology (HICAST) in affiliation with P. U. runs M. Sc. Dairy Technology, a two years course after relevant 4 years technical bachelor level. However, at present dairy technology related programs of CAFODAT and HICAST are not running regularly due to different reasons.

Similarly, Central Campus of Technology (CCT) Dharan under Tribhuvan University (TU) runs M. Tech. in Food Technology course, a two years program after 4 years relevant B. Tech. program. In this program, one of the specializations is Dairy Technology.Thus TU has been producing M. Tech. Food Technology with specialization in Dairy Technology. Altogether 132 numbers of higher levels (Bachelor & Master level) manpower in dairy technology have been produced so far in Nepal. Details of such higher level dairy related manpower so far produced in Nepal is as given in the following Table No. 10:

**Table 10 : Higher Level Dairy Technology Related Human Resources produced so far**

| S.No. | Institution | Level | Numbers | Remarks |
|---|---|---|---|---|
| 1 | CAFODAT | B. Tech. | 24 | |
| 2. | HICAST | M. Sc. | 50 | Food Tech., Dairy Tech, Veterinary & Livestock graduates are illegible. |
| 3. | CCT | M. Tech. | 58 | M. Tech. Food Tech. degree with specialization in Dairy Technology. |
| | **Total** | | **132** | |

Ref.: Information collected from concerned officials of the respective colleges[Dr. K. B. Shrestha, HICAST&Prof. Dr.Dhan Bahadur Karki, Campus Chief, CCT].

## 6. PROJECTION OF HUMAN RESOURCE (HR) REQUIREMENT:

In Nepal there is not actual data estimated on human resources required in the field of dairy for coming years. Data on cattle and other milking animals as well as milk production data are available as estimated by the government mechanism. However, there is no such data available so far in dairy processing.

Therefore, an attempt has been made to make an estimation of milk processing data and based on that to estimate human resource requirement for dairy processing. The basis taken are: (1)Average growth rate of 4.4% milk production per year; (2) Assuming 1 % growth per year in formal sector processing; (3) DDC data 60,000 MT processing require 44 technical officers (actual); and (4) Assuming 1 officer require at least 2 numbers of supervisors (diploma holders) – one in processing line and another in laboratory.

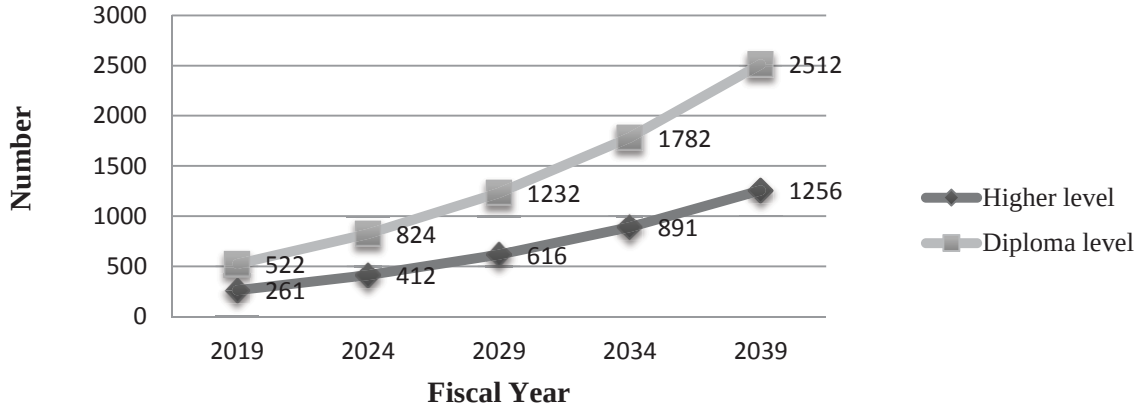
The estimated figure, based on above assumption, is presented in the following Table No. 11 and Figure 1:

**Table 11: Estimated Human Resource Requirement for Dairy Processing in Nepal**

| S. No. | Particular | Baseline Data, 2019 | Projected data, (,000 MT) | | | |
|---|---|---|---|---|---|---|
| | | | 2024 | 2029 | 2034 | 2039 |
| 1 | Production of Milk (‘000 MT) | 2092 | 2552 | 3113 | 3797 | 4632 |
| 2. | Formal sector processing (minimum) % | 17 % | 22% | 27% | 32% | 37% |
| 3. | Formal sector processing quantity (‘000 MT) | 356 | 562 | 841 | 1215 | 1713 |
| 4. | Requirement of technical officers | 261 | 412 | 616 | 891 | 1256 |
| 5. | Requirement of supervisors (Diploma level) | 522 | 824 | 1232 | 1782 | 2512 |

Ref. Authors’ calculations.

**Figure 1: Estimated Human Resource Requirement for Dairy Processing in Nepal**




Data presented in the above table shows that requirement of technical officers (having higher level education) and supervisors (having diploma level technical training) is at a ratio of 1:2. And taking the base line data of 2019 (261 technical officers & 522 supervisors) the projected figures for technical officers and supervisors come to 412 & 824 in 2024, 616 & 1232 in 2029, 891 & 1782 in 2034 and 1256 & 2512 numbers in 2039 respectively.

## 7. EMPLOYMENT OF DAIRY GRADUATES:

Higher level and middle level dairy related human resources, produced in Nepal, have been employed in different public, private and cooperatives related organizations. A significant numbers of Diploma holders and Bachelor/Master degree holders have been absorbed in Dairy Development Corporation (DDC).Other employers include National Dairy Development Board (NDDB), Department of Livestock Services (DoLS), DFTQC, private dairy processors and different dairy cooperatives. Some of this manpower has also been engaged in relevant field abroad.However, there is no consolidated date available.

## 8. MAJOR EXISTING POLICIES:

Government of Nepal through its ministries & departments and National Planning Commission (NPC) promulgates different policies from time to time considering existing situations and problems related to the concerned subject matter. Furthermore, there is a system of policy amendment as per the changed context. Policies related to pre-harvest and post-harvest areas of agriculture and livestock sectors is the scope of Ministry of Agriculture and Livestock Development (MoALD) and its departments namely Department of Agriculture (DoA), Department of Livestock & Fisheries (DoLF) and Department of Food Technology and Quality Control (DFTQC). First two departments are responsible for pre-harvest side whereas the last one is responsible for post-harvest and processing.

Major policies developed and implemented by the government that are related directly or indirectly with dairy education sector are: Agriculture Policy 2061; Agri-business Promotion Policy 2063; Agriculture Development Strategy (ADS) 2015 AD; Dairy Development Policy 2064; Code of Practice

for Dairy Industries, 2061 NDDB; Food Safety Policy (proposed); Higher Education Policy 2072; Private Technical Institution Policy 2063; CTEVT Policy 2064 and Foreign Affiliation Directives, 2059.

### 8.1 National Agriculture Policy (NAP) 2061(2004):

Provision made in**Policy Ka 7**of NAP states that "Agricultural and Forestry colleges to involve in extension of agricultural technologies". Similarly, **Policy Ka 15**of the same document has provisions of establishment of Agriculture and Forestry University (AFU), promotion of agricultural and forestry colleges, and exchange programs between university/colleges and agricultural research & resource centres to enhance quality of human resources.

### 8.2 Agri-Business Promotion Policy (ABPP) 2063 (2006):

ABPP policy document in its **Policy 3.12 e**mphasizes on human resource development for promoting agriculture as per market demand. It further illustrates in **Policy 3.13** thattimely revision of curriculum for producing middle level manpower of educational institutes so as to promote agri-businesses.

### 8.3 Dairy Development Policy (DDP) 2064 (2007):

**Policy 4.2 Chha** of DDP**e**mphasize on conducting academic courses and trainings by establishing Dairy Institutes/ Training Centers so as to develop technical human resources required for dairy industries. Similarly, **Policy 4.2 Ja** has provision of efficiency enhancement of both technical and managerial employees involved in dairy sector.

### 8.4 Higher Education Policy (HEP) 2072:

Quality Assurance and Accreditation (QAA) is the central theme of this policy. After the implementation of this policy every academic institutes has to get QAA certificates from the concerned unit of the University Grant's Commission of the government of Nepal.

**Objective 2** of HEP has made a provision for development of competitive and enterprising human resources related to the field of science and technology so as to help in economic development. Similarly **Objective 3** of the HEP has made provision of emphasizing on research in the academic programs.

### 8.5 Agriculture Development Strategy (ADS) 2015:

Government of Nepal has recently come-up with ADS as a succession plan to Agriculture Perspective Plan (1995-2015). This document has been developed in cooperation with most of the development partners of the government working in Nepal.

**DESTEP** – Decentralized Extension, Technology and Education Program – a flagship program has been proposed in the ADS document. Under DESTEPthere is a provision of establishing community agriculture extension service centers (CAESC) at ward level of the then local government units. DESTEP activities focuses on agriculture education system, which includes:support to AFU, creation of department of agribusiness and department of technology dissemination in AFU, capacity building of vocational schools and support to the establishment of regional agricultural colleges.

This way there is a sufficient provision of academic programs in the concerned policy documents. However, translating policies into programs and activities with sufficient funds has been inadequate in Nepal including dairy sector also.

## 9. CONCLUSION / RECOMMENDATION:

Based on the above data and information following conclusions and recommendations can be made:

**Conclusion:**

1. Recent data on safety and quality of milk and milk products show more than half (52.6 %) of samples do not comply with the mandatory standard of the GoN, posing a threat to the sustainable development of dairy sector in Nepal.One of the important reasons of such precarious scenario is inadequate level of availing services of qualified human resources, especially technical human resources in the dairy value chain.
2. At present, higher level dairy technology related manpower produced so far are 132 in numbers whereas estimation shows 261 numbers are needed in the value chain. Furthermore, middle level technicians produced so far are 162 numbers whereas the estimated requirement is 522 numbers for the year 2019. Similarly, projected data show that after 20 years the requirement would be 1256 numbers of higher level and 2512 numbers of middle level manpower so as to serve the increased level of milk production at a rate of 4.4% per annum and 1 % increase in formal sector processing per year.
3. Different policy documents of GoN have sufficiently addressed technical education related matters; however these policies have not been properly translated into programs/activities/budget with timeline of implementation.
4. There is no system of producing data related to number of dairy processing units, number of human resources working in such units, capacity utilization of processing units, etc in Nepal.

**Recommendation:**

1. Universities should give affiliation to the dairy technology colleges to produce 30 graduates per year for the first five year and 40, 55, and 73 graduates per year for the second, third and fourth five years period respectively. Similarly, CTEVT should give affiliation to produce diploma holders at a rate of 60, 80, 110, and 146 per year in the first, second third and fourth five-year periods respectively.
2. DFTQC, the food control agency of the GoN must make a provision of issuing license to dairy processing units by assuring services of technical manpower only. Furthermore, DFTQC should induct diary technologists and technicians in its organization structure sufficiently so as to monitor quality of dairy processing units.
3. GoN should come up with a project to improve safety level of dairy processing establishments by offering merger incentives, grants in capital investment, vocational training to lower level staffs of dairy processing units, etc.

4. NDDB in collaboration with CBS should conduct a nationwide census of dairy sector including production of milk, number of dairy processing units, percentage of formal sector milk processing, etc.

**ACKNOWLEDGEMENTS:**

1. All executives and or academic heads of different food and dairy colleges for providing information through telephone.
2. Officials of NDDB, DDC, DoLS, DFTQC and other government offices for providing information.
3. Officials of DIA, NDA and CDCAN for providing information

**REFERENCES**

**CDCAN (2074)**. Annual Report. Published by Central Dairy Cooperative Association, Nepal Ltd., Central Office, Baneshwor, Kathmandu,Nepal.

**DDC (2074)**. Annual Report for FY 2073/74. Published by Dairy Development Corporation, Lainchaur, Kathmandu, Nepal

**DFTQC (2071).** Annual Bulletin of Department of Food Technology and Quality Control (DFTQC), Babarmahal, Kathmandu, Nepal.

**DFTQC (2072).** Annual Bulletin of Department of Food Technology and Quality Control (DFTQC), Babarmahal, Kathmandu, Nepal.

**DFTQC (2073).** Annual Bulletin of Department of Food Technology and Quality Control (DFTQC), Babarmahal, Kathmandu, Nepal.

**DFTQC (2074).** Annual Bulletin of Department of Food Technology and Quality Control (DFTQC), Babarmahal, Kathmandu, Nepal.

**DFTQC (2075).** Annual Bulletin of Department of Food Technology and Quality Control (DFTQC), Babarmahal, Kathmandu, Nepal.

**DFTQC(2017)**. Food Safety Situation Analysis Report, a research report on Food Safety Situation Analysis of Mid and Far Western Nepal carried out by Research Inputs and Development Actions (RIDA) and funded by Agriculture and Food Security Project (AFSP).

**FAO (2019).** Food Outlook: Biannual Report on Global Food Market. Published by Food and Agriculture Organization of the United Nations, Rome, Italy.

**FAO (n.d.).** The Global Dairy Sector: Facts. Accessed from FAO Website in April 2019.

***Krishi Diary* (2076)**. Agriculture Diary in Nepali language. Published by Agriculture Information and Communication Center, Ministry of Agricultural Development, Harihar Bhawan, Lalitpur.

**MoAD (2017).** Statistical Information on Nepalese Agriculture. Published by then Ministry of Agricultural Development, Singha Durbar, Kathmandu, Nepal.

**NDA (2018)**. Data published by Nepal Dairy Association in December 2018. Information retrieved from https://thehimalayantimes.com/business. in April 2019.

**NDDB (2075a).** Study on Efficiency of Dairy Industries in Nepal. Published by National Dairy Development (RFP No. NDDB/C/RFP/2074/75/02), Lalitpur, Nepal.

**NDDB (2075b).** Dairy Value Chain Study in Nepal. Published by National Dairy Development Board(RFP No NDDB/C/ RFP/2074/75/03), Lalitpur, Nepal.

**Nolker and Shoenfeltd (1980).** Vocational Training. Experd Verlag, Grafenau 1/Wurtt.

**Shakya, D.B. (1988**). Food Industries of Nepal and T.U.: Needed Interactions. Published in the Proceedings of IInd National Seminar on Food Industry and Food Technology (NASOFIFT – II), pp 1-23, Institute of Science and Technology, T.U. Dharan Campus, Nepal.

**Sharma, T. N. (n.d.).** Technical Education and Vocational Training: A brief profile submitted to ESAT, Ministry of Education and Culture, Kesharmahal, Kathmandu, Nepal. ■

# CHAPTER - 4
# GROUP WORK, PLENARY AND CLOSING SESSION

## GROUP WORK AND PLENARY PRESENTATION

The workshop participants were be divided into three groups; Group A: Policies and programme; Group B: Technical human resources; and Group A: Industrial environment.

The groups were advised to base their discussion from the various papers presented by the dairy sector stakeholders, and summarize the existing scenario, issues and constraints, recommendations providing immediate, medium-term and long-term measures in order strengthen the dairy industry to a sustainable and competitive level.

Each group focused their discussions on existing scenario, expectations/requirements for next 20 years, and then derive the gaps to be fulfilled. Thereafter, recommend the plan, programme and interventions to be implemented with timeline, level of investment, and identifying and assigning responsibilities to the implementing unit/department/agency/ministry/board/public sector/private sector etc.

### Guidelines for the group work:

## GROUP A: POLICIES AND PROGRAMME

Step 1: Review existing policies and plans of dairy industry development; status of dairy development policy implementation, issues and constraints etc.;

Step 2: HR Policy requirements for next 20 years, to achieve the NPC targets of dairy sectoral growth;

Step 3: List out the policy gaps; and

Step 4: Recommend the interventions needed to amend the existing policy or needed to develop a new policy or others.

**GROUP B: TECHNICAL HUMAN RESOURCES**

Step 1: Review existing status of technical manpower availability, status of vocational training Centre or facilities producing various level HR resources needed for the dairy sector development such as floor level manpower, middle/supervisory level manpower and higher level/highly skilled manpower; location of facilities in various Pradeshes, quality and quantity of manpower produced, issues and constraints etc.;

Step 2: Various level HR resources requirements for next 20 years, to achieve the NPC targets of dairy sectoral growth; as possibilities to export HR to other needy countries; list out the various level training Centre, CTEVT, colleges and university etc.;

Step 3: List out the technical manpower gaps for various levels such as floor level manpower, middle/ supervisory level manpower and higher level/highly skilled manpower for various Pradesh; and;

Step 4: Recommend the interventions needed to develop and upgrade the existing training centres or colleges in various regions of Pradeshes (provinces), list out the programmes, tentative investment to establish new facilities and upgrade/equip the existing facilities.

**GROUP A: INDUSTRIAL ENVIRONMENT**

Step 1: Review existing status of industrial environment focusing on dairy industries; any specific issues and constraints;

Step 2: What should be the Industrial Environment for next 20 years, to achieve the national targets of dairy sectoral growth;

Step 3: List out the gaps in industrial environment which needs improvement; and

Step 4: Recommend the interventions/plans/programme needed to improve the industrial environment.

**Group presentations:**

The respective group made extension discussion, and the coordinators from each group presented their group findings and suggestions in the plenary session. A brief description of each group presentation is summarized here below;

**GROUP A: POLICY AND PROGRAM**

Altogether 15 participants contributed in this group which included Mr. Tek B. Thapa (Moderator), Dr. Balak Chaudhary (Team Leader), Mr. PurnachandraWasti, Dr. Huma Bokkhim, Mr. Mohan K. Maharjan, Mr. Krishna P. Rai, Mr. Raj K. Rijal, Dr.Hasana Maiya Shrestha, Mr. Atmaram Satyal, Mr. Sachit K. Waiba, Mr. Ajaya Pokharel, Mr. Pravin Ojha, Mr. Ghanshyam Bhattarai, Ms. Suvha Shree Sharma and Ms. Shushma Bhaila. The group made a fruitful discussion on reviews of existing policies, policy gaps and requirements for next 20 years. On behalf of the group, Mr. Krishna Prasad Rai presented summary of findings and suggestions as below;

1. There is lacking of short term and long-term policies for human resource development required for the dairy sector. As well, implementation of the provisions made in policies related to the dairy sector seems to be very poor.

2. There is a need of amendment or up-gradation of ongoing academic program's course syllabus as well as development and implementation of a training course for floor level technicians required by the dairy processing units.
3. Poorer participation of stakeholders while updating or formulating policies and plans by concerned authorities of the government.
4. For regulating food safety in dairy products, manpower having academic qualification of dairy technology/food technology, dairy microbiology, food biotechnology, dairy engineering, dairy/ food chemistry, etc. are essential. These qualifications must be recognized byPublic Service Commission for the post of dairy and food safety officer.
5. NDDB/MoALD should come up with a periodic refresher training program with a suitable course to enhance capacity of all dairy technologists/technicians working in dairy processing units of public and private establishments on cost sharing basis.
6. So as to enhance the efficiency of human resource produced, colleges and training institutions should be fully equipped with proper laboratory, pilot plant, and other basic required facilities.
7. GoN should come-up with a medium-term project to enhance quality and safety of dairy products being produced in Nepal so as to develop sustainable and competitive dairy sector.
8. It is strongly recommended to establish a National Food Council of Nepal.

**GROUP B: TECHNICAL HUMAN RESOURCE**

Group B, assigned with assessment of technical human resource requirement and suggestions to be made for its improvement, comprised of 23 participants which included Uttam P. Bhattarai (Moderator), Prof. Tika B. Karki, Phalendra Bista, Samir Siwakoti, Deepak Subedi, Chakravarty Poudel, Krishna Pd. Aryal, Prof. Bhesh Bhandari, Sankar Adhikari, Alok Shrestha, Sanjeev Kumar Karn, Ram Shovit Yadav, Sabin Bdr. Khatri, Ajab Lal Yadav, Sandeep Raj Pradhan, Giri Dhar Bajracharya, Rajendra Gopal Shrestha, Tika Prasad Ghimire, Ramesh Sanjel, Niranjan Tinalsina, Rajesh D.C., Kishor Singh, Niranjan Koirala and Rajeev Khanal. On behalf of the group participants, Mr. Chakrabarti Paudel, as the coordinator presented a summary report of the group work, highlighting the followings:

1. Information on overall dairy production and processing in the country is not up-to-date and reliable. Thus, it is recommended to conduct a detailed dairy sector study covering complete dairy value chain (farm to fork) in close collaboration Central Bureau of Statistics and NDDB.
2. It is suggested to categorize dairy sector human resource into four levels viz Level 1, 2, 3 and 4. Level 1 and 2 should get minimum of 3 months and 1-year duration trainings respectively whereas level 3 and 4 should obtain Diploma and Bachelor's level academic degree respectively.
3. Assessment of manpower trained/ produced by government agencies, academic institutions, vocational training institutions and NGOS/ INGOs needs to documented.

**GROUP C: INDUSTRIAL ENVIRONMENT**

There were 32 participants in this group which included Prof. Jagat B. KC ((Moderator), Nawaraj Upadhyaya, Rajendra Adhikari, Govind Raj Joshi, Alisha Ulak, Damodar Dhakal, Umesh Poudyal, Rabindra K.C., Madhab Pd. Ojha, Umesh Ghimire, Hom Kumar Shrestha, Rabi. P. Rijal, Kula Prasad Ghimire, Ram

Bhakta Danal, Nischala K.C., Kalpana Khanal, Krishna Pd. Bastola, ArnikoRajbhandary, Anisha Poudel, Munna Yadav, Bhupendra Gautam, Anish Bastola, Raj Lamichanne, ShauravDhakal, Diwash Basnet, Shaurab Jha, Sudarshan Gautam, Rajan Prasad Dhamala, Krishna Prasad Dhakal, Badri P. Dhakal, Man Bahadur Shrestha and Rajani Sapkota.On behalf of group, Mr. Rajendra Prasad Adhikari as coordinator presented a summary report of group discussion on industrial environment, as below;

1. Dairy industries are being registered with local government or district industry office or division cooperatives or company registrar's office. Therefore, it is suggested to make uniformity in registration and their regulation.
2. To manage the challenges of cottage and rural scale as well as small scale dairy industries with respect to safety and quality of products, there is a need of merging such establishments and enhancing their technical strengths. Government should come-up with special project to solve this problem.
3. There is a need of amending DairyDevelopment Policy 2064.
4. Insufficient level of services of qualified dairy technologists and middle level technicians in dairy processing units.
5. Retention of human resource within the country is very weak, so incentive mechanism would be helpful to retain them.
6. Like dairy technologist; dairy engineers and dairy managers should also be developed.
7. Special program should be launched to promote yak farming.
8. Cottage and rural scale dairy industries do not invest in laboratory due to their poor investment capacity and so government should consider on it seriously.
9. Wastes treatment plant should be improved or established in each dairy processing industry to protect environment.
10. Need strengthening of National Dairy Development Board in terms of human and financial resources.

**COMMENTS AND SUGGESTIONS FROM THE FLOOR:**

After the presentation made by all groups, the floor was opened for discussion. Following participants took part in the discussion:

Mr Uttam K Bhattarai suggested categorizing dairy industries according to the provisioned made in the prevailing Industrial Enterprises Act of Nepal.

Mr. Rajendra Gopal Shrestha suggested qualified manpower should be hired in dairy equipment manufacturing industry also.

Professor Dr. Bhesh Bhandari suggested the need of establishing a Dairy Research Institute in Nepal.

Mr. Arniko Rajbhandari suggested that unskilled manpower, working in the existing dairy processing units, should get a mandatory minimum two-week training basically covering food hygiene, occupational health, safety and hygienic milk handling.

Mr. Ajab Lal Yadav raised the issue of ineffective coordination between stakeholders such as NDDB, DDC,DIA, NDA, CDCAN, DFTQC, GON, CBS, etc. resulting in poor/weak implementation of the policy and programs. He further suggested establishing Food/Dairy Section within the Ministry of agriculture and livestock development (MoALD) for carrying out all dairy related activities within the country.

## CLOSING SESSION:

Closing session of the "One day Workshop on Availability and Requirement of Dairy science and Technology Related Human Resource in Nepal"started after chairing of the session by Professor Jagat Bahadur K.C., Chairperson of the Organizing Committee. Mr. Man B Shrestha was the master of ceremony (MC) in this very important session. Special Guests of the session were Professor Toran Bahadur Karki, former Vice-Chancellor of Purbanchal University, Dr.Shubha Narayan Pathak, Dean of Science and Technology Faculty, PU, and Dr. Banshi Sharma, Director General of Department of Livestock Services. At the outset special guests and other dignitaries on the dais were honored by students of College of applied Food and Dairy Technology by offering workshop badge and flower bouquets. Then the session commenced with presentation of the group works followed by the closing remarks by the dignitaries. Special guests invited for the closing session addressed the workshop and expressed their views and commitments, which is summarized below:

**Dr. Banshi Sharma, Director General, Department of Livestock Services:**

*Dr Sharma emphasized on establishing calf rearing centre in villages, introducing improved breed of buffalo for high productivity and protecting environment while enhancing milk production. He further suggested upgrading dairy related course syllabus being taught in different academic institutions. Dr. Sharma also opined to regulate import of dairy equipment for the sustainability of dairy business. He requested NDDB to take initiation to establish a Dairy Research Institute in Nepal. Lastly Dr. Sharma thanked organizers for inviting him and made his commitments to initiate the implementations of relevant suggestions made by the workshop.*

**Professor Dr. Shubha Narayan Pathak, Dean, Science and Technology Faculty, Purbanchal University:**

*Prof. Pathak thanked organizers for providing him opportunity to address the closing ceremony of the workshop and shared the move being taken by the PU to increase duration of in-plant training to at least 3 to 4 months for technical bachelor level courses, including B. Tech. Dairy Technology. He also insisted CAFODAT college to run short term training course and expressed his opinion to support on quality research proposals. Finally, Prof. Pathak committed to implement workshop recommendations related to the university.*

**Professor Toran Bahadur Karki, former VC, Purbanchal University:**

*Prof. Karki highlighted on different facets of education specially focusing on the use of education for enhancing the quality of life. He further emphasized on involving students in different extra-curricular activities so that they could develop themselves as future leaders to handle situations independently. Lastly, Prof. Karki thanked organizers for providing him the opportunity to share views.*

**Mr. Babu Kaji Pant, Officiating ED, National Dairy Development Board:**

*Mr. Pant, as an organizing committee member, presented vote of thanks to Hon. Minister Mr. Chakra Pani Khanal "Baldev" for his gracious presence in the Inaugural Session as the Chief Guest. Similarly, he also expressed his sincere gratitude to Prof Dr. Ghanashyam Lal Das, (VC, PU), Dr. YubakDhoj G.C. (Agriculture Secretary), Prof. Dr. Bhesh Bhandari (University of Queensland, Australia), Prof. Dr. Subha Narayan Mahato (Dean, S & T, PU), Prof. Toran Bahadur Karki (Former VC, PU), Dr. Banshi Sharma (Director General, DoLS), other guests, media persons, participants, students, workshop organisers and all others who contributed in one or other way to make the Workshop a grand success.*

*He also highlighted on different activities being carried out by NDDB to strengthen the dairy sector.*

**Closing remarks by the Chairperson Prof. Jagat Bahadur K.C.:**

*Prof K.C., chairperson of the session and Chair-workshop organizing committee, offered token of love to the distinguished special guests, guests and contributor for their valuable time, contribution and enriching the value of the program. The distinguished personnel who received token of love were special guest professor Toran Bahadur Karki, Professor Dr. Subha Narayan Pathak, Dr.Banshi Sharma, Mr. Babu Kaji Pant, Mr. Tek Bahadur Thapa, Mr. Purna Chandra Wasti, Mr. Man Bahadur Shrestha, Mr. Nawaraj Upadhaya, Mr. Rajesh D.C., Mr. Niranjan Timilsina, Mr. Krishna Prasad Rai, Mr. Damodar Dhakal and Mr. Raj Kumar Rijal.*

*Thereafter, Prof. K.C. thanked all who made significant contribution to organize the event. He also highlighted on the ways to improve the quality of manpower being produced in dairy sector in Nepal. Furthermore, Prof K.C. expressed his views to make arrangement of carrying out this type of workshop on a regular basis so that activities carried out in dairy sector could be reviewed and improved and make creative suggestion for way forward. He also expressed opinion on the need to amend/up-grade course syllables of food and dairy technology on a regular basis to include new innovations and technologies.*

*Finally, Prof. K.C. declared the workshop closed.* ■

# CHAPTER-5
# FINDINGS AND RECOMMENDATIONS

Findings and recommendations have been summed up based on the information, facts and figures presented by the resource persons; findings and presentation of group work; and views expressed by the experts and dignitaries during the inaugural sessions and closing sessions. Findings and recommendations are summarised here below for follow up actions and implementations by the relevant ministries, departments, universities and related bodies and agencies.

**FINDINGS:**

- Dairy sector demands a significant number of technical/skilled human resources to produce safe and quality dairy products and diversify them for import substitution.
- Basically, three level of manpower namely floor level dairy technicians, supervisory diploma level dairy technologists (JT level) and highly skilled technologists (technical officers' level) are required for operating and managing the dairy value chain in the country.
- Twenty-year projection shows formal sector milk processing will increase from 17 % to 37 % in the 20$^{th}$ year (2039) from the base year 2019. In the base year, 261 dairy technologists/technical officers are required which will increase to 1256 at the end of 20-year dairy human resource plan period. Similarly, the need of diploma or supervisory level dairy technologists and technicians increases from 522 to 2512, in order to diversify and develop a competitive dairy processing in Nepal. This projection is based on the average (2011/12 – 2017/18) annual growth rate of 4.4 % in milk production (Bhattarai et el, 2019)
- So far, there is no provision of short-term training programmes in the country to develop floor level dairy technicians.
- Many constituent colleges of reputed universities are offering graduate and post-graduate program in Animal sciences and veterinary sciences which are equipped with facilities. However, there is single college offering graduate programme in dairy technology i.e. CAFODAT college; and few CTEVT affiliated training institutes offering diploma program in food and dairy technology

established under private ownership. These facilities are not sufficiently equipped and needs support to strengthen labs/pilot training dairy plant.

- There are very limited fellowships to encourage the students to enroll and participate in dairy science and technology related trainings, diploma and graduate programmes through fellowships from the government institutions like NDDB, MoALD, DDC, Provincial government to study within the existing institutes of Nepal. As well, there are possibilities to request for bilateral and multilateral fellowships to supplement the much-needed manpower for dairy industry development.
- Private and cooperative run dairy processing plants have least appointed technical human resources sufficiently. DDC has also not maintained the 1:2 ratio of higher-level technologist to middle level diploma holders in their processing units. So, there is a significant gap between requirement and availability.
- Most of the dairy processing units across the country are either cottage level or small-scale units. Thus, due to low level of investment capacity they cannot afford salary to the qualified middle and higher level technical human resources. Furthermore, financially capable enterprises are also reluctant to avail services of technical manpower so as to make more profit.
- DFTQC, a food control agency of Nepal, has not made mandatory provision of availing services of technical manpower so as to maintain safety and quality of dairy products while issuing license to such units. So, dairy products produced by such units cannot compete with the similar products produced by other countries resulting in poor level of import substitution.
- Dairy colleges do not have standard pilot plant facilities so as to provide practical hands-on knowledge in the industrial environment. Thus, the quality of products produced is not up to the standard.
- GoN has not sufficiently inducted dairy technologist/technicians in the civil service, board, corporation etc.
- Investment on R&D of GoN is very poor in the dairy and food sector.
- Nepalese dairy graduates/technologists are not getting easy entry, as dairy development officer, dairy/food research officer in the organizations like department of livestock services, NDDB, DDC, DFTQC and ministry of agriculture and livestock development.
- Exclusive National Dairy Research Institute is yet to be established, despite the dairy sector has a significant contribution of 9 % in the national GDP.

**RECOMMENDATION:**

- Academic institutions should continue the academic programs in Bachelors and Master's Degree in Dairy & Food Technology. Universities should grant affiliations to the dairy technology colleges to produce at least 60 graduates per year for the first five year and then subsequently to meet the targets in the second, third and fourth five-year dairy plan period till 2039. CAFODAT should regularize the graduate programme in dairy technology to meet the national needs and targets. Similarly, CTEVT should limit affiliations to make 1:2 ratio of graduates to diploma level dairy technologists and technicians (120 diploma per year) to meet the national human resource need for the projected 20-year dairy plan period.

- Basically, three level of manpower namely floor level dairy technicians, supervisory diploma level or middle level technicians/dairy technologists (JT level) are needed, and to be produced by the CTEVT approved dairy training Institutions; and highly skilled technologists (technical officers' level) are to be produced by the dairy colleges affiliated to the universities. These human resources are required for operating and managing the dairy value chain in the country.
- CTEVT affiliated training institutes are needed to be established with the financial support of GoN, to help enhance the technical capability of existing and upcoming dairy processing units in the coming years.
- Special training packages of one to three months duration should be run by the Dairy Training Centre (DTC) located in the Pradeshes (provinces), thus local level trainees from the milkshed areas can easily benefit.
- Dairy colleges and dairy training institutions must have dairy processing plant attached for practical hands-on learning. It is worth taking lessons from Vidya dairy Anand or Model Dairy Karnal model wherein dairy technology graduate students undergo 12 months hands-on practical learning on 12 modules which includes milk processing, CIP and automation, milk packaging, cheese and paneer, ice-cream, ghee and fermented milks, quality assurance, engineering services and plant maintenance, commercial functions (purchase, stores, accounts), marketing and dispatch, MIS, SAP (systems application and products) and house-keeping. These types of manpower are ready to operate and manage a commercial dairy immediately upon their graduation. Thus, government should provide financial support to establish pilot dairy processing facility for specific and specialized campuses offering dairy technology programmes.
- Government should establish National Dairy Research Institute, for promoting and strengthening dairy research and development (R&D) in the country. NDDB should initiate the process of its establishment in consultation with relevant dairy value chain stakeholders.
- Till date, dairy technology courses are not lucrative comparing medical, engineering and other courses. Thus, enrollment is poor. Thus, fellowships should be provided to attract the students enrolling in the dairy science and technology related diploma and graduate programmes. Government institutions like NDDB, MoALD, DDC, Provincial (Pradesh) government should provide fellowships to study within the existing institutes of Nepal. As well government should request for bilateral and multi-lateral government fellowships to supplement the much-needed manpower for dairy industry development.
- Government of Nepal should come up with action plan with budget and time line based on the provisions made in the Dairy Development Policy (2064 BS); and Dairy Development Strategy (2071-2091 BS) and 10-Years Dairy Development Plan (2075- 2084 BS).
- Entry of dairy technologists must be assured in the positions like dairy development officer, dairy/ food research officer, technical officers in the department of livestock services, NDDB, DDC, DFTQC and ministry of agriculture and livestock development and so on.
- HR working in Dairy value chain should be trained and refreshed through short term course after conducting Training Need Assessment (TNA) in a regular interval of time to upgrade and update their technical knowledge on current trends and new technologies.

- Government should provide funding support to R&D activities to improve the quality and promote domestic products against imported products, and introduce tax incentives for R&D investments. R&D can help to improve the product and expand the market to internal and external markets. The models to be learnt from the developed nations/experts working in the area.
- Research institutions and university should carry out R&D in a sustainable way. Involvement of the students will reduce the cost; develop new products, improve current products & packaging. Reverse engineering is one of ways of improving products through duplication, copying and improving. For R&D, the commitment from the industry & government is very necessary.
- NDDB in collaboration with CBS should conduct a comprehensive nationwide dairy sector study to provide a mirror view of dairy sector. The study should include milk production, dairy cooperative, dairy processing industries and cheese units, real share of formal and informal sector handling, household consumption, indigenous products, export share of dairy trade, interventions and way forward needed to develop a competitive dairy business.
- GoN should come up with a project to improve safety level of dairy processing establishments by offering merger incentives, grants in capital investment, vocational training to floor level staffs of dairy processing plants etc.
- DFTQC, the Food control agency of the GoN must make a provision of issuing license to dairy processing units after by making sure of required services of technical manpower. Furthermore, DFTQC must induct enough number of dairy technologists and technicians in its organization structure, to be able to monitor safety and quality of dairy processing facilities across the country.
- Hygienic practices should be implemented to meet the food safety standards. Hence Farming: Good veterinary practices (GVP) & Manufacturing: Good Manufacturing Practices (GMP), Hazard Analysis and Critical Control Points (HACCP), Good Hygienic Practices (GHP) should be introduced. For medium and large-scale scale processing units, mandatory HACCP certifications must be provisioned. The existing manpower working at DFTQC is inadequate to enforce food regulation effectively. The competencies of manpower should be updated by providing frequent trainings. The laboratory at DFTQC has been accredited in accordance with ISO/IEC 17025. Other food laboratories under DFTQC also need to be strengthened and accredited. ■

# WORKSHOP PHOTO GALLERY

# Glimpses of Inauregural Session


Chief Guest Hon. Minister Chakra Pani Khanal, Chairperson Prof. JB KC & Dignitaries


Prof. Bhesh Bhandari delivering keynote address

Glimpses of Participants in Attendance

Participants


Chairperson Prof. KC offering Token of Love

Chief Guest & Dignitaries observing dairy products display from Australia

Chief Guest with Prof. Bhandari.

Chief Guest Hon. Minister Chakra Pani Khanal delivering inaugural address

# Technical Session in Progress


NDSA chairman Tek B. Thapa chairing the Technical Session


Adjunct Prof. Uttam K. Bhattarai presenting CAFODAT Paper

DDG Dr. Matina Joshi with Participants

Mr. Arniko Rajbhandari presenting DIA Paper

Prof. Tika B. Karki making comments on papers presented.

Mr. Ajab Lal Yadav making comments

Comments from CTEVT


Session Chair Mr. Thapa offering momento to BK Pant ED, NDDB


Resource persons receiving Token of Love from session chairman Mr. Tek B. Thapa.

# Brain Storming in Groups

Group work in progress

Group presentation by Chakrabarti Poudel

Group work in progress


Group work in progress

# Closing Session


Prof. Jagat B. KC chairing the plenary & closing session.

Prof. Bhandari making comments

NDSA Advisor Mr. Rajendra Gopal Shrestha commenting


Prof Dr. Shubh Narayan Pathak, - Dean, S & T Faculty receving momento from Prof. KC


Mr. Krishna P. Rai, DEFTQC receving momento from Prof. KC


Mr. Damodar Dhakal, DDC receving momento from Prof. KC

Prof. Jagat B. KC delivering closing address


Group Photos after the Closing session

# Refreshments/Interactions

Refreshments

NDSA Advisor Mr. Krishna Gopal Shrestha interacting with Prof. Bhandari

Dignitaries having refresments

Refresments and sharing light moments with colleagues

# ANNEXES

**ANNEX-1 A**

**Program Schedule for Inaugural Session of**

**One Day Workshop**

**On**

**Availability and Requirement of Dairy Science and Technology Related Human Resources in Nepal**

**Venue**: Hotel Himalaya, Kopundole, Lalitpur **Date:** 2076/2/28 (11th June, 2019)

**Master of Ceremony (MC):** Mr. Purna Chandra Wosti **Time:** 8.00 AM (Sharp)

Rapporteur: Mr. Kishor K.C. & Mr. Niranjan Timilsina

**Inaugural Session: 8.00 AM-9.40 AM**

| S.N | Time | Activity | Responsibility |
|---|---|---|---|
| 1. | 7:00-7.45 | Registration and Breakfast | Volunteers and participants |
| 2. | 7.45-8:00 | Arrival of Guest and Taking seats | MC |
| 3. | 8:00-8:05 | Chairing | **Prof. Jagat Bahadur K.C.**, Chairperson, Organizing Committee, Former Vice-Chancellor, PU & Principal, CAFODAT |
| 4. | 8:05-8:10 | **Invitation of Dignitaries on Dais**<br>- Hon. Minister, Mr. Chakra Pani Khanal 'Baldev' MoALD – Chief Guest<br>- Prof. Dr. Ghanashyam Lal Das,V.C, P.U, Special Guest.<br>- Dr. Yubak Dhoj G. C., Secretary (Agriculture), MoALD, Special Guest<br>- Prof. Dr. Bhesh Bhandari, University of Queensland, Australia, Guest<br>- Mr. Sanjeev Kumar Karn DG, DFTQC, Guest | MC and Distinguished guests |
| 5. | 8:10-8:15 | Welcome address and Objectives of the Conference | **Mr. Uttam K. Bhattarai**, Member Secretary, Organizing Committee and Former Secretary, GoN |
| 6. | 8:15-8:20 | Inauguration- by reading the content of Workshop Banner. | Chief Guest, **Hon. Mr. Chakra Pani Khanal "Baldev",** Ministry of Agriculture and Livestock Development |
| 7. | 8:20-8:25 | National Anthem | All |
| 8. | 8:25-8:50 | Paper presentation on **"Needs of Skill and Innovation through R & D for the Dairy Industry Growth".** | **Prof. Dr. Bhesh Bhandari,** Professor of Food Process Engineering and Technology, The University of Queensland, Australia |
| 9. | 8:50-8:55 | Remarks / Few Words | Dr. Yubak Dhoj G. C., Agriculture Secretary, MoALD, Special Guest |
| 10. | 8:55-9:05 | Remarks / Few Words | Prof. Dr. Ghanashyam Lal Das, Special Guest, V.C, Purbanchal University |
| 11. | 9:05- 9:20 | Inaugural Remarks | **Mr. Chakra Pani Khanal 'Baldev'**<br>Hon. Minister for Agriculture and Livestock Development |
| 12. | 9:20-9:30 | Vote of Thanks | **Mr. Sanjeev K. Karn**, DG, DFTQC |
| 13. | 9:30-9:40 | Chairman's Remarks | **Prof. Jagat Bahadur K.C.**, Chairperson, Organizing Committee & Former VC, PU |

**ANNEX-1 B**

**Program Schedule for One Day Workshop On**

**Availability and Requirement of Dairy Science and Technology Related Human Resources in Nepal**

**Venue:** Hotel Himalaya, Lalitpur **Date:** 2076/2/28 (11th June, 2019)

**II. Technical Session:** **10.30 – 13.00 Hrs.**

**Chairperson** – Mr. Tek Bahadur Thapa, Chairman, NDSA

**Rapporteurs:** Mr. Krishna Prasad Rai and Mr. DamodarDhakal

1. **Paper Presentations**: 10.30 – 12.30Hrs (15 minutes for each presentation)

   a) National Dairy Development Board (NDDB) – Government Policies and Programs in developing dairy sub-sector focusing on Human Resources with respect to processing and marketing by Mr. BabuKaji Pant.

   b) Department of Food Technology and Quality Control (DFTQC) / GoN – Regulatory System of Dairy Businesses in Nepal – Challenges and Way Forward, by Mr. Sanjeev Kumar Karn

   c) Nepal Dairy Association (NDA): Technical Human resources in Milk Processing Industries by Radhakrishna Sapkota

   d) Dairy Industry Association-Nepal (DIA) – Current Status, Requirement and Availability of Technical Human Resources in Dairy Industries by Mr. ArnikoRajbhandary.

   e) Nepal Dairy Science Association (NDSA) – HRD for Nepalese Dairy Sector: Current Status, Issues and Way Forward by Mr. R.T. Chaudhary.

   f) Dairy Development Corporation (DDC) - DDC Perspective: Technical Manpower Constraints and Way Forward by Mr. Govinda Raj Joshi.

   g) CAFODAT – Availability of Technical Manpower and Academic Courses in Food and Dairy Technology in Nepal by Mr. Uttam K Bhattarai.

2. **Q/A Session** – 12.30 – 12.50 Hrs

3. **Chairperson's remarks** and closing of the technical session. 12.50 AM – 13.00 Hrs

Lunch Break: 13.00 – 14.00 Hrs

**Program Schedule for One Day WorkshopOn**

**Availability and Requirement of Dairy Science and Technology Related Human Resources in Nepal**

**Venue**: Hotel Himalaya, Lalitpur **Date:** 2076/2/28 (11th June, 2019)

**III. Group work:** **14.00 – 16.30Hrs**

1. After the paper presentation session, there will be another session for **Group Work** so as to make recommendation as outcomes of the Workshop.

**2. Facilitators**: Mr. Uttam K Bhattarai

Mr. Tek Bahadur Thapa,

Mr. Nawaraj Upadhyaya

3. Following groups will be formed:

Group A - Policies and Programs;

Group B - Technical Human Resources;

Group C - Industrial Environment.

4. Within each group, deliberation will be made focusing on the following:

Existing situation,

Requirements for another 20 years,

Gap analysis, and

Recommendation i.e. Strategies and Programs to fulfill the gaps.

**Refreshment:** **16.30 – 16.45 Hrs**

## ANNEX 1 C

### Program Schedule for Closing Session of
### One Day WorkshopOn
### Availability and Requirement of Dairy Science and Technology Related Human Resources in Nepal

**Venue**: Hotel Himalaya, Kopundole, Lalitpur **Date:** 2076/2/28 (11th June, 2019)

**Master of Ceremony (MC):** Mr. Man Bahadur Shrestha **Time:**16.50 Hrs

**Rapporteurs:** Mr. Raj Kumar Rijal and Mr. Rajesh D.C.

**Closing Session: 16.50 - 17.30Hrs**

| S.N | Time | Activity | Responsibility |
|---|---|---|---|
| 1. | 16:50-16:55 | Arrival of Guests and Taking seats | MC |
| 2. | 16:55-17:00 | Chairing | **Prof. Jagat Bahadur KC,**Chairperson, Organizing Committee, |
| 3. | 17:00-17:05 | **Invitation of Dignitaries on Dais**<br>- Prof. Toran B. Karki, Former V.C. P.U., Special Guest<br>- Prof Dr. Shubh Narayan Pathak, - Dean, S & T Faculty, P.U.- Special guest<br>- Mr. BabuKaji Pant, ED, NDDB<br>- Dr. Banshi Sharma, DG, DoLS– Guest | MC and Distinguished guests |
| 4. | 17:05-17:35 | Presentation of the group work by team representatives:<br>Group A: Mr. Krishna P Rai<br>Group B: Mr. Chakrabarti Poudel<br>Group C: Mr. Rajendra P Adhikari | MC and Group Chairpersons |
| 5. | 17:35-17:50 | Suggestions from the floor. | MC, Group Chairpersons and Participants |
| 6. | 17:50-17:55 | Remarks / Few Words | Dr. Banshi Sharma, DG, DoLS– Guest |
| 7. | 17:55- 18:00 | Remarks / Few Words | Prof Dr. Shubh Narayan Pathak, - Dean, S & T Faculty, P.U.- Special guest |
| 8. | 18:00- 18:05 | Remarks / Few Words | Prof. Toran B. Karki, Former V.C. P.U., Special Guest |
| 9. | 18:05- 18:10 | Vote of Thanks | Mr. BabuKaji Pant, ED, NDDB |
| 10. | 18:10- 18:20 | Chairman's Remarks and closing of the Workshop. | **Prof. Jagat Bahadur K.C.**, Chairperson, Organizing Committee & Former VC, PU |

## ANNEX-2

## Workshop On

## Availability and Requirement of Dairy Science and Technology Related Human Resources in Nepal

**28th Jestha, 2076 (11th June 2019)**

Kathmandu, Nepal

### List of Participants

| S.N | Name | Designation | Organization |
|---|---|---|---|
| 1 | Hon. Chakra PaniKhanal, "Baldev" | Minister | Ministry of Agriculture and Livestock Development |
| 2 | Mr. Rabindra Subedi | Sr Agri Extension officer | Ministry of Agriculture and Livestock Development |
| 3 | Dr. Ghanashyam Lal Das | Vice Chancellor | Purwanchal University |
| 4 | Dr. YubakDhoj G.C | Secretary | Minister of Agriculture and Livestock Development |
| 5 | Mr. Binay | | Ministry of Agriculture and Livestock Development |
| 6 | Prof. Dr. Bhesh Bhandari | Professor | University of Queensland, Australia |
| 7 | Mr. Damodar Dhakal | Technical officer | Dairy Development Corporation |
| 8 | Mr. Rajiv Khanal | Technical officer | Dairy Development Corporation |
| 9 | Mr. Arjun Thapa | Program Officer | FAO, Pulchowk, Nepal |
| 10 | Dr. Tika Bahadur Karki | Professor | Kathmandu University |
| 11 | Prof. Jagat Bahadur K.C | Principal/Chairman | College of Applied Food and Dairy Technology CAFODAT) |
| 12 | Mr. Uttam K Bhattarai | Adjunct Professor | College of Applied Food and Dairy Technology CAFODAT) |
| 13 | Mr. Bhakta Prahlad Pandey | Board Chairman | College of Applied Food and Dairy Technology CAFODAT) |
| 14 | Mr. Sunil Chalise | Director | College of Applied Food and Dairy Technology CAFODAT) |
| 15 | Dr. Kalpana Tiwari | Research and Planning | College of Applied Food and Dairy Technology CAFODAT) |
| 16 | Mr. Man Bahadur Shrestha | Coordinator | College of Applied Food and Dairy Technology CAFODAT) |
| 17 | Ms. Sneha Shrestha | Faculty | College of Applied Food and Dairy Technology CAFODAT) |
| 18 | Mr. Rojan Chalise | Supporting staff | College of Applied Food and Dairy Technology CAFODAT) |
| 19 | Ms. Rajani Sapkota | Student | College of Applied Food and Dairy Technology CAFODAT) |
| 20 | Ms. Kalpana Khanal | Student | College of Applied Food and Dairy Technology CAFODAT) |
| 21 | Mr. Sanjeev Kumar Karn | Director General | Department of Food Technology & Quality Control (DFTQC) |
| 22 | Dr. Matina Joshi Vaidya | Deputy Director General | Department of Food Technology & Quality Control (DFTQC) |
| 23 | Mr. Upendra Raya Yadav | Deputy Director General | Department of Food Technology & Quality Control (DFTQC) |
| 24 | Mr. Purna Chandra Wosti | Sr. Food Research Officer | Department of Food Technology & Quality Control (DFTQC) |
| 25 | Mr. Mohan Krishna Maharjan | Sr. Food Research Officer | Department of Food Technology & Quality Control (DFTQC) |
| 26 | Dr. Huma Bokkhim | Sr. Food Research Officer | Department of Food Technology & Quality Control (DFTQC) |
| 27 | Mr. Rupendra Rawal | Food Research Officer | Department of Food Technology & Quality Control (DFTQC) |

| S.N | Name | Designation | Organization |
|---|---|---|---|
| 28 | Mr. Raj Kumar Rijal | Sr. Food Research Officer | Department of Food Technology & Quality Control (DFTQC) |
| 29 | Mr. Atmaram Satyal, | Under Secretary | Department of Food Technology & Quality Control (DFTQC) |
| 30 | Mr. Sachit Kumar Waiba | District Advocate | Department of Food Technology & Quality Control (DFTQC) |
| 31 | Mr. Krishna Prasad Rai | Sr. Food Research Officer | Department of Food Technology & Quality Control (DFTQC) |
| 32 | Mr. Nawaraj Upadhyaya | Chairman | Nepal Food Scientists & Technologists Association (NEFOSTA) |
| 33 | Dr. Alok Shrestha | Secretary | NEFOSTA |
| 34 | Ms. Anisha Poudel | Office Secretary | NEFOSTA |
| 35 | Dr. Ram Chandra Acharya | Dairy training | National Livestock Breeding Office, Pokhara |
| 36 | Dr. Saroj Chaudhari | Dairy training | National Livestock Breeding Office, Pokhara |
| 37 | Mr. Tek Bahadur Thapa | Chairman | Nepal Dairy Science Association |
| 38 | Mr. Tapeshwor Chaudhary | Vice-chairman | Nepal Dairy Science Association |
| 39 | Mr. NirajanTimilsina | Treasurer | Nepal Dairy Science Association |
| 40 | Mr. Kishor Singh | Member | Nepal Dairy Science Association |
| 41 | Mr. Ajab Lal Yadav | NDSA advisor | Nepal Dairy Science Association |
| 42 | Mr. Giri Dhar Bajracharya | General-secretary | Nepal Dairy Science Association |
| 43 | Mr. Sandeep Raj Pradhan | Life member | Nepal Dairy Science Association |
| 44 | Rajendra Gopal Shrestha | Resource person | Nepal Dairy Science Association |
| 45 | Mr. Madhav Prasad Ojha | Life member | Nepal Dairy Science Association |
| 46 | Mr. Shailendra Ghimire | Officiating GM | Dairy Development Corporation |
| 47 | Mr. Krishna Prasad Aryal | Technical officer | Dairy Development Corporation |
| 48 | Mr. Govinda Raj Joshi | Technical officer | Dairy Development Corporation |
| 49 | Mr. Rajendra Adhikari | Sr. Technical Officer | Dairy Development Corporation |
| 50 | Mr. Chakabarty Poudel | Dairy Technologist | Dairy Development Corporation |
| 51 | Ms. Alisha Ulak | | Dairy Development Corporation |
| 52 | Mr. Dipak Subedi | | Dairy Development Corporation |
| 53 | Mr. Babu Kaji Pant | Officiating ED | National Dairy Development Board |
| 54 | Mr. Rajesh D.C. | Research officer | National Dairy Development Board |
| 55 | Mr. Ajay Pokhrel | | National Dairy Development Board |
| 56 | Mr. Shankar Adhikari | Officer | National Dairy Development Board |
| 57 | Dr. Hasana Maiya Shrestha | Director | National Dairy Development Board |
| 58 | Dr. Balak Chaudhary | Director | National Dairy Development Board |
| 59 | Mr. Arniko Rajbhandhari | Chairman | Dairy Industry Association/Nepal |
| 60 | Mr. Pradeep Maharjan | | Dairy Industry Association/Nepal |
| 61 | Mr. Rabi Prasad Rijal | | Dairy Industry Association/Nepal |
| 62 | Mr. Krishna Prasad Bastola | Office Manager | Dairy Industry Association/Nepal |
| 63 | Mr. Kula Prasad Ghimire | | Dairy Industry Association/Nepal |
| 64 | Mr. Prabin Ojha | Scientist | National Agricultural Research Council |
| 65 | Mr. Radhakrishna Sapkota | Chairman | Nepal Dairy Association |
| 66 | Mr. Tika Prasad Ghimire | | Nepal Dairy Association |
| 67 | Mr. Ramesh Sanjel | | Nepal Dairy Association |
| 68 | Mr. Rabindra K.C. | | Nepal Dairy Association |
| 69 | Mr. Dip Prasad Dhamala | | Nepal Dairy Association |
| 70 | Mr. Ram Bhakta Dahal | | Nepal Dairy Association |
| 71 | Mr. Krishna Prasad Dhakal | | Nepal Dairy Association |
| 72 | Mr. Badri Dhakal | | Nepal Dairy Association |

| S.N | Name | Designation | Organization |
|---|---|---|---|
| 73 | Mr. Rajan Dahal | President Pradesh-3 | Nepal Dairy Association |
| 74 | Dr. Dinesh Parajuli | Managing Director | Agro-enterprise Centre, FNCCI |
| 75 | Upendra Pokharel | | Council for Technical Education &Vocational Training |
| 76 | Mr. Sabin Bahadur Khatri | | Nilgiri College, Itahari |
| 77 | Mr. Ram Shovit Yadav | Lecturer | Central College of Technology |
| 78 | Mr. Sital Kaji Shrestha | President | Nepal Veterinary Association |
| 79 | Ms. Sarita Gurung | | National Planning Commission |
| 80 | Mr. Ghanshyam Bhattarai | | Y-Pard |
| 81 | Ms. Suvha Shree Sharma | | Y-Pard |
| 82 | Mr. Ram Prasad Acharya | | Central Dairy Cooperative Association Limited Nepal |
| 83 | Mr. Naryan Ghimire | | Central Dairy Cooperative Association Limited Nepal |
| 84 | Mr. Jyoti Baniya | Chairman | Forum for Protection of Consumer Rights, Nepal |
| 85 | Mr. Govinda Subedi | | Forum for Protection of Consumer Rights, Nepal |
| 86 | Mr. Nirajan Ghimire | | Gayatri Dairy |
| 87 | Ms. Susma Bhaila | | Kharipati Dairy |
| 88 | Ms. Srijana Karn | | Kharipati Dairy |
| 89 | Ms. Arpana Ale Magar | | Media (The Himalaya Times) |
| 90 | Mr. Kiran Acharya | | Media (Karobar Daily) |
| 91 | Mr. Suman Pantha | | Media |
| 92 | Mr. Madan Sapkota | | Media |
| 93 | Mr. Shiva Pangeni | | Media (NTV) |
| 94 | Mr. Shubhadra Gautam | | Media (NTV) |
| 95 | Mr. Badri Ojha | | Media (Nepal Today) |
| 96 | Mr. Laxman Sharma | | Media (Krishidaily.com) |
| 97 | Mr. Rudra Prasad | | Cameraperson for the program |
| 98 | Mr. Subash Lamsal | | Cameraperson for the program |
| 99 | Mr. Bidhan Khatri | Student | College of Applied Food and Dairy Technology |
| 100 | Mr. Raj Lamichhane | Student | Dairy Students, CAFODAT |
| 101 | Ms. Sailu Rahul Magar | Student | Dairy Students, CAFODAT |
| 102 | Mr. Umesh Poudyal | Student | Dairy Students, CAFODAT |
| 103 | Mr. ShauravDhakal | Student | Dairy Students, CAFODAT |
| 104 | Mr. Saurav Jha | Student | Dairy Students, CAFODAT |
| 105 | Mr. Umesh Ghimire | Student | Volunteers |
| 106 | Ms. Asma Khatri | Student | Volunteers |
| 107 | Mr. Sudarsan Gautam | Student | Volunteers |
| 108 | Mr. Hom Kumar Shrestha | Student | Volunteers |
| 109 | Mr. Munna Kumar Yadav | Student | Volunteers |
| 110 | Mr. Bhupendra Gautam | Student | Volunteers |
| 111 | Mr. Ashish Bastola | Volunteers | Volunteers |
| 112 | Mr. Samir Shiwakoti | Volunteers | Volunteers |
| 113 | Ms. Nischala K.C. | Volunteers | Volunteers |
| 114 | Mr. Dipesh Nagarkoti | | Others |
| 115 | Mr. Texendra Rana | | Others |
| 116 | Mr. Ram Bahadur Bk | | Others |
| 117 | Mr. Pramod Dahal | | Others |

# ANNEX-3:

# POWERPOINT PRESENTATIONS

## Annex 3.1

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

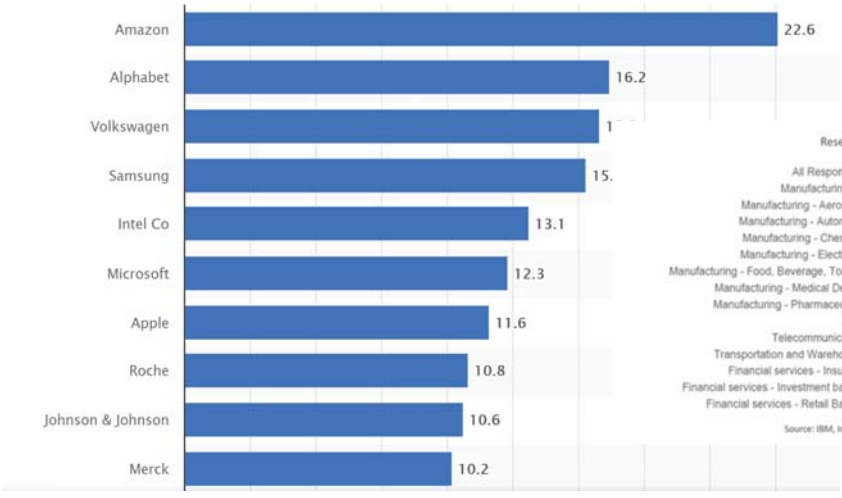
# Needs of skill and innovation through R&D for the dairy industry growth

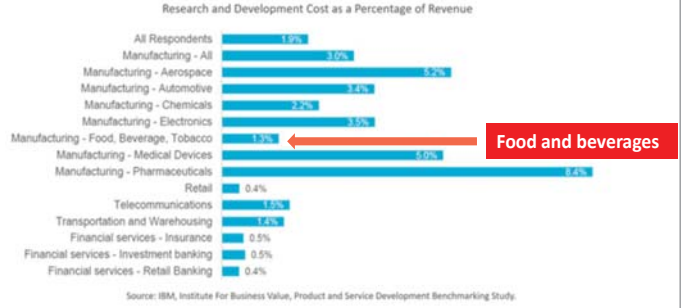
**Bhesh Bhandari**
**The University of Queensland**
**Brisbane, Australia**

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# R & D investment in different industry sectors

**R&D investment ∞ Sales & Profit**




**Food and beverages**

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# R & D tax credits- global practice

**100-200% tax credits to industries for their expenditures**

**Worldwide R&D Incentives Reference Guide**

2018

| | |
|---|---|
| Tax credits | ☑ |
| Cash grants | ☑ |
| Loans | ☐ |
| Reduced tax rates/preferable tax rates | ☑ |
| Reduced social security contributions | ☑ |
| Accelerated depreciation on R&D assets | ☑ |
| Tax allowance | ☐ |
| Infrastructure/land preferential price | ☐ |
| Tax deduction (including super deduction) | ☐ |
| Tax exemptions | ☑ |
| Income tax withholding incentives | ☐ |
| Patent-related incentives | ☐ |
| Financial support | ☐ |
| Tax holiday | ☐ |
| Expedited government approval process | ☐ |
| VAT reimbursement | ☑ |
| Qualifies for Horizon 2020 funding | ☐ |

**Nepal- not documented- not known to me???????**

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# R & D Levy (Milk) in Australia- Govt matching 50:50

Dairy produce (includes milk, cream and other such products made from or containing milk) levy rate comprises Animal Health **Australia** (**AHA**) membership, marketing and research and development (R&D)

| Levy component | Levy rate – Milk fat | Levy rate – Protein |
|---|---|---|
| AHA | 0.0580 cents per kilogram | 0.1385 cents per kilogram |
| R&D and Marketing | 2.8683 cents per kilogram | 6.9914 cents per kilogram |
| SUB TOTAL | 2.9263 cents per kilogram | 7.1299 cents per kilogram |
| **TOTAL** | **10.0562 cents per kilogram** | |

Levy and charge revenue used to biosecurity preparedness and emergency plant pest and animal disease responses, residue testing, marketing and research and development.

*http://www.agriculture.gov.au/ag-farm-food/levies/rates/dairy#return-and-payment-dates*

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# Farm gate price of milk (raw milk price) in Australia

**Milk solids= Fat and protein only (~3.25+4.0=7.25%)**

| | 2014/15 | 2015/16 | 2016/17 | 2017/18(p) |
|---|---|---|---|---|
| **cents/litre** | **48.5** | **44.9** | **40.9** | **46.0** |
| **$/kg milk solids** | **6.49** | **6.01** | **5.46** | **6.14** |

Dairy Australia (R&D Corp)

**Levy for R&D:**
**10 cents/kg solids (1.6% =0.75 cents/Litre)**

**Rs 37/Litre**


**Rs 126/Litre**

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# Knowledge and skills key to Innovation

**Knowledge and skills:**

- Farm level- raw milk production and handling
- Technical- factory operations and energy saving
- Improved or Innovative product development
- Waste utilisation and treatments
- Attractive packaging!!! Very important these days
- Management
- Marketing
- Sales



THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# R&D for profit and growth

**Competitiveness on price and product quality**

- **Domestic products**



- **Imported products (authorised and unauthorised)**

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# Quality to Quality Formula

R & D

Quality raw materials----------Quality product

Quality Process----------Quality product

Quality manpower---------- Quality product




THE UNIVERSITY OF QUEENSLAND AUSTRALIA

## Packaging-most important for consumers' perception

- Appearance
- Quality
- Shelf life
- Safety

**R & D for cost-effective but attractive packaging**

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# Industry priority

- Low raw material cost
- Cheap process
- Cheap manpower
- More sale price of the product

**Successful and sustainable Industry: No comprise on Quality**

**R&D for the best quality product and innovations**

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# Involvement of students (dairy/food) in R &D projects (future employee)

- **DEVELOP NEW PRODUCTS**
- **PACKAGING**
- **IMPROVEMENT OF CURRENT PRODUCTS**

- **Enthusiastic**
- **Creative**
- **Cheap/probably free**
- **No long term commitment (come and go)**

Industry commitment to training

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

## Improved or Innovative product development

**Approaches:**

- Evaluate the current process and procedures
- Reverse Engineering to match the best product in the market
- Packaging- the most important for the impression on quality and shelf-life- invest more on packaging…

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

## Reverse engineering

- Duplicate the product by identifying the components of a high quality product
- Common R&D practice of the industries to compete with the market product
- Illegal to copy but legal to improve the product


Example

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# R&D Need- Famous Juju Dhau

Hygiene?????
Safety ??????

R&D for characterisation, quality and packaging improvements

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# R & D results in improved packaging and quality product



Example

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# R& D: High protein Dahi (children, elderly, athletes)


Standard- 16% solids, 4% protein


High strength, 6% protein


Double strength, 8% protein

- Firmness increased
- No wheying-off
- Double nutrition
- Niche market
- Supreme quality product
- Price doubled

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# Plant sterol fortified milk, yoghurt and butter

**Plant sterols everyday (2-3 g) can reduce blood *cholesterol* by up to 15% in 3-4 weeks**

*8% plant sterol*



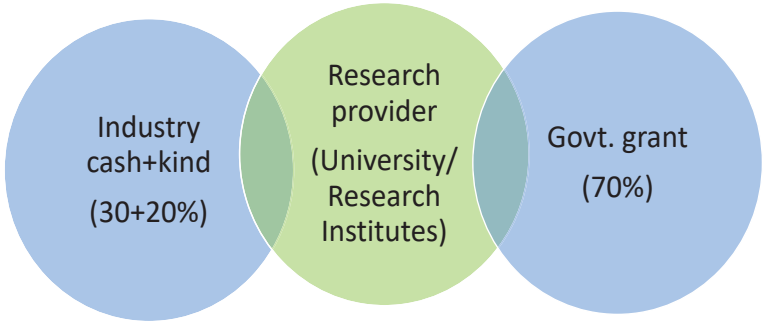
**A 10% reduction in serum cholesterol:**

- In men aged 40: 50% reduction in heart disease within 5 years;
- aged 70 years: an average 20% reduction in heart disease occurrence in the next 5 years.

**Require R & D**

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# Global practices on R&D: Industry linkage grants




**Objectives:**

- New product- improved product
- Increase the competitiveness
- Skill development
- Capacity building

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# Thailand: work-integrated education

Food Industry Consortium

Educational Institution

Master student placement R&D training

Cheaper, effective and good for developing trained manpower in the field- future employee

- Several industries come together and commit the training of internships (Bachelor and Masters level)- agreement for 5-10 years
- May pay minimum wage as scholarships to motivate the students
- Supervisor from industry as well as from the institutions
- Students are allocated to all activities of the factory or R&D activities

**ARC INDUSTRIAL TRANSFORMATION RESEARCH HUB (2014-2019)** **$7M**

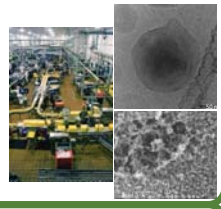
**Research to Underpin the Future of THE Australian Dairy Manufacturing Industry**

The ARC Dairy Innovation Hub brings together three of Australia's leading dairy research groups from the University of Queensland, University of Melbourne and Dairy Innovation Australia Ltd.

**UQ RESEARCH THEMES**

**PROCESS INNOVATIONS**

Innovate processing technologies to create dairy ingredients with new and enhanced functionalities



**QUALITY**

Characterise cheese flavour; oral processing and perception of dairy foods

**DAIRY CONCENTRATES**

Develop break-through science relevant to processability of dairy concentrates

**DAIRY- MICROBIOLOGY-BIOCONTROL**

Discover 'green preservatives' for spoilage moulds and sporeformers

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# Funding formula ($7.0 M)

- Industry linkage R&D project
- 70% ($5.0 million) funded by the federal government
- 30% ($2.0 Million) from Dairy Industries and Dairy Australia
- University of Queensland and University of Melbourne
- 5 major dairy industries in Australia involved

R&D innovations

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# Encapsulated Lactoferrin- Biaoctive protein in milk

Huma Bokkhim
PhD project

**Outstanding researcher**
**Highly motivated**



Inferrin™ - Bega Bionutrients ...

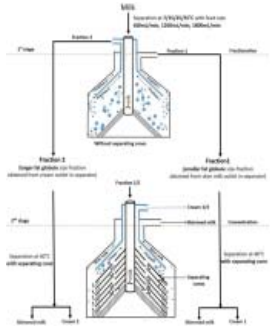
Microencapsulated Lactoferrin ...

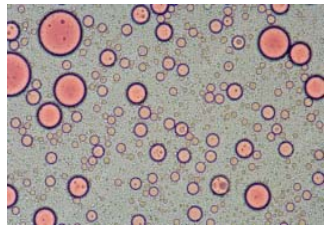
R&D innovations

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# Milk cream fractionation based on fat globule size (modification of cream separator)

Pramesh Dhungana
PhD project





**Softer butter, cheese, heat stable cooking cream and high quality whipped cream**

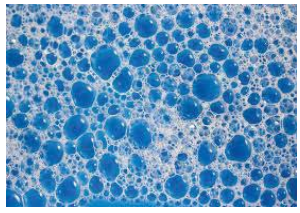
**(patent application)**

R&D innovations

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

## Gas nanobubbles: Control of crystallisation of milk fat, lactose and ice

Bhaskar Adhikari
PhD project



Prolong stability (melting) and increased smooth texture

(Patent application)

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

Have we done anything to support this small innovative enterprise?

## Goat milk cheese factory (Chitlang)


Ashok Kumar Singh Thakuri

**An example of dedication- have we helped this enterprise?**

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

## Himalayan French Cheese Factory- Dhulikhel- an example of imported cheese replacement


Francois Driard

Produces more than 10 varieties of cheeses

**Example: Education and Dairy Company initiated Research Institute- small investment but larger impact**

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

## **Goat Milk Research Institute-** Jiangnan University (China) and Kabrita joint R &D Centre


***International Advisory Board member***

**Established: May 2019**

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

# CONCLUSION

- **Government**
  - Funding support to R & D activities to improve the quality and promote domestic products against imported products
  - Introduce tax incentives for R&D investments (if not existing)
  - National pride- Impose/encourage use of domestic dairy products' use in hotels and national carriers
- **Company**
  - Invest on R&D
  - Support R&D through eductational institutions' student internships program- cheapest and fastest methods- the best opportunity to use young and enthusiastic generation
- **Academic/Research institutions**
  - Run specialised short courses or specialised technical trainings
  - Develop consortium with various companies
- Establishment of **Research Institute** dedicated to dairy product development and trouble shooting advices

THE UNIVERSITY OF QUEENSLAND AUSTRALIA


## Annex 3.2

Current Status, Requirement and Availability of Technical Human Resources in Dairy Industries.

"गोठ देखि ओठ सम्म"

From Farm to Fork

**Er. Arniko Rajbhandary**

**President :** Dairy Industries Association

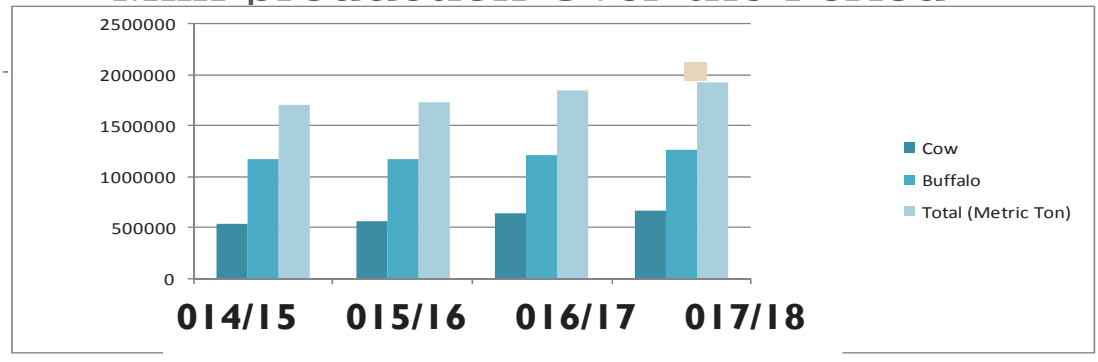
**Director :** Nepal Dairy Pvt. Ltd

# Milkonomic Footprint

| GDP Contribution | Farm Families involved | Dairy Cooperatives |
|---|---|---|
| 9% | > 550 000 | 1850 coop |

| Total Investment | Total Direct Employment | Cash Flow | Import |
|---|---|---|---|
| NRs30 Billion | JOBS > 20 000 (processing) | Urban — NRs. 12 B / year — Rural | IMPORT NRs2.5 B. |

## Milk production Over the Period




Source : MOLD/DLS2018

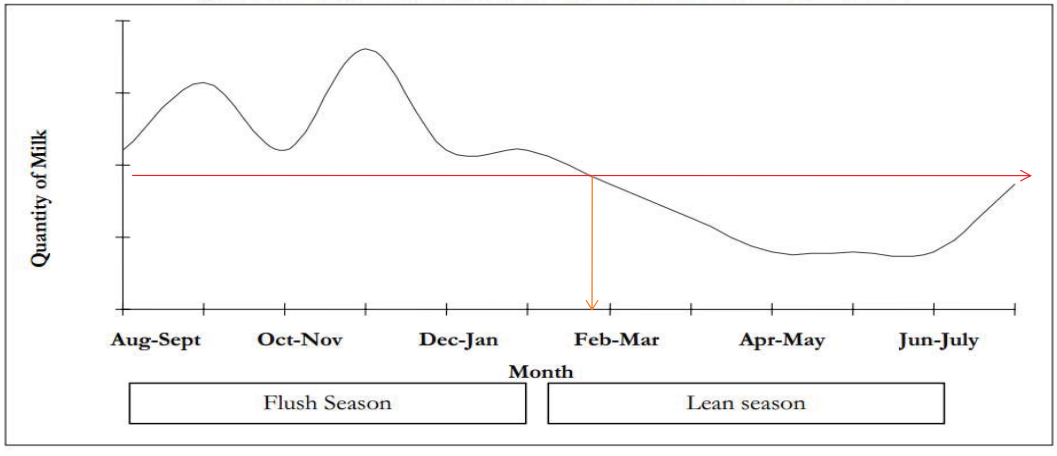
| | | | | |
|---|---|---|---|---|
| Cow Milk ( '000 MT) | 558 | 640 | 665 | 769 |
| Buffalo Milk ('000 MT) | 1168 | 1215 | 1258 | 1314 |
| Total Milk ('000 MT) | **1726** | **1855** | **1923** | **2083** |
| Cow milk growth % | 4.77 | 14.69 | 4.03 | 15.5 |
| Buffalo milk growth % | 0.0 | 3.99 | 3.62 | 4.4 |
| **Total Milk growth %** | **1.46** | 7.48 | **3.77** | **8.23** |

## Milk consumption per capita per year

1. FAO recommendation — 92 ltr/yr (252ml/day)
2. Govt target – (Self Sufficiency) — F.Y. 2019/20
3. Per capita availability — 72 ltr/ yr ( 197 ml / day)
4. Existing Milk Production — ( 2.082 M. Mt/ yr)
5. Targeted production for self Sufficient — 2.5 Million Mt.
6. Deficit : 0.416 Million Mt (4.16 lakh M.ton)

## Milk Production Pattern of Nepal

**Figure 3: Pattern of Seasonal Variation in Milk Collection**



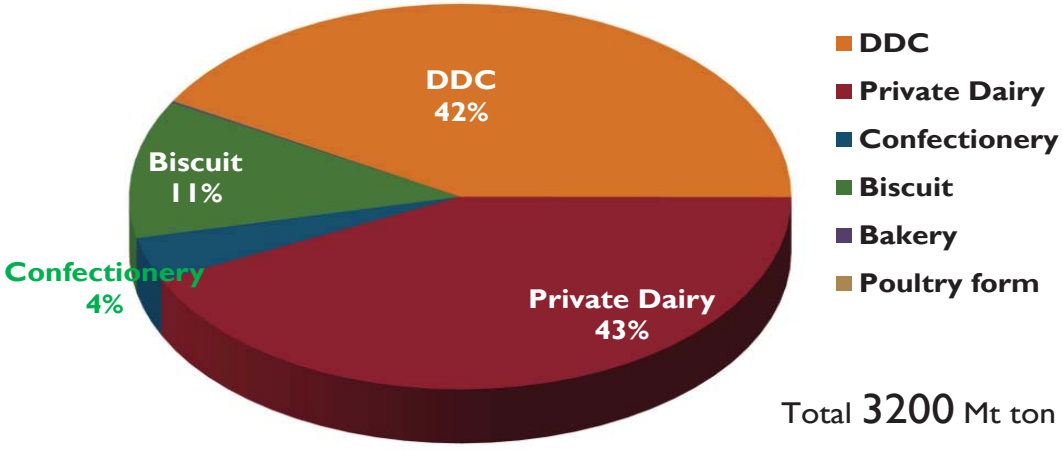

**Flush Season** — **August - February**

**Lean ( Dry) Season** — **March – July**

**This Year DIA Facilitated 3.5 million ltrs. Milk for SMP Conversion**

5

## Annual Skimmed Milk Powder Consumption

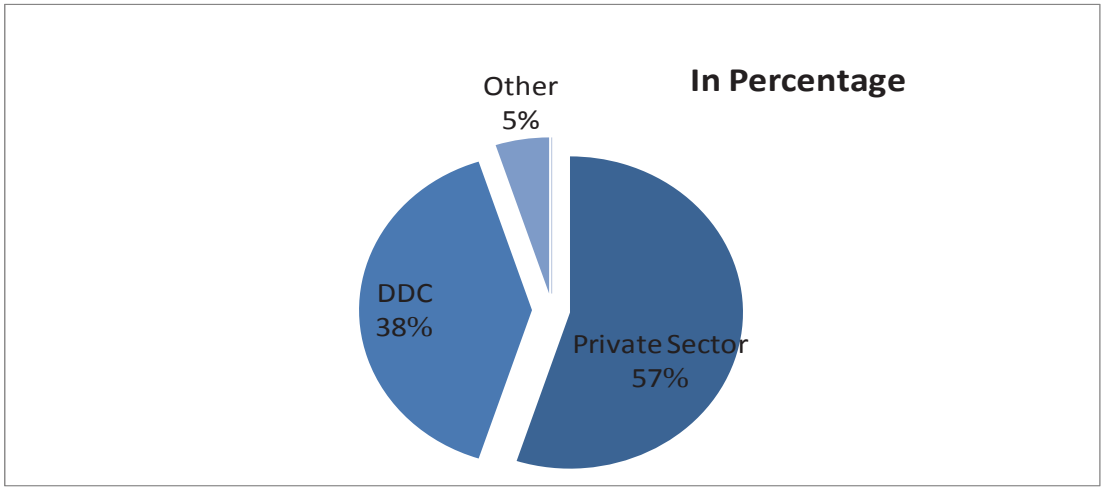



Total 3200 Mt ton

Total Dairy Products Import: Nrs 2.5 Billions

6

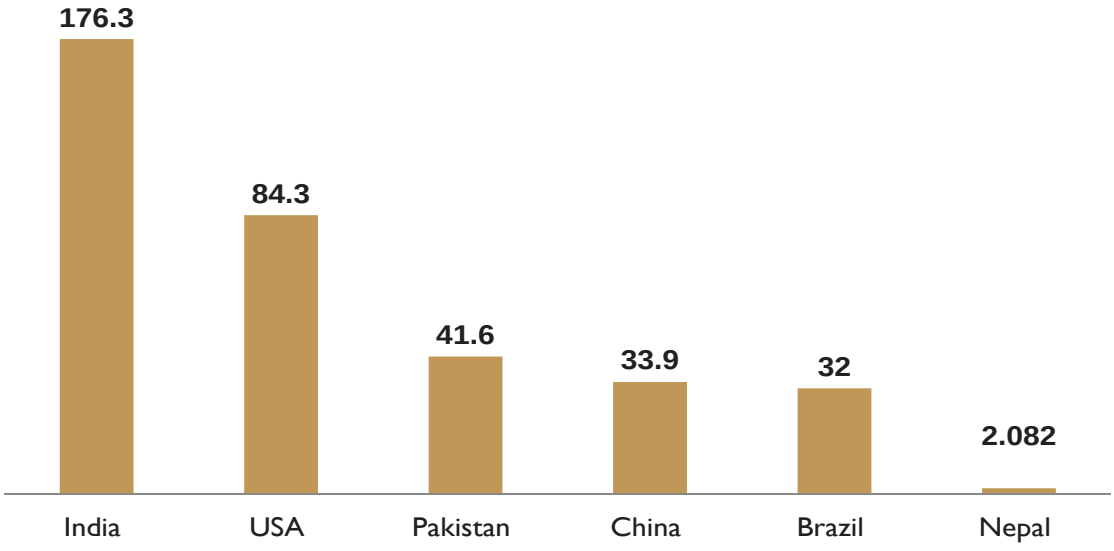
# Market Share




*Source: DIA/MOLD/N*

7

## World top Milk Production Countries and Nepal (in Million tons)




8

*Source: IFCN/MOAD/N*

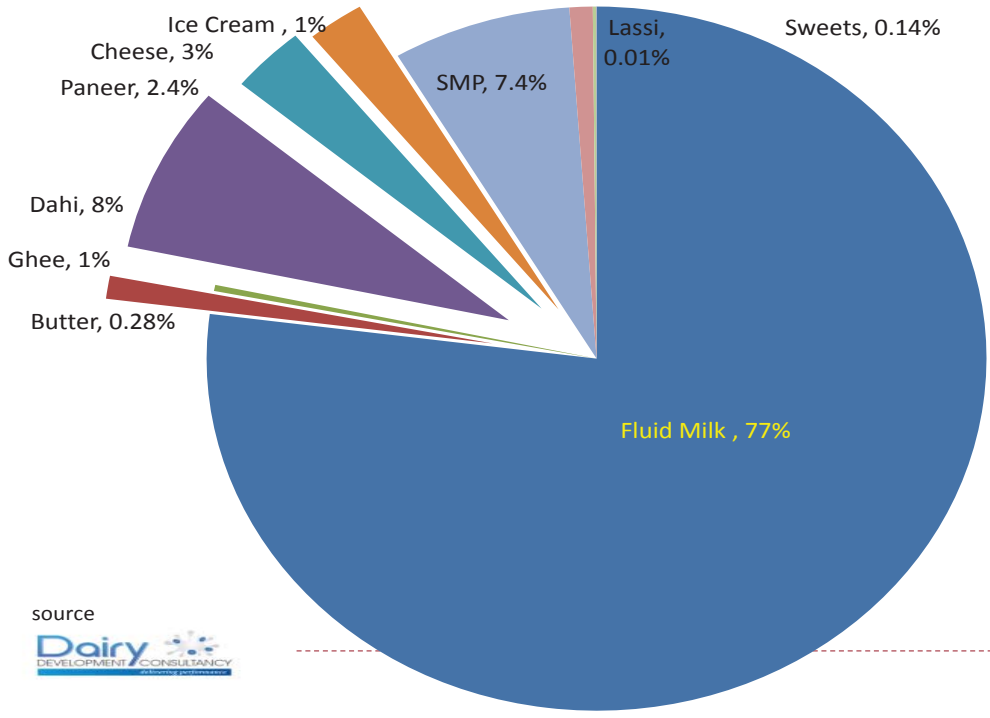
## World Top Buffalo Milk Producing Countries - 2017

| Rank | Country | Production(Million Mt) |
|---|---|---|
| 1 | India | 70.00 |
| 2 | Pakistan | 24.61 |
| 3 | China | 3.05 |
| 4 | Egypt | 2.16 |
| 5 | Nepal | 1.18 |
| 6 | Myanmar | 0.30 |
| 7 | Italy | 0.19 |

- Focus on buffalo milk based specialty products, like Mozzarella cheese- comparative advantage
- Less disposal problem for unproductive buffaloes

(source :Global Animal Feed Survey)

## Share of Milk in Dairy Product Production




source

Dairy Development Consultancy

## Manpower Requirement Scenario

| Scale | Capacity (Ltrs/day) | Plants | Required Technologist (Food/Dairy) | Required Skilled Technician | Sector |
|---|---|---|---|---|---|
| Large | 50,000-150,000 | 4 | 20 | 100 | Private |
| Medium | 10,000-50,000 | 25 | 50 | 150 | Private |
| Small | <10,000 | 50 | 60 | 180 | Private |
| Cottage | 200-500 | >600 | | 1200 | Private |
| Small | <10,000 | 10 | 20 | 50 | Co-operative |
| Medium | 10,000-50,000 | 2 | 10 | 20 | Co-operative |
| **Total** | | | **140** | **1700** | |

## Key Challenges across Dairy Value chain

**Inputs**

- Breeding / genetics Sex Semen, Improve Indigenous cattle
- Availability fodder/forge – Seeds /Land
- Labor shortage for increase herd size

**Production**

- Low productivity - Breed , Farm size, Fodder/Forage
- Low adoption of technology , animal health & sanitation
- Poor Quality Raw Milk

**Processing**

- Seasonality of Milk production
- Inadequate Cold chain system in Dairy Value Chain
- Lack of Skilled manpower
- Lack of Implementation of quality assurance measurers

**Market**

- Unorganized Market
- Unfair Competition due to unorganized sector
- Heterogeneous consumer Requirements

12

## The Way Forward

- Implementation of genetic improvement program
- Preparing & Execution of Raw milk Standards
- Encouraging dairy farming through with low interest rate financing with livestock insurance
- Strictly adoption of proper cold chain system in dairy value chain
- Providing short and long-term training to mid-level dairy personnel for theirs skill development
- Strictly regulated unorganized sectors
- Implementing Quality Assurance Measurers i.e. GMP, GHP HACCP, ISO 22000

## **Current activities :** (Dairy Industries Association):

- Upgrade of Dairy Technology Handbook.
- Piloting Program on Antibiotic Microbial Test in raw milk
- Develop and implement SOPs and SSOP in dairy Industries.
- Conduct ToT training for Dairy and Food Technologist
- Conduct Work based dairy technician Training
- Organize Exposure Visit for Technology Transfer

## Flush Season Milk Conversion

- DIA its Members Cov

40 Lakh Liters

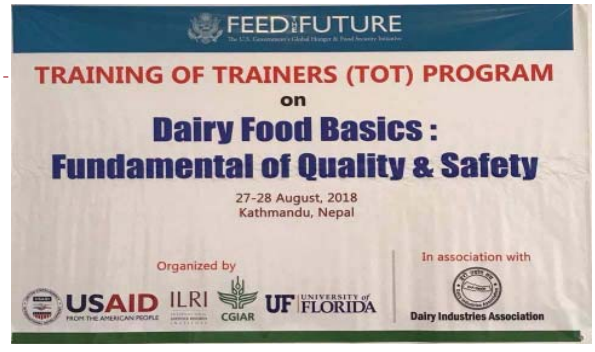
SMP


350 MT.

BUTTER

200 MT.

**TOT Training on DairyFood Basics**


## Work Place Based Training

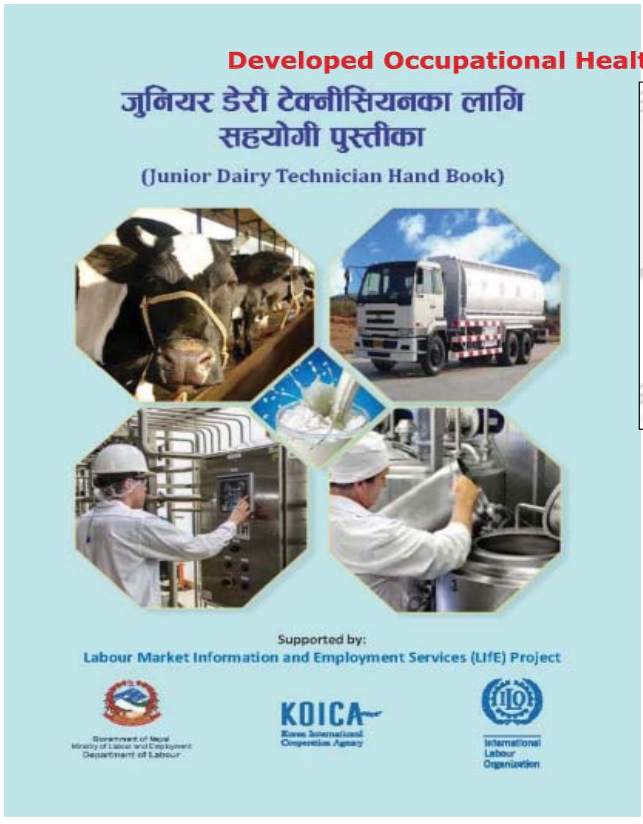
Written Exam

PracticalSession

Working in the Dairy

Theory Class

## Training and Manpower Development








Any Question ?

21

# Annex 3.3


Technical Human Resources in Milk Processing Industries.
Presented by:
Radha Krishna Sapkota
Nepal Dairy Association

# Nepal Dairy Association

- There are the people who are require as in production area, dairy boy to assist in coordinating with farmers and do some kinds of lab testing.

# Background

- With the opening of private  in the dairy sector there was a huge social economic improves in value chain a long with which there was tremendous demand for human resources  currently the dairy sector requires
- Skilled
- Semi skilled unskilled
- unskilled

# Skilled

- These are the people who might be dairy tech. or b.tech, there present is mainly requires in production area, engineering section, raw milk collection center of dairy sector
- the person who is trained, experienced, devoted to their field and is capable of doing any specific work and efficiently

# Semi skilled

- These are the people who are require as operating in production area, dairy boy to assist in co-ordinating with farmer and do some kinds of lab testing.

# Unskilled manpower

- Labours.
- Untrained employees.

# S. W. O. T. analysis

- S W O T analysis of private sector perspective on requirement and availabity of technical human resources in dairy business.
- It involves in the collection and portrayal of information about internal and external factors that have, or may have, an impact on the evolution of an organization or business. It generally provides a list of an organization's Strengths and Weaknesses as indicated by an analysis of its resources and capabilities, plus a list of the Threats and Opportunities identified by an analysis of its environment. Strategic logic requires that the future pattern of actions to be taken should match strengths with opportunities ward off threats and seek to overcome weaknesses.

# STRENGTH

- With the growth of Dairy and food processing industries there has been growth in food and dairy technology institute.
- Students have shown lots of interest in this subject.
- Government also providing so much facilities for opening new dairy industries.
- Industries are also collecting raw milks from rural and undeveloped areas, and also providing grains for cows and buffaloes.

- Enhanced milk production with consequently increased availability of milk processing.
- Improved purchasing power of the consumer.
- Improved transportation facilities for movement of milk and milk products. Increased availability of indigenously manufactured equipment.
- Large number of dairy plants in the country.
- Vast pool of highly trained and qualified manpower available to the industry.

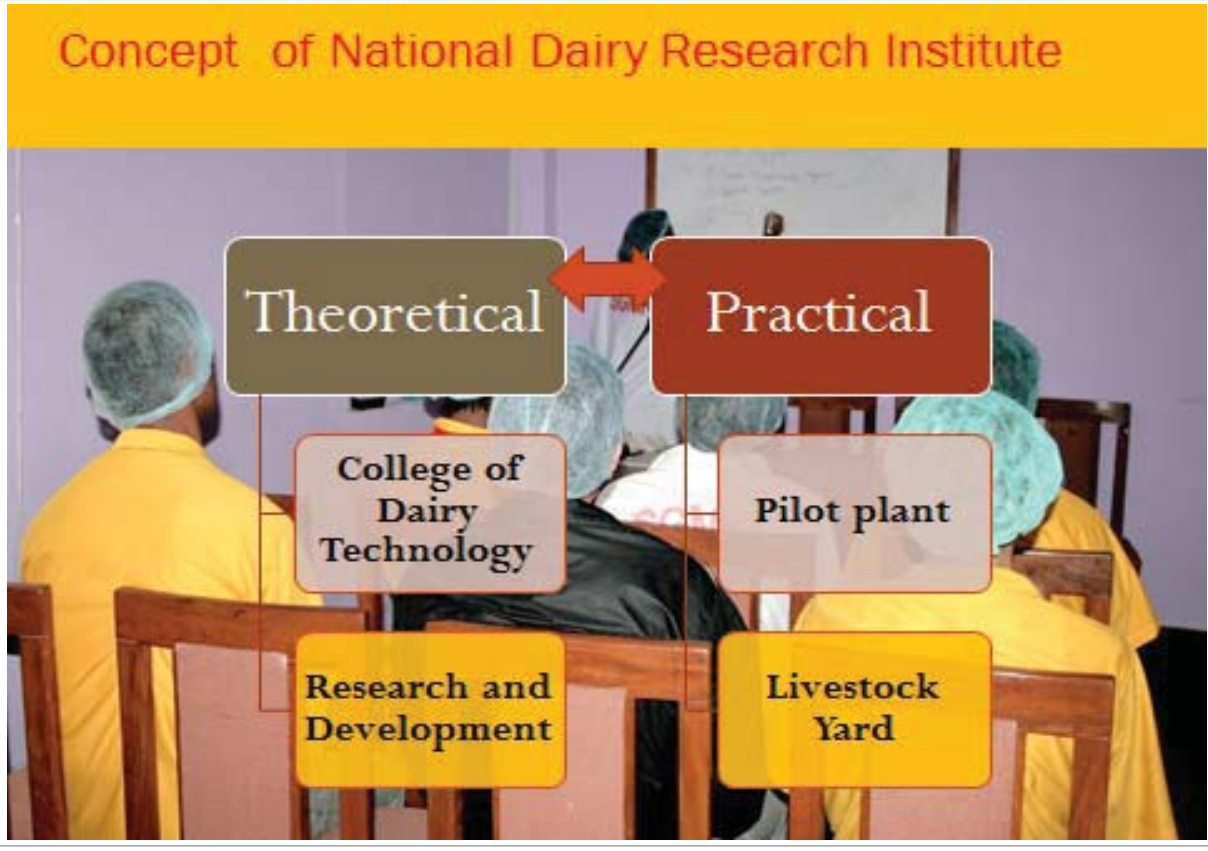
# Weakness

- There has been lack of co-ordination between food and dairy technology institute and industries.
- Lack of well equipped facilities.
- Lack of knowledge of food and dairy industries.
- Lack of improvement in milk and milk products.
- Lack of modern technology also not improving in dairy industry in Nepal.
- Lack of Concepts of NDRI.
- These are also a issues facing by a dairy farmers outside of the straight economic challenges of price and cost.
- Lack of theoretical knowledge.

- Lack of appropriate technologies for tropical climate conditions.
- Erratic power supply.
- Lack of awareness for clean milk production.
- Underdeveloped raw milk collection systems in certain parts of the country.
- Seasonal fluctuations in milk production pattern.
- Regional imbalance of milk supply.
- Species-wise variation in milk quality received by dairy plants.
- Poor productivity of cattle and arable land.
- Scarce capital for investment in the dairy development programmes on a priority basis.

# Concepts of NDRI

- Model Dairy Plant provides one year In-plant training to the students of B. Tech. (DT) of the N.D.R.I. Deemed University during the 4th year of the course curriculum.
- The students are provided with complete infrastructure for training, which helps them in gaining sufficient experience in managing the modern commercial Dairy Plant and instills confidence in handling real life problems in production management.
- It also provides infrastructure facilities to the scientists of NDRI for scaling up R & D concepts from laboratory scale to industrial scale under commercial environment.



# opportunity

- With growth of dairy and food industries, Students have shown lots of interest in this subject.
- Government has been providing and giving facilities for selling new milk products.
- Greatly improved export potential for milk products of western as well as traditional types.
- Expanding market for traditional dairy products.
- Increasing demand for fluid milk as well as value added products.
- By product utilization for import substitution.
- Employment generation.
- Growing demand for milk and milk products.
- Liberalized polices in dairy sector.
- Availability of large resources of unconventional feeds and fodder.

- Integrated structure of marketing for milk and milk products.
- Integrated structure of livestock marketing through regulated markets.
- Improved collection of data on contract basis through agencies.
- Market information intelligence system for milk and milk products.
- Development of software for project formulation for dairy enterprise.

# Threat

- Due to lack of theoretical and practical knowledge
- Due to there is lack of quality students
- Introduction of foreign products in Indian market.
- Increasing chemical contaminants and residual antibiotics in milk.
- Poor microbiological quality of milk.
- Export of quality feed ingredients particularly cakes under the liberalization policy.
- Deficiency of molasses, a rich source of energy and binding agent in feed industry and constituent of urea molasses mineral lick.
- Excessive grazing pressure on marginal and small community lands resulting in complete degradation of land.

## Lets work together for the white revolutions in Nepal


## Thanks

Nepal Dairy Science Association (NDSA) is pleased to inform and invite you to attend a
Three-day **"Asia Regional Dairy Conference cum Exhibition"**

**Date:** 6-8 May 2020 (24-26 Baisakh 2077)
**Venue:** Rastriya Sabha Griha, Kathmandu,

**Theme:** *Dairy Development for Nutrition, Sustainable Livelihoods and Economic Growth.*

Conference will be organised in close collaboration with MoALD, NDDB, DDC, DLS, DFTQC, dairy value chain stakeholders such as dairy industries/associations, cooperatives/farmers organisations, professional societies, dairy educational and research institutions.

**Dairy exhibitions** by national and international dairy equipment manufacturers/suppliers, dairy inputs suppliers and animal feed manufacturers/suppliers, dairy industries, dairy importers/exporters, cooperatives/farmers organisations, dairy educational and research institutions, yak cheese makers, chhurpi producers/exporters.

**Poster session** for presenting the research findings and innovations.

**International participants** from India, Bangladesh, Pakistan, Sri-Lanka, Bhutan, Afghanistan, China, Australia, USA, Thailand (success stories of school milk programme), Asian dairy association, Heifer International, as well from International dairy federation (IDF), FAO and other donors working in the field of dairy and livestock development in Nepal.

**Major programme highlights:**

Day 1: Inaugural session and Dairy Exhibition starts

Day 2: Paper presentations: Asia Regional Dairy Scenario, & Dairy Development Scenario in Pradesh.
Poster Session for presenting the research findings & innovations by young Scientists.

Day 3: Paper presentations: Policy, Human Resource and Trade
Panel Discussion (Policy, Industries and Stakeholders)
Closing Session

**Supported by:** Ministry of Agriculture and Livestock Development (MoALD) and National Dairy Development Board (NDDB).

**For registration and other details, please contact:**

| | | |
|---|---|---|
| Tek B Thapa | 9841645344 | tthapa2013@gmail.com |
| Giri Dhar Bajracharya | 9808299405 | giribajracharya@gmail.com |
| Rajesh DC | 9841215115 | rajeshdcnepal@gmail.com |
| Subash Bhattarai | 9841205298 | subash_b@hotmail.com |
| Niranjan Timilsina | 9841807411 | niranjan62@hotmail.com |
| **Expo Co-ordinator:** | | |
| Ram Tapeshwar Chaudhary | 9751009675 | ramtapesh2007@gmail.com |

Nepal Dairy Science Association, GPO Box-7445, Kathmandu
Email: info@ndsa.org.np; Website: www.ndsa.org.np

नेपाल सरकार

कृषि तथा पशुपन्छी विकास मन्त्रालय

## खाद्य प्रविधि तथा गुण नियन्त्रण विभाग

बबरमहल, काठमाडौँ

# दुग्ध व्यवसायी तथा उपभोक्ता वर्गमा अनुरोध

दूध तथा दुग्ध पदार्थमा स्वच्छता एवम् गुणस्तर कायम राख्न यस विभागले नियमित रुपमा दुग्ध प्रसोधन उद्योगहरुको अनुगमन, निरीक्षण तथा अनुसन्धान गरिरहेको छ। अनुगमन निरीक्षणको क्रममा मापदण्ड अनुरुप नपाइएका दूध तथा दुग्ध पदार्थका उत्पादक विरुद्ध कानूनी कारबाही समेत अघि बढाइएको छ।

दूधमा स्वच्छता एवम् गुणस्तर कायम राख्न, दूधलाई फाट्नबाट बचाउन दुग्ध उत्पादक, व्यवसायी तथा प्रसोधन उद्योगहरुले सोडा लगायत कुनैपनि बाह्य पदार्थ प्रयोग नगर्न, दूधमा हानिकारक सूक्ष्म जीवाणु आउन नदिन कृषक देखि प्रसोधनकर्तासम्म सबैले सरसफाइको राम्रो व्यवस्था मिलाउन तथा बिक्रेताहरुले दूध तथा दुग्ध पदार्थलाई उचित रुपमा भण्डारण गरी विक्री वितरण गर्न अनुरोध गरिन्छ।

साथै उपभोक्ताहरुलाई खरिद गरिसकेको दूध तथा दुग्ध पदार्थ सुरक्षित रुपमा भण्डारण गर्न र दूधलाई उमाल्दा कोलिफर्म लगायतका सूक्ष्म जीवाणुहरु नष्ट हुने भएकोले दूध उमालेर मात्र उपभोग गर्न अनुरोध गरिन्छ।

दूध तथा दुग्ध पदार्थ लगायत कुनै पनि खाद्य वस्तुको स्वच्छता एवम् गुणस्तरमा शंका लागेमा विभाग तथा यस अन्तर्गतका कार्यालयहरुमा सूचना दिई सहयोग गरिदिनुहुन अनुरोध छ।

# One-Day Workshop

on

## Availability and Requirement of Dairy Science and Technology Related Human Resources in Nepal

11 June, 2019 (28 Jestha, 2076)
Kathmandu, Nepal

## ADVISORY PANEL

**Mr. Sanjeev Kumar Karn, DG, DFTQC**
**Dr. Bimal Kumar Nirmal, DG, DoLS;**
**Mr. Bhakta Pralhad Pandey, CAFODAT;**
**Dr Iswori Neupane, Officiating GM, DDC;**
**Mr. Sumit Kedia, MD, Sitaram Dairy;**
**Mr. Bisworam Khadka, MD, Kharipati Dairy.**

## ORGANIZING COMMITTEE

| | |
|---|---|
| **Prof. Jagat Bahadur K.C., Founding Chairman, CAFODAT and Former V.C. Purbanchal University** | **- Chairperson** |
| **Mr. Babu Kaji Panta, Officiating ED, NDDB** | **- Member** |
| **Dr. Matina Joshi Vaidya, DDG, DFTQC** | **- Member** |
| **Mr. Radha Krishna Sapkota, Chairman, NDA** | **- Member** |
| **Mr. Arniko Rajbhandari, Chairman, DIA** | **- Member** |
| **Mr. Tek Bahadur Thapa, Chairman, NDSA** | **- Member** |
| **Mr. Narayan Prasad Devkota, Chairman, CDCAN** | **- Member** |
| **Mr. Man Bahadur Shrestha, Coordinator, CAFODAT** | **- Member** |
| **Mr. Uttam Kumar Bhattarai, Vice-Principal, CAFODAT and Former Agriculture Secretary, GoN** | **- Member Secretary** |

## SUB-COMMITTEES

1. **Venue Management**
   **Coordinator:** **Mr. Man Bahadur Shrestha, CAFODAT**
   **Members:** **Mr. RojanChalise, CAFODAT**
2. **Finance**
   **Coordinator:** **Mr. Kishor K.C., DFTQC**
   **Members:** **Mr. Ram Raj Sapkota**
3. **Registration**
   **Coordinator:** **Ms. Sneha Shrestha, CAFODAT**
   **Member:** **Ms. Rajani Sapkota.**
4. **Proceedings/Publications**
   **Coordinator:** **Mr. Tek Bahadur Thapa, Chairman NDSA**
   **Members:** **Mr Bimal Kumar Dahal, CFRO, DFTQC,**
   **Rajendra Gopal Shrestha, NDSA advisor and**
   **Dr. Balak Chaudhary, Technical Director, NDDB.**