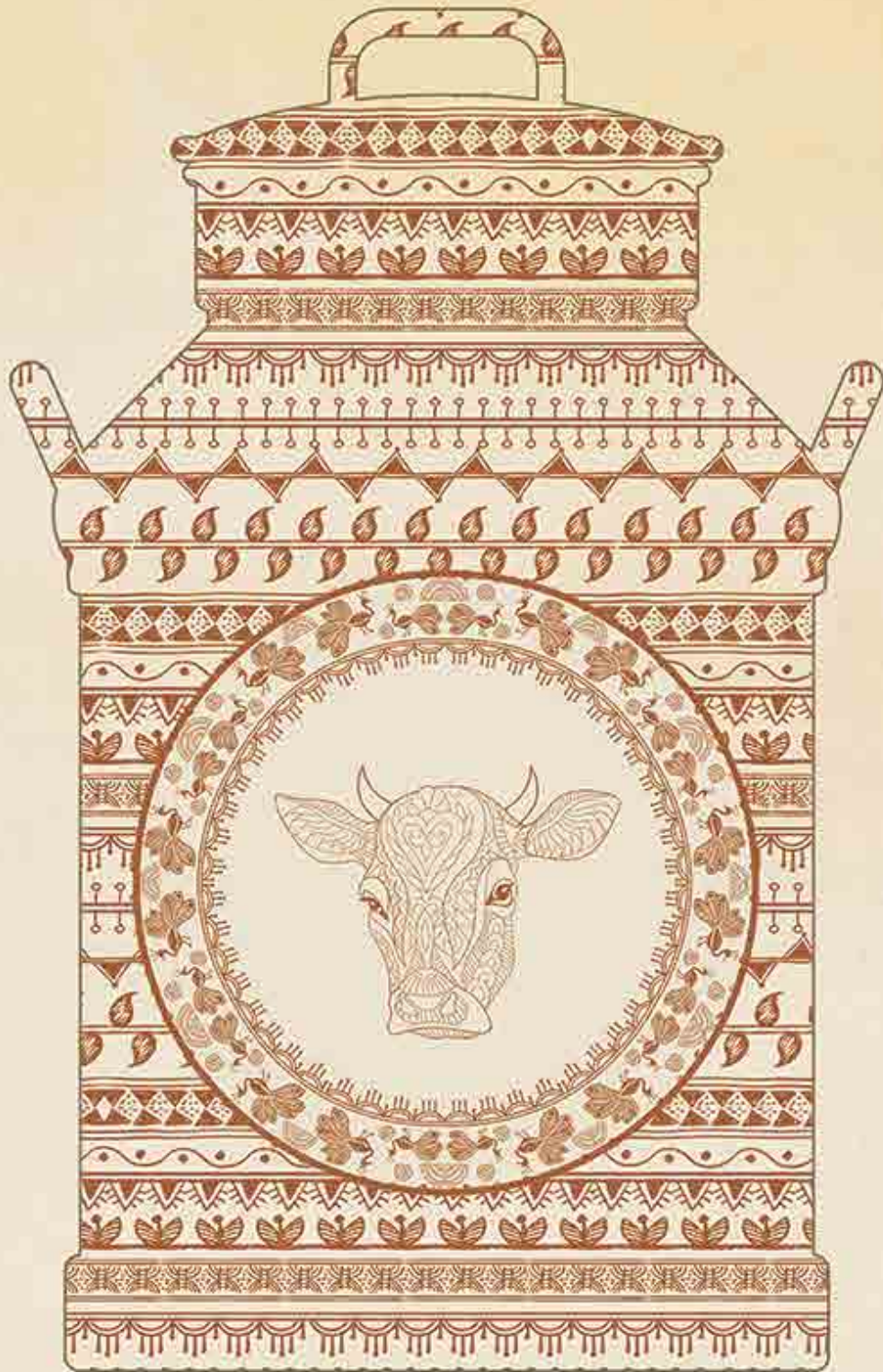


National Dairy
Development Board



2016-17
ANNUAL REPORT

Contents

| | |
|--|-----|
| Members of the Board | 1 |
| The Year in Retrospect | 2 |
| Strengthening Cooperative Business | 4 |
| Enhancing Productivity | 12 |
| Research & Development | 26 |
| Building an Information Network | 36 |
| Developing Human Resources | 38 |
| Engineering Projects | 44 |
| The National Dairy Plan | 48 |
| Centre for Analysis and Learning in Livestock and Food | 62 |
| Other Activities | 64 |
| Subsidiaries | 66 |
| Dairy Cooperatives at a Glance | 72 |
| Visitors | 76 |
| Accounts | 77 |
| NDDB Officers | 102 |



Members of the Board

As on 31st March, 2017

Shri Dilip Rath

Chairman

Joint Secretary (DD)*

Department of Animal Husbandry,
Dairying & Fisheries
Ministry of Agriculture and Farmers Welfare
Government of India

Shri Jethabhai P. Patel

Chairman

Gujarat Co-operative Milk Marketing
Federation Ltd.
Anand

Smt. Mandakini Khadse#

Chairperson

Maharashtra Rajya Sahakari Duddh
Mahasangh Maryadit
Mumbai

Prof. Guru Prasad Singh#

Institute of Agricultural Sciences
Banaras Hindu University
Varanasi

Shri Sangram Chaudhary

Executive Director

Shri T Nandakumar was Chairman till 31 July, 2016 and Dr. S. Ayyappan, President, NAAS was a Director (under Section 8 (2) (e) of NDDDB Act) till 4 March, 2017.

* Dr. OP Chaudhary and Dr. E. Ramesh Kumar attended the meeting as Joint Secretaries (DD) during the year

With effect from 5 March, 2017



The Year in Retrospect

The domestic milk production increased from 155.5 MMT in 2015-16 to 163.7 MMT in 2016-17, registering a gain of 5.3 per cent against the backdrop of two consecutive drought years during 2014-15 and 2015-16.



Promoting rural livelihood through cooperative dairying

By the end of the year, about 70 lakh out of the 96 lakh milk pourer members of dairy cooperatives had bank accounts.

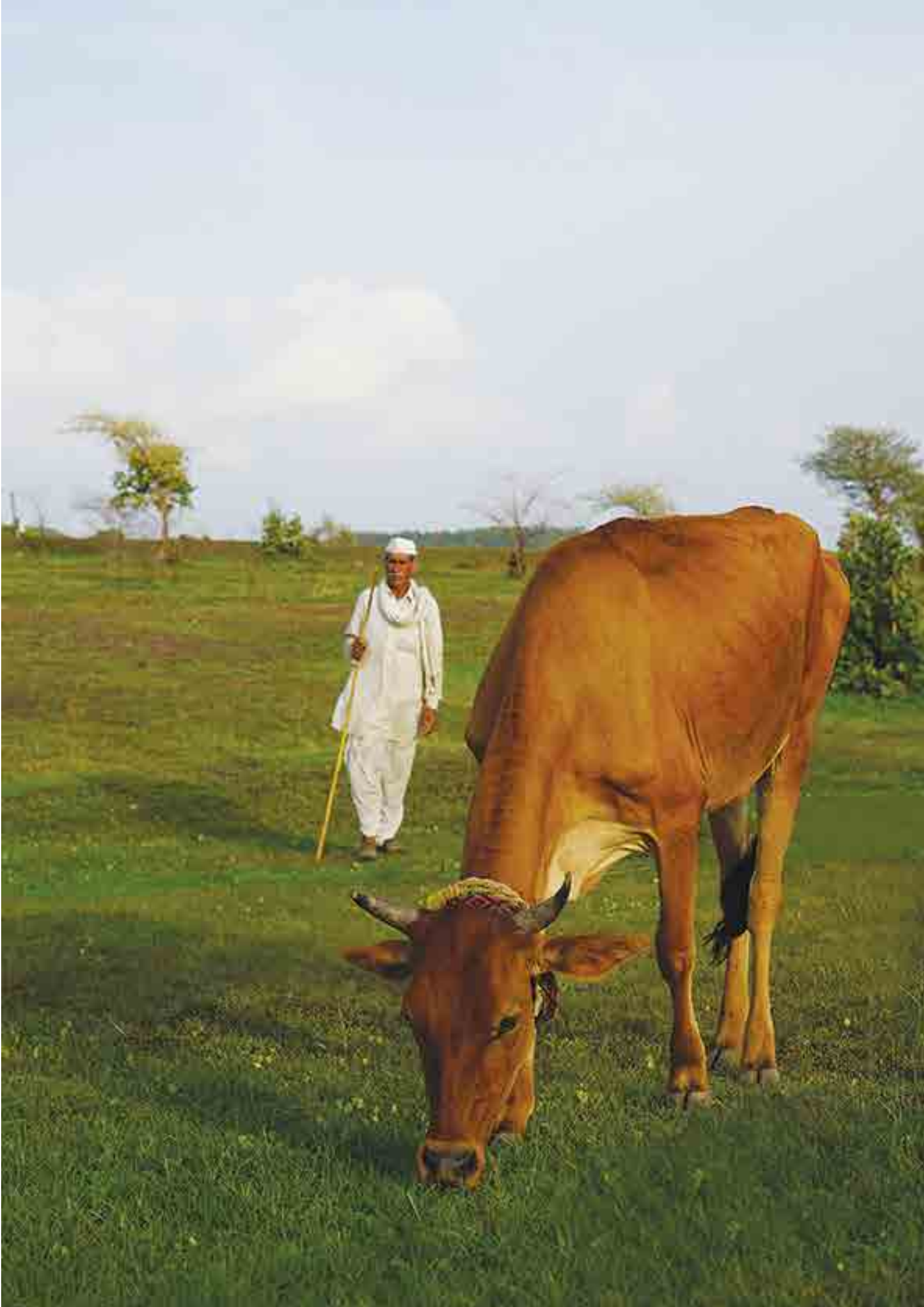
in international markets. As stocks with private dairies in India had by then declined, prices in the domestic market also started rising due to a combination of low stocks and high international prices.

As private dairies, many of whom are also exporters of dairy commodities, sensed opportunities to export in the coming months, they stepped up their procurement by offering higher purchase price to farmers. Dairies in the cooperative network also increased retail sale prices to ensure that they are able to pay higher prices to their producer members, with the aim of neutralising increased production cost and maintaining competitive price.

As prices of major dairy commodities like skimmed milk powder remained weak in international markets during the first quarter of 2016-17, many traditional exporters of milk powder from the private dairy sector in India reduced their domestic milk collection, which contributed in increased milk procurement of the dairy cooperatives.

However, in the second half of 2016-17, milk production declined in major exporting countries, namely European Union, New Zealand, Australia and Argentina, and prices of dairy commodities like milk powder recovered

As part of the contribution to the Digital India initiative of the Government of India, dairy cooperatives made significant efforts in routing payments through banking system to milk producers for milk collected from them, during the second half of 2016-17. By the end of the year, about 70 lakh out of the 96 lakh milk pourer members of dairy cooperatives had bank accounts.



Strengthening Cooperative Business


NDDB's initiatives to improve the livelihood of dairy farmers continued throughout the year. While it continues empowering women dairy farmers, improving the operations of the cooperative milk unions and increasing the income of dairy farmers, NDDB also sought to expand its footprint to newer areas of the country and venture into new initiatives.



Women are encouraged to become active members of dairy cooperatives

Financial inclusion of the producer members of the dairy cooperative societies (DCS) was one of the major thrust areas of NDDB during the year. Constant interactions were held with the state-level milk federations and cooperative milk unions and they were encouraged to help producer members open their individual bank accounts. The effort was taken a notch higher after the demonetisation drive and status of milk bill payment through bank accounts is being maintained.

Training and capacity building programmes under various modules were conducted for producer members, officers and board of directors of milk unions. Participants were explained about the importance of dairying in the livelihood basket of farmers, cooperative principles and the importance of women participation, fairness and transparency in milk collection system, scientific animal management practices, better quality fodder, clean milk production practices and the democratic governance system of the cooperatives.



Training and capacity building programmes under various modules were conducted for producer members, officers and board of directors of milk unions.





In order to increase the effectiveness of training programmes, especially those for dairy farmers, a demonstration model was set up at NDDDB premises with solar electrification and facilities for milk testing, where visiting dairy farmers are being acquainted with fair and transparent milk procurement system. Taking this initiative further, a new concept of transforming an existing milk union into a model milk union is in progress. The ideal profile for the model union have been finalised.

Efforts were made to strengthen the governance structure of the cooperative milk unions. Model bye-laws for village-level dairy cooperative societies, milk unions and federations were drafted and shared with milk federations and unions. The model bye-laws brought together the best features of various central and state level acts.

NDDDB collaborated with the National Bee Board for creating awareness on scientific bee-keeping practices among farmers. NDDDB also organised a National Seminar on Beekeeping to propagate the initiatives of National Bee Board (NBB) and to brainstorm on developing a road map for the promotion of scientific beekeeping among the interested dairy farmers. The participants included senior officials from select milk federations and unions, progressive beekeeping farmers and other relevant stakeholders.

NDDDB took up the responsibility of dairy development in areas where development has not been significant. It entered into a tripartite agreement with the Government of Assam for management of East Assam Milk Union Limited (EAMUL) and Cachar and Karimganj Milk Union Limited (CAMUL). It is already a party in the implementation of the Vidarbha-Marathwada Dairy Development project. Towards the end of the year, a MoU was signed with the Government of Arunachal Pradesh, following which NDDDB has also started exploring the possibilities of dairy development.

By the end of the year, the cooperative milk unions covered about 177 thousand village dairy cooperative societies, with a cumulative membership of 16.3 million milk producers. The cooperative milk unions procured an average of 42.8 million kg of milk per day. The sales of liquid milk reached 33.1 million litres per day, recording a growth of 3 per cent over the previous year.

Strengthening Village Based Milk Procurement System

Village Based Milk Procurement System (VBMPS), one of the major components of the National Dairy Plan Phase I, continued achieving more than the set targets. By



By the end of the year, the cooperative milk unions covered about 177 thousand village dairy cooperative societies, with a cumulative membership of 16.3 million milk producers.



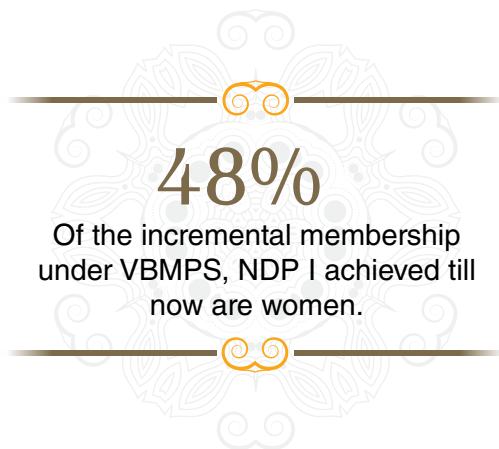
March, 2017, the number of sub-project plans (SPPs) approved increased to 128, including 5 sub-project plans of Producer Companies, with total approved outlay of ₹ 8,479.3 million, with a project contribution of ₹ 5,198.5 million and contribution of ₹ 3,280.8 million by the End Implementing Agencies (EIA).

By March 2017, 21,611 villages were covered by either formation of new Dairy Cooperative Societies or strengthening of existing Dairy Cooperative Societies with facilities for milk chilling using Bulk Milk Coolers and advanced testing facilities. Approximately, 5.54 lakh new members were inducted into the system and another 5.58 lakh existing members benefited from the improvements in the milk collection system. Of the incremental membership achieved till now, about 48 per cent are women.

The dairy cooperatives reached out to the hitherto uncovered areas and increased their coverage using the funding support under VBMPS. There has been a constant focus on bringing in greater number of women members into the system, who are benefiting from improved economic status and training on improved animal husbandry practices. Fairness and transparency in milk payment has improved by the installation of Automated Milk Collection Units (AMCUs) and Data Processor-Based Milk Collection Units (DPMCUs) in the newly formed and existing Dairy Cooperative Societies. Introduction of Bulk Milk Coolers (BMCs) at strategic locations in the milk collection routes have increased the quality of milk collected, which is evident by the high Methylene Blue Reduction Test (MBRT) results recorded at the End Implementing Agency (EIA) level.

NDDDB Foundation for Nutrition

During the year, the 'Giftmilk' programme of NDDDB Foundation for Nutrition (NFN) provided flavoured milk, free of cost, to government school children on



all working days by mobilising donations from NDDB subsidiaries under their Corporate Social Responsibility (CSR) commitments.

NFN's 'Giftmilk' programme continued to supply milk to Zilla Parishad High school, Telangana under CSR contribution of Indian Immunologicals Limited, Hyderabad. Till 26th July, 2016, Mother Dairy, Delhi supplied chocolate-flavoured milk in 200 ml Tetra pack. Subsequently, sterilised flavoured milk of various flavours in 200 ml bottles was arranged from Nalgonda-Ranga Reddy Milk Producers Mutually Aided Cooperative Union Limited (NARMUL). NARMUL has started to supply milk to school children who belong to their milkshed as part of their social responsibility also.

'Giftmilk' continues to supply in both the Sarvodaya Kanya Vidyalayas in Delhi with the support of Mother Dairy, Delhi under their CSR commitment.

IDMC Limited, Anand adopted four schools in Anand under their CSR commitment and launched 'Giftmilk' on 15th August, 2016. The Kaira Milk Union Limited (AMUL) has been supplying fortified pasteurised flavoured milk to these school children.

During the year, NFN has received donations of about ₹ 1.2 crore and covered around 3,600 students to serve around 4,50,000 Child Milk Days.*

Management of Dairy Cooperatives

West Assam Milk Producers' Cooperative Union Limited

NDDB continued to manage the West Assam Milk Producers' Cooperative Union Ltd. (WAMUL) during the financial year 2016-17. For 2016-17, WAMUL reported

an average milk procurement of around 26 thousand kg per day at 4.2 per cent Fat and 8.2 per cent SNF with a peak procurement of around 38 thousand kg per day from 182 functional milk producers' institutions / dairy cooperative societies that covered over 4,500 dairy farmers. This year, the Union has paid an average milk procurement price of ₹ 34.30 per kg of milk with average 4.2 per cent Fat and 8.2 per cent SNF to its dairy farmers. Besides, the Union also disbursed an average price difference of ₹ 2.80 per kg of milk for the period March 2015 to March 2016. The Union has also achieved 100 per cent digitisation in the payments of milk bill amounts by direct bank transfers into the savings account of the individual dairy farmer.

During the year, the Union sold around 48,000 litres of packed liquid milk per day under the brand name 'Purabi' and had also launched a new product 'Tea Special' in 500 ml pouches. The Union has registered a sales turnover of ₹ 820 million (provisional) as against ₹ 725 million last year. The logo of the brand name "Purabi", which enjoys a significant prominence and value in this region, has been revamped to give a more contemporary and appealing look. WAMUL has applied for registering both its brand name and logo under Trademark Act, 1999.

In August 2016, WAMUL organised its Annual Milk Day where it recognised and rewarded the efforts made by dairy farmers including women dairy farmers in making the concept of cooperative dairying a success.

In December 2016, WAMUL organised a Consumer Day for creating awareness among the general public about the essence of consuming pasteurised and hygienically packed milk and milk products.

During the year, considering the progress made by WAMUL under the management of NDDB, the management of East Assam Milk Producers' Cooperative Union Ltd. (EAMUL) and Cachar and Karimganj Milk Producers' Cooperative Union Ltd. (CAMUL) were also handed over to NDDB by the Government of Assam. WAMUL will be spearheading the implementation of dairy development activities in the districts of these Milk Unions.

During the year, WAMUL was taken on board as one of the End-Implementing Agency (EIA) for implementing dairy development activities in the formal milk sector of 13 districts in Assam under a new World Bank aided project-Assam Agribusiness and Rural Transformation Project (APART) slated to be implemented for a period of seven years. Under the new project, WAMUL, in consultation with World Bank Mission and ARIAS Society

* Child Milk Days means one child getting a glass of milk for a day.

(Project Coordination Unit of APART), has prepared its proposal with an estimated outlay of ₹ 2,370 million that got submitted in the Project Implementation Plan (PIP) of APART.

During the year, in the operational area of EAMUL, activities of milk marketing and delivery of extension services such as doorstep AI, distribution of cattle feed and mineral mixture under RBP have commenced. Moreover, WAMUL has been sanctioned an amount of ₹ 260 million for implementing activities under National Programme for Dairy Development (NPDD) scheme of Department of Animal Husbandry, Dairying and Fisheries (DADF), GoI in the districts of Cachar, Hailakandi and Karimganj for a period of three years. The three districts fall under the area of operation of CAMUL.

WAMUL have also been sanctioned financial assistance under the erstwhile IDDP-III scheme of DADF, GoI for installation of solar-powered data processor based milk collection units (DPMCU) in all of its MPIs/DCS located in the districts of Morigaon and Nagaon. This will strengthen the fairness and transparency of milk procurement and payment system for the benefit of dairy farmers.

As of March 2017, WAMUL rendered around 87,000 doorstep AI delivery services through a network of 120 mobile AI technicians in its area of operation besides reporting birth of around 26,000 calves of which over 50 per cent are female calves.

Jharkhand Milk Federation

The thrust on dairy development in Jharkhand continued during the year. The Federation was also sanctioned two Sub-Projects under NDP I for VBMPs and RBP with an estimated outlay of ₹ 99.34 million. The Federation reached an average daily milk procurement of 85.41 thousand kg per day (TKgPD) during March 2017, with an annual average of about 68.16 TKgPD, through some 15,272 milk pourers spread over 1,516 villages and a network of 275 DPMCU/AMCU villages in 480 Milk Pooling Points attached to 46 Bulk Milk Coolers (BMCs) and four dairy plants at Ranchi, Latehar, Deoghar and Koderma. During the year, the Federation on an average marketed about 54 thousand litres of milk per day.

During the year, the area-specific mineral mixture plant produced and sold 465 MTs of chelated mineral mixture to the milk producers of the State. Additionally, the Bypass Protein Plant manufactured and sold about 105



NDDB took up the responsibility of dairy development in areas where development has not been significant.



MT of the Bypass Protein supplement. The Federation also facilitated supply of 2,600 MTs of Compound Cattle Feed (Type-I) to milk producers. Under the training and extension activities, the Federation trained 7,310 milk producers during the year.

Financial Assistance to Dairy Cooperatives

NDDB continued to provide financial assistance to dairy cooperatives for enhancing their milk processing facilities and implementing other programmes. During 2016-17, a project outlay of ₹ 2,500 million was approved under the scheme "Providing financial assistance for infrastructure activities, skill development and trainings". Financial assistance to dairy cooperatives also continued for projects approved under the Perspective Plan. Financial assistance of ₹ 2,084 million was disbursed to dairy cooperatives during the year. Working capital advances of ₹ 518 million were also provided to dairy cooperatives during the year.

Dairy Processing & Infrastructure Development Fund (DIDF)

Demand for milk & milk products in the country has been rising due to increasing population, rising disposable income, changing lifestyle and food habits and export opportunities. With increase in milk production and the resultant marketable surplus, Dairy Cooperatives are expected to increase their village coverage and raise their milk procurement.

Currently, Dairy Cooperatives have milk processing capacity of about 66 million litres per day. Most of these plants were commissioned during Operation Flood which ended in 1996. A majority of these plants have not been expanded nor modernised since then. It is therefore imperative that the existing plants are expanded and new plants are established to handle increased milk procurement by 2019-20.



Dairying a source of sustainable livelihood and poverty alleviation for milk producers

NDDB prepared a project proposal and submitted to Department of Animal Husbandry, Dairying and Fisheries, Government of India.

The Government of India in the Union Budget 2017-18 announced setting up of Dairy Processing and Infrastructure Development Fund (DIDF) in NABARD with a corpus of ₹ 80,000 million over three years. Initially, the Fund will start with a corpus of ₹ 20,000 million.

The investment envisaged under the project will help in adopting environment-friendly, energy-efficient and modern technologies particularly keeping in view the stringent food safety norms being enforced by FSSAI for processing of liquid milk and manufacturing of Value Added Products. It will simultaneously help in meeting the growing demand for milk & milk products in the country. Rapid chilling of milk at village level would help in controlling proliferation of bacteria and strengthen the food quality in the production chain. Dairy Cooperatives are expected to create adequate chilling infrastructure and install electronic milk adulteration testing equipment at village level to maintain the initial quality of milk and ensure fair and transparent milk procurement system.

The Department of Animal Husbandry, Dairying and Fisheries, Government of India has carried out consultations with key stakeholders like State Government, Milk Federation, Milk Unions, NABARD and NDDB to discuss on the proposed Dairy Processing and Infrastructure Development Fund (DIDF) scheme.

Dairy Development Initiative in Vidarbha and Marathwada Regions of Maharashtra

Vidarbha and Marathwada regions in comparison to other parts of Maharashtra are less developed. Frequent droughts and inadequate irrigation facilities in these regions lead to frequent crop failure resulting in rising debt on farmers, which in turn leads to high incidence of farmers' suicide. Anecdotal evidence across India suggests that dairying is a better insurance for livelihood security particularly in the drought-prone regions.

To make dairying a source of sustainable livelihood and poverty alleviation for milk producers in these regions, NDDB and the Government of Maharashtra (GoM) have jointly planned to take up dairy development activities in Vidarbha & Marathwada regions. NDDB has prepared and shared a Detailed Project Report with GoM. It is proposed to implement the project over a period of three years from 2017-18 to 2019-20 with an outlay of about ₹ 3,000 million covering 90,000 farmers in 3,000 villages. The objective of this project is to improve productivity of milch animals and simultaneously establish milk producers' institutions at village level for collection of surplus milk, its processing and marketing of packed liquid milk & milk products.

Mother Dairy, a subsidiary of NDDB has already started milk procurement operations in these regions.



The Government of India in the Union Budget 2017-18 announced setting up of Dairy Processing and Infrastructure Development Fund (DIDF) in NABARD with a corpus of ₹ 80,000 million over three years. Initially, the Fund will start with a corpus of ₹ 20,000 million.



Farmers are now encouraged to produce and sell milk through a fair and transparent milk procurement system established under the project. Mother Dairy has also invested in refurbishment of Nagpur Dairy plant which was handed over by the GoM for its operations and management, along with installation of Bulk milk coolers and Automatic milk testing equipment at village level and setting-up of marketing infrastructure.

Under the project, to improve the productivity of milch animals in the region, GoM proposes to provide support for various Productivity enhancement activities such as doorstep delivery of AI services, ration balancing advisory services, supply of feed & feed supplements, fodder development activities, village level animal health services and animal induction.

Quality Assurance

NDDDB rolled out the concept of Quality Mark (QM) with a Unique Logo to (i) impart a distinct identity to Dairy Cooperatives & Milk Unions, Government owned dairies, Dairy Units of Educational Institutes, Producers companies/NGC and subsidiaries of NDDDB, and (ii) to enhance consumer confidence. The concept aims to improve food safety and quality across the entire milk chain. The Cooperative Dairies have shown interest in this initiative.

NDDDB's support to various regulatory or scientific or advisory bodies like the Codex Alimentarius Commission (CAC), National Codex Committee (NCC), Food Safety and Standards Authority of India (FSSAI), Bureau of Indian Standards (BIS), Exports Inspection Council of India (EICI), Department of Animal Husbandry, Dairying

and Fisheries etc. continued during the year. NDDDB has been supporting EIC for evaluation of certification of export worthiness of dairies and coordinating as Secretariat of the Indian National Committee (INC) of the International Dairy Federation (IDF) and providing technical support as e-Working Group (eWG) member for IDF and CAC.

NDDDB shares various technical information - specifications of process equipment, products and strengthening of laboratory equipment / instruments, Standard Operating Procedures (SOP's), technical articles related to CMP, GMP, GHP and FSMS etc. and 'Technews' through its knowledge portal.

Sustainability studies were undertaken for the states of Odisha, Punjab, Madhya Pradesh and Rajasthan. In addition, studies were also conducted to ascertain fat and solids not fat (SNF) in fresh raw milk from 175 animals in the states of Punjab, Rajasthan, Karnataka, Kerala, Odisha, Madhya Pradesh and Gujarat. Over 200 samples of milk & milk products were picked up from across the country to ascertain the levels of residues and contaminants (Heavy metals, Pesticide residues, Aflatoxin, Antibiotics and Veterinary Drug residues) to generate a data base. The study will be continued in the following year.

Milk Producer Companies

NDDDB Dairy Services (NDS) facilitated the incorporation and operationalisation of four more Milk Producer Companies (MPCs), two in Rajasthan namely, Sakhi Mahila Milk Producer Company in Alwar and Asha Mahila Milk Producer Company in Pali, Shwethdhara Mahila Milk Producer Company Limited in Pratapgarh, Uttar Pradesh and Ruhaanii Milk Producer Company Limited in Mansa, Punjab. NDS has promoted these MPCs, based on a request from Tata Trust, in areas where the Trust is already implementing livelihood projects. Out of these four MPCs, three MPCs are 'all women-member' based and all the producer-directors on the Board are women. In a short span of time, these four MPCs have together enrolled more than 7,300 members in about 200 villages and have reached milk procurement of 20 thousand kg of milk per day.

NDS continued to support the five MPCs namely, Paayas in Rajasthan, Maahi in Gujarat, Shreeja in Andhra Pradesh, Baani in Punjab and Saahaj in Uttar Pradesh. NDS has also provided technical support to these MPCs in taking up various activities under NDP I.

Together, these five MPCs have enrolled around four lakh milk producers as members as of March 31, 2017 and have contributed about ₹ 910 million towards share capital. Of the total membership, about 41 per cent are women and about 59 per cent are small holder milk producers.

These five companies together procured about 21 lakh kg of milk per day during the year. These MPCs together market about 4.25 lakh litre per day of various variants of poly pack milk and value-added products like curd, *ghee*, butter milk etc., besides bulk supplies to institutions.

Advisory services for ration balancing, fodder development, delivery of cattle feed and mineral mixture were undertaken in all the five MPCs, while Artificial Insemination (AI) services were provided by Paayas, Maahi, Shreeja and Saahaj MPCs under the NDP I.

Under the Ration Balancing Programme (RBP), a total of about 7.6 lakh animals were covered in about 12,300 villages through about 6,400 Local Resource Persons (LRPs) in the five MPCs. In the year 2016-17, about 5.2 lakh AIs were performed in about 10,700 villages by more than 1,300 Mobile AI Technicians (MAITs) in the four MPCs.

NDDB's Golden Jubilee Coffee Table Book

NDDB published its Golden Jubilee Coffee Table Book titled "50 Years – The Great Indian Milk Revolution" which was released by the Minister for Agriculture & Farmers Welfare, Government of India. The Coffee Table Book features a glimpse of NDDB's 50-year remarkable journey and the value it has created for millions of dairy farmers in this country. The book exemplifies NDDB's belief that cooperative principles are as relevant today as they were in the past and the institutions which follow these will form the structural framework for driving dairying in future. It also highlights the Dairy Board's efforts towards bringing about socio-economic change in rural India.

Awareness Generation

NDDB has constantly strived to create awareness amongst milk producers about the best animal husbandry practices to ensure clean milk production at the farm level, healthy bovine and maximum returns to the milk producers. For this, extension materials on Animal Health, Nutrition and Breeding were prepared during the year and were distributed in large numbers.



Release of NDDB's Golden Jubilee Coffee Table Book titled "50 Years – The Great Indian Milk Revolution"

Animal welfare is one of the areas that have been receiving the focus it rightly deserves of late. Recognising this, NDDB has come out with a booklet titled "Understanding Your Bovine" in English and Hindi. The booklet creates awareness on easily discernible signs of bovines so that corrective measures can be taken for management, feeding, health, hygiene practices, levels of discomfort etc., thereby avoid losses which at times could be disastrous.

NDDB has developed an Android-based mobile application (App) on improving dairy animal productivity through Artificial Insemination (AI), which was launched by the Minister for Agriculture & Farmers Welfare, Government of India.

Films on Clean milk production, Moringa, Calf Care, Progeny Testing and Pedigree Selection were produced in 12 vernacular languages during the year and distributed through milk federations and milk unions.

Enhancing Productivity

ANIMAL BREEDING

Under NDP I, scientific genetic improvement programmes have been initiated for a few important dairy breeds to enhance the productivity of huge cattle and buffalo population in the country.

To meet the challenges arising from climate change, maintaining biodiversity in the bovine population is important as some of our indigenous breeds have resistance to diseases and parasites, resilience to climatic stress and ability to cope with variable access to nutrients. These characteristics are vital to mitigate the impact of climate changes. Equally important is to raise the genetic potential of some of the indigenous dairy breeds so that they are able to compete with exotic breeds or their crosses.

The main programmes initiated for enhancing the genetic potential of cattle and buffaloes include: Production of High Genetic Merit (HGM) bulls through Progeny Testing (PT) and Pedigree Selection (PS) programmes; production of disease free, high quality semen doses from HGM bulls produced through genetic improvement programmes; delivery of Artificial Insemination (AI) services at the doorstep of producers using only disease free, high quality semen doses produced from HGM bulls. Various quality control procedures have been developed to ensure that the end implementing agencies undertaking these programmes adhere to the Minimum Standards (MS) and Standard Operating Procedures (SOPs) established for bull production, semen production and AI delivery. An information network, "Information Network for Animal Productivity and Health (INAPH)", has been put in place to collect field level data on individual animal basis, process them and send relevant information to all stakeholders including farmers, technicians, managers and policy makers.

Progeny Testing

Evaluating bulls based on their daughters' performance is a practical and proven option for achieving a steady genetic improvement in any breed.

NDDDB continued its efforts in implementing Progeny Testing (PT) Projects during the year. Under NDP I, 13 sub-projects for 12 End Implementing Agencies (EIAs) spread over nine States have been approved with a total outlay of ₹ 2,380.9 million. Considering the demand for semen doses, PT programmes have been initiated for three cattle breeds viz. Holstein Friesian, Holstein Friesian crossbred, and Jersey crossbred and two buffalo breeds namely, Murrah and Mehsana.

Since the launch of NDP I in 2012-13, all the projects together have put 1,479 bulls under test mating and supplied 776 young HGM bulls to different semen stations for the production and supply of high quality disease free semen doses across the country.

Animal type classification forms an integral part of PT programme. Giving weightage to type traits in selection of animals improves the longevity of animals. Field implementation of typing has been initiated in six projects and type trait measurement procedures have been standardised for CBHF, Murrah and Mehsana breeds. A workshop on Animal Typing was also held during the year to discuss the progress and share experiences of typing of animals.

A nine-member Expert Committee for Estimation of Breeding Value of Bulls formed by the Government of India completed breeding value estimation of 519 bulls of five PT projects, namely SAG CB HF PT, SAG Murrah PT, Mehsana Milk Union (MU) Mehsana PT, Banas MU Mehsana PT, and KMF HF PT. A Test Day Random Regression method was used for estimating breeding values of bulls and recorded females. The estimated breeding values have been published on the NDDDB website.

Information Network for Animal Productivity and Health (INAPH) has been put in place to collect field level data on individual animal basis, process them and send relevant information to all stakeholders including farmers, technicians, managers and policy makers.



Progress made under PT projects during 2016-17

| Breed | End Implementing Agency / State | No. of Bulls put to test | No. of HGM Bulls distributed to various Semen Stations |
|-----------------|---|--------------------------|--|
| Murrah PT | Sabarmati Ashram Gaushala (SAG, Bidaj Gujarat), Punjab Livestock Development Board (PLDB, Punjab), Haryana Livestock Development Board (HLDB, Haryana), Animal Breeding Reserach Organisation (ABRO, Uttar Pradesh) | 141 | 88 |
| Mehsana PT | Mehsana & Banaskantha Milk Unions (Gujarat) | 43 | 26 |
| HF Cross PT | Sabarmati Ashram Gaushala (SAG, Bidaj Gujarat), Uttarakhand Livestock Development Board (ULDB, Uttarakhand) | 75 | 72 |
| Jersey Cross PT | Andhra Pradesh Livestock Development Agency (APLDA, Andhra Pradesh), Tamil Nadu Cooperative Milk Producers' Federation (TCMPF, Tamil Nadu) | 167 | 89 |
| HF PT | Karnataka Milk Federation (KMF, Karnataka) | 70 | 53 |
| TOTAL | | 496 | 328 |

Pedigree Selection

Unlike Progeny Testing programmes, here bulls are selected based on the performance of their parents and not on their daughters' performance.

Ten Pedigree Selection (PS) projects - six for cattle breeds namely Kankrej, Rathi, Gir, Sahiwal, Hariana and Tharparkar and three for buffalo breeds viz. Nili-Ravi, Jaffarabadi and Pandharpuri have been initiated in their respective native tract with a total outlay of ₹ 584.6 million. NDDB continued to support implementation of these projects during the year.

In these projects, AI centres are established and all efforts are made to promote AI in the project area. In addition, high producing female animals available with farmers are identified through a systematic milk recording programme and bred with the best bulls to produce future breeding bulls, top among them are then used for AI in the project area. With continued selection of bulls and their extensive use in the project area, steady genetic progress is achieved. The Standard Operating Procedures (SOPs) and the Minimum

Standards (MS) set under NDP I are followed for implementing these projects.

Under NDP I, till date, 411 AI centres have been established, which carried out around 2,35,000 AIs. So far 78 young HGM bulls have been distributed from the PS projects to different semen stations for production and supply of high quality disease free semen doses. During 2016-17, these projects all together produced 38 HGM bulls ready for distribution to the semen stations.



Under NDP I, 411 AI centres have been established, which carried out around 2,35,000 AIs.





Sahiwal cow

Progress made under PS projects during 2016-17

| Sl. No. | Indigenous Breed | End Implementing Agency & States | No. of AI centres established | AI done | No. of bulls distributed to Semen Stations |
|--------------|------------------|--|-------------------------------|---------------|--|
| 1 | Sahiwal | Sri Ganganagar Zila Dugdh Utpadak Sahkari Sangh Ltd. (GANGMUL), Rajasthan | 25 | 8,698 | --- |
| 2 | Sahiwal | Punjab Livestock Development Board (PLDB), Punjab | 25 | 5,388 | --- |
| 3 | Gir | Sabarmati Ashram Gaushala (SAG), Gujarat | 50 | 14,490 | 11 |
| 4 | Kankrej | Banaskantha Milk Union, Gujarat | 57 | 7,949 | 5 |
| 5 | Rathi | Uttari Rajasthan Cooperative Milk Union Ltd (URMUL Rural Health, Research and Development Trust), Bikaner, Rajasthan | 47 | 10,426 | 12 |
| 6 | Tharparkar | Rajasthan Livestock Development Board (RLDB), Rajasthan | 40 | 5,251 | --- |
| 7 | Nili Ravi | Punjab Livestock Development Board (PLDB), Punjab | 50 | 9,933 | --- |
| 8 | Jaffarabadi | Sabarmati Ashram Gaushala (SAG), Gujarat | 47 | 14,088 | 8 |
| 9 | Pandharpuri | Maharashtra Livestock Development Board (MLDB), Maharashtra | 30 | 5,166 | --- |
| 10 | Haryana | Haryana Livestock Development Board (HLDB), Haryana | 40 | 3,103 | 13 |
| TOTAL | | | 411 | 84,492 | 49 |

Strengthening Semen Stations (SSS)

Production of disease free, high quality semen from HGM bulls maintained at bio-secured semen stations forms the basis of any genetic improvement programme.

Until March 2017, 22 projects of 19 EIAs from 14 states have been approved for strengthening of 'A' and 'B' graded semen stations (SSS) under NDP I with a total outlay of ₹ 2,550 million. Infrastructure, pertaining to biosecurity, semen production and processing of high quality, disease free semen doses from genetically superior bulls, has been developed under these projects. These 22 semen stations together produced 77.16 million semen doses during the year. This comprises about 74 per cent of the total doses produced in the country.

AI Delivery Services

During the year, 353 new AI centres were established as part of Pilot AI Delivery (PAID) services. These new AI centres, together with already established AI centres, carried out about 0.52 million AIs and produced 51,226 genetically superior female calves.

The AI delivery services to the farmers remained the core activity of input delivery services rendered by all cooperative milk unions. During 2016-17, the Cooperative Milk Unions together performed 15.87 million AIs through 21,075 centres covering 62,777 Dairy Cooperative Societies (DCSs) at village level.

Information Network for Animal Productivity and Health

An Information Network covering all areas of productivity enhancement for real-time monitoring and efficient decision-making

In addition to NDP I scheme, the Government of India decided to use Information Network for Animal Productivity and Health (INAPH) system in implementation of other central sector schemes like National Project on Bovine Breeding (NPBB), Rashtriya Gokul Mission (RGM), National Mission on Bovine Productivity (NMBP), Nakul Swasthya Patra etc. across the country. In order to operationalise the same, NDDDB organised a national workshop on 'INAPH system' at NDDDB, Anand to sensitise animal husbandry departments/livestock development boards in the states. Officials of 18 states participated in the workshop. Following the instructions of the Department of Animal Husbandry, Dairying and Fisheries, Government of India, 14 states have nominated a

Joint Director level officer as nodal officer for INAPH related activities in the state. On request of the Animal Husbandry Commissioner, NDDDB arranged four special INAPH "Training of Trainers (ToT)" Programmes exclusively for the State Animal Husbandry Departments/Livestock Development Boards' officials in which 67 officers from 17 states and 2 Union Territories attended the programme at NDDDB, Anand.

To strengthen Government of India's unique animal identification programme, NDDDB is centrally managing the activity and generated around 18.1 million unique numbers on request received from 275 institutions.

Innovation and Adoption of Technologies to Enhance Productivity

Genomic Selection

Estimation of breeding values on the basis of observed physical characteristics may be inaccurate and hard to evaluate till the animal attains maturity resulting in delay in verification of the results. Genome analysis tools that have been developed recently provide a new avenue for estimating Genomic Breeding Values (gEBV), even in young animals, thus helping to rank them based on genetic merit. Once these tools are standardised to suit our animal populations, Genomic Selection can be a quick and cost effective method for selection of breeding bulls and bull mothers. This method is now being used the world over in dairy cattle breeding. NDDDB has started collecting DNA material from performance recorded animals. These DNA samples will be used for identifying Single Nucleotide Polymorphism (SNPs) useful for genomic selection of the indigenous breeds of cattle and buffaloes and crossbred cattle. A MoU has been signed with Aarhus University, Denmark for the capacity building of officers.



During 2016-17, the Cooperative Milk Unions together performed 15.87 million AIs through 21,075 centres covering 62,777 Dairy Cooperative Societies (DCSs) at village level.



Establishment of laboratory for OPU-IVEP

For genetic improvement of cattle and buffaloes, utilisation of identified elite males and females to the maximum possible extent, through Progeny Testing (PT) and Pedigree Selection (PS) projects under NDP I is important for production of future breeding bulls. Genetic gain per year, apart from other factors, depends on intensity of selection i.e. number of animals used for production of progenies out of the recorded animals. To meet the demand of bulls, every year around 10 per cent of recorded cows or buffaloes are used for bull production. The female calves are used for nominated mating and, on an average, 3-4 male calves could be produced from each elite female in its lifetime. Ovum Pick Up and In Vitro Embryo Production (OPU-IVEP) technology allows 5-10 folds increase in the number of male calves produced from one elite animal. This technology involves aspiration of oocytes from ovaries of donor female animals, fertilising these oocytes outside the body with the use of In Vitro Fertilisation (IVF) technique, and producing larger number of viable embryos for implantation in recipient animals. This enables production of more number of calves from less number of elite animals, thereby increasing the selection intensity. Further, NDDDB has already decided to adopt Genomics for selection of breeding animals, and therefore an OPU-IVEP facility would help to fully exploit genomically-selected animals. With this background, NDDDB has initiated a project to establish a laboratory on OPU-IVEP at NDDDB, Anand with facilities to house donor animals.

Training and Capacity Building

Continuous capacity building is essential for better implementation of the projects. Under NDP I, during the year, 44 officers of Progeny Testing & Pedigree Selection projects were trained at NDDDB, Anand. Training of 38 semen station personnel was also facilitated by NDDDB at four training Institutions – National Dairy Research Institute (NDRI), Karnal, Kerala Livestock Development Board (KLDB), Mattupatty, Madras Veterinary College (MVC), Chennai and Anand Agricultural University (AAU), Anand for Semen Station Strengthening Projects. During the year, various officers attended international trainings. Number of papers were also presented by experts from NDDDB at international events during the year.

In order to create awareness about the PT and PS projects among farmers, documentary movies on PT and PS activities have been prepared and shared with EIAs. These have also been made available on the Dairy Knowledge Portal.



An elite Nili-Ravi buffalo registered under PLDB PS project

Technical Workshops

Several workshops on Body Typing, Project Evaluation, AI Delivery and monitoring through INAPH were held during the year. These workshops have helped participants share their experience with others and acquire skill and knowledge to implement their projects more efficiently.

Project Monitoring and Evaluation

All AB projects are being monitored regularly by dedicated NDDDB officers and timely feedback and technical support are being provided to project authorities which helps in smooth implementation of these projects.

During the year, 13 PT and 10 PS projects were evaluated by Evaluation Teams constituted by Mission Director, NDP I. These evaluations help the EIAs examine the processes followed with respect to SOPs and understand lacunae, if any. NDDDB provides constructive feedback to improve qualitative and quantitative performance of the projects through review meetings.

ANIMAL NUTRITION

Initiatives for enhancing green fodder production from the available land by using certified/truthfully labelled fodder seed, securing available biomass from the farmers' field and popularisation of Moringa and thorn-less cactus as a source of green fodder continued during the year.

For improving productivity, it is important that the calves born are healthy and reared on scientific lines so that they attain early maturity and start producing milk at an early age. To address this, NDDDB initiated field studies to rear healthy female indigenous cow and buffalo calves under field conditions. Efforts for providing ration balancing advisory services at farmers' doorstep, using locally available feed resources and area-specific mineral mixtures continued during the year, which helped in improving productivity of dairy animals.

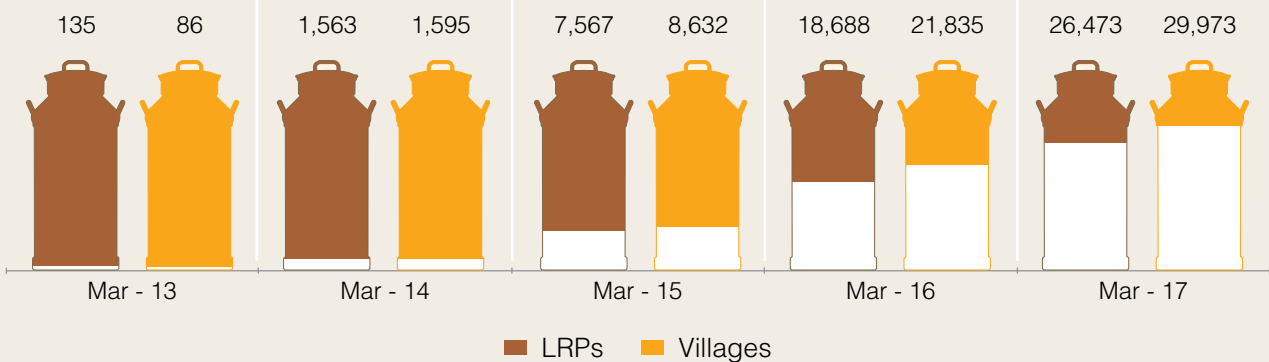
Ration Balancing Advisory Services

Efforts to expand coverage of Ration Balancing Programme (RBP) continued during 2016-17. During

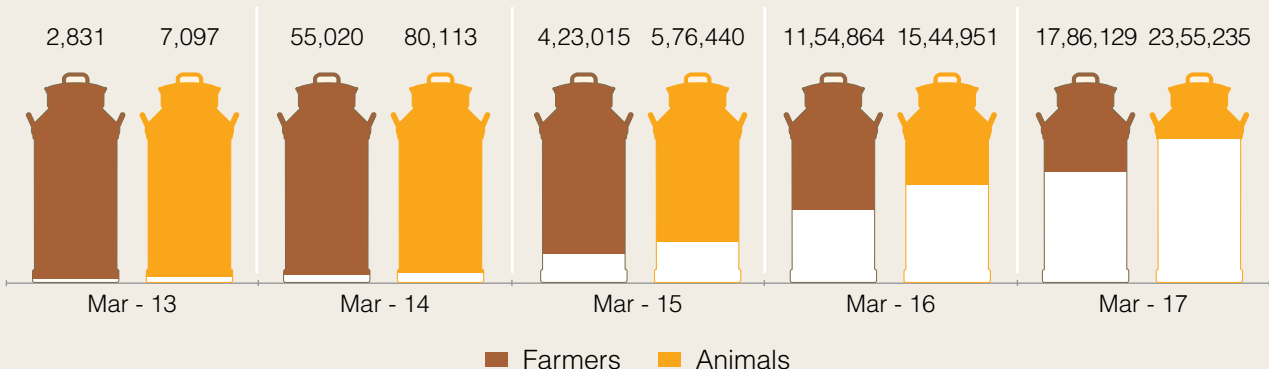
the year, 20 new Sub-Project Plans (SPP) with financial outlay of ₹ 34.40 crore were approved. In total, 117 SPPs with a financial outlay of ₹ 324.69 crore and envisaged coverage of 2.61 million animals in 34,429 villages, spread over 18 states, have been sanctioned so far.

Since training plays a very important role in success of any project implementation, therefore, in 2016-17, 123 animal nutritionists / Technical officers and Trainers of 41 end implementing agencies (EIAs) were imparted training on ration balancing programme (RBP) at NDDDB, Anand. With an objective to expand the reach of the programme beyond NDP I areas, 18 officers from the Animal Husbandry Department were also oriented on ration balancing programme. On the request of FAO, two officials from Myanmar were also acquainted on RBP software enabling them to initiate similar activity in their country. So far, 688 officers, including 67 women have been trained on RBP. To enhance the capacity of project implementing agencies, refresher training was arranged for 35 officers during the year. Further, with an aim to make the EIAs more competent in trouble shooting and

Periodic RBP expansion in terms of Village coverage and LRP induction



Periodic RBP expansion in terms of Farmers and Animals





A Local Resource Person makes producers aware of the importance of feeding a balanced ration to their animals

addressing software-related issues for implementation of INAPH (Information Network on Animal Productivity and Health), 32 IT officers were also trained on software application aspects.

Trained technical officers and trainers carried out the process of identifying and imparting software and practical training on RBP to local resource persons (LRPs) at their respective EIAs. During the year, 7,313 LRPs were trained in 92 EIAs. Out of total 26,733 LRPs trained so far, 20 per cent were women, 11 per cent SC/STs and 66 per cent small holders. In 2016-17, 22 new EIAs initiated RBP activity and the number of EIAs providing ration balancing advisory services increased from 77 to 99. Another seven EIAs are at various stages of project readiness to roll out the programme.

This year, 7,785 new LRPs were inducted in 8,138 villages that brought 8.1 lakh animals of 6.3 lakh milk producers under the fold of RBP. As of now, 26,473 trained local resource persons (LRPs) are providing digitally-generated balanced ration advices to around 1.78 million farmers for their 2.36 million milch animals in 29,973 villages across 17 states of our country. The year-wise progress under RBP is depicted in the following graphs.

Performance records of animals captured online in INAPH indicates that balanced ration led to an increase in average daily milk yield of 0.27 kg and milk fat by 0.10 per cent along with reduction in feeding cost by ₹ 2.36 per kg of milk. These led to increase in average net daily income of milk producers by about ₹ 26 per animal. In addition, comparison of data on lactation length of animals fed with balanced rations as against those not fed balanced rations indicate that the lactation period increased on feeding a balanced ration by 28 and 67 days in cattle and buffaloes, respectively.

Keeping in view the significance of LRPs in the project, it is necessary that all the EIAs put in place a sustainability plan to carry on RBP activity during and beyond NDP I period. To ensure this, a workshop on RBP sustainability was organised at NDDB, Anand where Chief Executive Officers (CEOs)/Managing Directors (MDs) and RBP Project Coordinators of 65 EIAs were present and they chalked out proposed sustainability plans for respective projects. Out of those attended workshop, 59 EIAs have taken approvals from respective board of milk unions and have confirmed sustainability mechanisms for continuation of RBP.

Pashu Poshan, an android-based mobile application launched during the previous year, through which farmer themselves can prepare a balanced ration for their milch animals, has also attracted the attention of dairy farmers. To popularise it, numerous farmer meetings were held across the country. Till March 31, there were 26,724 downloads of the application and more than 12,841 unique users have registered for the application.

Production of specialised feeds and feed supplements

Promotion of bypass protein and fat supplements, area-specific mineral mixtures, pregnancy feed, buffalo feed, calf starter and calf growth meal continued during the year. For production and supply of area specific mineral mixtures, one more mineral mixture plant of 12 tonnes per day capacity, was set up at cattle feed plant, Kanjari in Gujarat. During the year, one bypass protein plant of 50 tonnes per day capacity was also set up at cattle feed plant, Himmatnagar under Sabarkantha Milk Union in Gujarat. With the technical assistance of NDDB, production of calf starter, calf growth meal and pregnancy feed was initiated at cattle feed plant, Katarva in Gujarat and cattle feed plant at Khanna in Punjab. These specialised feeds help in improving growth rate in young calves, milk production and reproduction efficiency in milch animals.

Green Fodder Production Enhancement

Green fodder is the most economic source of nutrients for dairy animals. There is an urgent need to focus on meeting the green fodder demand of an increasing

livestock population and also to help enhance their productivity, for which availability of fodder resources have to be increased along with their judicious utilisation. Chronic shortage of green fodder makes dairying uneconomical and unattractive as an income generation activity for farmers. More income to farmers from dairying is possible only by making available good quality green fodder in adequate quantity for animals from his fields. Cultivation of newly developed varieties and hybrids of fodder crops at farmers' field plays an important role in this direction. Adoption of recommended cultivation practices in fodder cultivation by farmers further helps in fodder productivity and quality enhancement.

New varieties and hybrids of fodder crops are being continuously developed, notified and released for cultivation by ICAR / Agricultural Institutes in the country. It is very important that fodder seed of high genetics having inherent potential to give high yield and quality fodder under good management conditions are provided to farmers to ensure timely sowing and optimum fodder production. A regular seed production programme is carried out by NDDB to ensure availability of new varieties of fodder seed for farmers. In this programme, NDDB provided technical support to fodder seed processing units of dairy cooperatives in arranging breeder / parent seed material from different ICAR institutes / agricultural universities for use in seed multiplication programmes.

To replace the old varieties which are low yielding and prone to disease and pest attacks, NDDB introduced, newly notified and released fodder varieties like JHO 99-2 in Oats and BAIF - 1 in Pearl millet, in the seed



Green Fodder crops contribute to enhanced milk production at low cost

multiplication chain. Through network of seed processing unit under Dairy Cooperatives, certified / truthfully labelled seed of improved varieties of fodder crops were produced and distributed to farmers. During the year, about 12.0 metric tonnes of breeder seed of improved varieties of fodder crops like Oats (Kent, NDO -1, UPO 212, JHO 99-2, Bundel Jai 99-1 and JHO 822), Sorghum (Pant Chari 6, HJ 513, CSH 24 MF, CO FS 29, CSV 27 and Pant Chari 5), Lucerne (Anand Lucerne 3 and Anand 2), Berseem (Wardan, JHB 146, BL 1, BL 10 and JB 1), Maize (African Tall, J 1006 & Pratap Makka Chari 6), Cowpea (EC 4216 and UPC 8705) and Cluster bean (RGC 936 and RGC 1002) were obtained from the Indian Council of Agricultural Research/Agricultural Universities and supplied to registered seed growers through dairy cooperatives for further seed multiplication. Raw seed were procured, processed, graded and packed in bags and then supplied to dairy farmers for fodder cultivation. Proper technical guidance and monitoring was conducted to ensure production of healthy seed with high vigour, germination and purity.

In the Fodder Demonstration Unit (FDU) at NDDDB, Anand cultivation of different fodder crops with recommended agronomic practices were demonstrated to disseminate improved forage production and conservation technologies among dairy farmers, field staff and fodder officers. Awareness on scientific methods to enhance green fodder productivity, year round green fodder production and management of fodder crops with limited availability of water was created through demonstration of different varieties/hybrids of seasonal crops sorghum, maize, pearl millet, berseem, lucerne, oats and range grasses & range legumes like anjan, dhaman, blue panic, rhodes, sehima, sewan, clitoria, siratro, stylo and hedge lucerne. Under irrigated and high soil fertility conditions, fodder crops like BN hybrid grass, para grass, guinea grass and setaria grass were demonstrated for fodder production. More than 6,800 farmers, field staff, officers, board of directors from milk unions/EIAs visited the Fodder Demonstration Unit to enhance their knowledge in improved fodder production, conservation (silage making) and harvesting. Ensiling methods were demonstrated to reduce fodder scarcity in lean periods. Maize is an ideal crop for silage making. Cultivation of various maize hybrids like GAWMH-2, GAYMH-1, HQPM-1, HQPM-4, P-31Y45, P-3502 and Pratap hybrid maize-3 were demonstrated for silage making. Emerging fodder crops like fodder beet, fodder chicory, grassy sorghum, dual purpose barley, hybrid maize and sweet sorghum were shown to farmers.

Fodder seed production of different fodder crops like cowpea, oats, berseem, velvet bean, rice bean was

demonstrated to farmers. 93,000 stem cuttings and rooted slips of Bajra Napier hybrid grass viz. BNH-10, CO-5, DHN-6 and Phule Jayawant (RBN-13), Co-3 and Co-4 were provided to visiting farmers, milk union's officers/staff for fodder cultivation and further propagation. To develop pastures on farmers' fields, stem cuttings of marvel grass was also provided to farmers.

Cultivation of improved varieties / hybrids of fodder crops like B.N. Hybrid (KKM-1), Cenchrus grass (Gujarat Anjan Grass -1), Oats (OL-1802, OL-1804 and UPO 06-1), Maize (Narmada Moti) and Cowpea (UPC 622 & UPC 621) were demonstrated to visiting trainees. To enhance green fodder availability under water scarcity conditions in drought-prone and desert areas falling under arid and semi-arid zones, demonstration of thornless cactus (*Optunia* spp.) by use of cladodes and tissue culture saplings for fodder purpose was taken up in Gujarat and Rajasthan.

Under the collaborative project with Anand Agricultural University, Anand, on micro propagation technology (tissue culture) in fodder cactus (*Optunia*), the protocol involving use of modern plant tissue culture methods for rapidly multiplying thornless cactus cladodes to produce large numbers of progeny plants was finalised and completed. Demonstrations of hardened thornless cactus cultivation with drip irrigation system were organised to create awareness among farmers for fodder cultivation in Gujarat.

In few villages facing drought situation in Kutch region, Banaskantha and stony hilly regions of Dahod districts, demonstration of thornless cactus cultivation for fodder purpose with drip irrigation system was started by NDDDB.

Drumstick (*Moringa oleifera*) is an emerging multi-cut perennial fodder crop with great potential for providing nutritious green fodder throughout the year. To create awareness among farmers, NDDDB continued technical and financial support to Malabar Milk Union and Jharkhand Milk Federation (JMF) to introduce and popularise its cultivation for fodder production. To meet the future demand of such high value fodder seeds, NDDDB has established demonstration of drumstick variety PKM-1 seed production farm in four hectare land at Itola near Vadodara under drip irrigation system. During the year, over 1,500 drumstick trees have been raised for seed production.

Under NDP I, technical support was provided to 47 EIAs for implementing the Fodder Development Programme. Five new seed processing plant established at Kolar, Raichur, Vijayawada, Lucknow and Kota was fully functional and involved in seed production,

processing and marketing activities. EIAs produced 3,231 MT of quality seed of different fodder crops through registered seed growers under buy-back arrangement and supplied about 6,878 MT of certified/truthfully labelled fodder seeds of improved genetics to farmers. In different states, 645 silage demonstrations were organised at the village level. 13 officers were trained on fodder production and conservation. Two Micro training centres in rural areas of Farrukhabad EIA were established to create awareness on green fodder cultivation, ensiling and modern animal husbandry practices with the help of progressive dairy farmer.

Due to key interventions undertaken in implementing fodder development programmes (NDP I), farmers have now started adopting modern agriculture practices in fodder cultivation and conservation, which has helped them in improving fodder crops and livestock productivity in their farmyard.

Crop Residues Management

Farmers are now adopting combine harvesters for managing their food crops like wheat, rice, maize, oilseeds, pulses etc. Use of such grain combine harvesters leads to heavy loss of crop residues right in the fields, which was otherwise available to dairy animals in the traditional manual method of harvesting. For reducing the field wastage of dry fodder after combining, mowers and pick-up devices have been introduced in different states for effective management of fodder. During the year, 164 mowers cum fodder biomass management attachments were procured to carry out field demonstrations at village level. During harvesting seasons, being by-product of main crop, the fodder is available at a very cheap price. With the help of these mowers, over 1,050 demonstrations were carried out to explain the usefulness of these machines in biomass management. Considering the importance of village level fodder stores, many biomass bunkers were also constructed at strategic locations.

For economising the transportation and storage cost, two straw enrichment and densification plants are also being installed: at Sri Ganganagar in Rajasthan and at Kolhapur in Maharashtra having inbuilt provisions for diet fortification along with pellet and block-making options. Civil work at both the sites is almost complete and machinery erection activities are in progress.

Crop residue based feeding system does not compete for land and water for growing human food. Straw recovery and fortification activities are environment-friendly technologies assisting in water saving apart from pollution control and wastage reduction of crop residues.

ANIMAL HEALTH

NDDB focusses on issues related to animal health that significantly affect the profits of the dairy farmers. In line with the national goal of doubling the farmers' income by the next decade, NDDB is playing an active role in formulating robust, cost-effective, farmer-centric disease control models which can be adopted across the country.

Recognising the importance of digital tools like the Information Network for Animal Productivity and Health (INAPH) software, NDDB endeavours to promote its use amongst the stakeholders so as to generate robust databases that will have an overarching impact in decision-making at all levels - from farmers to service providers to policy makers.

Efforts are also being continuously made to enhance and improve the animal health and biosecurity in bull production areas, and, in and around semen stations.

NDDB continued to support the pilot project on brucellosis control being implemented in Kutch district in Gujarat, around a semen station, and, in an organised dairy farm. As on March 2017, 15,500 cattle and buffalo calves have been vaccinated since the commencement of the Project. All the vaccinated calves are uniquely identified by ear tags and data recorded in the Information Network for Animal Productivity and Health (INAPH). Awareness creation on the control measures to be adopted at the farmers' doorstep has been the mainstay of the programme. A third party survey has shown that there has been significant improvement in awareness levels in the project area with regard to the disease per se and, particularly with respect to the control aspects like vaccination, disinfection, appropriate disposal of aborted materials etc. which are crucial elements in disease control.



During the year, 164 mowers cum fodder biomass management attachments were procured to carry out field demonstrations at village level.



The project is for a period of five years with a total outlay of ₹ 16.90 million with NDDDB contributing ₹ 10.49 million.

NDDDB also extended the support to the pilot project on bovine mastitis control in Sabarkantha Milk Union, for a further period of 18 months from October 2016 to March 2018 (Phase-II) by increasing the number of milk societies covered from 50 to 100 and, adding new components like Ethno-Veterinary Medicine (EVM) with the aim to reduce the use of antibiotics and, thereby its residues in milk. In addition, this will also help the farmers in reducing treatment costs significantly since EVM uses household ingredients that are usually available in the farmer's house. The total outlay of the Phase-II project is ₹ 16.2 million with NDDDB contributing ₹ 5.7 million. The Phase-I of the project was from October 2014 to September 2016 which focussed mainly on detection and management of sub-clinical mastitis and, awareness creation on hygienic milk production practices. A third party study estimated a cost benefit of 1:8 for the Phase-I of the project.

Biosecurity in bull production areas and semen stations

Considering that semen from the High Genetic Merit (HGM) bulls being produced under NDP I would be used on a large population of breedable cows, strict biosecurity protocols have been formulated for procurement of bull calves from the PT/PS areas and, during production of frozen semen doses so as to prevent transmission of infection through semen. Adequate technical competencies have been developed for dealing with biosecurity under NDP I in the bull

production areas, semen stations and its 10-km buffer zones. Animal Health Officers (AHO) have been trained to facilitate the implementation of activities under animal health & biosecurity in 13 Progeny Testing (PT), 10 Pedigree Selection (PS) projects and, 22 semen stations. The 10-km radius of each frozen semen station under NDP I is being covered under vaccination against Foot and Mouth Disease (FMD) and other infectious diseases to reduce the chances of disease ingress into the semen station.

Mastitis Control Popularisation Workshops

Three workshops on mastitis control were organised at Anand, Bengaluru and Mumbai to popularise the model of mastitis control being implemented at Sabarkantha Milk Union. All the 60 milk unions / milk producer companies providing veterinary services in Kerala, Karnataka, Andhra Pradesh, Telangana, Maharashtra, Goa and Gujarat were covered through these workshops and were sensitised to take up the cost-effective and farmer-friendly model.

Popularisation of INAPH Health Module

The INAPH Health module captures all the animal health interventions carried out on a dairy animal. NDDDB is providing technical support to Maharashtra's Kolhapur and Rajarambapu milk unions in deploying the Health module of INAPH. This is envisaged to become an integral part of their veterinary delivery system helping them to improve upon their services and take informed policy decisions based on robust data and analytical reports generated.



Training of Veterinary officers on treatment of clinical mastitis using ethno-veterinary medicine

Success stories of NDDB supported control projects

A. Mastitis Control Project

1. How Ethno-veterinary Medicine (EVM) is helping farmers avert losses due to mastitis

Mastitis is one of the most infectious diseases which seriously affect the income of the dairy farmer. Through implementation of the pilot project on mastitis control in Sabarkantha Milk Union, there was a significant reduction in the number of sub-clinical mastitis cases as evidenced by the lower number of California Mastitis Test (CMT) positive pooled milk samples of the farmer at the Dairy Cooperative Society (DCS). Introduction of EVM for management of clinical mastitis cases in the Milk Union came as a boon to many farmers who had exhausted all options trying to cure their animals of mastitis. Below are a few examples from the dairy farmers in Gujarat who benefited from EVM therapy and hence were saved from incurring huge losses.

2. Reducing the subclinical mastitis levels in the field through a cost-effective strategy

It has been reported that 60 per cent of losses for mastitis are due to the sub-clinical form which cannot be discerned by the farmers since there is no change in the physical characteristics of milk or udder of the animal. One way to differentiate this is by testing milk using simple field tests like CMT. Controlling sub-clinical mastitis (SCM) at a mass scale is further compounded by the thin distribution of animals among the farmers. Keeping these challenges in view, a pilot programme on mastitis control was implemented in 50 DCS in Sabarkantha Milk Union to promote a cost-effective model that would be feasible under field conditions. In this model, individual animal(s) of farmers with SCM were identified by a two-level CMT plan. At the first level, pooled milk samples of farmers collected for Fat and S.N.F testing during milk collection at DCS were screened for SCM by CMT. At the second level, all the cattle/buffaloes of the farmer whose

Shri Jasavantbhai Manibhai from Bhuvel village owned a crossbred HF animal that was under treatment for clinical mastitis for several days with no improvement. He had already spent around ₹ 6,000 for antibiotics and supportive therapy. Milk production also had dropped to around 200 ml per day. Through EVM therapy and guidance of trained veterinarians of the union, the animal recovered completely after a few days. The milk production also was restored to 12 litres per day.

Shri Patel Kanubhai Murabhai from Tintisar village also had a similar experience with his two crossbred animals having spent around ₹ 5,400 for unsuccessful treatment. After the EVM therapy for mastitis, the milk production of both the animals was restored from 400-500 ml to 15-20 litres per day.

Similar experiences are shared by Shri Patel Bhupendrabhai, Navivasani village, Shri Patel Navanitbhai Savajibhai, Tintisar village, Shri Patel Manjulababen Bhogilal, Berana village who had spent between ₹ 1,500 and ₹ 4,500 to unsuccessfully treat their animals with antibiotics and supportive therapy. After EVM, all the animals regained milk yields from as low as 100 ml per day to about 16 litres per day.

Buoyed by the extremely encouraging results, all the 100 veterinarians in the milk union have taken up EVM therapy for clinical mastitis on a large scale and have treated a large number of cases with very high cure rates. This has also helped the union in reducing the antibiotic usage drastically.

pooled milk was CMT positive were individually tested by CMT to identify animals with SCM.

A simple, easily dispensable oral regimen of trisodium citrate was then provided to the farmer for CMT positive animals to be provided in drinking water or feed every day for 10 consecutive days. Unresolved cases (persistently CMT positive after two consecutive regimens) were referred to the veterinarian for further treatment. The average percentage of SCM as judged by CMT positive pooled milk samples of cattle and buffaloes in the 50 DCSs was found to be significantly reduced from 55 per cent at the start of the project in January 2015 to 22 per cent by August 2016. The farmers also appreciated the benefits of carrying out this simple procedure of CMT testing and oral regimen since it increased their profitability.

B. Brucella Control Project

1. Rapargarh Gaushala takes up brucella control

Vipulbhai is the owner of Rapargarh Gaushala in Naliya Taluk of Kutch district having 750 animals, mainly indigenous breeds like Kankrej and Gir.

Before the implementation of the pilot project on brucellosis control in Kutch, he had no awareness about the disease and did not allow vaccination of the female calves in the gaushala. The placenta or aborted material used to be openly disposed with no disinfection being followed. Milk was also being consumed without boiling.

After the awareness programme was conducted, Milk Ring Test (MRT) and Rose Bengal Plate Test (RBPT) were carried out in the gaushala. Many animals were found positive for brucellosis. Now, all the calves are being vaccinated and ear-tagged. The disposal of placenta and aborted material and disinfection of infected premises is carried out as per the standard protocol. Vipulbhai has stopped drinking milk without boiling and also educates others on the same. The number of abortions in the gaushala has reduced drastically. He is now convinced of the benefits of the brucella control programme and also strives to create awareness amongst other villagers.



Awareness programme on brucellosis control

Research & Development

NDDB's R&D laboratory caters to the routine disease monitoring needs of bovine breeding farms - the semen stations and bull mother farms, breed improvement projects under NDP I, and the disease control projects.

NDDB's R&D laboratory in Hyderabad renders extensive disease diagnostic support for bovine diseases and semen testing in accordance with international quality standards. The laboratory is equipped with state-of-the-art instrumentation and trained personnel for the performance of high-throughput screening assays. It employs established methods and proven techniques for diagnosis of infectious diseases; with an emphasis on diseases known to cause vertical transmission. Semen stations regularly avail semen testing services for the pathogen-free production of high-quality frozen semen doses (FSD). Research programmes are focussed on development and evaluation of novel diagnostic assays. The laboratory also undertakes disease prevalence studies for aiding timely design of effective disease management strategies.

Disease diagnosis

The sexually transmitted diseases of cattle and buffaloes, listed in the compendium of minimum standard protocol (MSP diseases) for bovine breeding, by the Department of Animal Husbandry, Dairying & Fisheries, Government of India forms the focus of diagnostic activity. Validated serological assays (various formats of ELISA), molecular diagnostics (PCR, real-time PCR), microbial and cell culture techniques are employed for disease diagnosis. A total of 97,699 samples from cattle and buffaloes were screened for MSP diseases viz., infectious bovine rhinotracheitis (IBR), bovine brucellosis, bovine viral diarrhoea (BVD), Johne's disease (JD), bovine genital campylobacteriosis (BGC) and trichomonosis.

Serological screening of 17,280 and 17,255 serum samples from cattle and buffaloes revealed 2.21 per cent and 27.82 per cent positivity for brucellosis and IBR respectively. The sero-prevalence of brucellosis and IBR at village level was found to be 3.12 per cent and 31.16 per cent, respectively. This prevalence rate in contrast to organised herds (semen stations, bull mother farms and dairy farms) where 0.93 per cent and 23.5 per cent animals were recorded positive for brucellosis and IBR respectively. The disease prevalence further reduced in semen stations where only 0.07 per cent and 19.77 per cent animals were declared positive for brucellosis and IBR respectively. These observations reinforce the importance of good management practices, implementation of strict bio-security measures and periodic disease monitoring in control of infectious diseases.

A total of 14,355 serum samples from cattle and buffaloes were screened for detection of persistently infected animals by employing BVD antigen ELISA kit (n=14,128) for animals above six-month of age and real-time PCR (n=227) for calves below six month age. Only 0.26 per cent animals turned positive in BVD antigen ELISA kit. But none of those animals were persistently infected with BVD as they turned negative on further sampling after one month. Screening of 1,484 animals by ELISA revealed 1.56 per cent positivity for JD. None of the prepuccial washing collected from bulls were found positive for BGC and trichomonosis.

The laboratory also screened all the animals of six organised herds to ascertain the prevalence of anaplasma and bluetongue (BT) antibodies. Testing of 1,595 serum samples by ELISA revealed 22.88 per cent and 84.2 per cent prevalence of anaplasma and BT respectively. Both anaplasmosis and BT are vector-borne diseases transmitted by ticks and midges, respectively. These prevalence data advocates initiation





of vector control strategies at the farms to mitigate the prevalence of vector-borne diseases. The laboratory has also standardised a nested PCR targeting *msp1* gene of anaplasma and have confirmed the PCR product by restriction enzyme digestion with *EcoRV* as well as nucleotide sequencing. This method can be utilised for determination of active infection as well as carriers.

Testing semen batches for bovine herpesvirus-1 (BHV-1)

Bulls infected with the bovine herpesvirus-1 (BHV-1), the causative agent of IBR may shed the virus intermittently in semen under stress conditions. Semen contaminated with the virus is a potential source of disease spread when used in artificial insemination. OIE guidelines for international trade suggest that, frozen semen batches (FSB) produced from IBR sero-positive bulls should be screened for the presence of BHV-1 by real-time PCR or cell culture. Semen batches negative for BHV-1 is qualified for use in artificial insemination. During the year, under report, the laboratory received 32,031 FSB from 10 semen stations for screening against BHV-1 which is around 78 per cent more than the last year. The samples were tested by real-time PCR for the detection of BHV-1 viral DNA and 1.09 per cent samples were recorded positive.

The laboratory also tested more than 300 semen batch samples for the determination of bacterial load as a quality check for clean and appropriate handling of semen in the frozen semen dose (FSD) production.

Stakeholder meeting and workshops

One-day workshop and meeting with the stakeholders were conducted at three different regions of the country viz., Bengaluru, Noida and Anand and it was attended by more than 90 participants representing different stakeholders. The workshop involved orientating the stakeholders on diagnosis of MSP diseases, creating awareness on the quality policy and procedure adopted by the laboratory, protocol to be followed for collection, storage and packaging of samples and importance of sending feedback on the services rendered by the laboratory. The meeting also served as an able platform for forging a strong alliance between laboratory and stakeholders for the implementation of effective disease management strategies.

Evaluation of filter-papers for sample transport and storage

One of the major factor that affects diagnostic sensitivity is the retention of biological sample-integrity during

transportation and storage of samples. Maintenance of cold chain during transport is not only expensive but also a challenge in many remote locations. The filter-paper based cards spotted with biological specimen have been used in R&D laboratory for detection of both antibodies as well as nucleic acids of pathogenic organisms.

Detection of bovine herpesvirus-1 (BHV-1) in semen spotted on FTA® elute cards

Screening of FSD batches faces the logistical challenge of transporting samples in cryogenic containers containing liquid nitrogen (LN₂). Besides being labour and cost intensive, LN₂ based cryogenic transport also pose the hazard risk of cryo-burns in the event of accidental LN₂ spills during transport and handling. The FTA® elute card was evaluated for its suitability in transport of extended semen samples for the downstream detection of BHV-1 nucleic acid. A protocol was standardised for retrieval of nucleic acid from elute cards spotted with extended semen samples followed by real-time PCR for detection of BHV-1 viral DNA. Results suggest that viral DNA can be detected from the spotted FTA® card after storage at 37°C as long as for 28 days. The real-time PCR results showed strong correlation ($r=0.9774$) in Ct values ($p<0.0001$) for the DNA extracted from semen spotted FTA® card with the OIE recommended extraction method. The diagnostic sensitivity and specificity for detection of BHV-1 DNA in semen samples of unknown status spotted on FTA® cards was 83.08 per cent and 93.23 per cent relative to the samples where DNA is extracted with OIE protocol. This bench validation suggests, the potential of FTA® cards as an alternative method for transportation of extended bovine semen to the laboratory for screening BHV-1.



The R&D laboratory is currently, perhaps the nation's only veterinary laboratory for bovine disease testing with the twin international quality accreditations of ISO/IEC 17025:2005 and ISO 9001:2008.



Evaluation of filter-paper strips for the transport of serum meant for antibody screening

Blood samples spotted on Nobuto filter-paper strips (Advantec, Japan) are used in sampling and transport for the downstream detection of antibodies and other analytes. The filter-paper strips were evaluated for its suitability in the transportation of serum and ELISA based detection of antibodies to brucella. The assay protocol was standardised with reference serum samples, previously characterised for the status of brucella-specific antibodies. Results of ELISA performed with elutes of samples collected from ~300 animals showed a sensitivity of 97.27 per cent and a specificity of 100 per cent relative to the ELISA performed directly with serum samples as per standard protocol.

FMD NSP seromonitoring

The MSP guidelines has made it mandatory for semen stations to adopt preventive vaccination policy for control of FMD using inactivated trivalent FMD vaccine (O, A, Asia-1 serotypes). Differentiation of vaccinated animals from infected animals (DIVA) is possible by detecting antibodies against non-structural proteins (NSPs) by ELISA. The infected animals may have antibody against NSPs whereas the vaccinated animals should be free from NSP antibodies. The laboratory has initiated a pilot study to ascertain the prevalence of FMD NSP antibodies in animals. Screening of 2,200 animals from eight organised herds located at different parts of the country revealed nearly 30 per cent of the animals, showed sero-prevalence in a range of 7.32 to 43.56 per cent to FMD NSP.



Examination of specimen for diagnosis of BGC and trichomonosis

Use of pooled serum for diagnosis of brucellosis

Pooling of serum samples is a cost-effective and efficient approach to screen large number of samples and has been adopted in herd level disease surveillance. The European Union has also approved the National reference laboratories to use pooled serum sample for initial disease screening. The laboratory attempted to evaluate the applicability of pooled serum sample diagnosis of antibodies to brucella by preparing a panel of pooled serum samples from known positive and negative sera. The manufacturer's instructions on result interpretation from pooled serum sample was followed. The analysis of result suggested pooling of 10 samples showed good correlation with individual serum test result. A pool containing at least one positive sample always turned positive in ELISA. Similarly, pool containing all clear negative sample turned negative. Interestingly, pool containing border-line negative samples turned positive suggesting its increased sensitivity. These results suggest a pool of 10 serum samples can be used for screening of brucella negative herds or in low prevalence herds. However, further evaluation with more number of samples are under progress.

Achievements of NDDDB R&D laboratory, Hyderabad:

A. NDDDB R&D laboratory - designated as Central Referral Laboratory (CRL)

The R&D laboratory is continuously striving to become a centre of excellence in the field of animal disease diagnosis. It has been recognised by the Department of Scientific and Industrial Research (DSIR), Government of India as research and development laboratory for animal diseases. This year, the laboratory has been designated as Central Referral Laboratory (CRL) by Department of Animal Husbandry, Dairying and Fisheries, GoI for NDP I to undertake testing of bulls produced / procured under NDP programme and accordingly certify the bulls free from diseases listed in MSP. The laboratory has state-of-the-art infrastructural facilities equipped with qualified, trained and experienced manpower. Up-to-date and accurate disease diagnostic techniques are adopted for disease screening. Diagnosis is performed with strict adherence to the international standards of quality management systems, ISO 9001:2008 and ISO/IEC 17025:2005. Well-characterised reference controls are used in every batch of tests performed. Commissioning of high-throughput robotic sample processing systems ensure large scale testing and quick turnaround time of testing.



Use of robotic sample processing system for animal disease diagnosis

During the year, the laboratory processed a total of 97,699 samples from cattle and buffaloes for MSP diseases viz., infectious bovine rhinotracheitis (IBR), bovine brucellosis, bovine viral diarrhoea (BVD), Johne's disease (JD), bovine genital campylobacteriosis (BGC) and trichomonosis. The total number of samples tested were 51.80 per cent more than the previous year. Majority of the samples received were tested for brucellosis (24,807) followed by IBR (23,867). The increase in number of samples tested for brucellosis and IBR, year-on-year (YoY) was ~24 per cent and ~55 per cent respectively. More than 14,000 samples were tested for BVD, with an increase of 64 per cent. The laboratory tested more than double the number of samples tested for JD (1,484) over the previous year. The laboratory also screened samples for BGC (369) and trichomonosis (409).

B. ISO/IEC 17025:2005 quality accreditations for competence in testing

Ensuring prompt service, accurate testing, timely and error-free communication of results is paramount for a testing laboratory. The NDDDB R&D laboratory has made conscious efforts to put in place appropriate workflows and effective quality management systems for disease testing. It has recently been accredited with the much acclaimed international quality standard, the ISO/IEC 17025:2005, for testing based on sero-diagnosis of bovine diseases. The accreditation is accorded by the country's premier quality body, the National Accreditation Board for Testing and Calibration Laboratories (NABL) for competence in testing. The R&D laboratory is currently, perhaps the nation's only veterinary laboratory for bovine disease testing with the twin international quality accreditations of ISO/IEC 17025:2005 and ISO 9001:2008. The NABL

accreditation implies stringent adherence to quality on all aspects of disease diagnosis and reporting. As a sustained approach for quality improvement, efforts are now on for upgrading the ISO 9001:2008 standard to the latest ISO 9001:2015 standard with the incorporation of risk management procedures.

Calf-rearing programme for buffalo calves and indigenous cow calves

Poor feeding during pre-natal, neonatal and post-natal stages of calves lead to higher age at first calving and overall loss of productive life. Provision of an optimal nutrition for the calves right from the prenatal stage is vital in establishing the patterns of growth and development processes essential to allow the calves to express their genetic potential fully for milk production and reproductive efficiency during their entire life span. To address this, NDDDB undertook a field study to demonstrate the scientific feeding practices to raise healthy indigenous cow and buffalo calves in villages of Anand and Kheda districts of Gujarat. Advanced pregnant buffaloes (n=120) and indigenous Gir and Kankrej cows (n=105) were supplemented pregnancy feed @ 3 kg/day during the last two months of pregnancy. Service period reduced from 149 to 118 days in buffaloes and from 140 to 110 days in cows, supplemented on pregnancy feed. In addition, there was overall increase in about 220 litres of milk over the entire lactation in both buffaloes and cows. Average body weight was found higher in buffaloes (175 v/s 250 kg) and cows (170 v/s 225 kg) in animals fed with calf starter and growth meal during early age. Gir calves attained 76 per cent of their mature body weight at the age of one year. Similar trend was observed in seventy female Mehsani buffalo calves. Twenty-two buffaloes and twelve cow heifers showed heat at an average age of 17 months in group fed with calf starter and growth meal. Artificial Insemination (AI) was done in seventeen heifers and fourteen got pregnant at twenty two months of age. Calf-rearing programme for female Kankrej calves (n=1,000) in Banaskantha district in Gujarat and female Murrah buffalo calves (n=1,000) under Milkfed, Punjab has been initiated by the respective milk union / federation for which technical assistance is being provided by NDDDB.

Effect of supplementing bypass fat on RM value of butter fat

Some state regulatory authorities consider the use of the Reichert and Meissl (RM) value for the detection of foreign fats in butter fat. The RM value gives a measure of the volatile fatty acids (butyric acid and some of

The laboratory has been designated as Central Referral Laboratory (CRL) by Department of Animal Husbandry, Dairying and Fisheries, Gol for NDP I to undertake testing of bulls produced / procured under NDP programme.

caproic acid), which is minimum 21 and 24 for cotton tract areas and areas other than cotton tract areas, respectively. Butterfat contains high proportions of volatile fatty acids, whereas, vegetable and other animal origin fats contain very little or no volatile fatty acids. Low RM value could be indicative for adulteration of butterfat with vegetable fats. Bypass fat is calcium salts of long chain fatty acids being prepared from palm fatty acid distillate (PFAD). In view of this, effect of supplementing bypass fat on RM value of butter fat in 20 buffaloes was studied.

Animals were divided into two groups of ten each, based on milk yield, fat per cent and stage of lactation. Animals in both the groups were fed similar basal ration, comprising 20 kg green maize fodder and 4-5 kg wheat straw. Concentrate mixture was given according to level of milk production, to meet the maintenance and milk production requirements. In addition to basal diet, animals in group II were fed 200 g per day bypass fat supplement. On feeding bypass fat supplement, there was no significant effect on RM value of butter fat in control (28.26 ± 0.14) and experimental groups (28.59 ± 0.29). However, there was significant improvement in daily milk yield (10.32 ± 0.35 vs. 11.18 ± 0.41) and fat per cent (6.65 ± 0.05 vs. 6.90 ± 0.04) in control and experimental groups, respectively. There was also significant reduction in saturated fatty acids and increase in unsaturated fatty acids, in experimental group. This study demonstrated that feeding bypass fat supplement in the ration of lactating buffaloes has no impact on RM value of milk fat.

Effect of supplementing boron on calcium and phosphorus metabolism

Recent studies on the biological significance of boron for various metabolic, nutritional, hormonal, and physiological processes indicate that boron is an essential mineral for animals. Boron is expected to positively affect calcium, phosphorus and magnesium metabolism during periparturient period in animals. A study was conducted in crossbred cows to demonstrate the effect of supplementing boron four weeks before and four weeks after calving in crossbred cows. Feeding boron resulted in maintenance of higher serum calcium, phosphorus and magnesium levels after calving. The trial results suggest that boron supplementation may be useful for preventing metabolic disorders such as milk fever and hypomagnesaemia in dairy animals during the peri-parturient period.

Carbon footprint of milk in India

A carbon footprint of milk is a measure of the impact human activities have on environment in terms of amount

of greenhouse gases (GHG) produced, measured in unit of carbon dioxide equivalent ($\text{CO}_2\text{-eq.}$) per unit of fat and protein corrected milk (FPCM). NDDB conducted a cradle-to-grave life cycle assessment study using regional data for estimating carbon footprint of milk in India. Study indicates that Indian dairy sector emitted 449.8 million tonnes $\text{CO}_2\text{-eq.}$ net emissions for the year 2015. Emissions of carbon dioxide, methane and nitrous oxide contributed 5.3, 83.7 and 11.0 per cent, respectively, to the total GHG emissions by the dairy sector. Methane from enteric fermentation was the major hotspot (71.6 per cent), followed by GHG emissions from feed production (10.1 per cent). The post-farm gate emissions contributed only 1.7 per cent to the total GHG emissions. The average carbon footprint of cow and buffalo milk in India is 3.4 and 2.4 kg $\text{CO}_2\text{-eq./kg}$ FPCM, lower by 38 and 25 per cent, respectively, than the values reported by Food and Agriculture Organisation of the United Nations for South Asia. Low carbon footprint of milk in India is mainly due to the fact that animals' ration does not contain significant quantity of grains and green fodder. In addition, energy used for processing of feed ingredients, fodder production, harvesting, fodder distribution to animals, dung collection, milking etc. is non-significant.

Effect of Moringa fodder on milk production efficiency

NDDB has been propagating cultivation of Moringa as a fodder crop in different parts of the country. To study its effect on milk production, a field trial was conducted on sixteen animals which were divided into two groups of eight each, based on milk yield, fat per cent and stage of lactation. Animals in control group were fed basal ration, comprising 15 kg hybrid napier fodder and 2-3 kg wheat straw. Animals in experimental group were fed 15 kg Moringa fodder by replacing conventional green fodder in lactating crossbred cows for 90 days. Concentrate mixture was given according to level of milk production,



NDDB undertook a field study to demonstrate the scientific feeding practices to raise healthy indigenous cow and buffalo calves in villages of Anand and Kheda districts of Gujarat.





Moringa - a fodder crop

to meet the nutrient requirements for maintenance and milk production. Average daily milk yield (kg) increased from 9.89 to 10.80 and fat (%) from 3.82 to 4.11. This translated into an average daily monetary benefit ranging from ₹ 30 to 45 per animal. In addition, there was significant improvement in immunity and antioxidant status of animals. There was no change in organoleptic properties of milk, on feeding Moringa as a fodder.

Productivity enhancement: An effective way to reduce carbon footprint of milk in India

An inverse relationship between milk production and carbon footprint of milk has been reported. Study conducted by NDDDB reported that the carbon footprint of milk decreased with increasing FPCM yield, indicating a strong inverse relationship ($R^2=0.73$). This relationship also indicated that with every 500 kg increase in FPCM yield per year per head, the carbon footprint of milk reduced by 33 per cent. The reduction in carbon footprint took place to the greatest extent until an increase to ~3,000–3,500 kg FPCM per year, and then the reductions decelerated. This decreased carbon footprint with increased milk yield is achieved mainly through increased efficiency caused

by a dilution of maintenance energy requirements per kg of milk. Study showed that smallholder dairy production system of India, where the average productivity of dairy animals is low-to-medium, provide a good opportunity to reduce carbon footprint with improving productivity, through feeding a nutritionally balanced ration to dairy animals. Thus, productivity enhancement of dairy animals offers considerable mitigation potential for dairy production systems characterised by low-to-medium productivity in India and other developing countries.

Mineral mixture supplementation reduces enteric methane emission

The minerals play an important role for efficient production, reproduction and maintenance of normal health in dairy animals. It is predicted that inadequate or lack of mineral supplementation in the diet of dairy animals would result in sub-optimal performance and thus higher methane emission. To evaluate the effect of supplementing mineral mixture on methane emission, NDDDB undertook a field study on 30 early lactating crossbred cows in Surat district of Gujarat. All experimental cows were divided into two groups of



Mineral mixture supplementation reduces enteric methane emission

15 each, based on milk yield and fat per cent. Cows in control group were fed balanced ration without supplementing mineral mixture, whereas, cows in experimental group were fed balanced ration with supplementation of mineral mixture for 40 days. Study revealed that feed conversion efficiency and nitrogen use efficiency improved by 3.0 ($P=0.164$) and 8.3 per cent ($P=0.064$), respectively. Supplementation of mineral mixture improved fat corrected milk (FCM) yield by 6.1 per cent ($P=0.248$) and reduced enteric methane emission (g/kg FCM) by 14.1 per cent ($P=0.049$) in crossbred cows.

PRODUCT AND PROCESS DEVELOPMENT

In its pursuit to support dairy cooperatives, the Dairy Board has undertaken development of ready-to-use cultures, which require no activation prior to use, for manufacturing fermented milk products. *The technology for one indigenous culture has been developed after optimisation of crucial process parameters for a freeze dried product. The ready-to-use culture has been successfully tested in lab and is ready for trials at a commercial dairy plant.*

Simultaneously, the process for isolation of new starter cultures for manufacturing fermented milk products has resulted in six potential lactic acid bacteria which have been identified and are being studied.

NDDB continued to support Balaji Dairy, Tirupati Andhra Pradesh; Mother Dairy Fruits and Vegetable Pvt. Ltd, New Delhi; DIMUL, Nagaland; and Nainital Milk Union with providing lyophilised starter cultures for production of indigenous fermented products - *dahi, mishti doi and lassi.*



Dairy-based ready-to-eat-on-the-go meal is aimed at providing a healthy food incorporating goodness of proteins of milk and cereals, while the vegetables provide the fibre.





Development of ready-to-use-culture

To keep pace with the changing food habits of the GenX and to fulfil the need for innovative dairy products, the recipe and processes that were standardised, during the year, for three innovative products – *dairy-based ready-to-eat-on-the-go meal*, *dahi-based spread* and *pickled paneer* – are available for commercial production.

Dairy-based ready-to-eat-on-the-go meal is aimed at providing a healthy food incorporating goodness of proteins of milk and cereals, while the vegetables provide the fibre. The preparation requires thawing and heating and is ready for consumption in six minutes.

Dahi-based spread incorporates benefits of fermentation and spread ability and is a combination of high protein and low fat than the conventional spreadable products.

Pickled paneer is aimed at providing an animal protein rich pickle for vegetarians as well as extending the shelf life of the food.

In the continued endeavour to have new innovations in product range with minimal investments, production of these products at the dairy plants is possible without substantial changes in existing infrastructure/process.



Building an Information Network

Assessing the potential for dairy development in Northwest Bihar

An initiative to assess the potential for dairy development in Northwest Bihar covering four districts, Purba Champaran, Pashchim Champaran, Gopalganj and Siwan was taken during the year.

A sample survey was carried out in 576 sample villages (11 per cent of total villages) covering 3.28 lakh households to gather information on milk production, marketable surplus and procurement by various agencies at the sub-district level (i.e., tehsil / block) in these four districts of Bihar.

It was found that almost every fourth household owned milch animal(s) in the study area, with higher share of ownership in Gopalganj and Siwan districts. The proportion of milk sold by the Milch Animal owning Households (MAH) was estimated at 53 per cent, while the net milk surplus available in the villages was estimated at 29 per cent of production. The above profile varied from district to district. The organised producer institutions in the villages were virtually non-existent and hence most of the milk (85 per cent) was sold either to dudhias or locally in the villages. Close to one-tenth of milk was sold "outside village". The farm gate price of milk was found to be in the range of ₹ 28-30 per litre, while Dairy Cooperative Societies, were paying ₹ 25-26 per litre. Interestingly, the producer prices of cow and buffalo milk were found to be almost same in the study area. The total milk production in these four districts together was estimated at 20.5 lakh litres per day, milk producers' surplus at 10.9 lakh litres per day and net surplus of milk at 6.00 lakh litres per day.

Baseline Surveys for NPDD

To avail the assistance under National Programme for Dairy Development (NPDD) – a Central Sector Scheme of the Government of India, the cooperative milk unions are required to submit a project proposal with baseline report consisting details on milk production, procurement, processing infrastructure and marketing based on primary sample survey. Upon request from the Cooperative Milk Unions of Chamrajnagar (Karnataka), Krishna (Andhra Pradesh), Cachar (Assam), Ambala, Hisar-Jind, Kurukshetra-Karnal, Rohtak and Sirsa (Haryana), NDDDB conducted baseline survey.

GIS for Milk Unions has been conceived, designed and developed for minimising the transportation cost of milk as well as dairy business planning and monitoring of the activities.

Re-survey to assess changes in dairying scenario with reference to "Milk Production and Surplus Survey in 2014"

A comprehensive survey was conducted in October 2014 in eight districts of Marathwada & Vidarbha regions viz., Akola, Amravati, Buldana, Wardha, Yavatmal, Latur, Nanded and Osmanabad to assess potential for milk production and surplus at sub-district (block) level. Based on the output of the survey, the potential areas were identified for interventions through dairying. However, in view of consecutive droughts; in April 2016, a quick re-survey was conducted in these eight districts to assess the changes in dairying scenario. From the sample villages surveyed in 2014, a sub-sample of 64 villages were randomly selected for resurvey to assess the changes in terms of incidence of milch animal holding, composition of animals, milk production, retention and surplus in these sample villages. From the primary data and field observations, it was found that there were no significant changes in dairying scenario between 2014 and 2016 in the study area.

Gap analysis of dairy cooperative coverage in the country

On the basis of village-wise Livestock Census data released by the Department of Animal Husbandry, Dairying & Fisheries, Government of India and district / state-wise productivity as available from the Integrated Sample Survey (ISS) reports of respective state governments, village-wise milk production was estimated and potential villages for dairy development were identified. In addition, an exercise has been

initiated to identify the villages covered by dairy cooperatives in the country. The juxtaposition of outputs from both these exercises would help identify the potential villages that are still not covered by dairy cooperatives. This would provide robust inputs to formulate strategy for increasing cooperative coverage for providing market access to milk producers in uncovered potential areas.

External Monitoring & Evaluation for NDP I

The mid-term Round of External Monitoring and Evaluation for NDP I was completed and the Project Development Objectives (PDO) level indicators which are crucial to monitor the progress of the project have been finalised.

The third Annual Round was initiated by the external agency. The fieldwork for the 3rd annual round for monitoring the PDO level indicators of NDP I with a specific theme on “Prevalence of credit among milk producers in NDP I project area” has been completed.

Internet-based Dairy Information System (i-DIS)

NDDDB is implementing the “Internet-based Dairy Information System” (i-DIS), a web-enabled system since 2001 for dairy cooperatives with an objective to

provide a platform to the dairy cooperatives for their mutual benefits. The existing i-DIS has been modified to make it compact and more user-friendly. Subsequently, workshops were conducted covering 25 States, 190 Milk Unions and 15 Milk Federations to familiarise them about the modified i-DIS system.

Geographical Information System for milk unions

Geographical Information System (GIS) for Milk Unions has been conceived, designed and developed exclusively for use of the Cooperative Milk Unions of the country. GIS for Milk Unions is a software which includes a set of GIS tools with a strong visual impact. This is useful for minimising the transportation cost of milk as well as dairy business planning and monitoring of the activities.

During the year, workshops were held in eight states and officers of 14 Cooperative Milk Unions / Producer Companies were trained in utilising open-source GIS application (QGIS).



Linking cooperative to markets

Developing Human Resources

For building a truly farmer-owned institution, capacity-building at all levels is imperative. NDDB continued its effort of training milk producers, executives and Board of Directors, for NDP I.

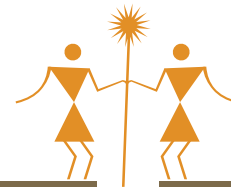
During the year, 12,689 persons were trained under different categories, at NDDB, Anand and its training centres, with the objective of strengthening milk business and governance.



A session on Animal Nutrition in progress

Responding to the expressed needs of the dairy cooperative institutions, NDDB introduced new training modules like 'Achievement Motivation' and 'Marketing Management at Milk Unions'. To expand the outreach of good practices, NDDB organised training on "Video Editing & Dissemination" for milk unions.

Progressive dairy entrepreneurs were provided exposure to successful Micro Training Centres and were trained in Training Methodology. It is expected that the entrepreneurs will act as local resource persons for demonstrating good animal husbandry practices for other milk producers in the area. Such centres will act



NDDB introduced new training modules like 'Achievement Motivation' and 'Marketing Management at Milk Unions'.



as an extension platform for innovations in dairy animal husbandry science.

This was also the year for expanding Digital learning platform. NDDB, with the help of a software, conducted several long distance interactive sessions in remote locations.

Post training hand-holding is a crucial link in the capacity building process. During the year, ten Regional and State level workshops were held with the objective of providing post training support as well as creating a platform for cross-learning.



कीरावत
Green Chirayta
Andrographis paniculata

Training Programmes at a Glance

| Name of the Programme | No. of Programmes | No. of Participants |
|---|-------------------|---------------------|
| Productivity Enhancement | | |
| Artificial Insemination-Basic | 16 | 408 |
| Artificial Insemination-Refresher | 24 | 639 |
| Ration Balancing Programme | 9 | 239 |
| Ration Balancing Programme-Refresher | 2 | 35 |
| Training on IT for Ration Balancing Programme | 2 | 32 |
| Refresher Training on Bovine Breeding | 3 | 71 |
| Dairy Animal Management | 20 | 559 |
| Refresher Training for Project Officials for PT Officers | 2 | 33 |
| Refresher Training for Project Officials for PS Officers | 1 | 10 |
| Modern Cryopreservation Technology for QCO and VO | 3 | 24 |
| Bull Breeding Soundness and Andrological Examination for VO and QCO | 2 | 12 |
| Laboratory Techniques for Lab Technician of Frozen Semen Station | 1 | 2 |
| INAPH "Health Module" training under NDP I | 5 | 96 |
| Total | 90 | 2,160 |
| Cooperative Services | | |
| Farmers Induction Programme | 62 | 2,170 |
| Farmers Orientation Programme | 157 | 5,258 |
| Board Orientation Programme | 85 | 127 |
| Management Committee Orientation Programme | 23 | 436 |
| DCS Secretaries Training | 5 | 97 |
| Refresher Training of DCS Secretaries | 14 | 288 |
| Training of New Supervisors | 6 | 112 |
| Training of Trainers | 4 | 42 |
| Training of Lady Extension Officers | 1 | 25 |
| Customised Programmes for Paraveterinarians | 10 | 120 |
| Training for prospective Resource Persons of Micro Training Centres | 1 | 18 |
| Total | 368 | 8,693 |
| Quality Assurance | | |
| Procurement, Producer Relationship and QA for BMC facilitators | 2 | 64 |
| Clean Milk Production | 1 | 26 |
| Operation & Maintenance of AMCU | 8 | 157 |
| Total | 11 | 247 |

| Name of the Programme | No. of Programmes | No. of Participants |
|---|-------------------|---------------------|
| Dairy Plant Management | | |
| Minimizing Milk Solid Losses in Dairy Industry | 2 | 50 |
| Efficient Steam Generation & Distribution | 2 | 28 |
| Hygiene & Sanitation for Dairy Plants | 3 | 49 |
| Effective Milk Processing & Packaging | 2 | 31 |
| Alternate Energy Resources utilisation in Dairy Industry & CFP | 1 | 8 |
| Basics of Dairy Technology | 1 | 13 |
| ETP and Waste Management in Dairy Industry | 2 | 30 |
| Energy Conservation and Management | 1 | 25 |
| Quality & Food Safety for Dairy Plant | 3 | 51 |
| Efficient Operation of Refrigeration Plants | 2 | 42 |
| Electrical Distribution, Safety and Maintenance in Dairy Industry | 1 | 18 |
| Instrumentation & Automation in Dairy Industry | 1 | 19 |
| Total Productive Maintenance | 1 | 20 |
| Customised Programmes for Clients | 8 | 297 |
| Total | 30 | 681 |
| NDP Trainings | | |
| Orientation on NDP Procurement Guidelines | 1 | 36 |
| Environment & Social Aspects | 2 | 25 |
| Training on INAPH | 11 | 167 |
| Total | 14 | 228 |
| Centre for Analysis and Learning in Livestock and Food | | |
| Advanced Instrumentation Training in Residual Analysis | 1 | 3 |
| Training on Analysis of Cattle Feed | 1 | 5 |
| Instrumental Analysis of Nutritional Parameters | 1 | 4 |
| Pathogen Handling | 1 | 1 |
| Total | 4 | 13 |
| Sectoral Analysis & Studies | | |
| GIS Training | 17 | 185 |
| i-DIS Training | 10 | 36 |
| Gap Analysis | 10 | 265 |
| Producer Profile for Members of VBMPs under NDP I | 11 | 53 |
| Total | 48 | 539 |
| Other Trainings for Milk Union Personnel | | |
| Management Development Programme | 1 | 20 |
| Marketing Management in Milk Unions | 3 | 66 |
| Achievement Motivation | 2 | 27 |
| Video Editing & Dissemination | 1 | 15 |
| Total | 7 | 128 |
| Grand Total | 572 | 12,689 |

Manpower Development

Training, induction, mentoring, sectoral exposure and employee engagement programmes were organised throughout the year with involvement of employees across the organisation. Training programmes like Project Management, Dairy for Non-Dairy professionals, Finance for non-finance, Communication skills focussed on functional and organisational needs were organised for NDDB employees. NDDB employees were also nominated to attend training programmes/seminars at premier institutions to help them keep abreast with the latest developments. With the objective of motivating employees, four seminars on “Living positively in a negative world” were organised covering 214 employees. Exclusive training programme for women employees were also organised during the year. In all, 967 training nominations were processed during the year.

In addition, 18 officers underwent the mentoring programme and 10 officers underwent sectoral exposure programme at Milk Unions across the country. NDDB also organised a 21-day orientation programme for

Management Trainees from Uttarakhand Federation wherein 11 trainees participated. Other important employee engagement initiatives like ideas forum, meeting the expert, talks on contemporary themes, book reading/review, Unnati (group learning forum for workers) and inspirational video shows were organised throughout the year.



NDDB employees were also nominated to attend training programmes/seminars at premier institutions to help them keep abreast with the latest developments.



Training of NDDB employees

| Name of the Programme | No. of Programmes | Nominations | |
|--|-------------------|-------------|------------|
| | | Total | SC/ST |
| Dairy for Non-Dairy Professionals | 1 | 19 | 1 |
| Communication Skills | 1 | 25 | 3 |
| Finance for Non-finance | 1 | 20 | 3 |
| Project Management | 3 | 59 | 8 |
| Training on Measurement Uncertainty | 1 | 26 | - |
| Self and Interpersonal Management (exclusive programme for women employees) | 1 | 26 | 2 |
| Understanding & Managing Self and Environment (exclusive programme for women employees) | 1 | 28 | 4 |
| Training on “MS Advance Excel, MS PowerPoint & MS Outlook” | 1 | 21 | 2 |
| Videography | 1 | 9 | 2 |
| Training on “Laboratory Quality Management System as per ISO 17025:2005” | 1 | 37 | 3 |
| Training on “MS Excel” | 1 | 32 | 3 |
| Mentoring Review | 1 | 37 | 4 |
| Living Positively in a Negative World | 3 | 214 | 17 |
| चाहे जो हो, कैसे खुश रहो | 1 | 40 | 13 |
| Workshop on CVC Guidelines | 2 | 110 | 9 |
| Training for Staff and Worker ‘Chale Chalo’ | 5 | 132 | 18 |
| Other Programmes (employees sponsored for training at premier training institutions) | 56 | 132 | 9 |
| Total | | 967 | 101 |



Engineering Projects

NDDB provides consultancy services for execution of projects for dairy cooperatives across the country, creating new processing infrastructure and expanding existing facilities for dairy, dairy products and cattle feed plants. Services are also being extended to execute Bio Security Labs, Animal Vaccine Production Units and Semen Stations. The group also undertakes the study of existing plants for improving energy efficiency, ensuring food safety & reducing product handling losses.

Eight projects were completed during the year. These included fully automated 30 TPD Banas Cheese Plant at Palanpur (Gujarat), 100 TLPD Dairy Plant at Padalur (Tamilnadu) & 30 TLPD Fermented Milk Products Plant at Ambattur, Chennai (Tamilnadu), 10 TLPD per shift Ice Cream Plant at Bathinda (Punjab), two CFP each of 150 MTPD at Khurda (Odisha) & Erode (Tamilnadu) and Semen Station at Bengaluru. 50 MTPD By-pass Protein Plant at Sabar Milk Union and 12 MTPD Mineral Mix Plant at Kanjari (Gujarat) were also commissioned during the year.

NDDB emphasises on providing energy-efficient and state-of-the-art technology for setting up dairy and cattle feed plants for milk unions and federations. In order to improve the efficiencies of the existing plants, studies on infrastructure of dairy plants were carried out and recommendations submitted to respective milk unions for upgradation of the facilities along with cost estimates and payback period.

Studies undertaken for feasibility of expansion and improving energy efficiency of dairy plants, during the year, include five government dairy plants in Dankuni, Belgachia, Haringhata, Burdwan and Durgapur in West Bengal; Bhubaneswar dairy - I and Bhubaneswar dairy - II in Odisha; Central dairy at Hyderabad; dairies in Sirsa, Jind, Ambala, Rohtak and Ballabgarh in Haryana. Similarly, study for feasibility of CFP expansion was taken up for plants at Kolhapur, Madurai, Jalgaon and Baramati.

30 TPD Cheese Plant at Palanpur

The fully automated cheese plant was commissioned, ahead of its schedule, to produce Cheddar Cheese in April 2016 and Processed & Mozzarella Cheese in July 2016.

The plant was formally inaugurated by the Prime Minister of India in December 2016.

10 TLPD Ice Cream Plant at Bathinda

NDDB commissioned 10 TLPD Ice Cream Plant and building for two LLPD dairy at Bathinda. The plant has the facility to produce Ice cream in cups, cones, tubs, family packs, kulfi and candies.

The project was completed within nine months from the commencement of the civil works and was inaugurated in December 2016 by the Food Processing Minister of India.

100 TLPD Dairy Plant at Padalur

The plant was commissioned to process and pack milk and *ghee* in October 2016.

Solar Energy Implementation

As an initiative to promote solar energy in the dairy industry to provide long-term sustainable clean, renewable and viable source of energy in line with the policy of the Government of India and reduce dependence on fossil fuel and carbon emission, NDDB is installing 15 Concentrating Solar Thermal (CST) systems at dairies and chilling centres in Karnataka, Maharashtra and Punjab. The CST system will generate hot water at 80 °C for use in boiler feed water, can / crate washing and CIP systems. This would result in reduction of fossil fuel consumption by 5 to 15 per cent.



NDDB provides consultancy services for execution of projects to dairy cooperatives across the country, creating new processing infrastructure and expanding existing facilities for dairy and cattle feed plants.





Bio-Safe Laboratories

NDDB extended technical expertise in construction of different Research & Development Facilities for Animal Virus / Pathogens and production facility for vaccine across the country. R&D facilities with BSL3+, BSL3 & BSL2 standards have been planned and implemented in an integrated manner with multiple layers of bio-containment involving controlled climate with highly reliable heating, ventilation and air conditioning and building management systems.

NDDB has been involved in some major projects during 2016-17 including an International Centre for Foot & Mouth Disease (ICFMD), a BSL3+ facility, at Bhubaneswar which is a prestigious state-of-the-art R&D facility of ICAR with BSL3+ Laboratory for conducting biomedical research in the area of Foot and Mouth

Disease. This facility will also serve as a regional resource laboratory for SAARC countries for conducting Bio-medical research on FMD.

Apart from this, NDDB is making a BSL3 laboratory with Small Animal testing facility (LATU) at Tamil Nadu Veterinary & Animal Sciences University, Chennai, the construction of which is in progress.

It is also involved in planning and design of an Anthrax Spore Vaccine Production, Blending and Filling facility with GMP standard and QA/QC lab (GLP standard), and QC facility (BSL3 standard) including Animal Experimental Unit at IVPM Ranipet, Tamil Nadu, and a Poultry diagnostics & feed water analysis laboratory (GLP standard) at Palladam, Tamil Nadu, for the Department of Animal Husbandry & Veterinary Sciences.



10 TLPD Ice cream plant at Bhatinda, Punjab

On-going Projects

| Project | Capacity | Location |
|--|------------------------------------|-----------------------------------|
| Northern Region | | |
| Fermented Milk Products Plant | TLPD 350 | Verka Dairy, Mohali |
| Dairy Plant Expansion (Phase-II) | TLPD 1000 | Jaipur, Rajasthan |
| Western Region | | |
| Baby Food Plant with Milk Processing Facility | TPD 120 PP & LMP 12 LLPD | Sabar, Gujarat |
| Dairy Plant Expansion | TLPD 700-1200 | Kolhapur, Maharashtra |
| Bi-pass Protein Plant at CFP | 50 MTPD | Kanjari, Gujarat |
| Jalgaon Dairy Expansion | TLPD 300-500 | Jalgaon, Maharashtra |
| Eastern Region | | |
| International Centre for Foot & Mouth Disease | BSL3+ facility | Bhubaneswar, Odisha |
| Cattle Feed Plant | 50 MTPD | Hotwar, Ranchi |
| Southern Region | | |
| Powder Plant with expansion of Milk Processing | PP 30 TPD / LMP 400-700 TLPD 30 | Channarayapatna, Karnataka |
| Fermented Products Plant (Phase-II) | TLPD 30 | Ambattur, Tamil Nadu |
| Dairy Plant | TLPD 250 | Uppoor (Manipur), Karnataka |
| Aseptic Milk Packing Station | TLPD 100 | Sholinganallur, Chennai |
| Ice Cream Plant | TLPD 30 | Madurai |
| Cattle Feed Plant (silo system) | TPD 150 | Erode, Tamil Nadu |
| Bio-Security Laboratory with Small Animal Testing Facility | BSL3 facility | Chennai |
| Solar Projects | | |
| Solar Energy Implementation | Projects 15 | Karnataka, Punjab and Maharashtra |

TLPD – thousand litres per day | TPD – tonnes per day | PP – Powder Plant | LPD – Litres per day



30 TPD Cheese plant at Banas Dairy, Gujarat

The National Dairy Plan

The National Dairy Plan Phase I (NDP I), a Central Sector Scheme of the Government of India, is being implemented by National Dairy Development Board (NDDB) in 18 States with a network of 150 End Implementing Agencies (EIAs) for the period 2011-12 to 2018-19.



Milk - a wholesome food



Project Development Objectives:

- Increase productivity of milch animals and thereby increase milk production to meet the rapidly growing demand for milk.
- Provide rural milk producers with greater access to the organised milk processing sector.

These objectives are being pursued through adoption of focussed scientific and systematic processes in the provision of technical inputs supported by appropriate policy and regulatory measures.



सत्यव्रजन महिला दुग्ध उत्पादक सहयोग समिति लि.
Milk Producers' Cooperative Society Ltd.

सत्यव्रजन महिला दुग्ध उत्पादक सहयोग समिति लि.
Milk Producers' Cooperative Society Ltd.

सत्यव्रजन महिला दुग्ध उत्पादक सहयोग समिति लि.
Milk Producers' Cooperative Society Ltd.

NDP I is an externally-aided project with the total outlay of ₹ 22,420 million comprising ₹ 15,840 million as International Development Association (World Bank) assistance, ₹ 1,760 million as GoI share, ₹ 2,820 million as share of EIAs that will carry out the projects in participating States and support of ₹ 2,000 million by National Dairy Development Board and its subsidiaries for providing technical and implementation support to the project.

NDP I is being implemented in 18 major milk producing States, viz. Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh, Uttarakhand and West Bengal. These States account for more than 90 per cent of the country's milk production, over 87 per cent of the breedable cattle and buffalo population and 98 per cent of the country's fodder resources. However, the benefits from the project are accruing across the country.

NDP I consists of a multi-pronged series of initiatives and the key envisaged outputs under the programme are mentioned in the table below:

| Activity | Key Outputs |
|--|---|
| Breed Improvement | |
| Production of High Genetic Merit (HGM) cattle and buffalo bulls | <ul style="list-style-type: none"> • Production of 2,500 HGM bulls |
| Strengthening of "A" and "B" graded Semen Stations | <ul style="list-style-type: none"> • Production of 100 million semen doses annually in the terminal year |
| Pilot Model for Viable Doorstep AI delivery Services | <ul style="list-style-type: none"> • 3,000 MAITs carrying out annual 4 million doorstep AIs by the terminal year |
| Animal Nutrition | |
| Ration Balancing Programme | <ul style="list-style-type: none"> • Coverage of 2.7 million milch animals in 40,000 villages |
| Fodder Development Programme | <ul style="list-style-type: none"> • Production of 7,500 tonnes of certified/truthfully labelled fodder seed • 1,350 silage making/fodder conservation demonstrations |
| Village Based Milk Procurement System | |
| Strengthening and Expanding Milk Procurement System at Village level | <ul style="list-style-type: none"> • 23,800 additional villages to be covered • 1.2 million additional milk producers |
| Project Management and Learning | |
| Project Management & Learning | <ul style="list-style-type: none"> • Monitoring, Learning and Evaluation system for collection of data, its analysis and interpretation |



Sub-Project Approvals

During 2016-17, 52 sub-projects were approved with the total outlay of ₹ 1,256.84 million out of which ₹ 929.85 million to be provided as grant assistance from NDP I and ₹ 335.99 million to be contributed by the End Implementing Agencies implementing Village Based Milk Procurement System sub-projects.

Till 2016-17, 390 sub-projects of 162 EIAs from 18 States have been approved with the total outlay of ₹ 19,932.03 million out of which ₹ 16,651.15 million would be grant assistance and ₹ 3,280.88 million would be contributed by the End Implementing Agencies. The approved sub-projects include 38 sub-projects for Project Management and Learning Activities.

Activity-wise approved sub-projects during 2016-17 and cumulative till 2016-17 is mentioned in the table below:

(Amount in ₹ million)

| Activity | No. of Approved Sub-Projects | | Outlay of Sub-Projects Approved till 2016-17 | | |
|--|------------------------------|-------------------------|--|------------------|--------------|
| | 2016-17 | Cumulative till 2016-17 | Grant Assistance | EIA Contribution | Total Outlay |
| Animal Breeding | 2 | 57 | 7,095.69 | 0.00 | 7,095.69 |
| Bull Production Programme | 0 | 29 | 3,497.33 | 0.00 | 3,497.33 |
| Strengthening of Semen Stations | 2 | 24 | 2,671.62 | 0.00 | 2,671.62 |
| Pilot AI Delivery Services | 0 | 4 | 926.74 | 0.00 | 926.74 |
| Animal Nutrition | 20 | 167 | 3,968.64 | 0.00 | 3,968.64 |
| Ration Balancing Programme | 20 | 117 | 3,246.95 | 0.00 | 3,246.95 |
| Fodder Development | 0 | 50 | 721.69 | 0.00 | 721.69 |
| Village Based Milk Procurement System | 15 | 128 | 5,198.49 | 3,280.88 | 8,479.37 |
| Sub Total | 37 | 352 | 16,262.81 | 3,280.88 | 19,543.70 |
| Project Management & Learning | 15 | 38 | 388.34 | 0.00 | 388.34 |
| Total | 52 | 390 | 16,651.15 | 3,280.88 | 19,932.03 |

State-wise approved sub-projects during 2016-17 and cumulative till 2016-17 is mentioned in the table below:

(Amount in ₹ million)

| Activity | No. of Approved Sub-Projects | | Outlay of Sub-Projects Approved till 2016-17 | | |
|--|------------------------------|-------------------------|--|------------------|--------------|
| | 2016-17 | Cumulative till 2016-17 | Grant Assistance | EIA Contribution | Total Outlay |
| Andhra Pradesh | 2 | 15 | 851.97 | 178.53 | 1,030.49 |
| Bihar | 3 | 25 | 466.64 | 40.14 | 506.79 |
| Chhattisgarh | 0 | 2 | 41.67 | 19.32 | 60.99 |
| Gujarat | 2 | 46 | 3,455.78 | 815.32 | 4,271.10 |
| Haryana | 1 | 18 | 760.94 | 8.34 | 769.28 |
| Jharkhand | 0 | 2 | 68.55 | 33.22 | 101.77 |
| Karnataka | 5 | 34 | 1,567.50 | 587.05 | 2,154.55 |
| Kerala | 0 | 11 | 454.88 | 54.16 | 509.03 |
| Madhya Pradesh | 2 | 13 | 237.20 | 22.74 | 259.93 |
| Maharashtra | 2 | 37 | 1,059.78 | 215.07 | 1,274.85 |
| Odisha | 6 | 19 | 291.83 | 45.85 | 337.68 |
| Punjab | 2 | 22 | 1,083.58 | 281.41 | 1,364.99 |
| Rajasthan | 2 | 31 | 2,161.31 | 572.14 | 2,733.45 |
| Tamil Nadu | 4 | 20 | 894.35 | 49.92 | 944.28 |
| Telangana | 1 | 7 | 225.97 | 39.83 | 265.80 |
| Uttar Pradesh | 0 | 24 | 1,735.96 | 217.14 | 1,953.10 |
| Uttarakhand | 3 | 10 | 368.98 | 86.26 | 455.24 |
| West Bengal | 2 | 15 | 304.45 | 14.48 | 318.93 |
| Centralised | 0 | 1 | 231.46 | 0.00 | 231.46 |
| Sub Total | 37 | 352 | 16,262.81 | 3,280.88 | 19,543.70 |
| Project Management & Learning | 15 | 38 | 388.34 | 0.00 | 388.34 |
| Total | 52 | 390 | 1,6651.15 | 3,280.88 | 19,932.03 |

Considering that the Government of India has extended the NDP I implementation period till 2018-19, the Project Steering Committee approved extension of all the sub-projects approved under NDP I till 2018-19. The Committee has also approved the extension of activities related to Environment and Social Action Plan till 2018-19.

During the financial year 2016-17, Project Steering Committee has also approved several new studies to be undertaken during 2017-18 which include:

- To assess the contribution of NDP I in inclusion, equity and income of dairy farmers
- To assess the pattern of improvement in MBRT with installation of BMCs in Dairy Cooperative Societies
- Sustainability of Dairy Cooperative Societies organised under NDP I
- To understand the existing knowledge/skill level and attitude/perception of rural youth towards dairying as an employment activity in NDP I villages
- Impact assessment and evaluation of Fodder Seed Production and sale activities under NDP I

Production of High Genetic Merit Cattle and Buffalo Bulls

To meet the demand for disease-free high genetic merit (HGM) bulls of different breeds for production of high quality disease-free semen doses, the animal breeding interventions undertaken under NDP I are: Progeny Testing Programme, Pedigree Selection Programme, Import of Bulls / Embryos and bull production through imported embryos. These interventions aim to produce and supply replacement requirement of HGM bulls for frozen semen stations across the country by the end of project period.

Progeny Testing Programme:

14 sub-projects are being implemented by 12 EIAs in nine States to make available high genetic merit bulls of major dairy breeds of cattle and buffalo to semen stations for production of high quality disease-free semen.

The breeds covered under the Progeny Testing Programme are Gir, Mehsana, Murrah, Holstein Friesian, Crossbred Holstein Friesian and Crossbred Jersey. During the financial year 2016-17, the Pedigree Selection sub-project for Gir breed has been converted into Progeny Testing Programme.

Till March 2017, 855 disease-free HGM bulls have been made available for distribution to semen stations out of which 776 bulls have been distributed.

The field implementation of animal typing was initiated in Gujarat, Karnataka and Tamil Nadu and typing standards for objective traits of animals have been developed for CBHF, Murrah and Mehsana breeds.

Breeding value estimation on milk yield was carried out for five PT sub-projects by a nine-member Expert Committee formed by the Government of India. Breeding values for daughter pregnancy rate and sire conception rates were also calculated.

Collaborative research studies have also been taken up on the following topics:

- Genome-wise association studies for type and morphological traits of Gir cattle
- Devising appropriate statistical models for analysis of Sire Conception Rate and Daughter Pregnancy Rate in Mehsana buffaloes
- Buffalo genotyping

Pedigree Selection Programme:

To conserve and promote indigenous breeds of cattle and buffalo in their native tracts by making available high genetic merit bulls for semen production, 9 sub-projects are being implemented by 8 EIAs in 5 States. The indigenous breeds of cattle and buffalo covered under the Pedigree Selection Programme are: Kankrej, Hariana, Rathi, Tharparkar, Sahiwal, Jaffarabadi, Nili-Ravi and Pandharpuri.

Till March 2017, 105 disease-free HGM bulls have been made available out of which 78 bulls have been distributed to semen stations for production of disease free semen doses.

In August 2016, Banaskantha Milk Union organised a one-day workshop on Genetic Improvement of Kankrej cattle at Dantiwada to facilitate interaction between

progressive farmers of the region, representatives from Goshala/Pantrapole and subject matter specialists. Around 1,000 progressive farmers participated in this workshop.

Review meeting for PS sub-projects under NDP I was held in August 2016 to provide feedback on evaluation, identify critical issues faced by the sub-projects and prepare future plan of actions.

Additionally, to meet the requirement of pure Jersey and Holstein Friesian bulls for production of high quality

disease-free semen doses, during 2016-17, 95 Jersey bulls were imported which after successful quarantine were distributed to 25 A and B graded semen stations. Till March 2017, 171 bulls have been imported for semen production. Till March 2017, 463 imported embryos have been transferred with 157 pregnancies. Total 113 calves (59 male and 54 females) were born from these embryo transfers and five bull calves have been made available for distribution to semen stations.

Focus on climate-resilient Haryana cattle

Haryana's Rohtak boasts of having an excellent germplasm pool of Murrah buffalo and Haryana cattle. With the advent of cross breeding and popularisation of the Murrah breed, a large number of farmers of Khidwali village near Rohtak stopped rearing Haryana cattle and its number started dwindling. Due to the susceptibility of crossbred cattle to various diseases in the harsh climatic conditions and high input requirement of the Murrah buffalo, many farmers have again started rearing Haryana cattle.

Production of High Genetic Merit Haryana bulls through Pedigree Selection was initiated under NDP I by Haryana Livestock Development Board in March 2014. Khidwali was one of the centres selected for implementation of the sub-project. Through powerful extension activities including village awareness camps and infertility camps, the field staff was able to motivate the struggling farmers. The initiative led to the creation of successful farm-entrepreneurs. Shri Rajesh was one of them.

Earlier, Shri Rajesh had been producing milk from three Murrah buffaloes purchased with an investment of ₹ 1-1.5 Lakh each and a crossbred HF purchased with an investment of ₹ 60,000. Now, with the same level of investment, he is rearing 12 Haryana cows and the overall milk production has increased. Further, the lower requirement of inputs like feed, fodder, water, especially in the resource-stressed region, has been an added advantage. As Haryana cattle are thriving even on crop residues, preference for climate-resilient desi cow milk is creating greater demand for Haryana cows. All the 12 Haryana cows owned by him are bred with the semen supplied by the PS project. In the herd, he has cows producing up to 15 litres of milk per day and none of them is yielding less than 10 litres of milk per day.

Villagers are approaching him for good desi cows. Shri Rajesh has started buying desi cows and selling them after impregnating them with semen doses of Haryana breed. He says that the ear-tagged animals are fetching more returns. The Haryana cows have made him a successful farm-entrepreneur. Shri Rajesh is now an inspiration for others in his village.

Strengthening of Semen Stations

Under NDP I, existing semen stations with a rating of either "A" or "B" grade are being supported to expand and upgrade their facilities to meet the increasing demand of frozen semen doses for Artificial Insemination. 24 semen stations of 22 EIAs from 15 States are being strengthened under NDP I. The 22 semen stations being strengthened under NDP I during 2016-17 alone produced 77.16 million disease-free high quality semen doses.

The semen stations have placed the civil work orders and quality of civil works is being checked by the consultant hired under NDP I through periodic visits to the sites. The semen stations have also completed the purchase of laboratory equipment and farm machineries sanctioned in their projects.

For effective coordination, monitoring and reporting of animal health activities, Coordination Committees have been formed under the respective sub-projects sanctioned under NDP I, encompassing all the tehsils for bull production areas and all villages in 10 km radius of the semen stations taken up for strengthening.

Under NDP I, a Semen Station Management System (SSMS) has been developed to link all the activities of semen stations ranging from bull management, semen production, fodder production, stock management, asset management to finally sale of semen doses to customers. This network aims to create a 'National Link' for all the semen stations in India leading to the formation of an information pool on semen production for field use.

Semen Station Management System (SSMS) has been rolled out in the following six semen stations:

- Amul Research and Development Association, ARDA, Ode
- Central Semen Bank, Bhadbhada, Bhopal
- Bull Station, Dhoni Farm
- Dama Semen Production Unit, Dama
- Frozen Semen Bank, Bassi
- Deep Frozen Semen Production Unit, Rishikesh

22 semen stations under NDP I produced

77.16 Mn

disease-free high quality semen doses

To assist the EIAs for effective implementation of animal health measures, Animal Health Officers have been put in place for all the Progeny Testing, Pedigree Selection and Strengthening of Semen Stations sub-projects.

Compact biogas plant - a Sustainable Livestock Waste Management by Frozen Semen Bull Station, Haringhata

The Frozen Semen Station, Haringhata, located in Nadia district of West Bengal faces severe power shortage. A 10 KVA digital generator takes care of the power requirement of the semen processing laboratory. However, other electrical farm machineries could not be operated through this generator.

Keeping this in view, a biogas plant was installed under NDP I in the semen station. The semen station is being strengthened under NDP I which produced 14.52 Lakh Frozen Semen Doses (FSDs) in 2015-16.

The Energy Bin has been designed and equipped with crushing-cum-feeding system to process 500 - 600 kg per day cow-dung, food/kitchen waste, vegetable market waste, fish and meat market waste etc. Approximately, 40-50 m³ of biogas may get generated, depending upon the type of input. The gas generated is supplied to a 10 KVA biogas generator. This can be operated continuously for 6-8 hours depending upon the load. Unlike the conventional biogas plant, it is a compact plant and requires very less space and manpower.

At present, the electricity produced through biogas is used to run 25 electric ceiling fans and 50 LED bulbs in 2 bull sheds for 5-7 hours. Surplus electricity is used for running the water pump or chaff cutter machine.



Semen processing at a modern lab

Pilot Doorstep AI Delivery Services

Under NDP I, sub-projects are being implemented to set up a pilot model for doorstep AI delivery services operating in a financially self-sustainable manner using Standard Operating Procedures including animal tagging and performance record. Considering the overlap in area of operation between Andhra Pradesh Livestock Development Agency (APLDA) and Shreeja Mahila Milk Producer Company, the Pilot Doorstep AI Delivery Services sub-project implemented by Shreeja Mahila Milk Producer Company has been withdrawn. APLDA has committed to provide doorstep AI Delivery services to all the members of Shreeja Mahila Milk Producer Company.

These pilot sub-projects being implemented under NDP I have covered 10,710 villages through 1,367 Mobile AI technicians (MAITs) and have carried out 0.52 million artificial inseminations during 2016-17. Seven AI Training Centres are being engaged to provide Basic AI training to prospective MAITs of the project and since inception, 1,706 MAITs have undergone training. Deployed MAITs have been trained on AI module of INAPH for capturing transactions directly into INAPH using internet-enabled netbooks.

The extension activities have been intensified and tin paintings, posters, wall paintings etc. have been placed in strategic locations around villages. 11,048 Farmers

meetings were organised which were attended by about 2.3 Lakh farmers. 3,237 infertility management camps and 397 calf shows were also organised.

Ration Balancing Programme

Under Ration Balancing Programme (RBP), Local Resource Person (LRP) formulates a least cost balanced ration for milch animals from locally available feed resources using the software "Information Network for Animal Productivity and Health (INAPH)". Balanced ration to milch animals helps in ensuring that the milch animals produce milk commensurate with their genetic potential. Feeding the balanced ration to milk animals not only reduces the cost of feeding per kg of milk but also significantly reduces methane emissions.

Under this programme, 117 sub projects of 105 EIAs from 18 States have been approved. Under these sub-projects advice on balanced ration has been provided for 2.36 million milch animals in 29,973 villages. The interventions has resulted in reducing the cost of feeding per kg of milk by more than 10 per cent on an average and also reduction in methane emission by more than 12 per cent in lactating cows and buffaloes.

A workshop on the sustainability of LRPs under RBP was organised wherein good performing EIAs, having sustainability mechanism in place, shared their experiences. Based on the deliberations during the workshop, participating EIAs prepared their plans for sustaining the LRPs and RBP.

INAPH data indicates that balanced ration to milch animals has led to an increase in average daily milk yield of 0.26 kg per animal and milk fat by 0.10 per cent. Cost of feeding was reduced by ₹ 2.36 per kg of milk. These factors have resulted in increase in average net daily income of milk producers by about ₹ 26 per animal.

Comparison of data on lactation length of RBP verses non-RBP animals indicate that the lactation period increased on feeding a balanced ration by 28 and 67 days in cattle and buffaloes, respectively.

Convergence of Ration Balancing Programme with Progeny Testing and Pedigree Selection activities has happened in various sub-projects. Out of the total 6,574 villages under Progeny Testing (PT) and Pedigree Selection (PS) interventions, 3,513 (53%) villages have convergence with Ration Balancing Programme.

Fodder Development Programme

Under Fodder Development Programme, certified / truthfully labelled fodder seeds are being promoted to increase fodder production. Field demonstrations of mowers, silage making and biomass storage silos are

also being carried out to popularise these technologies among farmers. 50 fodder development sub-projects from 13 states are under implementation.

Under these sub-projects till March 2017, support has been provided for production of 8,218 MT of fodder seeds and sale of 19,980 MT of certified / truthfully labelled fodder seeds. 1,899 silage demonstrations have been organised, 637 mowers have been procured and 87 biomass storage silos have been constructed. During the year, Kota fodder seed processing plant has been set up and put under operation and with this 5 seed processing plants have been made operational under NDP I. The civil works for the enrichment and densification plant at Kolhapur is in an advance stage of completion.

Silage making is getting popular among farmers and 2,687 farmers have started silage making after participating in silage demonstrations organised under NDP I.

Under NDP I, the initiative to establish Micro-Training Centre (MTC) has been quite successful for reaching out to farmers and promote new technologies on improved fodder production & conservation. Farmer-to-farmer education/technology transfer has been quicker as compared to other traditional methods.

Ropar Milk Union - Pioneer in implementation of Fodder Development Programme

The progressive farmers of Ropar Milk Union own relatively large holdings of agricultural lands. The major crops cultivated in the area are paddy and wheat. In many villages, the farmers burn the paddy straw to prepare the land for sowing of wheat crop. Due to non-availability of proper infrastructure, farmers had no option but to burn the stubble after using combine harvesters.

Under NDP I, the Ropar Milk Union procured Flail Mower Chopper Loader, Baler, Raker, Disk Mower, Row Free Mower Chopper Loader and Paddy Straw Chopper-cum-Shredder. About 1,850 farmers from 52 villages have been covered under the demonstration of mowers programme.

With baler rake set, paddy could be collected easily and some farmers were able to sell it @ ₹ 12,000 per hectare. This has proved to be an additional source of income to farmers. Some farmers managed to mix biomass into soil by using mulcher type paddy straw chopper-cum-shredder. A few needy farmers even collected and utilised the left over chopped straw for animal feeding. The milk union is providing mowers to the needy farmers on rent on no profit no loss basis. The demand for mowers rises during harvesting season.

The rental charges fixed by the milk union for the mowers are:

| Activity | Ropar Milk Union | Private Agencies |
|---|------------------|--------------------|
| Flail and Row Free Mower (along with tractor and manpower facility for machine operation) | ₹ 3,000/acre | ₹ 4,000-5,000/acre |
| Baler | ₹ 1,200/acre | ₹ 1,500/acre |
| Raker and Disc mower | ₹ 500/day | Not Available |
| Paddy straw chopper cum shredder | ₹ 1,000/day | Not Available |

Silage making demonstration was also arranged using flail mower chopper loader. Induction of high speed mower-cum-chopper loader reduced the cost of silage making by about 30 per cent and saved time too. Considering this, many farmers have adopted the flail machine made silage. The milk yield and quality in terms of Fat percentage and SNF percentage have increased and cost of feed has also decreased.

The farmers are satisfied with the machines purchased under NDP I and the response is quite encouraging.

Village Based Milk Procurement System

The Village Based Milk Procurement System under NDP I aims at providing rural milk producers with greater access to the organised milk-processing sector. Under this activity, new societies/pooling points are being formed and existing societies/pooling points are being strengthened by providing village level capital items like Bulk Milk Coolers, Automated Milk Collection Units (AMCU), Data Processor-based Milk Collection Units (DPMCU), Milk Cans, etc. While installation of DPMcUs and AMcUs has resulted in increased transparency and fairness in milk procurement operations, installation of BMCs has given farmers more flexibility in pouring milk as well as improvement in quality of milk.

Under this activity, 128 sub-projects from 18 States are being implemented by 115 EIAs. Till March 2017, these sub projects have covered 32,548 villages and have enrolled 9.59 Lakh additional milk producers. Out of the total members enrolled, 4.32 Lakh (45 per cent of total) are women members and 6.35 Lakh (66% of total) are small holders.

Kambassi Mahila Dairy Cooperative Society (Ambala Milk Union) – role model of progress

The aim of the VBMPS sub-project goes much beyond providing access to organised market to the milk producers as it also improves the socio-economic condition of its members. The Kambassi Mahila Dairy Cooperative Society (DCS) formed under the VBMPS sub-project of the Ambala Milk Union is the role model of progress. Dairy farming has transformed lives of the milk producers here.

Initially, there was no regular means of selling milk in the village. Milk producers had no other alternative but to sell it to private vendors. They were desperately looking for an alternative to break free from the clutches of the private vendor. Finally, Kambassi Society took charge of their destiny. The officers and staff of the Ambala Milk Union organised multiple awareness generation exercises for village milk producers and finally the DCS started functioning on 19th August, 2015.

The DCS initially started its operations with 21 producer members and procured 35 litres of milk on the first day. Gradually, as the milk producers of the village understood that they will be paid on the basis of milk quality through a fair and transparent procurement system, milk collection increased steadily. Presently, 84 members (all women) pour about 278 litres of milk per day. There is also good representation of members from SC community of the village.

The producer members are taking active interest in the functioning of the DCS and have placed demand for installing DPMCU in their DCS.

Project Management and Learning

Project Management & Learning (PM&L) is of critical importance for tracking progress in the implementation of various project components, identifying problems as they arise, guiding remedial actions to help ensure that the project achieves its intended objectives and assessing the impact of the project. The PMU hires, wherever required, the services of specialised agencies to undertake various activities such as development, operation and maintenance of project MIS; capacity-building in PM&L; results monitoring and sample-based validation of findings of concurrent monitoring; special studies; and baseline, mid-term, end-of-project and annual surveys / evaluation studies. For monitoring and evaluation of NDP I, both internal and external monitoring and evaluation system have been put in place.

NDP I Regional Review Meetings are being organised regularly to review the progress made, identify the bottlenecks / shortcomings, highlight the success and work out the future action plan etc. These regional review meetings are attended by Secretary, DADF; Chairman, NDDDB; Mission Director, NDP I; World Bank Team; Secretaries and Directors of State AH Department, MDs of Federations, CEOs and Project Coordinators of concerned EIAs; DADF and NDDDB officers. During 2016-17, eight regional review meetings were organised. Additionally, each sub-project has been assigned to a monitoring officer of NDDDB for concurrent monitoring and providing implementation support to EIAs.

Some of the major highlights of the external monitoring and evaluation reports include:

- Methane Emission Measurement Studies have been undertaken by NDRI, Karnal in Northern India and Anand Agriculture University in Western India. It has been found that due to balanced feeding of ration, methane emission from enteric fermentation has reduced by more than 12 per cent in lactating cows and buffaloes.
- NDRI, Karnal and IRMA, Anand has undertaken RBP impact study in Northern & Western and Southern India respectively. These external studies have found that due to feeding of balanced ration to animals, there has been reduction in cost of feeding per kg of milk by more than 10 per cent on an average. This is due to optimisation of feed resources from locally available feed ingredients and increase in milk yield.
- IRMA, Anand has undertaken a study on Women Empowerment in Dairy Sector. The study has highlighted that direct participation of women as Dairy Cooperative Society (DCS) members has increased to 50 per cent in NDP I project area. Inclusion of women has substantially increased in the governing bodies and management committees and other leadership positions at the DCS level.

Additionally, to coordinate and monitor all Animal Husbandry and Dairy Development Schemes in the States, a State Level Monitoring Committee has been formed under the Principal Secretary (Animal Husbandry & Dairying) of the State with the representatives from various stakeholders including NDDDB for effective implementation and convergence.

Training and Capacity-Building

Various training and capacity-building programmes have been organised for farmers, field functionaries and EIA personnel to upgrade the knowledge base and the skill sets required for successful implementation of the sub-projects. These training and capacity-building programmes are being organised by NDDDB and End Implementing Agencies.

During the year 2016-17, 6.63 Lakh participants have been trained / oriented in programmes organised by NDDDB and EIAs. Cumulatively, 14.61 Lakh participants have been trained / oriented under NDP I.



Stakeholders' conference on dairying

Trainings conducted by NDDB, Anand:

| Activity/ Training Programme | Component | Category of Participants | 2016-17 | Cumulative |
|--|----------------------------------|-------------------------------|---------------|---------------|
| Farmers Induction* | | Milk Producers | 5,804 | 18,295 |
| Farmers Orientation* | | | 3,872 | 12,806 |
| Board Orientation | VBMPS-Coops | Board of Directors Executives | 261 | 936 |
| Business Appreciation | | | 219 | 1,594 |
| Training of Trainers | | | 35 | 202 |
| New Supervisors Training | | | 112 | 644 |
| Sub-total | | | 10,303 | 34,477 |
| Training of Technical Officers on RBP | Ration Balancing Programme-Coops | Executives | 91 | 460 |
| Refresher Training on Training of Trainers | | | 10 | 71 |
| Training of Information Technology on RBP | | | 32 | 101 |
| Sub-total | | | 133 | 632 |
| Training of Technical Officers on RBP | Ration Balancing Programme-PC | Executives | 21 | 141 |
| Refresher Training on Training of Trainers | | | 8 | 21 |
| Training of Information Technology on RBP | | | - | 7 |
| Sub-total | | | 29 | 169 |
| Fodder Production & Conservation Practices | Fodder Development-Coops | Executives | 25 | 297 |
| Sub-total | | | 25 | 297 |
| Fodder Production & Conservation Practices | Fodder Development-PCs | Executives | 6 | 48 |
| Sub-total | | | 6 | 48 |
| Orientation/Refresher to AIOs | Progeny Testing | Executives | - | 44 |
| Orientation/Refresher to Project Coordinators | | | 7 | 25 |
| Orientation/Refresher to District Coordinators | | | 20 | 74 |
| Orientation/Refresher to Calf Rearing In-charges | | | 7 | 21 |
| Sub-total | | | 34 | 164 |
| Orientation/Refresher to Project Coordinators | Pedigree Selection | Executives | 4 | 19 |
| Orientation/Refresher to Area Coordinators | | | 3 | 17 |
| Sub-total | | | 7 | 36 |
| Basic AI training for MAIT | Pilot AI Delivery | Village Resource Person | 68 | 68 |
| Sub Total | | | 68 | 68 |
| Total | | | 10,605 | 35,891 |

Other NDP Training Programmes conducted at NDDB, Anand

| Activity | Category of Participants | 2016-17 Achieved | Cumulative Achieved |
|---|--------------------------|------------------|---------------------|
| Training of Trainers on INAPH | Executives | - | 39 |
| Training on Environment and Social aspects | | 25 | 213 |
| Training of AH Officers | | - | 81 |
| Orientation on NDP Procurement Guidelines | | 36 | 825 |
| Lady Extension Officers-BAP | | 25 | 44 |
| Customised Ration Balancing Programme | | - | 17 |
| Exposure visit to RBP functionaries | | 17 | 17 |
| Follow-up training on INAPH Android application | | 3 | 3 |
| Total | | | 106 |

* Includes training conducted by EIAs.



Educating farmers on importance of green fodder

Environment and Social Management

While implementing the activities under NDP I, social inclusion and environment mitigation measures are being undertaken with a focus on increasing participation of women, small holders and scheduled caste & scheduled tribes across the activities. The key activities undertaken include:

- During 2016-17, Environment and Social (E&S) monitoring visits were undertaken in 89 sub-projects of 44 EIAs in 10 States. Success stories are also being documented during the monitoring visits to EIAs.
- Three batches of E&S Officers of EIAs were trained at NDDDB, Anand in 2016-17 in which 35 designated E&S officers from 35 EIAs of 11 states were trained on Environment and Social Management issues and their management in the dairy sector.
- Till date, 19 semen stations have bio-medical waste management systems in place and 10 semen stations have complied with Bio-medical Waste Management Rules 2016.
- Biogas plants have been funded to 18 semen stations under NDP I to demonstrate the effective use of renewable energy from animal waste like production of gas from dung. The slurry and excess dung is being used as manure in the fodder fields. 13 semen stations have constructed bio-gas plant.
- Five sub-projects, one of each activity, are being provided implementation support to showcase the best environmental and social management practices.

- Equity action plan is prepared to ensure social inclusion under different on-going activities under NDP I sub-projects.
- The women inclusion in different activities under NDP I is as below:
 - Village based Milk Procurement System: 4.32 Lakh
 - Ration Balancing Programme: 2.96 Lakh
 - Fodder Development Programme (silage making demonstrations): 8,812 farmers
 - Pilot AI Delivery Services: 10,654 farmers

Financial Management

During the financial year 2016-17, ₹ 3,143.20 million has been received from DADF and ₹ 2,686.44 million has been disbursed. Cumulatively, till March 2017, ₹ 10,451.14 million has been received by NDDDB from DADF for implementation of NDP I and ₹ 10,062.13 million has been disbursed to EIAs as advance and for expenditure on centralised activities.

Fund Utilisation during the financial year 2016-17 has been ₹ 2,990.06 million, while the cumulative fund utilisation has been ₹ 9,446.40 million. Additionally, ₹ 1,929.50 million has been contributed by End Implementing Agencies till 2016-17, out of which ₹ 496.80 million has been contributed during 2016-17.

External audit of NDP I for 2015-16 has been completed and audit report has been shared with the Government of India and the World Bank.

Key Achievements: National Dairy Plan Phase I

- 390 Sub-Projects approved from 18 States from 162 EIAs with total outlay of ₹ 19,932.03 million
- 855 Bulls made available for distribution under Progeny Testing, out of which 776 have been distributed to semen stations
- 105 Bulls have been made available under Pedigree Selection Programmes for indigenous breeds, out of which 78 bulls have been distributed
- 22 approved strengthening of Semen Stations sub-projects produced 77.16 million semen doses in 2016-17
- Semen Station Management System has been rolled out in six semen stations
- 10,710 villages have been covered by 1,367 MAITs under Pilot doorstep AI Delivery Services
- 2.36 million Animals have been covered in 29,973 villages under Ration Balancing Programme with more than 10 per cent reduction in cost of feeding per kg of Milk
- More than 12 per cent reduction in Methane Emission has been reported due to balanced feeding
- 1,899 silage demonstrations have been organised, 637 mowers have been procured and 87 biomass storage silos have been constructed

- 9.59 Lakh additional Milk Producers enrolled under VBMPS, of which about 45 per cent are women and 66 per cent are Small Holders
- Project Management and Learning Activities are being undertaken like internal and external monitoring and evaluation, quality assurance, special studies
- ICT-based Management Information System has been implemented
- 8 Regional Review Meetings were organised during 2016-17



During the financial year 2016-17, ₹ 3,143.20 million has been received from DADF and ₹ 2,686.44 million has been disbursed.



Centre for Analysis and Learning in Livestock and Food

Centre for Analysis and Learning in Livestock and Food (CALF) is a multi-disciplinary, single window analytical laboratory for dairy industry. Services of CALF in the field of chemical and biological testing and training are availed by dairy cooperatives across the country. CALF provides high quality analytical services for milk and milk products, food, fruit and vegetables, water, animal feed, mineral salts, mineral mixture, vitamin premixes and diagnostic services for animal genetics, with the help of latest state-of-the-art technology and experienced, skilled and trained manpower.

In 2016-17, CALF analysed about 38,700 samples, with an overall growth of 51 per cent compared to the previous year. These samples were analysed for about 98,300 tests comprising of 64,900 tests in food & feed and 33,400 tests for animal genetics. CALF also organised customised training programmes for quality assurance personnel of dairy industry.

Accreditation, Recognition and Association

CALF is a notified referral food laboratory of Food Safety and Standards Authority of India (FSSAI) for milk and milk products and its analytical facility is accredited as per ISO-17025 by National Accreditation Board for Testing and Calibration Laboratories (NABL).

CALF has been recognised by the Bureau of Indian Standards (BIS) for undertaking analysis of various milk and milk products viz., packaged pasteurised milk, flavoured milk, sterilised milk, condensed milk, milk powder, cheese, *shrikhand*, *paneer*, skimmed milk powder (Grade I and II), pasteurised butter, butter oil, *ghee*, *dahi*, yoghurt and ice-cream. Out of the above products, presently, CALF is the only laboratory in the country having recognition from BIS for undertaking analysis of pasteurised milk, sterilised milk, flavoured milk, *shrikhand*, *paneer*, pasteurised butter, butter oil, *ghee*, *dahi* and yoghurt.

CALF facilitated the 3rd Food Analyst examination of FSSAI for the candidates from western part of India. The Laboratory also participated in National Milk Quality Survey 2016 organised by FSSAI.

New Initiatives

During the year, CALF took various initiatives to improve its services by enhancing scope of analysis and addressing the industry requirements.

- New methods for estimation of multi residue pesticides in milk & milk products and fruit & vegetables (about 120 pesticides) have been standardised and validated on Liquid Chromatography coupled with tandem Mass Spectrometry (LC-MS/MS) and Atmospheric Pressure Gas Chromatography coupled with Mass Spectrometry (APGC-MS/MS). An enzymatic, UV Spectrophotometer based method for quantitative estimation of maltodextrin was standardised for skimmed milk powder. The method for detection of foreign fat in cow milk fat, as per ISO 17678:2010 (E), was put in use. The facility of all these tests is being used by dairy and food industry.
- Laboratory has doubled the analytical infrastructure required for testing of cattle feed and its ingredients for proximate analysis. The advanced rapid technology for microbiological test has been adopted to reduce the turnaround time as compared to conventional methods (TEMPO and VIDAS).
- In order to increase approachability and awareness about the analytical facility at CALF, the laboratory organised customer meets at Anand and Bengaluru, wherein delegates from 9 states participated.
- CALF has been included in DAC-sponsored scheme on "Monitoring of Pesticide Residue at National Level" for fruit and vegetables.

Quality and Competency

CALF's personnel attended various training programmes conducted by national and international experts in the field of residue analysis, water and mineral analysis, good laboratory practices and quality management system. CALF also implemented a robust quality control programme to ensure the accuracy of analytical results.



Other Activities



A meeting of the Town Official Language Implementation Committee (TOLIC) was organised at NDDB, Anand

Progressive Use of Hindi

With a view to encourage Hindi in the official work, concerted efforts were made during the year. NDDB's Annual Report, NDP I progress report, website contents, training material, PPTs and other documents were translated in Hindi. Besides, effective steps were taken to implement the Official Language Policy.

To accelerate the pace of its progressive use, a Hindi Fortnight was organised in all NDDB offices during September 2016. Apart from a lecture by a prominent Hindi scholar, competitions like on-the-spot Hindi Essay Writing, Hindi Translation, Essay Writing, General Knowledge and Poetry Recitation were organised during the year. A large number of employees participated in these competitions. Prize money for all these competitions was enhanced and an amount of ₹ 83,100 was distributed as cash prize to employees.

NDDB has introduced various incentive schemes for promotion of Hindi in office work. One such scheme is Hindi Noting and Drafting Incentive Scheme. 31 employees participated in this scheme and were given cash incentives. The cash incentive for Noting and Drafting Scheme was also enhanced as per the guidelines. Ten employees whose children scored 75 per cent and more marks in Hindi in Class 10th and 12th examination, were given a cash prize of ₹ 1,000 each.

Group-wise meetings were organised for increasing use of Hindi in day-to-day office work. Demonstration on use of voice typing tool in Hindi was also organised in all Groups for enhancing use of Hindi in computer. In order to encourage non-Hindi speaking employees, a Hindi workshop was organised for employees belonging to C Region, which was highly appreciated by the participants. For regular monitoring of progress of Hindi usage in office work, inspection of NDDB office; Noida, Bengaluru and Training Centre, Erode was done during the year.

During 2016-17, NDDB, Anand was associated with Town Official Language Implementation Committee (TOLIC). Half-yearly meeting of TOLIC, Anand was organised in NDDB office wherein Dy. Director

NDDB has introduced various incentive schemes for promotion of Hindi in office work. One such scheme is Hindi Noting and Drafting Incentive Scheme.



(Implementation), Western Region, Mumbai and representatives of all the Government institutions, PSUs and Banks located in Anand were present. NDDDB employees were nominated to participate in the competitions organised by TOLIC, Anand and two employees received cash awards.

The NDDDB library has a large number of books in Hindi. During the year, books in Hindi, amounting to about ₹ 98,000 were added to the library.

All national programmes viz. Republic Day, Independence Day, Gandhi and Shastri Jayanti and Ambedkar Jayanti were organised in Hindi.

Welfare of SC/ST Employees

During the year, 101 training nominations for SC/ST employees were processed, which included training/exposure to need-based programmes. Welfare measures for SC/ST employees also continued during the year. Meritorious children of SC/ST employees were recognised with cash prize and certificates for their academic achievements. To encourage academic orientation, SC/ST employees were reimbursed



expenses incurred on education as well as books for their children.

As a mark of respect to Dr. B.R. Ambedkar and for remembering his contribution to the nation, Ambedkar Jayanti was celebrated in all offices of NDDDB wherein distinguished speakers shared their thoughts on the life and achievements of Dr. Ambedkar.



Award distribution to meritorious children of SC/ST employees

Subsidiaries



Bulk coolers manufacturing facility

IDMC Limited

IDMC continued operations in the business segments of dairy, cattle feed, pharmaceutical, beverage, thermal and packaging.

During 2016-17, IDMC completed the supply, installation, testing and commissioning of three dairy projects with capacities ranging from two to five lakh litres per day to process, market milk and products such as *paneer*, sterilised milk. Also, three ice-cream plants of capacity ranging from 10,000 LPD to 1 LLPD were set up. An automated continuous butter making plant of capacity 2.5 TPH was also set up by IDMC. Ten turnkey dairy projects with products which also included the civil construction work are under execution.

IDMC completed the installation and commissioning of 100 TPD automatic cattle feed plant covering civil, mechanical, electrical, automation and utilities in a record time of 12 months. The company completed the expansion of a cattle feed plant from 500 TPD to 800 TPD and also installed a silo storage system of 1,500 MT.

On the pharmaceutical front, IDMC successfully commissioned its first PED-approved mixing vessel which it had manufactured and supplied to a pharmaceutical company in the United Kingdom. Work is underway on a large fermentation project and two effluent decontamination systems.



An automated continuous butter-making plant of capacity 2.5 TPH was also set up by IDMC.





FILMATIC S

IDMC completed the supply and installation of a 24 KLPH juice processing plant with automatic double circuit CIP. By the end of the year, IDMC had supplied an 8 KLPH sugar dissolving system to a food and beverage plant.

During the year, IDMC completed work on five ammonia-based refrigeration projects ranging in capacity from 400 TR to 2,460 TR. Work is in progress on four ammonia refrigeration projects. The Company commissioned five indigenously manufactured ice silos with capacities ranging from 3,000 to 4,100 MCAL. In addition, several orders for similar ice silos were being executed.

IDMC continued to supply key processing equipment such as pasteurisers, homogenisers, ice-cream freezers etc. and have a major share of the market for Bulk Milk Coolers (BMCs) in India. Service agreements were executed with key customers.

Accreditation of the packaging film plant was upgraded from ISO 22000:2005 to FSSC: 22000 certification during the year. A laser scoring system was installed at the plant for value addition in films and pouches.

IDMC's R&D centre is recognised by the Department of Scientific and Industrial Research and is also a member of the technical committee of the Bureau of Indian Standards for food processing equipment.

The research and development initiatives of IDMC continued to focus on making its products and processes more efficient and cost-effective.

In 2016-17, IDMC reported a total income of ₹ 6,967.67 million with a profit before tax of ₹ 209.10 million.

Indian Immunologicals

Indian Immunologicals Limited (IIL) achieved a significant growth of 37 per cent for its highest sales turnover of ₹ 5,092 million for the year 2016-17. IIL managed to deliver 206 million doses of FMD vaccine in 2016-17, its highest since inception. In addition, IIL also has established itself as the largest supplier of anti-rabies vaccine to the various state governments. IIL's institution business (₹ 2,731 million) grew by 24 per cent. IIL's retail business in Animal Health (₹ 720 million) grew by 5 per cent and IIL's retail business in Human Health (₹ 422 million) grew 85 per cent. IIL's exports grew by 134 per cent and recorded a turnover of ₹ 789 million, while its Animal nutrition business achieved 54 per cent growth and recorded a turnover of ₹ 403 million.

IIL launched the world's first vaccine against Porcine Cysticercosis (Cysvax). The recombinant vaccine when administered in pigs will reduce the incidence of neurocysticercosis and associated epilepsy in human beings.



Inside of a Vaccine production plant

IIL has obtained licence and has started manufacturing its human anti-rabies vaccine, Abhayrab from its state-of-the-art manufacturing facility in Karakapatla. IIL's stamp of quality has been well recognised by industry peers and the company has signed agreements to make anti-rabies vaccines for other players.

IIL's DSIR-approved Research and Development Centre has many exciting candidate vaccines in its pipeline. A gene-deleted marker vaccine for IBR has been developed and a large scale field study with the vaccine will be undertaken shortly. Technology for the manufacture of Classical Swine Fever vaccine has been completed from Indian Veterinary Research Institute (IVRI) and field studies with the vaccine at two centres will be undertaken. Phase-III studies for Pentavalent vaccine (Childhood immunisation) has been successfully completed and the product will be available in the second quarter of 2017. Pre-Clinical Toxicology (PCT) studies for Hepatitis A vaccine and Chikungunya vaccine have been successfully completed. PCT studies for Typhoid Conjugate vaccine is under progress.

IIL is in the forefront of farmers' education and awareness programmes. The company has actively participated in various Krishi Melas in several parts of the country to create awareness among the farmers. As a part of its Corporate Social Responsibility (CSR) initiative, IIL continues to provide health coverage to more than a lakh cattle in gaushalas. IIL has adopted a Government school (Laxmapur village, Medak district, Telangana state) and has created infrastructure for the well-being of students and also has provided them with uniforms, school bags and notebooks.

Pristine Biologicals NZ Ltd, an overseas subsidiary of IIL has successfully commenced operations and has supplied the yearly requirement of Adult Bovine Serum (ABS) to enable IIL to produce various vaccines.

Mother Dairy Fruit & Vegetable Private Limited

Mother Dairy's heritage is intrinsically linked to the cooperative movement of the country and with a determination to work towards the upliftment of farmers. It is the company's constant endeavour to ensure that milk producers and farmers receive remunerative prices regularly. With the objective of helping the farmers in augmenting their family income, in the year 2016-17, the company has ventured into new territories which are drought-affected areas of Maharashtra. Within six months, the operations were spread in 586

villages procuring around 39,000 litres per day from over 7,000 farming families in the districts of Vidarbha and Marathwada region of Maharashtra. Further, the procurement operations were also extended to Bihar, in the districts of Motihari, east and west Champaran and Gopalgunj, and this programme was started in February 2017.

The Company's sustained efforts to strengthen procurement from its own network was complemented by improved sourcing from the Cooperatives and the Producers' Companies. It has resulted in increasing the contribution level of milk sourcing to 81 per cent (from 72 per cent of last year) from the farmer-centric set-up.

Through its Horticulture division, MDFVPL has extended its farmer connect to the underdeveloped area by providing market access through our new frozen line to the peas-growing farmers of Jharkhand. This facility will also enable processing cut vegetables produced in and around Ranchi. The company has set-up a new modern IQF processing facility of 4,350 MT at Ranchi in Phase-1 and has further plans to install pulp processing facility of 17,700 MT during 2017-18 at Ranchi. The second phase will help secure market access to tomato growers of the area as well as mango and other fruits grown in the region.

As a part of Mother Dairy Environmental Management System, the company has consistently emphasised sustainable use of natural and non-renewable resources. In this direction, the company has set-up Solar Power Generation Units and commissioned 800 KW Photo Voltaic Projects Pan India (500 KW at Balaji, Andhra Pradesh, 100 KW each at Patparganj, Pilkua and Etawah factory in Uttar Pradesh). The company has also installed Concentrated Solar Technology (CST) project at Patparganj equivalent to ~3 MW power to reduce the consumption of PNG by approximately 69,000 standard cubic meter per annum. The company has also added three rainwater harvesting pits of 1 lakh litres capacity each for water conservation.

Mother Dairy has always spearheaded innovations in the Dairy, Oils and F&V category, and current emphasis has been nutrition-focussed innovations. In addition to innovation, bench-marking quality assurance systems, driving improved and modern analytical capability embracing best scientific and regulatory practices and networking to drive the innovation, Quality and Food Safety agenda have been some critical few focus areas. The Quality Assurance Systems have been conceptualised on "Quality by Design", strengthened through Global Standards and



Mother Dairy ice-cream cones

Process Controls in Quality, for existing and for all new Innovations. Mother Dairy has been a primary force in various National committees like the FSSAI-CHIFSS Initiative on “FSMS Guidance Documents for Edible Oils & Fats”, “Ethylene Controlled Artificial Ripening”, “Certified Food Safety Training” for Food Safety Officers (FSOs), CII’s “Food Safety Assessors” and BIS-FAD 19 committee.

During the Financial Year, the company took various initiatives to support the Digital India Programme, (a flagship programme of the Government of India with a vision to transform India into a digitally empowered society), Mother Dairy equipped all its distribution outlets/booths across Delhi/NCR with ‘cash-less’ payment options, like customised Prepaid Card, PayTM, UPI and Aadhar-enabled payment system in collaboration with Ministry of Electronics and Information Technology. It has ensured more than 97 per cent coverage of cashless payment options to its customers.

The Employee Value Proposition (EVP) has been linked with the PMS and Recruitment Policy of Mother Dairy was awarded the BBC Knowledge Best Articulated EVP at the World HRD Congress.

In 2016-17, the company achieved a turnover of ₹ 79,180 million registering an overall growth of

10 per cent which has been largely driven by 24 per cent growth in Edible Oil and 18 per cent growth in Value-Added Dairy Products.

The Milk Business has delivered a growth of 7 per cent over last year. The Strategic Business Unit launched Cow Milk and positioned the category for growing kids between age group 2-7 years. The milk with 4 per cent Fat and homogenised for easy palatability, created a niche for itself. The variant, within 8 months, achieved 3 LLPD sales and is estimated to do an annualised sales exceeding ₹ 5,000 million.

With the release of new guidelines of fortification from FSSAI, Mother Dairy was first off the block to fortify all milk variants as permitted by FSSAI. Currently, about 30 LLPD of Mother Dairy Milk is fortified with vitamin A and D2.

Through Horticulture division, the company’s exports have been extended to 30 countries in 2016-17.

NDDB Dairy Services

NDDB Dairy Services (NDS) was incorporated in 2009 as a not-for-profit company under Section 25 of the Companies Act, 1956, to function as a delivery arm of NDDB for field operations relating to promoting producer organisations and productivity services.

NDS manages the two largest semen stations in the country - Sabarmati Ashram Gaushala in Bidaj (Gujarat) and Animal Breeding Centre in Salon (Uttar Pradesh) and has set up two new mega semen stations in Alamadhi (Tamil Nadu) and Rahuri (Maharashtra). During the year, these four semen stations together sold about 269 lakh doses.

A common marketing strategy was implemented by NDS for the four semen stations wherein a pan-India brand – “SAG-Superior Animal Genetics” of frozen semen was promoted. More than 45 Artificial Insemination Technician (AIT) meets were held across the country where more than 2,800 AITs participated and these AITs were educated on the importance of high genetic merit semen in cattle breeding.

NDS continued to support five Milk Producer Companies namely Paayas in Rajasthan, Maahi in Gujarat, Shreeja in Andhra Pradesh, Baani in Punjab and Saahaj in Uttar Pradesh. NDS has also provided technical assistance to these MPCs in taking up various activities under NDP I.

NDS supported the MPCs in the capacity-building of various stakeholders of the MPCs. Finance Module for the Board of Directors, Workshop for the BODs, Senior Officers, Field Teams on Core Design Principles of the MPCs, Trainers’ Training Programme and field demonstrations for the outsourced agencies for taking

up the awareness programmes for the MPCs were organised during the year.

The Ministry of Rural Development, Government of India has recognised NDS as Deen Dayal Anthyodaya Yojana NRLM Support Organisation (DNSO) to assist the State Rural Livelihood Missions (SRLMs) in implementation of dairy value chain interventions by setting up milk producer companies.

The proposal for setting up MPCs in Bihar and Madhya Pradesh has been approved by the Empowered Committee set up by the Ministry of Rural Development. In Madhya Pradesh, an MPC will cover the districts of Rajgarh and Agar and another will cover the district of Sagar in Bundelkhand region. The MPC in Bihar would be covering the districts of Supaul, Madhepura and Saharsa.

NDDB Dairy Services is also facilitating setting up of a Milk Producer Company to cover Northwest districts of Bihar.

As per the MoU signed between NDDB and the Government of Maharashtra for developing dairying in the region of Vidarbha and Marathwada, Mother Dairy Fruits and Vegetables Ltd (MDFVL) has initiated milk procurement operations in the select districts of the regions. NDS is undertaking various institution-building activities to help MDFVL put in place systems for formation of producer company at appropriate stage.



Member enrolment for a milk producer company

Dairy Cooperatives at a Glance

Dairy Cooperative Societies

(in numbers)[@]

| Region/State | 80-81 | 90-91 | 00-01 | 15-16 | 16-17* |
|-----------------------|---------------|---------------|---------------|-----------------|-----------------|
| NORTH | | | | | |
| Haryana | 505 | 3,229 | 3,318 | 7,157 | 7,318 |
| Himachal Pradesh | | 210 | 288 | 860 | 918 |
| Jammu & Kashmir | | 105 | ** | 366 | 366 |
| Punjab | 490 | 5,726 | 6,823 | 7,575 | 7,954 |
| Rajasthan | 1,433 | 4,976 | 5,900 | 14,620 | 15,159 |
| Uttar Pradesh | 248 | 7,880 | 15,648 | 22,790 | 26,149 |
| Uttarakhand | | | | 3,941 | 4,133 |
| Regional Total | 2,676 | 22,126 | 31,977 | 57,309 | 61,997 |
| EAST | | | | | |
| Assam | | 117 | 125 | 332 | 355 |
| Bihar | 118 | 2,060 | 3,525 | 19,483 | 19,837 |
| Jharkhand | | | | 60 | 540 |
| Meghalaya | | | | 97 | 97 |
| Mizoram | | | | 37 | 37 |
| Nagaland | | 21 | 74 | 52 | 52 |
| Odisha | | 736 | 1,412 | 5,541 | 5,579 |
| Sikkim | | 134 | 174 | 433 | 451 |
| Tripura | | 73 | 84 | 99 | 100 |
| West Bengal | 584 | 1,223 | 1,719 | 3,658 | 3,830 |
| Regional Total | 702 | 4,364 | 7,113 | 29,792 | 30,878 |
| WEST | | | | | |
| Chhattisgarh | | | | 859 | 924 |
| Goa | | 124 | 166 | 180 | 182 |
| Gujarat | 4,798 | 10,056 | 10,679 | 18,546 | 18,595 |
| Madhya Pradesh | 441 | 3,865 | 4,877 | 8,371 | 9,247 |
| Maharashtra \$ | 718 | 4,535 | 16,724 | 21,671 | 20,267 |
| Regional Total | 5,957 | 18,580 | 32,446 | 49,627 | 49,215 |
| SOUTH | | | | | |
| Andhra Pradesh | 298 | 4,766 | 4,912 | 3,493 | 3,537 |
| Karnataka | 1,267 | 5,621 | 8,516 | 14,794 | 15,185 |
| Kerala | | 1,016 | 2,781 | 3,240 | 3,266 |
| Tamil Nadu | 2,384 | 6,871 | 8,369 | 10,986 | 11,283 |
| Telangana | | | | 1,719 | 1,849 |
| Puducherry | | 71 | 92 | 102 | 104 |
| Regional Total | 3,949 | 18,345 | 24,670 | 34,334 | 35,224 |
| Grand Total | 13,284 | 63,415 | 96,206 | 1,71,062 | 1,77,314 |

[@] Organised (cumulative), includes conventional societies and Taluka unions formed earlier

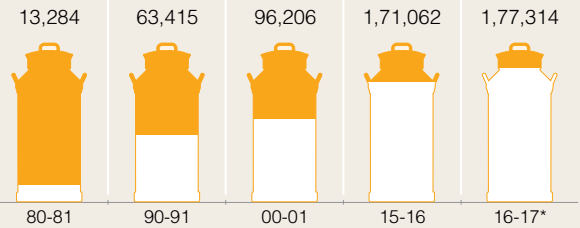
* Provisional

** Not reported

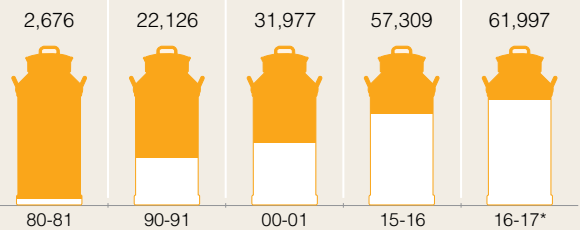
\$ A total of 1,736 DCSs have been liquidated in Maharashtra

Data for Meghalaya, Mizoram, Telangana & Uttarakhand included from 2014-15

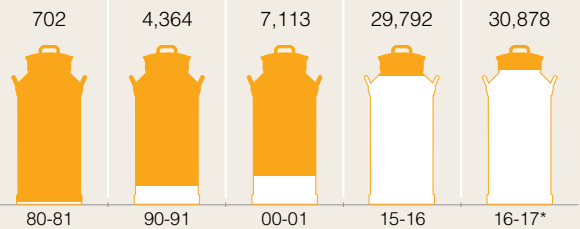
TOTAL



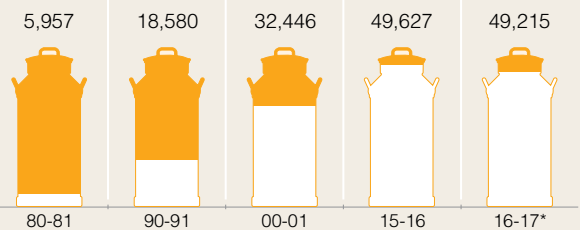
NORTH



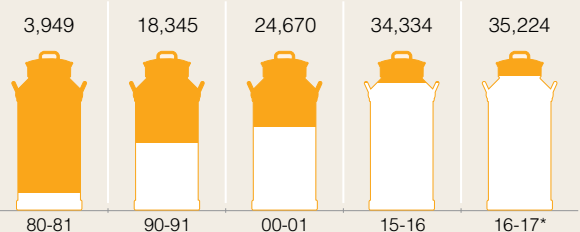
EAST



WEST



SOUTH



Producer Members

(in thousands)

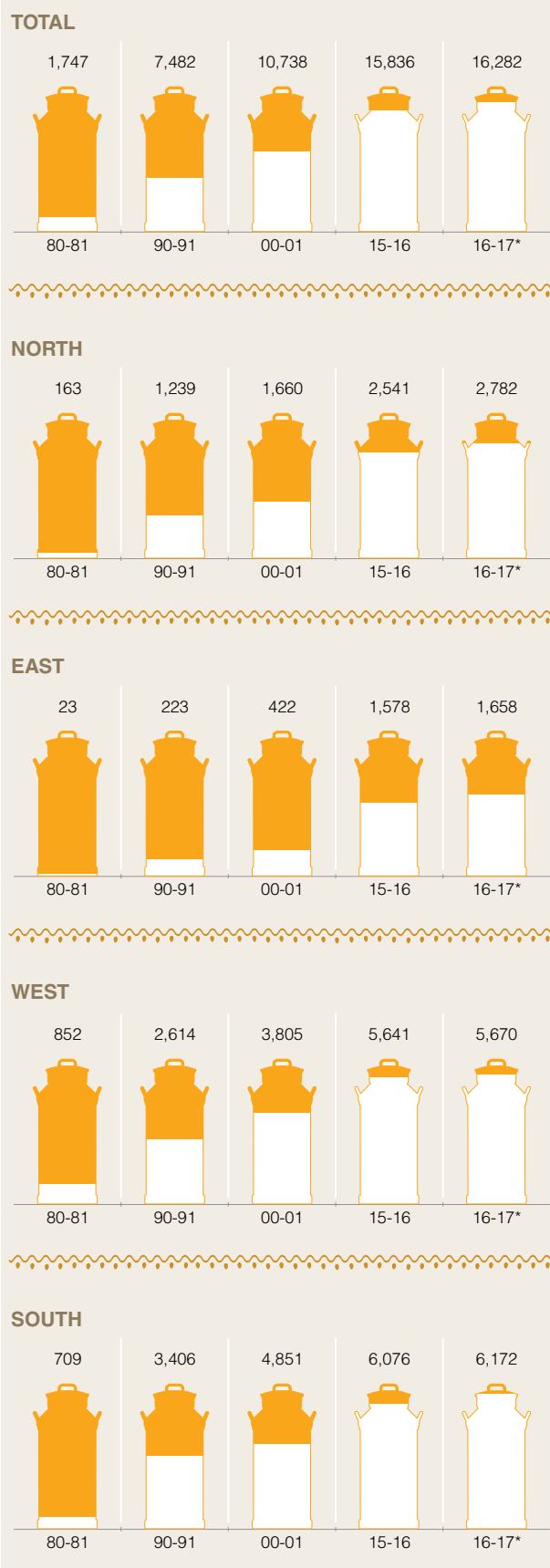
| Region/State | 80-81 | 90-91 | 00-01 | 15-16 | 16-17* |
|-----------------------|--------------|--------------|---------------|---------------|---------------|
| NORTH | | | | | |
| Haryana | 39 | 184 | 185 | 305 | 304 |
| Himachal Pradesh | | 17 | 20 | 36 | 38 |
| Jammu & Kashmir | | 2 | ** | 7 | 7 |
| Punjab | 26 | 304 | 370 | 399 | 405 |
| Rajasthan | 80 | 340 | 436 | 763 | 783 |
| Uttar Pradesh | 18 | 392 | 649 | 878 | 1086 |
| Uttarakhand | | | | 153 | 159 |
| Regional Total | 163 | 1,239 | 1,660 | 2,541 | 2,782 |
| EAST | | | | | |
| Assam | | 2 | 1 | 16 | 17 |
| Bihar | 3 | 100 | 184 | 1,004 | 1,054 |
| Jharkhand | | | | 1 | 17 |
| Meghalaya | | | | 4 | 4 |
| Mizoram | | | | 1 | 1 |
| Nagaland | | 1 | 3 | 2 | 2 |
| Odisha | | 46 | 111 | 281 | 286 |
| Sikkim | | 4 | 5 | 12 | 13 |
| Tripura | | 4 | 4 | 6 | 6 |
| West Bengal | 20 | 66 | 114 | 252 | 259 |
| Regional Total | 23 | 223 | 422 | 1,578 | 1,658 |
| WEST | | | | | |
| Chhattisgarh | | | | 35 | 37 |
| Goa | | 12 | 18 | 19 | 19 |
| Gujarat | 741 | 1,612 | 2,147 | 3,452 | 3,456 |
| Madhya Pradesh | 24 | 150 | 242 | 321 | 440 |
| Maharashtra \$ | 87 | 840 | 1,398 | 1,814 | 1,719 |
| Regional Total | 852 | 2,614 | 3,805 | 5,641 | 5,670 |
| SOUTH | | | | | |
| Andhra Pradesh | 33 | 561 | 702 | 649 | 651 |
| Karnataka | 195 | 1,013 | 1,528 | 2,400 | 2,463 |
| Kerala | | 225 | 637 | 940 | 962 |
| Tamil Nadu | 481 | 1,590 | 1,957 | 1,923 | 1,909 |
| Telangana | | | | 127 | 148 |
| Puducherry | | 17 | 27 | 38 | 38 |
| Regional Total | 709 | 3,406 | 4,851 | 6,076 | 6,172 |
| Grand Total | 1,747 | 7,482 | 10,738 | 15,836 | 16,282 |

* Provisional

** Not reported

\$ A total of 1,736 DCSs have been liquidated in Maharashtra

Data for Meghalaya, Mizoram, Telangana & Uttarakhand included from 2014-15



Milk Procurement

(in thousand kilograms per day)[#]

| Region/State | 80-81 | 90-91 | 00-01 | 15-16 | 16-17* |
|-----------------------|--------------|--------------|---------------|---------------|---------------|
| NORTH | | | | | |
| Haryana | 33 | 94 | 276 | 450 | 449 |
| Himachal Pradesh | | 14 | 24 | 57 | 64 |
| Jammu & Kashmir | | 11 | ** | 12 | 18 |
| Punjab | 75 | 394 | 912 | 1,392 | 1,482 |
| Rajasthan | 138 | 364 | 887 | 2,602 | 2,569 |
| Uttar Pradesh | 64 | 382 | 791 | 322 | 351 |
| Uttarakhand | | | | 173 | 182 |
| Regional Total | 310 | 1,259 | 2,890 | 5,009 | 5,114 |
| EAST | | | | | |
| Assam | | 4 | 3 | 22 | 26 |
| Bihar | 3 | 95 | 330 | 1,726 | 1,565 |
| Jharkhand | | | | 61 | 87 |
| Meghalaya | | | | 11 | 12 |
| Mizoram | | | | 7 | 5 |
| Nagaland | | 1 | 3 | 3 | 3 |
| Odisha | | 41 | 94 | 526 | 501 |
| Sikkim | | 4 | 7 | 27 | 33 |
| Tripura | | 3 | 1 | 5 | 5 |
| West Bengal | 31 | 52 | 204 | 160 | 160 |
| Regional Total | 34 | 200 | 642 | 2,547 | 2,398 |
| WEST | | | | | |
| Chhattisgarh | | | | 74 | 77 |
| Goa | | 16 | 32 | 66 | 66 |
| Gujarat | 1,344 | 3,102 | 4,567 | 17,481 | 18,203 |
| Madhya Pradesh | 68 | 256 | 319 | 1,029 | 887 |
| Maharashtra | 165 | 1,872 | 2,979 | 3,646 | 3,404 |
| Regional Total | 1,577 | 5,246 | 7,897 | 22,296 | 22,637 |
| SOUTH | | | | | |
| Andhra Pradesh | 79 | 763 | 879 | 1,332 | 1,352 |
| Karnataka | 261 | 917 | 1,887 | 6,480 | 6,549 |
| Kerala | | 185 | 646 | 1,099 | 1,068 |
| Tamil Nadu | 301 | 1,106 | 1,618 | 3,040 | 2,998 |
| Telangana | | | | 712 | 677 |
| Puducherry | | 26 | 45 | 43 | 52 |
| Regional Total | 641 | 2,997 | 5,075 | 12,705 | 12,696 |
| Grand Total | 2,562 | 9,702 | 16,504 | 42,557 | 42,845 |

Includes outside State operations

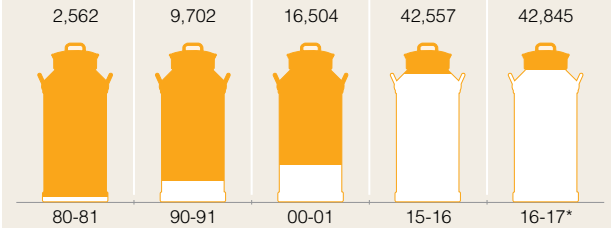
* Provisional

** Not reported

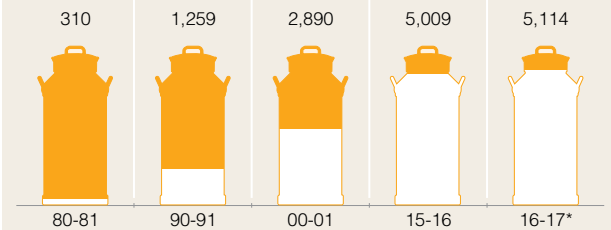
Gujarat's total milk procurement in 2016-17 includes 2,453 TKgPD from outside the State. In 2015-16, the corresponding figure was 2,643 TKgPD.

Data for Meghalaya, Mizoram, Telangana & Uttarakhand included from 2014-15.

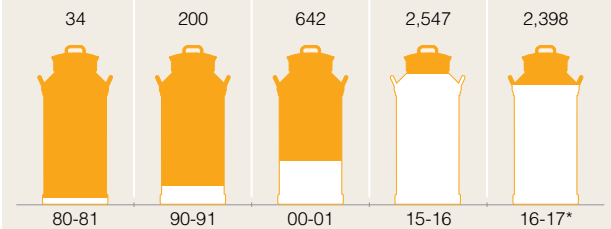
TOTAL



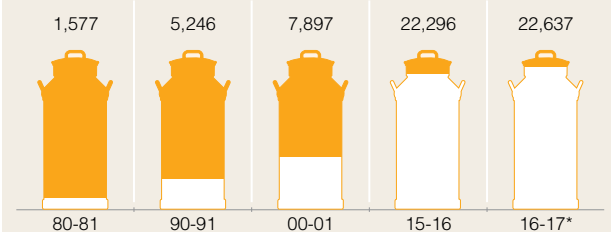
NORTH



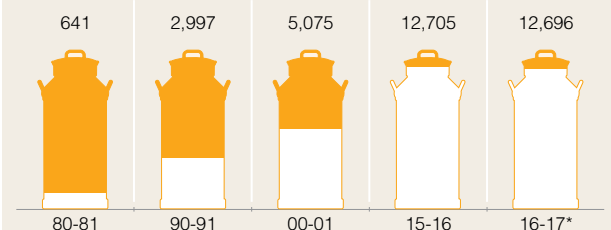
EAST



WEST



SOUTH



Liquid Milk Marketing

(in thousand litres per day)[#]

| Region/State | 80-81 | 90-91 | 00-01 | 15-16 | 16-17* |
|-----------------------|--------------|--------------|---------------|---------------|---------------|
| NORTH | | | | | |
| Haryana | 2 | 80 | 108 | 335 | 323 |
| Himachal Pradesh | | 15 | 20 | 23 | 27 |
| Jammu & Kashmir | | 9 | ** | 14 | 19 |
| Punjab | 7 | 139 | 420 | 965 | 956 |
| Rajasthan | 12 | 136 | 540 | 2,084 | 2,132 |
| Uttar Pradesh | 1 | 326 | 436 | 689 | 814 |
| Uttarakhand | | | | 146 | 150 |
| Delhi | 697 | 1,051 | 1,524 | 6,032 | 6,165 |
| Regional Total | 719 | 1,756 | 3,048 | 10,288 | 10,587 |
| EAST | | | | | |
| Assam | | 10 | 7 | 42 | 47 |
| Bihar | 8 | 111 | 324 | 880 | 1,008 |
| Jharkhand | | | | 339 | 360 |
| Meghalaya | | | | 12 | 12 |
| Mizoram | | | | 6 | 5 |
| Nagaland | | 1 | 4 | 4 | 3 |
| Odisha | | 65 | 98 | 406 | 413 |
| Sikkim | | 5 | 7 | 31 | 35 |
| Tripura | | 6 | 7 | 11 | 11 |
| West Bengal | 17 | 26 | 27 | 28 | 33 |
| Kolkata | 283 | 526 | 840 | 1,158 | 1,219 |
| Regional Total | 308 | 750 | 1,314 | 2,916 | 3,147 |
| WEST | | | | | |
| Chhattisgarh | | | | 132 | 157 |
| Goa | | 36 | 83 | 83 | 81 |
| Gujarat | 210 | 1,052 | 1,905 | 4,749 | 4,917 |
| Madhya Pradesh | 39 | 279 | 244 | 795 | 832 |
| Maharashtra | 18 | 363 | 1,178 | 2,686 | 2,826 |
| Mumbai | 950 | 1,057 | 1,390 | 1,784 | 1,815 |
| Regional Total | 1,217 | 2,787 | 4,800 | 10,229 | 10,629 |
| SOUTH | | | | | |
| Andhra Pradesh | 19 | 552 | 733 | 1,139 | 1,196 |
| Karnataka | 166 | 889 | 1,501 | 3,344 | 3,257 |
| Kerala | | 223 | 640 | 1,264 | 1,308 |
| Tamil Nadu | 109 | 405 | 559 | 988 | 980 |
| Telangana | | | | 790 | 801 |
| Puducherry | | 22 | 43 | 99 | 100 |
| Chennai | 245 | 662 | 725 | 1,071 | 1,076 |
| Regional Total | 539 | 2,753 | 4,201 | 8,695 | 8,718 |
| Grand Total | 2,783 | 8,046 | 13,363 | 32,128 | 33,080 |

Includes Metro Dairies and outside State operations

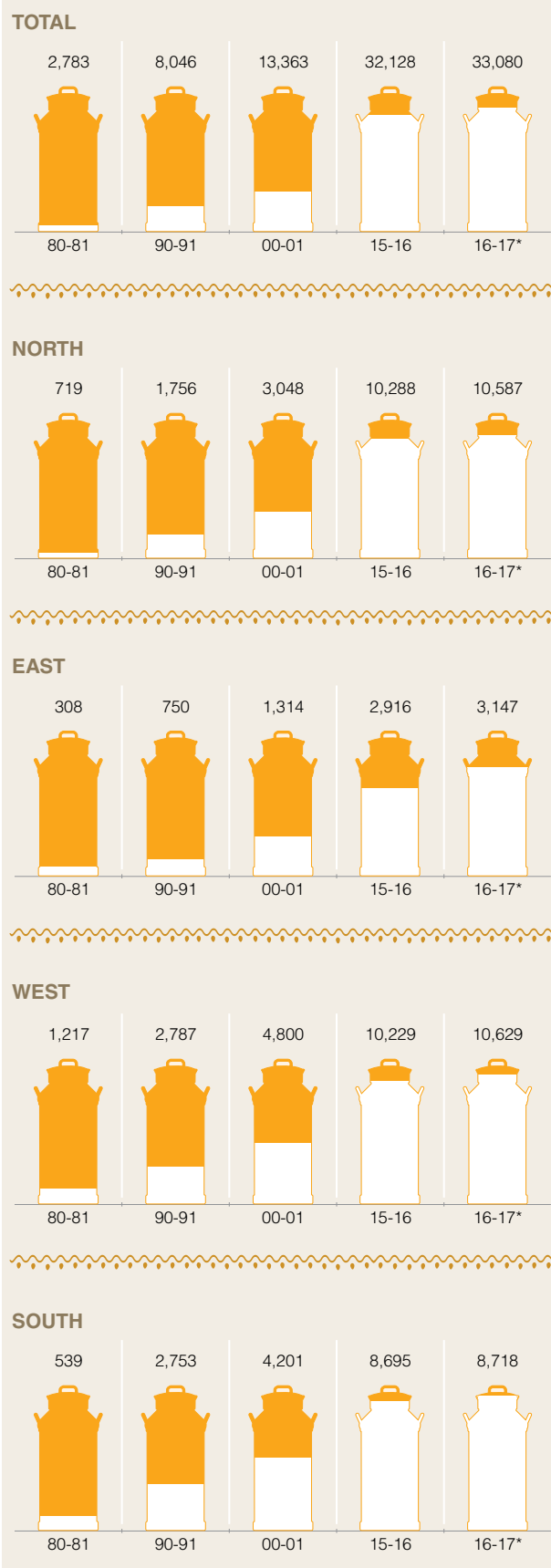
* Provisional

** Not reported

Gujarat's total milk marketing in 2016-17 including outside the State stands at 11,319 TLPD.

In 2015-16, the corresponding figure was 10,835 TLPD.

Data for Meghalaya, Mizoram, Telangana & Uttarakhand included from 2014-15



Visitors

During 2016-17, NDDDB received 761 visitors from India and Abroad.

Overseas visitors came from Bangladesh, Brazil, Denmark, Ethiopia, France, Japan, Kenya, Netherlands, Nepal, Thailand and the United States of America.



Mr Takumi Kunitake and Ms Chikako Maruyama, Japan International Cooperation Agency (JICA) Tokyo



Shri Parshottam Rupala, Minister of State for Agriculture accompanied by Shri Dilip Patel, Member of Parliament



IAS officer trainees of 2016 Batch from Lal Bahadur Shastri National Academy of Administration, Mussoorie



H.E. Mr Augusto Montiel, Ambassador Extraordinary and Plenipotentiary of the Bolivarian Republic of Venezuela



Mr Thumrongsakd Phonbumrung, Dairy Asia consultant, accompanied by Mr Kamchai Kidsin, Department of Livestock Development, Thailand



Shri Devendra Chaudhry, Secretary, Department of Animal Husbandry, Dairying & Fisheries, Government of India accompanied by Shri OP Chaudhary, Joint Secretary (C&DD)

Borkar & Muzumdar

Chartered Accountants

INDEPENDENT AUDITOR'S REPORT

TO THE BOARD OF DIRECTORS OF NATIONAL DAIRY DEVELOPMENT BOARD

Report on the Financial Statements

We have audited the accompanying financial statements of **National Dairy Development Board** ("the Board"), which comprise the balance sheet as at March 31, 2017, the Income and Expenditure Account and the Cash Flow Statement for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation of these financial statements in accordance with the financial reporting provisions of National Dairy Development Board Act, 1987 ("the Act"). This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation of the financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those Standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Board's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Board's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of the accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion and to the best of our information and according to the explanations given to us, the financial statements of the Board for the year ended 31st March, 2017 are prepared, in all material respects, in accordance with the provisions of the Act.

For **Borkar & Muzumdar**

Chartered Accountants

FRN: 101569W

Devang Vaghani

Partner

M. NO. 109386

Date: 16 June, 2017

Place: Anand

Tel: 022 6689 9999 / Fax: 022 6689 9990 / Email: contact@bnmca.com / Website: www.bnmca.com
21/168, Anand Nagar, Om CHS., Anand Nagar Lane, Off Nehru Road, Vakola, Santacruz (East), Mumbai - 400 055

Branches: Ahmedabad, Bengaluru, Bhopal, Bhubaneswar, Bilaspur, Delhi, Goa, Jabalpur, Mira Road, Nagpur, Patna, Pune, Raipur

National Dairy Development Board (“NDDB” or “the Board”)

(A Body corporate constituted under the National Dairy Development Board Act, 1987)

Balance Sheet as at 31st March, 2017

₹ in Million

| PARTICULARS | Annexure | 31.03.2017 | 31.03.2016 |
|--|-----------------|-------------------|-------------------|
| LIABILITIES | | | |
| NDDB Funds | I | 28,774.71 | 28,032.67 |
| Secured Loans | II | 50.11 | 752.84 |
| Current Liabilities and Provisions | III | 6,542.03 | 6,575.01 |
| Deferred Tax Liability | XVI (Note 8) | 239.23 | - |
| Total | | 35,606.08 | 35,360.52 |
| ASSETS | | | |
| Cash and Bank Balances | IV | 9,487.01 | 8,815.12 |
| Inventories | V | 0.51 | 1.40 |
| Sundry Debtors | | 62.21 | 72.56 |
| Loans, Advances and Other Current Assets | VI | 15,274.58 | 16,903.15 |
| Investments | VII | 8,890.74 | 7,532.17 |
| Fixed Assets | VIII | 1,891.03 | 1,907.75 |
| Deferred Tax Assets | XVI (Note 8) | - | 128.37 |
| Total | | 35,606.08 | 35,360.52 |
| Significant Accounting Policies | XV | | |
| Notes to Accounts forming part of Financial Statements | XVI | | |

In terms of our report of even date attached.

For Borkar & Muzumdar
Chartered Accountants

Devang Vaghani
Partner

For and on behalf of the Board,

Dilip Rath
Chairman

Y Y Patil
Executive Director

S Regupathi
Deputy General Manager
(Accounts)

Anand, 16th June, 2017

National Dairy Development Board (“NDDB” or “the Board”)

(A Body corporate constituted under the National Dairy Development Board Act, 1987)

Income and Expenditure Account for the year ended 31st March, 2017

₹ in Million

| PARTICULARS | Annexure | 2016-2017 | 2015-2016 |
|---|-----------------|------------------|------------------|
| INCOME | | | |
| Interest | | 1,962.88 | 1,919.32 |
| Service Charges | IX | 170.03 | 175.65 |
| Rent | | 188.68 | 169.37 |
| Dividend | | 268.22 | 130.14 |
| Other Income | X | 499.81 | 600.55 |
| Total (A) | | 3,089.62 | 2,995.03 |
| EXPENDITURE | | | |
| Interest and Financial Charges | | 138.02 | 121.65 |
| Remuneration and Benefits to Employees | XI | 951.79 | 638.44 |
| Administrative Expenses | XII | 139.41 | 175.95 |
| Grants | | 7.48 | 13.14 |
| Research and Development | | 126.00 | 134.84 |
| Maintenance of Assets | XIII | 184.88 | 193.02 |
| Other Expenses | XIV | 82.19 | 78.47 |
| Bad Debts Written off | XVI (Note 9) | 152.01 | 319.92 |
| Depreciation | VIII | 131.06 | 133.29 |
| Total (B) | | 1,912.84 | 1,808.72 |
| Surplus during the year before tax (C) = (A - B) | | 1,176.78 | 1,186.31 |
| Less: Provision for Taxation | | | |
| Current Tax | | 75.20 | - |
| Deferred Tax | XVI (Note 8) | 35.80 | 61.93 |
| Surplus during the year after tax | | 1,065.78 | 1,124.38 |
| Less: Appropriations to - | | | |
| Special Reserve | | 140.52 | 135.98 |
| Balance carried to General Funds | | 925.26 | 988.40 |
| Total (D) = (B + C) | | 3,089.62 | 2,995.03 |
| Significant Accounting Policies | XV | | |
| Notes to Accounts forming part of Financial Statements | XVI | | |

In terms of our report of even date attached.

For Borkar & Muzumdar
Chartered Accountants

Devang Vaghani
Partner

For and on behalf of the Board,

Dilip Rath
Chairman

Y Y Patil
Executive Director

S Regupathi
Deputy General Manager
(Accounts)

Anand, 16th June, 2017

National Dairy Development Board (“NDDB” or “the Board”)

(A Body corporate constituted under the National Dairy Development Board Act, 1987)

Cash Flow Statement for the year ended on 31st March, 2017

₹ in Million

| PARTICULARS | 2016-17 | 2015-16 |
|--|-----------------|-------------------|
| Surplus during the year before tax | 1,176.78 | 1,186.31 |
| Adjustments for : | | |
| Depreciation | 131.06 | 133.29 |
| (Write back)/Provision for inventory obsolescence | (0.79) | - |
| (Profit)/Loss on sale of investments | - | (11.35) |
| Interest income on fixed deposit and bonds considered separately | (1,048.60) | (964.68) |
| Dividend Income considered separately | (268.22) | (130.14) |
| (Profit)/Loss on sale/ Grant of fixed assets considered separately | (40.41) | (129.94) |
| Employee Retirement Benefit | 216.84 | 59.51 |
| Interest and financial charges to banks | 3.00 | 4.45 |
| Bad debts written off | 152.01 | 319.92 |
| Premium Amortised on Bonds | 0.61 | - |
| | (854.50) | (718.94) |
| Operating Cash flow before changes in working capital | 322.28 | 467.37 |
| (Increase)/ Decrease in Inventories | 1.68 | - |
| Decrease/(Increase) in Sundry Debtors | 10.35 | 11.02 |
| Decrease/(Increase) in Loans and Advances | 833.03 | (1,906.52) |
| Tax refunded/(paid) | (82.27) | (34.74) |
| Increase/(Decrease) in current liabilities | 440.89 | 273.96 |
| | 1,203.68 | (1,656.28) |
| Net cash flow generated/(used) in operating activities (A) | 1,525.96 | (1,188.91) |
| Investing activities | | |
| Interest Income | 897.52 | 804.21 |
| Dividend Income | 268.22 | 130.14 |
| Proceeds from maturity of investments (Bonds) | 100.00 | 158.50 |
| Purchase of Investments (Bonds) | (1,459.18) | - |
| Decrease / (Increase) in FDR's with banks more than 90 days (net) | (251.90) | (683.00) |
| Proceeds from sale of fixed assets | 47.58 | 198.58 |
| Fixed Asset Purchase from Grant received from ICAR | 17.03 | 24.94 |
| Purchase of fixed assets | (130.48) | (211.79) |

₹ in Million

| PARTICULARS | 2016-17 | 2015-16 |
|--|-----------------|----------------|
| Net cash flow generated /(used) in investing activities (B) | (511.21) | 421.58 |
| Financing activities | | |
| Proceeds / (Repayment) of borrowed funds (702.73) | | 738.95 |
| Interest and financial charges to banks (3.00) | | (4.45) |
| Net cash flow from financing activities (C) | (705.73) | 734.50 |
| Net Cash flow during the year (A+B+C) | 309.02 | (32.83) |
| Cash and Cash Equivalents at the beginning of the year | 5.58 | 38.41 |
| Cash and Cash Equivalents at the end of the year | 314.60 | 5.58 |
| Cash and Cash Equivalent | | |
| Balances with Banks: | | |
| In fixed deposits | 8,949.20 | 8,417.30 |
| Less: Deposits with maturity more than 90 days | 8,669.20 | 8,417.30 |
| | 280.00 | - |
| In current accounts | 34.54 | 5.23 |
| Cash and Cheques on hand | 0.06 | 0.35 |
| Total | 314.60 | 5.58 |
| Significant Accounting Policies | XV | |
| Notes to Accounts forming part of Financial Statements | XVI | |

Note : Cash Flow Statement has been prepared under the "Indirect Method" as set out in Accounting Standard - 3 on Cash Flow Statements.

In terms of our report of even date attached.

For Borkar & Muzumdar
Chartered Accountants

For and on behalf of the Board,

Devang Vaghani
Partner

Dilip Rath
Chairman

Y Y Patil
Executive Director

S Regupathi
Deputy General Manager
(Accounts)

Anand, 16th June, 2017

NDDDB Funds

ANNEXURE I

₹ in Million

| | 31.03.2017 | 31.03.2016 |
|--|------------------|------------------|
| General Reserve (Note a) | | |
| Balance as per last balance sheet | 3,885.63 | 3885.63 |
| Add: Transferred from Grant for Fixed Assets | 5.78 | - |
| Less: Deferred Tax Liability on Special Reserve on 01.04.2016 (Refer Note 8 of Annexure XVI) | 331.80 | - |
| | 3,559.61 | 3885.63 |
| Grant for Fixed Assets (Note b) | | |
| Balance as per last balance sheet | 30.78 | 10.22 |
| Add: Grant received during the year | 17.03 | 24.94 |
| Less: Transferred to General Reserve | 5.78 | - |
| Less: Recoupment of depreciation (Refer Note 4 of Annexure VIII) | 8.97 | 4.38 |
| | 33.06 | 30.78 |
| Special Reserve under section 36 (1) (viii) of the Income Tax Act, 1961 | | |
| Balance as per last balance sheet | 958.73 | 822.75 |
| Add: Transfer from Income and Expenditure Account | 140.52 | 135.98 |
| | 1,099.25 | 958.73 |
| Income and Expenditure Account | | |
| Balance as per last balance sheet | 23,157.53 | 22,169.13 |
| Add: Surplus after appropriation during the year | 925.26 | 988.40 |
| | 24,082.79 | 23,157.53 |
| Total | 28,774.71 | 28,032.67 |

Notes :

- To promote, plan and organise programmes for development of dairy and other agriculture based and allied industries and biologicals as per the NDDDB Act, 1987.
- In accordance with Accounting Standard - 12 - 'Accounting for Government Grants'.

Secured Loans

ANNEXURE II

₹ in Million

| | 31.03.2017 | 31.03.2016 |
|--|--------------|---------------|
| Bank Overdraft (Secured against lien on fixed deposits with Banks) | 50.11 | 752.84 |
| Total | 50.11 | 752.84 |

Current Liabilities and Provisions

ANNEXURE III

₹ in Million

| | 31.03.2017 | 31.03.2016 |
|--|-----------------|-----------------|
| a) Current Liabilities | | |
| Advances and deposits | 32.36 | 21.06 |
| Sundry creditors | 205.85 | 223.79 |
| Net liability on account of Consultancy Project | | |
| Funds received | 19,110.59 | 15,066.51 |
| Add : Due to suppliers for expenses | 938.34 | 902.27 |
| | 20,048.93 | 15,968.78 |
| Less : Expenditure incurred | 16,443.38 | 13,179.28 |
| Advance to suppliers | 556.59 | 291.53 |
| | 3,048.96 | 2,497.97 |
| Add : Payable to NDDDB (Per contra, Refer Annexure VI) | 37.67 | 14.54 |
| | 3,086.63 | 2,512.51 |
| b) Provisions for : | | |
| Non-performing assets | 1,890.89 | 2,578.16 |
| General contingency on Standard Assets | 30.20 | 32.81 |
| Contingency | 610.49 | 611.32 |
| | 2,531.58 | 3,222.29 |
| c) Provisions for : | | |
| Leave encashment (Refer Note 6 of Annexure XVI) | 366.17 | 280.18 |
| Post retirement medical scheme (Refer Note 6 of Annexure XVI) | 73.38 | 76.84 |
| Gratuity (Refer Note 6 of Annexure XVI) | 33.02 | 11.27 |
| VRS monthly benefits | 30.51 | 44.54 |
| | 503.08 | 412.83 |
| Provisions for income tax (net of taxes paid) | 182.53 | 182.53 |
| Total | 6,542.03 | 6,575.01 |

Cash and Bank Balances

ANNEXURE IV

₹ in Million

| | 31.03.2017 | 31.03.2016 |
|--------------------------|-----------------|-----------------|
| Balances with Banks | | |
| In fixed deposits | 9,452.41 | 8,809.54 |
| In current accounts | 34.54 | 5.23 |
| | 9,486.95 | 8,814.77 |
| Cash and cheques on hand | 0.06 | 0.35 |
| Total | 9,487.01 | 8,815.12 |

Note : Fixed deposits includes ₹ 2,112.80 million (Previous Year ₹ 1,355.40 million) placed with Banks which are under lien for the Overdraft facility.

Inventories

ANNEXURE V

₹ in Million

| | 31.03.2017 | 31.03.2016 |
|-----------------------------------|-------------|-------------|
| Stores, spares and others | 1.55 | 2.30 |
| Project equipments | 3.37 | 4.30 |
| | 4.92 | 6.60 |
| Less : Provision for obsolescence | 4.41 | 5.20 |
| | 0.51 | 1.40 |
| Total | 0.51 | 1.40 |

Loans, Advances and Other Current Assets

ANNEXURE VI

₹ in Million

| | 31.03.2017 | 31.03.2016 |
|--|------------------|------------------|
| Loans to cooperatives | | |
| Milk - Secured | 9,363.91 | 9,198.07 |
| Unsecured | 521.43 | 130.17 |
| | 9,885.34 | 9,328.24 |
| Oil (including interest accrued) - Unsecured | 1,753.45 | 2,412.83 |
| Loans and advances to subsidiary companies / managed units | | |
| Secured | 1,275.90 | 2,493.26 |
| Unsecured | 879.90 | 1,242.12 |
| | 2,155.80 | 3,735.38 |
| Loans to employees | | |
| Secured | 1.21 | 1.56 |
| Unsecured | 10.32 | 8.71 |
| | 11.53 | 10.27 |
| Interest accrued on - | | |
| Loans and advances | 52.54 | 70.64 |
| Fixed deposits and investments | 171.92 | 131.81 |
| | 224.46 | 202.45 |
| Advances to suppliers and contractors | 8.10 | 3.97 |
| Recoverable on account of turnkey projects | | |
| (Per contra, Refer Annexure III) | 37.67 | 14.54 |
| Sundry deposits | 17.23 | 16.13 |
| Income taxes paid (net of provisions) | 1,174.78 | 1,167.71 |
| Other receivables | 6.22 | 11.63 |
| Total | 15,274.58 | 16,903.15 |

Note : Secured loans are secured against the mortgage of assets and/or hypothecation of stocks/assets.

Investments

ANNEXURE VII

₹ in Million

| | 31.03.2017 | 31.03.2016 |
|---|-----------------|-----------------|
| Long term investments (at cost) : | | |
| Equity Shares (unquoted) in subsidiary companies: | | |
| Mother Dairy Fruit and Vegetable Private Limited (MDFVPL) | 2,500.00 | 2,500.00 |
| IDMC Limited (IDMC) | 283.90 | 283.90 |
| Indian Immunologicals Limited (IIL) | 90.00 | 90.00 |
| NDDDB Dairy Services (NDS) | 2,000.00 | 2,000.00 |
| | 4,873.90 | 4,873.90 |
| Bonds (Quoted) of Government companies, financial institutions and banks (at cost) | 4,015.94 | 2,657.37 |
| (aggregate market value of bonds is ₹ 4,022.92 million (Previous Year ₹ 2,679.61 million) as at the balance sheet date) | | |
| Shares (unquoted) in Co-operatives and Federations | 1.00 | 1.00 |
| Less: Provision for diminution in value of investments | 0.10 | 0.10 |
| | 0.90 | 0.90 |
| Total | 8,890.74 | 7,532.17 |

Fixed Assets

ANNEXURE VIII

₹ in Million

| Particulars | Gross Block (at Cost) | | As at 01.04.2016 | Addition 49.49 | Deduction/ (adjustments) | As at 31.03.2017 | Depreciation | | Net Block | |
|---|-----------------------|-----------------------------|---------------------|-------------------|-----------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | As at 01.04.2016 | Deduction/ (adjustments) | | | | | As at 31.03.2017 | As at 31.03.2017 | As at 31.03.2016 | As at 31.03.2017 |
| FreeHold Land (refer note 1 to 3) | 451.17 | - | - | 49.49 | - | 500.66 | - | - | 500.66 | 451.17 |
| Lease Hold Land | 64.16 | - | 10.80 | - | 0.75 | 64.16 | 0.75 | - | 52.61 | 53.36 |
| Buildings and Roads | 1,985.50 | 0.37 | 929.80 | 5.48 | 52.26 | 1,980.39 | 3.15 | 978.91 | 1,001.48 | 1,055.70 |
| Plant and Machinery | 55.73 | 0.09 | 54.18 | 1.00 | 0.24 | 54.82 | 1.00 | 53.42 | 1.40 | 1.55 |
| Electrical Installations | 165.87 | 10.08 | 104.88 | 16.09 | 8.91 | 159.86 | 11.75 | 102.04 | 57.82 | 61.00 |
| Furniture, Computers and Others Equipments | 868.62 | 98.48 | 684.92 | 83.47 | 75.88 | 883.63 | 82.97 | 677.83 | 205.80 | 183.70 |
| Rail Milk Tankers | 213.50 | - | 213.50 | 6.90 | - | 206.60 | 6.90 | 206.60 | - | - |
| Vehicles | 27.11 | - | 21.56 | 2.47 | 1.99 | 24.64 | 2.47 | 21.08 | 3.56 | 5.54 |
| Total | 3,831.66 | 158.51 | 2,019.64 | 115.41 | 140.03 | 3,874.76 | 108.24 | 2,051.43 | 1,823.33 | 1,812.02 |
| Previous Year | 4,440.99 | 197.04 | 2,619.69 | 806.37 | 137.67 | 3,831.66 | 737.72 | 2,019.64 | 1,812.02 | 1,821.30 |
| Capital Work in Progress including capital advances | | | | | | | | | 67.70 | 95.73 |
| Total Fixed Assets | | | | | | | | | 1,891.03 | 1,907.75 |

Notes :

1. Land for FMD Control Project amounting to ₹ 0.39 million is obtained from Government of Tamil Nadu by alienation.
2. Freehold land includes land for Oil Tank farm, Narela amounting to ₹ 17.94 million which has been obtained on perpetual lease for which lease deeds are yet to be executed.
3. Land amounting to ₹ 65.98 million at Kannamangala Horticulture Farm received from Agriculture and Horticulture Department, Government of Karnataka is in the Name of the subsidiary company Mother Dairy Fruit and Vegetable Private Limited and transfer of title is pending.
4. Depreciation for the year in Income and Expenditure account excludes depreciation ₹ 8.97 million (Previous year ₹ 4.38 million) on account of recoupment from grants received.

Service Charges

ANNEXURE IX

| | ₹ in Million | |
|---|---------------|---------------|
| | 2016-17 | 2015-16 |
| Training fees | 6.95 | 5.79 |
| Management fees | - | 0.66 |
| Procurement and technical service fees | 159.77 | 166.10 |
| Fees from consultancy and feasibility studies | 0.15 | 1.04 |
| Royalty and process knowhow fees | 3.16 | 2.06 |
| Total | 170.03 | 175.65 |

Other Income

ANNEXURE X

| | ₹ in Million | |
|--|---------------|---------------|
| | 2016-17 | 2015-16 |
| Profit on sale of fixed assets (net) | 40.41 | 135.22 |
| Profit on disposal of Investments | - | 11.35 |
| Excess provision and NPAs written back | 412.49 | 423.38 |
| Miscellaneous income | 46.91 | 30.60 |
| Total | 499.81 | 600.55 |

Remuneration and benefits to employees

ANNEXURE XI

| | ₹ in Million | |
|--|---------------|---------------|
| | 2016-17 | 2015-16 |
| Salaries and Wages (including ex-gratia and retainership fees) | 710.40 | 497.77 |
| Contribution to Provident, Superannuation fund and Gratuity | 191.51 | 89.20 |
| Staff welfare expenses | 49.88 | 51.47 |
| Total | 951.79 | 638.44 |

Remuneration excludes ₹ 24.76 million (Previous year : ₹ 19.53 million) shown as part of Research and Development expenses.

Administrative Expenses

ANNEXURE XII

| | ₹ in Million | |
|---|----------------|----------------|
| | 2016-17 | 2015-16 |
| Printing and stationery | 6.38 | 6.49 |
| Communication charges | 9.90 | 7.90 |
| Audit fees and expenses (including service tax) | | |
| Audit fees | 0.69 | 0.77 |
| Tax audit | 0.25 | 0.25 |
| Fees for other services | - | 0.02 |
| Out of pocket expenses | 0.04 | 0.10 |
| | 0.98 | 1.14 |
| Legal fees | 2.76 | 2.39 |
| Professional fees | 26.93 | 42.97 |
| Vehicle expenses | 2.78 | 3.45 |
| Recruitment expenses | 0.43 | 0.67 |
| Advertisement expenses | 3.34 | 13.72 |
| Travelling and conveyance expenses | 57.93 | 66.98 |
| Electricity and rent | 24.62 | 25.61 |
| Other administrative expenses | 3.36 | 4.63 |
| Total | 139.41 | 175.95 |

Maintenance of Assets

ANNEXURE XIII

| | ₹ in Million | |
|-------------------------|----------------|----------------|
| | 2016-17 | 2015-16 |
| Repairs and maintenance | | |
| Buildings | 121.75 | 135.40 |
| Others | 53.89 | 51.36 |
| Rates and taxes | 6.77 | 4.28 |
| Insurance | 2.47 | 1.98 |
| Total | 184.88 | 193.02 |

Other Expenses

ANNEXURE XIV

| | ₹ in Million | |
|-------------------|----------------|----------------|
| | 2016-17 | 2015-16 |
| Training expenses | 29.14 | 26.41 |
| Computer expenses | 13.06 | 16.20 |
| Other expenditure | 39.99 | 35.86 |
| Total | 82.19 | 78.47 |

National Dairy Development Board (“NDDDB” or “the Board”)

Significant Accounting Policies Forming Part of Financial Statements

ANNEXURE XV

1. Basis of preparation

The financial statements are prepared on accrual basis, using the historical cost convention and Generally Accepted Accounting Principles (“GAAP”) in India including accounting standards issued by the Institute of Chartered Accountants of India, as applicable to the Board. The financial statements are presented in Indian Rupees rounded off to the nearest million, unless otherwise stated.

2. Use of Estimates

The preparation of financial statements in conformity with the GAAP requires the management to make estimates and assumptions that affect the reported amounts of assets and liabilities, revenues and expenses and the disclosure of contingent liabilities as at the date of the financial statements. Such estimates and assumptions are based on the Management’s evaluation of relevant facts and circumstances as on the date of the financial statements. Management believes that the estimates used in the preparation of the financial statements are prudent and reasonable; however the actual outcome may diverge from this estimate which is recognized prospectively in the current and future periods. Any changes in such estimates are recognized prospectively in current and future period.

3. Asset Classification and Provisioning

NDDDB being a Public Financial Institution follows the guidelines of Reserve Bank of India(RBI) for asset classification. Provision for Non-Performing and Standard Assets is made at the rates approved by the Board.

4. Revenue Recognition

Interest income on standard assets in accordance with the RBI guidelines is recognized on an accrual basis. Interest income from non-performing assets classified in conformity with the guidelines is accounted on cash basis upon realisation.

Interest income on fixed deposits with Bank and investment in Bonds is recognized on a time proportionate basis.

Income from Services to co-operatives etc. is recognized on proportionate completion basis and in accordance with the terms of relevant agreement.

Sale of milk commodities is accounted for on transfer of substantial risk and rewards, which is on dispatch of the commodities from the warehouse.

Dividend income is accounted for when unconditional right to receive income is established.

Other income is recognized when there is no uncertainty as to its ultimate collectability.

5. Grants

a. Grants relating to fixed assets are initially credited to Grant for Fixed Assets under the General Fund. This amount is recognized in the Income and Expenditure Account on a systematic basis over the useful life of such fixed asset as a recoupment of depreciation on such assets.

b. Revenue grants received during the year are recognized in the Income and Expenditure Account.

- c. Grants received for specific projects are credited to the Project Funds and is utilized by disbursements for these projects.

6. Research and Development Expenditure

Research and Development Expenditure (other than cost of fixed assets acquired) are charged as expense in the year in which they are incurred. Fixed assets used for the Research and Development purpose with alternate use is depreciated over its useful life based on the Board's policy.

7. Employee Benefits

- a. Defined Contribution Plan: Contribution to Provident Fund and Superannuation Fund is made at a predetermined rate and is charged to Income and Expenditure account.
- b. Defined Benefit Plans: The Board's liabilities towards gratuity, compensated absences and post-retirement medical benefit schemes are determined using the projected unit credit method which considers each period of service giving rise to an additional unit of benefit entitlement and measures each unit separately to build up final obligation. Actuarial gains and losses based on actuarial valuation done by the independent actuary carried out annually are recognized immediately in the Income and Expenditure account as income or expense. Obligation is measured at the present value of estimated future cash flows using a discounted rate that is determined by reference to the market yields at the Balance sheet date on the Government bonds where the currency and terms of Governments bonds are consistent with the currency and estimated terms of defined benefit obligation.

Compensated absences: The Board has a scheme for compensated absences benefit for employees, the liability for which is determined on the basis of an actuarial valuation carried out at the end of the year.

The Board has funded its liability towards gratuity by participating in Group Gratuity cum Life Assurance Scheme of Life Insurance Corporation of India.

8. Fixed Assets and Depreciation

Tangible fixed assets are carried at cost less depreciation and impairment loss. Cost comprises of purchase price, import duties and other non-refundable taxes or levies and any directly attributable costs to bring the asset ready for its intended use.

Depreciation on fixed assets costing more than ₹ 10,000 each is charged on Straight Line Method basis at the rates fixed by the Board. Depreciation is charged for the full year in the year of capitalization and no depreciation is charged in the year of disposal. Each asset costing ₹ 10,000 or less is depreciated at 100 percent in the year of purchase. Depreciation rates, as approved by the Board, for various classes of assets are as under:

| Assets | Rate (in %) |
|-------------------------------------|----------------|
| Factory buildings, Godown and Roads | 4.00 |
| Other buildings | 2.50 |
| Cold storage | 15.00 |
| Electrical installation | 5.00 |
| Computers (including software) | 33.33 |
| Office and Lab equipment | 15.00 |
| Plant and machinery | 10.00 |
| Solar equipment | 30.00 |
| Furniture | 10.00 |
| Vehicles | 20.00 |
| Rail milk tankers | 10.00 |

Leasehold Land is amortized over the duration of lease. Depreciation on the assets located on leasehold land shall be at lower of lease duration or useful life of that asset.

Capital assets under installation / construction are stated in Balance Sheet as “Capital Work in Progress”.

9. Impairment of Assets

The carrying value of assets at each Balance Sheet date is reviewed for impairment of assets. If any indication of such impairment exists, the recoverable amount of such asset is estimated and impairment is recognized, if the carrying amount of these assets exceeds the recoverable amount. The recoverable amount is greater of net selling price and their value in use. Value in use is arrived at by discounting their future cash flows to their present value based on appropriate discount factor. When there is indication that an impairment loss recognized for an asset in prior accounting periods no longer exists or may have decreased such reversal of impairment loss is recognized in Income and Expenditure Account.

10. Investments

Long term investments are valued as under:

- a) Shares in Subsidiaries, Co-operatives and Federations – at cost of acquisition;
- b) Debentures / bonds in Government Companies, Financial Institutions and Banks - at cost of acquisition net of amortised premium, if any,

Current investments are valued at lower of cost or market value.

Long term Investments are valued at cost. In case cost price is higher than the face value, the premium is amortised over the remaining period of maturity of the underlying security. Such investments are stated in balance sheet at acquisition price less amortised premium.

Provision for any diminution other than temporary in value of investments is made in the year in which such diminution is assessed.

11. Inventories

Inventories including stores and project equipment are valued at cost or net realizable value whichever is lower, cost being worked out on first-in-first-out basis. Provision for obsolescence is made, wherever necessary.

12. Foreign Currency Transactions

Transactions in foreign currencies are recorded at the exchange rate prevailing on the date of the transactions.

Monetary items denominated in foreign currency and outstanding at the Balance Sheet date are translated at the exchange rate prevailing at the year-end. Non-monetary items are carried at historical cost.

Exchange differences arising on foreign currency transactions are recognised as income or expense in the period in which they arise.

13. Accounting for Voluntary Retirement scheme

The cost of voluntary retirement scheme including ex-gratia is charged to the Income and Expenditure Account in the period of separation of employees. A provision for Monthly Benefit Scheme is made for the employees opting for the voluntary retirement scheme in the period of separation of employees and the same is adjusted against the payments made.

14. Taxes on Income

Current tax is the amount payable on the taxable income for the year as determined in accordance with the provisions of the Income Tax Act, 1961.

Deferred Tax is recognized on timing differences, being the differences between the taxable income and the accounting income that originate in one period and are capable of reversal in one or more subsequent periods.

Deferred Tax Assets in respect of unabsorbed depreciation and carry forward losses are recognized if there is a virtual certainty that there will be sufficient future taxable income available to set-off such tax losses. Other deferred tax assets are recognized when there is reasonable certainty that there will be sufficient future taxable income to realize such assets.

15. Leases

Lease arrangements where the risks and rewards incidental to ownership of an asset vest substantially with the lessor are recognized as operating leases. Lease rent under operating leases are recognized in the Income & Expenditure Account with reference to lease terms.

16. Provisions and Contingencies

A provision is recognized when the Board has a present obligation as a result of past events and it is probable that an outflow of resources will be required to settle the obligation, in respect of which a reliable estimate can be made. Provisions (excluding retirement benefits) are not discounted to their present value and are determined based on the estimate required to settle the obligation at the Balance Sheet date. These are reviewed at each Balance Sheet date and are adjusted to reflect the current best estimates. Contingent liabilities are disclosed in Notes to Accounts.

The Board created provisions in respect of loans and other assets prior to the year 2001-02. Based on the movement in underlying assets for which such provision was created, Board reallocates / write back, such provisions based on identified events. Accordingly, the Board had made allocation of contingency provision for possible diminution in value of its asset or for unforeseen events leading to such liability.

National Dairy Development Board (“NDDB” or “the Board”)

Notes to Accounts forming part of the Financial Statements

ANNEXURE XVI

1 At the request of the concerned authorities, the NDDB has been managing West Assam Milk Producers’ Co-operative Union Ltd. and Jharkhand State Cooperative Milk Producers’ Federation Ltd. These are separate and independent entities and their accounts are maintained by the respective authorities and audited separately.

2 Contingent Liabilities:

2.1. Principal amount of claims not acknowledged as debt : ₹ 58.49 million (Previous Year : ₹ 39.95 million)

2.2. Guarantees outstanding : ₹ 0.05 million (Previous Year : ₹ 0.05 million)

2.3. Income tax demands (excluding interest and penalty applicable under respective statutory provisions) ₹ 491.08 million (Previous Year : ₹ 736.84 million)

2.4. Service tax demands ₹ 442.66 million (Previous Year: ₹ 446.72 million)

2.5 Other Demands

| Particulars | Authority | ₹ in Million | |
|---|---|--------------|---------|
| | | 2016-17 | 2015-16 |
| Settlement of Land dues | Land and Land Reform Department, Siliguri | 0.39 | 0.39 |
| Combined Effluent Treatment Plant (CETP) charges, Ground Rent and Maintenance Charges | Delhi State Industrial and Infrastructure Development Corporation Limited, Narela | 7.32 | 7.32 |
| Demand for Municipal Tax for Land at Itola | Taluka Development Officer, Vadodara | 4.73 | 4.73 |

Demands presented hereinabove at 2.3 to 2.5 have been contested by the Board before appropriate forums. Future cash flows in respect of the same are determinable only on receipt of judgment / decision of the forums where the demands are contested.

3 Funding for National Dairy Plan – I (NDP-I) is through a line of credit from International Development Association, which along with the share of Government of India, flows from the budget of Department of Animal Husbandry, Dairying and Fisheries to the Project Management Unit (PMU) in NDDB as “Grant-in-aid for onward distribution to the End Implementation Agencies”. A separate bank account is being maintained for receipt of funds. Separate Project accounts are being maintained for NDP-I funds which are audited by the statutory auditors of NDDB.

4 Segment information:

NDDB is a body corporate constituted under the National Dairy Development Board Act, 1987. As per the objectives set out in the Act, all the activities of NDDB revolve around the Dairy/Agriculture sector which in terms of Accounting Standard-17 on “Segment Reporting” constitute a single reportable segment.

5 Disclosure of related party and Transactions with them for the year ended 31st March, 2017 as per Accounting Standard 18

a) Related Party and their relationship

1) Wholly owned subsidiaries

IDMC Limited

Indian Immunologicals Limited

Mother Dairy Fruit and Vegetable Private Limited

NDDDB Dairy Services

Pristine Biologicals (NZ) Limited (wholly owned subsidiary of Indian Immunologicals Limited)

2) Other enterprises where management has significant influence over the management

The West Assam Milk Producers Co.op Union Ltd

Animal Breeding Research Organisation (India)

Anandalaya Education society

Jharkhand State Cooperative Milk Producers' Federation Ltd.

NDDDB Foundation for Nutrition

3) Key management personnel

Mr. T Nandakumar Chairman upto 31 July 2016

Mr. Dilip Rath Managing Director upto 30 November 2016, Chairman from 01 December 2016

Mr. Sangram Chaudhary Executive Director

b) Transactions with related parties

(figures in Italic represent previous year figures)

| Particulars | Interest Income | Dividend | Rent (Income) | Grant | Sale of Fixed Assets | Sale (others) | Other Income | Other Expenditure | Current Account Balance outstanding Dr/(Cr) | Loan Disbursed | Loan repaid / Adjusted | | Loan Balance outstanding Dr/(Cr) |
|---|-----------------|---------------|---------------|-------------|----------------------|---------------|--------------|-------------------|---|-----------------|------------------------|---------------|----------------------------------|
| | | | | | | | | | | | Principle | Interest | |
| Subsidiary Companies | | | | | | | | | | | | | |
| IDMC Limited | 34.59 | 18.22 | 0.58 | - | - | - | 0.12 | 0.01 | (0.37) | 300.00 | 1,620.75 | 33.51 | 260.00 |
| Indian Immunologicals Limited | 106.45 | 12.14 | 0.79 | - | - | - | 0.04 | - | 0.06 | 1,107.40 | 442.67 | 101.65 | 1,580.75 |
| | 105.74 | - | 27.70 | - | - | - | 0.09 | - | (5.44) | 397.38 | 362.20 | 95.09 | 1,015.91 |
| | 100.55 | 18.00 | 21.41 | - | 0.14 | - | 0.13 | 1.84 | (1.14) | 777.96 | 785.94 | 95.59 | 980.47 |
| Mother Dairy Fruit and Vegetable Private Limited | 6.54 | 250.00 | 99.92 | 4.05 | 4.05 | - | 0.68 | 11.88 | 43.08 | - | 336.45 | - | - |
| | 77.20 | 100.00 | 113.02 | - | 15.03 | - | 0.56 | 45.36 | 51.29 | 38.85 | 814.28 | - | 336.45 |
| NDDB Dairy Services | 0.02 | - | 1.53 | - | - | - | 0.41 | - | 0.57 | 428.27 | 384.85 | - | 875.00 |
| | 3.07 | - | 1.82 | - | - | 72.92 | 4.07 | - | 0.31 | 499.09 | 199.93 | 0.09 | 831.58 |
| Total | 146.89 | 268.22 | 129.73 | 4.05 | 4.05 | - | 1.30 | 11.89 | 37.84 | 1,125.65 | 2,704.25 | 128.60 | 2,150.91 |
| | 287.27 | 130.14 | 137.04 | - | 15.17 | 72.92 | 4.80 | 47.20 | 50.52 | 2,423.30 | 2,242.82 | 197.33 | 3,729.25 |
| Other enterprises where management has significant influence over the management | | | | | | | | | | | | | |
| The West Assam Milk Producers Co.op Union Ltd | - | - | - | - | - | - | 0.57 | - | - | - | 1.23 | - | 4.90 |
| | 0.55 | - | - | - | - | - | 0.07 | - | - | - | 24.49 | 0.55 | 6.13 |
| Animal Breeding Research Organisation | - | - | - | - | - | - | 1.86 | - | - | - | - | - | - |
| | - | - | - | 0.28 | - | - | 1.33 | 0.01 | - | - | - | - | - |
| Anandalaya Education society | - | - | 0.51 | - | - | - | - | - | 0.14 | - | - | - | - |
| | - | - | 0.66 | - | - | - | 0.04 | - | 0.11 | - | - | - | - |
| Jharkhand State Cooperative Milk Producers' Federation Ltd. | - | - | - | 1.84 | - | - | 1.15 | - | 0.77 | - | - | - | - |
| | - | - | - | 0.10 | - | - | 1.07 | - | 0.81 | - | - | - | - |
| NDDB Foundation for Nutrition | - | - | - | - | - | - | - | 5.00 | - | - | - | - | - |
| | - | - | - | - | - | - | - | 0.10 | - | - | - | - | - |
| Total | - | - | 0.51 | 1.84 | - | - | 3.58 | 5.00 | 0.91 | - | 1.23 | - | 4.90 |
| | 0.55 | - | 0.66 | 0.38 | - | - | 2.51 | 0.11 | 0.92 | - | 24.49 | 0.55 | 6.13 |

Remuneration to key management personnel

| | |
|-----------------------|-------------|
| Mr. T Nandakumar | 2.15 |
| | 2.68 |
| Mr. Dilip Rath | 3.54 |
| | 3.16 |
| Mr. Sangram Chaudhary | 3.73 |
| | 2.98 |
| Total | 9.42 |
| | 8.82 |

6. Disclosure as per Accounting Standard 15 (Revised 2005) regarding Employee Benefits is as under:**Employee benefit plans**Defined Contribution Plans

The Company makes Provident Fund and Superannuation Fund contributions to defined contribution plans for qualifying employees. Under the Schemes, the Company is required to contribute a specified percentage of the payroll costs to fund the benefits. The Company recognised ₹ 59.23 millions (Year ended 31 March, 2016 ₹ 45.19 millions) for Provident Fund contributions and ₹ 39.49 millions (Year ended 31 March, 2016 ₹ 30.24 millions) for Superannuation Fund contributions in the Statement of Income and Expenditure. The contributions payable to these plans by the Company are at rates specified in the rules of the schemes.

Defined Benefit Plans

The Company offers the following employee benefit schemes to its employees:

- Gratuity
- Post-Retirement medical benefits schemes (PRMBS)
- Leave Encashment

The following table sets out the funded status of the defined benefit schemes and the amount recognised in the financial statements:

₹ in Million

| Particulars | Year ended 31 March, 2017 | | | Year ended 31 March, 2016 | | |
|--|---------------------------|--|------------------|---------------------------|--|------------------|
| | Gratuity | Post-Retirement medical benefits schemes (PRMBS) | Leave Encashment | Gratuity | Post-Retirement medical benefits schemes (PRMBS) | Leave Encashment |
| Components of employer expense | | | | | | |
| Current service cost | 24.41 | - | 25.01 | 9.56 | - | 18.25 |
| Interest cost | 23.34 | 6.15 | 22.42 | 21.30 | 6.15 | 19.09 |
| Expected return on plan assets | (21.94) | - | - | (22.89) | - | - |
| Actuarial losses/(gains) | 67.16 | (5.22) | 75.51 | 5.82 | (3.97) | 6.20 |
| Total expense recognised in the Statement of Income and Expenditure | 92.97 | 0.93 | 122.94 | 13.79 | 2.18 | 43.54 |

| Particulars | Year ended 31 March, 2017 | | | Year ended 31 March, 2016 | | |
|--|---------------------------|--|------------------|---------------------------|--|------------------|
| | Gratuity | Post-Retirement medical benefits schemes (PRMBS) | Leave Encashment | Gratuity | Post-Retirement medical benefits schemes (PRMBS) | Leave Encashment |
| Actual contribution and benefit payments for year | | | | | | |
| Actual benefit payments | (44.41) | (4.39) | (36.95) | (19.83) | (2.20) | (9.67) |
| Actual contributions | 71.22 | - | - | 19.09 | - | - |
| Net asset / (liability) recognised in the Balance Sheet | | | | | | |
| Present value of defined benefit obligation | (362.20) | (73.38) | (366.17) | (291.71) | (76.84) | (280.18) |
| Fair value of plan assets | 329.18 | - | - | 280.44 | - | - |
| Funded status [Surplus / (Deficit)] | - | - | - | - | - | - |
| Unrecognised past service costs | - | - | - | - | - | - |
| Net asset / (liability) recognised in the Balance Sheet | (33.02) | (73.38) | (366.17) | (11.27) | (76.84) | (280.18) |
| Change in defined benefit obligations (DBO) during the year | | | | | | |
| Present value of DBO at beginning of the year | 291.71 | 76.84 | 280.18 | 274.86 | 76.86 | 246.31 |
| Current service cost | 24.40 | - | 25.01 | 9.56 | - | 18.25 |
| Interest cost | 23.34 | 6.15 | 22.42 | 21.30 | 6.15 | 19.09 |
| Actuarial (gains) / losses | 67.16 | (5.22) | 75.51 | 5.82 | (3.97) | 6.20 |
| Benefits paid | (44.41) | (4.39) | (36.95) | (19.83) | (2.20) | (9.67) |
| Present value of DBO at the end of the year | 362.20 | 73.38 | 366.17 | 291.71 | 76.84 | 280.18 |
| Change in fair value of assets during the year | | | | | | |
| Plan assets at beginning of the year | 280.44 | - | - | 258.27 | - | - |
| Acquisition adjustment | - | - | - | - | - | - |
| Expected return on plan assets | 21.94 | - | - | 22.89 | - | - |
| Actual company contributions (Excluding Contribution made by Gratuity Trust and charges deducted by LIC) | 71.22 | - | - | 19.11 | - | - |
| Actuarial gain / (loss) | - | - | - | - | - | - |
| Benefits paid | (44.41) | - | - | (19.83) | - | - |
| Plan assets at the end of the year | 329.19 | - | - | 280.44 | - | - |
| Actual return on plan assets | 21.94 | - | - | 22.89 | - | - |
| Composition of the plan assets is as follows: | | | | | | |
| Government bonds | 50% | - | - | 50% | - | - |
| PSU bonds | 45% | - | - | 45% | - | - |
| Equity & Equity related Investments | 5% | - | - | 5% | - | - |

| Particulars | Year ended 31 March, 2017 | | | Year ended 31 March, 2016 | | |
|--------------------------------|---|---|---|---|---|---|
| | Gratuity | Post-Retirement medical benefits schemes (PRMBS) | Leave Encashment | Gratuity | Post-Retirement medical benefits schemes (PRMBS) | Leave Encashment |
| Others | 0% | - | - | 0% | - | - |
| Actuarial assumptions | | | | | | |
| Discount rate | 7.50% | 7.50% | 7.50% | 8.00% | 8.00% | 8.00% |
| Expected return on plan assets | 8.44% | NA | NA | 9.29% | NA | NA |
| Salary escalation | 8.50% | 3.00% | 8.50% | 8.50% | 3.00% | 8.50% |
| Attrition | 1.00% | 1.00% | 1.00% | 1.00% | 1.00% | 1.00% |
| Medical cost inflation | NA | 5.00% | NA | NA | 5.00% | NA |
| Mortality tables | Indian Assured Lives (2006-08) ultimate Mortality Rates | Indian Assured Lives (2006-08) ultimate Mortality Rates and LIC Annuitants (1996-98) ultimate Mortality Rates | Indian Assured Lives (2006-08) ultimate Mortality Rates | Indian Assured Lives (2006-08) ultimate Mortality Rates | Indian Assured Lives (2006-08) ultimate Mortality Rates and LIC Annuitants (1996-98) ultimate Mortality Rates | Indian Assured Lives (2006-08) ultimate Mortality Rates |

Experience adjustments

| | ₹ in Million | | | | |
|---|---------------|---------------|---------------|---------------|---------------|
| | 2016-17 | 2015-2016 | 2014-2015 | 2013-2014 | 2012-2013 |
| Gratuity | | | | | |
| Present value of DBO | 362.20 | 291.71 | 274.86 | 222.51 | 203.05 |
| Fair value of plan assets | (329.18) | (280.44) | (258.27) | (217.71) | (205.13) |
| Funded status [Surplus / (Deficit)] | (33.02) | (11.27) | (16.59) | (4.80) | 2.08 |
| Post-Retirement medical benefits schemes (PRMBS) | | | | | |
| Present value of DBO | 73.38 | 76.84 | 76.86 | 66.22 | 78.71 |
| Other defined benefit plans (Leave Encashment) | | | | | |
| Present value of DBO | 366.17 | 280.18 | 246.31 | 187.85 | 181.85 |

| | ₹ in Million | |
|---|-----------------------------------|-----------------------------------|
| | For the year ended 31 March, 2017 | For the year ended 31 March, 2016 |
| Actuarial assumptions for long-term compensated absences | | |
| Discount rate | 7.50% | 8.00% |
| Expected return on plan assets | 8.50% | 8.70% |
| Salary escalation | 8.50% | 8.50% |
| Attrition | 1.00% | 1.00% |

The discount rate is based on the prevailing market yields of Government of India securities as at the Balance Sheet date for the estimated term of the obligations.

The estimate of future salary increases considered, takes into account the inflation, seniority, promotion, increments and other relevant factors.

The contribution expected to be made by the Board during FY 2017-18 has not been ascertained.

7 Disclosure as per Accounting Standard 19 – ‘Leases’(Refer Annexure VIII):

Operating lease arrangements entered into by the Board as a Lessor for following assets:

a) Nature of Assets leased

₹ in Million

| Class of Asset | Gross value of assets as at 31st March, 2017 | Depreciation for the year | Accumulated Depreciation as at 31st March, 2017 |
|---|--|---------------------------|---|
| Buildings and Roads# | 1,621.08 | 43.15 | 829.67 |
| | <i>1,621.71</i> | <i>43.27</i> | <i>787.15</i> |
| Electrical Installations# | 31.55 | 1.24 | 22.17 |
| | <i>31.63</i> | <i>1.24</i> | <i>21.01</i> |
| Plant and Machinery | - | - | - |
| | <i>0.38</i> | - | <i>0.38</i> |
| Furniture, fixtures, computers, software and office equipment | 7.92 | 0.16 | 7.34 |
| | <i>8.13</i> | <i>0.16</i> | <i>7.40</i> |
| Rail Milk Tankers | 194.55 | - | 194.55 |
| | <i>194.55</i> | - | <i>194.55</i> |
| Total | 1,855.10 | 44.55 | 1,053.73 |
| | <i>1,856.40</i> | <i>44.67</i> | <i>1,010.49</i> |

including staff quarters and cold storage
(Figures in *italics* represent previous year figures)

These arrangements are cancellable with prior notice to the lessee.

b) Initial Direct cost relating to leasing arrangements is charged to Income and Expenditure account in the year of arrangement of lease.

c) Significant Leasing arrangements:

All assets mentioned above are leased out to subsidiaries, federations and others with an option to renew or cancellation of the agreement.

8 Deferred tax assets have been recognised as per Accounting Standard 22 – ‘Accounting for Taxes on Income’. Details are as under:

₹ in Million

| Particulars | Opening Balance as at 1st April, 2016 | Adjustment during the year | Adjusted against General Reserve | Closing Balance at 31st March, 2017 |
|---|---------------------------------------|----------------------------|----------------------------------|-------------------------------------|
| Deferred Tax Assets /(Liability): | | | | |
| Depreciation | 11.05 | (19.59) | - | (8.54) |
| | <i>76.26</i> | <i>(65.21)</i> | - | <i>11.05</i> |
| Expenditure allowable on payment basis | 98.01 | 29.74 | - | 127.75 |
| | <i>86.44</i> | <i>11.57</i> | - | <i>98.01</i> |
| Gratuity | 3.90 | 7.53 | - | 11.43 |
| | <i>5.74</i> | <i>(1.84)</i> | - | <i>3.90</i> |
| Voluntary Retirement Scheme | 15.41 | (4.85) | - | 10.56 |
| | <i>21.86</i> | <i>(6.45)</i> | - | <i>15.41</i> |
| Opening Balance (01.04.2016) of Special Reserve under section 36(1)(viii) Income Tax Act adjusted against reserve | - | - | (331.80) | (331.80) |
| Special Reserve | - | (48.63) | - | (48.63) |
| | - | - | - | - |
| Total | 128.37 | (35.80) | (331.80) | (239.23) |
| | 190.30 | (61.93) | - | 128.37 |

(Figures in *italic* represent previous year figures)

In line with Reserve Bank of India's (RBI's) Circular to Banks, the Board has created Deferred Tax Liability on the Special Reserve under section 36(1)(viii) of the Income-tax Act, 1961. Accordingly the expenditure, amounting to ₹ 331.80 million due to the creation of DTL on Special Reserve as at March 31, 2016 has now been adjusted directly from the Reserves.

- 9** Principal amount of ₹ 148.66 million and ₹ 2.99 million has been written off to the Income and Expenditure Account on account of one time settlement of loan to Madhya Pradesh State Co-operative Oilseeds Growers Federation Ltd and Satara Sahakari Dudh Utpadak & Prakriya Sangh Ltd respectively.

10 Disclosure as per Accounting Standard 29 – ‘Provisions, Contingent Liabilities and Contingent Assets’ is as follows:

₹ in Million

| Particulars | Non-Performing Asset (NPA) | General Contingency on Standard Assets | Contingency |
|--|-----------------------------------|---|----------------------|
| Opening balance | 2,578.16 | 32.81 | 611.32 |
| | <i>3,444.30</i> | <i>28.69</i> | <i>616.77</i> |
| Created during the year from contingency | 0.12 | 5.05 | (5.17) |
| | <i>1.33</i> | <i>4.12</i> | <i>(5.45)</i> |
| Write-off of interest receivable | (280.72) | - | - |
| | <i>(444.09)</i> | - | - |
| Reversed/movement during the year | (406.67) | (7.66) | 4.34 |
| | <i>(423.38)</i> | - | - |
| Closing balance | 1,890.89 | 30.20 | 610.49 |
| | <i>2,578.16</i> | <i>32.81</i> | <i>611.32</i> |

(Figures in italic represent previous year figures)

11 The figures of the previous year have been regrouped/re-arranged wherever necessary.

In terms of our report of even date attached.

For Borkar & Muzumdar
Chartered Accountants

Devang Vaghani
Partner

For and on behalf of the Board,

Dilip Rath
Chairman

Y Y Patil
Executive Director

S Regupathi
Deputy General Manager
(Accounts)

Anand, 16th June, 2017

NDDB Officers

(As on 31st March, 2017)

HEAD OFFICE, ANAND

Chairman & Chief Executive

Dilip Rath,

M A (Eco), M Sc (Eco)

Executive Director

Sangram R Chaudhary,

M Sc, PGDRM

Chief Executive's Office

A Rajasekaran,

DY GEN MGR, M Sc (Agri), PGDRM

Financial and Planning Services

Y Y Patil, GEN MGR,

B Com, LLB, PGDRDM, ICWA (Inter), SAS (Comm)

Pramod N Menon, SR MGR,

B Com, MBA (Fin)

Chintan Khakhariawala, MGR,

B E (Chem), MBA (Fin)

P V Subrahmanyam, MGR,

BBM, MBA (Fin)

Nishi Kant Ranjan, MGR,

B Sc (Chem), PGDM (Fin & Mktg)

Kahnu C Behera, MGR,

B Sc (Agri), PGDRM

Smriti Singh, MGR,

B A (Eng), PGDM (Mktg & HR)

Chandan Singh, DY MGR,

B Sc (Zoo), PGDM (Mktg & Fin)

Rohan B Buch, DY MGR,

B Com, MBA (Fin)

Chandani C Patel, DY MGR,

B Com, PGDBM (E-Com), MBA (Fin)

Shilpa P Behere, DY MGR,

BMS, PGDRM

Saurabh Kumar, DY MGR,

B Tech (Elect & Comm), PGDM

Reeti, DY MGR,

B Sc (Zoo), PGDM (Fin & Mktg)

Harsh Vardhan, DY MGR,

B Tech (Electro), PGDM (Fin)

Cooperative Services

NDDB, ANAND

M Govindan, SR MGR,

M A (SW)

Rajesh Gupta, SR MGR,

B Sc, MSW

M Jayakrishna, SR MGR,

M A (Eco), M Phil (Eco),

Ph D (Eco)

Dhanraj Sahani, SR MGR,

MBA (Mktg), DPCS

Hrshikesh Kumar, MGR,

B Sc (Phy), PGDRM

Niranjan M Karade, MGR,

B E (Mech), PGDRM

Sandeep Dheeman, MGR,

B Com, M A (SW)

Sandeep Bharti, MGR,

B Sc, PGDDM

Priyadarshini Paliwal, DY MGR,

B Sc (Genetics), PGDRM

Bhimashankar Shetkar, DY MGR,

B E (Prod), PGDRDM

Prakashkumar A Panchal, DY MGR,

B Tech (DT), M Sc (ICT-ARD)

Denzil J Dias, DY MGR,

B Tech (DT), M Tech (DT)

Prit H Gandhi, DY MGR,

B Sc (Biotech), M Sc (Med Biotech),

PGDRM

Milan Sanghvi, DY MGR,

B E (Elect & Comm), PGDRM

Quality Assurance

D K Sharma, GEN MGR,

M Sc (Dairy Micro),

Ph D (Dairy Bacteriology)

R S Lahane, DY GEN MGR,

B Tech (Chem), PGDRM

Narinder Sharma, DY GEN MGR,

M Sc (Dairying), PGDM

Suresh Pahadia, MGR,

B Tech (DT), M Sc (Dairying)

Jyothis J Mazhuvanchery, DY MGR,

B Tech (Dairy Sc & Tech), M Sc (DT)

Jagadish Nayaka, DY MGR,

B Tech (DT), M Tech (Food Tech)

Naveenkumara AC, DY MGR,

B Tech (DT), M Tech (Dairy Micro)

Product & Process Development

D K Sharma, GEN MGR,

M Sc (Dairy Micro),

Ph D (Dairy Bacteriology)

A K Jain, SR MGR,

B Sc (DT), M Sc (Dairying)

Jitender Singh, SCI II,

B Sc, M Sc (Micro), Ph D (Dairy

Micro)

Sougata Das, SCI I,

B Tech (DT), M Sc (Dairy Micro)

Harendra P Singh, SCI I,

B Tech (DT), M Sc (Dairy Chem)

Vishalkumar B Trivedi, SCI I,

B Tech (DT), M Tech (DT)

Lalita Oraon, SCI I,

B Tech (DT), M Tech (DT)

Coordination & Monitoring Cell

Meenesh C Shah, DY GEN MGR,

B Sc (DT), PGDRDM

V K Ladhani, DY GEN MGR,

M Com, SAS (Comm), ICWA (Inter)

M R Mehta, DY GEN MGR,

M Sc (Stats), Dipl (Comp Sc)

Arvind Kumar, MGR,

B Sc (Agri), M Sc (Agri Mktg

& Coopn)

Naveen Kumar, MGR,

M Sc (Env Sc), M Tech (Env Sc &

Engg), M Sc (Env Mod & Mgmt)

Mamata Mishra, MGR,

B A (Sociology), M A (Sociology),

Ph D (Sociology), MBA

Hemali Bharti, MGR,

B E (Power Elect.), MBA (Fin)

Rajesh Kumar, MGR,

B A (Eco), PGDRM

Ashutosh K Mishra, MGR,

B Sc (E&I), PGDBA (Fin)

Sarvesh Kumar, MGR,
B Sc (Agri & AH), M Sc (Dairy Eco),
Ph D (Dairy Eco)

Ravindra G Ramdasia, DY MGR,
M Com, CA, CS

Nikit Bansal, DY MGR,
B Com, CA

Sudarshana, DY MGR,
M Com, CA

Frederic Sebastian, DY MGR,
MA (Dev Studies), PGDDM,
PGCMRDA

Human Resource Development

Ashok Kumar Gupta, DY GEN MGR,
M Sc (Agri), PGCHRM

Jaidev Biswas, SR MGR,
B Sc (Chem), PGDRD, PGDHRM

Gulshan Kumar Sharma, SR MGR,
B A, Dipl (Hotel Mgmt)

S S Gill, SR MGR,
B Sc (Geo), MSW, Ph D (SW),
Dipl (Trg & Dev)

Anindita Baidya, SR MGR,
B Sc (Bot), PGDRD

K M Shah, MGR,
B Com, LLB (Gen), LLB (Spl), DTP

Mohan Chander J, MGR,
B E (Mech), M Tech (HRD)

S Mahapatra, MGR,
B A, LLB, PGDM

Shelly Topno, MGR,
B A (Hons), M A (SW)

B J Hazarika, MGR,
B Sc (Stats), MBA

T Prakash, DY MGR,
M A (Dev Admn)

Nimmi Topno, DY MGR,
B Com, PGDM-HRM

Sameer Dungdung, DY MGR,
B Com, PGDM-HRM

Rahul R, DY MGR,
B Tech (CS), MBA (Systems)

Mansinh Institute of Training,
Mehsana

S S Sinha, DY GEN MGR,
B E (Elect)

A S Bhadauria, MGR,
B E (Food Engg & Tech)

Hitendrasinh Rathod, DY MGR,
DEE

Dushyant Desai, DY MGR,
B Tech (DT)

Arvind Kumar Yadav, DY MGR,
B Tech (Mech), MBA (Infra)

Hitendrakumar B Raval, DY MGR,
B Tech (Dairy & Food Tech), M Tech (DT)

Information & Communication Technologies

Niraj Prakash Garg, DY GEN MGR,
B Tech (DT), PGDRM

S Karounanithy, SR MGR,
DEE

R K Jadav, SR MGR,
B Sc (Phy), MCA, PGDM

Supriya Sarkar, SR MGR,
B Sc (Maths), MCA

Vipul Gondaliya, SR MGR,
B E (Electronics)

Reetesh K Choudhury, MGR,
B E (Comp Sc), PGDBM

Rakesh R Maniya, MGR,
B E (ECE)

Mitesh C Patel, DY MGR,
B E (IT)

Anil M Adroja, DY MGR,
B E (IT)

Ashok Kumar Sahani, DY MGR,
B E (CSE)

Saqib Khan, DY MGR,
MCA

Kartik R Vyas, DY MGR,
B Sc (Comp Sc.), MCA

Sohel A Pathan, DY MGR,
BE (IT), ME (Comp Sc & Engg)

Meet J Kulkarni, DY MGR,
B Sc (Phy), MCA

Jay Y Barot, DY MGR,
B Tech (CE)

Sectoral Analysis & Studies

G Chokkalingam, DY GEN MGR,
M Sc (Agri Stats), PGD (Agri Stats)

S Mitra, SR MGR,
B Sc (Elect Engg), PGDRM

J G Shah, SR MGR,
B E (Elect), MBA, Ph D (Mgmt)
Dipl (Exp Mgmt)

Anil P Patel, SR MGR,
M Sc (Agri), PGDMM

Mena H Paghadar, MGR,
B Sc, MCA

Biswajit Bhattacharjee, MGR,
B Sc (Agri), M Sc (Agri Eco)

Mukesh R Patel, MGR,
B Sc, M Sc (Agri)

Darsh K Worah, MGR,
B Sc (Micro), M Sc (Env Sci),
Cert GIS

Vinay A Patel, DY MGR,
B Tech (Biomed), MBA (Mktg)

Ayush Kumar, DY MGR,
B Tech (Genetic Engg), PGDM

Purchase

O P Sachan, GEN MGR,
B Tech (Chem), MBA (FIN)

A K Chakraborty, DY GEN MGR,
B Tech (Agri Engg),
M Tech (Industrial Mgmt)

T S Shah, DY GEN MGR,
DME, B E (Mech), PGDBA

B Sekar, SR MGR,
M Com, PGDMM

Sougata Bhar, SR MGR,
B E (Mech)

Narendra H Patel, SR MGR,
B E (Mech)

Krishna SY, SR MGR,
B E (Mech), M Tech (Produ. Mgmt.)

Mohd Nasim Akhter, MGR,
B E (Mech)

Nilesh K Patel, MGR,
B E (Prodn)

Bhadrasingh J Gohil, MGR,
B E (Mech)

Amol M Jadhav, MGR,
B E (Mech)

Nidhi Trivedi, MGR,
B Sc (Bot), MSW

Bharat Singh, DY MGR,
B Tech (Mech)

Himanshu K Ratnottar, DY MGR,
B E (Prod), PGD (Opern Mgmt)

Public Relations & Communications

Abhijit Bhattacharjee, DY GEN MGR,
B Sc, LLB, PGDRD

Basuman Bhattacharya, SR MGR,
B Sc (Bot), M A (Journalism), Dipl in
Social Comm (Film Making)

Divyaraj R Brahmhatt, MGR,
BA (Eng), PGDBA, MBA (PR)

Sarvesh Syal, DY MGR,
B E (IT), MBA (PR)

Engineering Services

J S Gandhi, DY GEN MGR,
B E (Civil)

V E E Sundar, DY GEN MGR,
B Sc (Applied Sci), AMIE (Elect)

G Rajagopal, DY GEN MGR,
B E (Elect)

P Saha, DY GEN MGR,
B Tech (Agri Engg)

Nitin M Shinkar, DY GEN MGR,
B E (Metall), MPBA (O & M Mgmt)

Santosh Singh, DY GEN MGR,
B Tech (Civil)

S Goswami, DY GEN MGR,
B E (Mech), PGDRDM

U B Das, DY GEN MGR,
B E (Mech)

G S Sarvarayudu, DY GEN MGR,
B Tech (Civil)

A B Ghosh, DY GEN MGR,
M Tech (D & F Engg)

V Srinivas, DY GEN MGR,
B E (Civil)

S Chandrasekhar, DY GEN MGR,
B E (Mech)

S Talukdar, SR MGR,
B E (Mech), MIE

S K Nasa, SR MGR,
B E (Civil)

Jasbir Singh, SR MGR,
B Tech (Agri Engg),
M Tech (Post Harvest Tech)

Chandra Prakash, SR MGR,
B Tech (Mech)

Shashikumar B N, SR MGR,
B E (EEE), PGDRDM

R S Sisodiya, SR MGR,
DME

R Soundhararajan, SR MGR,
AMIE (Mech)

K S Patel, SR MGR,
B E (Civil), MBA (HRD & Fin)

Saumitra Das, SR MGR,
B E (Civil)

Shailendra Mishra, SR MGR,
Dip (Civil), Dip (Const Tech)

Gopal K Narang, MGR,
B E (Civil), DIP-MCM

Mihir B Bagaria, MGR,
DCE, B E (Civil), MBA (Fin)

Sachin Garg, MGR,
B E (Elect), PGDBA

Subrata Chaudhuri, MGR,
DCE, AMIE (Civil)

Manoj Kumar, MGR,
B Tech (Mech)

D B Lalchandani, MGR,
B E (Mech), MBA (Oprn)

Nikesh V More, MGR,
B E (Inst & Cont Engg)

Shreyas Jain, MGR,
B E (Elect)

Abhishek Gupta, MGR,
B E (Mech)

Prakash A Makwana, MGR,
B E (Elect)

Balbir Sharma, MGR,
DEE, B Tech (Elect)

Gaurav Singh, MGR,
B Tech (Civil)

Bibhash Biswas, DY MGR,
Dip (Civil), DBM

Nirant S Songaonkar, DY MGR,
B E (Civil)

Ashish Ravi, DY MGR,
B Tech (Civil)

Vatsal Patel, DY MGR,
B E (Mech)

Pratik K Agrawal, DY MGR,
B E (Civil)

Vivek Jaiswal, DY MGR,
B E (Civil)

Sumeet Shekhar, DY MGR,
B E (Mech)

Shantanu Kr Shukla, DY MGR,
B Tech (Env Engg), MBA (EMS)

Syed Abdul Rashid, DY MGR,
B E (Mech)

Banas Dairy Project-III, Palanpur
Sandipkumar P Patel, MGR,
B E (Civil), M Tech (Civil)

Bhatinda Dairy Project Site, Bhatinda
Manish Sharma, MGR,
B Tech (Elect), MBA (HRD)

Balram Niboriya, MGR,
B Tech (Civil)

Bio-Security Lab Project Site,
TANUVAS, Chennai

F Pradeep Raj, DY MGR,
BE (Civil), M Tech (Civil)

Cattle Feed Plant-Erode
Dharmendra K Behera, MGR,
B E (Mech), MBA (Mktg & Syst)

P Murukesan, DY MGR,
DCE, BBA, MBA

Cattle Feed Plant-Kaladera, Jaipur
Akshay Mandora, DY MGR,
B E (Mech)

Cattle Feed Plant, Khurda
Dhiraj B Tembhurne, MGR,
B E (Civil)

Surjeet K Choudhary, DY MGR,
B E (Mech)

Dairy Plant Project, Padalur
Kousik Roy, MGR,
B Tech (Elec)

Flexi Pouch UHT Milk Plant Project,
Chennai

Sudhir Kumar Gangal, MGR,
DCE, B E (Civil)

U Sundara Rao, MGR,
DEE, B Tech (EEE)

Gokul Dairy Expansion Project,
Kolhapur

K J J Ahmed, DY GEN MGR,
B E (Elect)

Jasdev Singh, MGR,
B Tech (Elec), M Tech (Power Engg)

Rabindra K Behera, MGR
B E (Civil)

Hotwar Dairy Project, Hotwar
Pradip Layek, MGR,
B Tech (Elect)

ICFMD, ICAR Project, Bhubaneswar
P Ramesh, SR MGR,
B E (Mech), PGCPM

Bibhu Prasad Jena, MGR,
B E (Civil)

Sunand Kumar N, MGR,
B Tech (Mech), M Tech (Mat. Sc.
& Tech)

Asutosh Samal, DY MGR,
B Tech (Civil)

Soumya Ranjan Mishra, DY MGR,
B E (Elect)

Jaipur Dairy Expansion Project,
Mohali
Bhushan P Kapshikar, MGR,
B E (Civil)

Charan Singh, DY MGR,
Dip (Civil), B Tech

Shashank V Telang, DY MGR,
B E (Mech)

Mohali Dairy Expansion Project, Mohali
Aditya Sharma, MGR,
B Tech (Civil), M Tech (CPM)

Powder Plant & Dairy Expansion
Project, Channarayapatna
P Balaji, MGR,
B E (Civil)

Satendra Singh Gurjar, DY MGR,
B E (Mech)

Prudhvi Pathaneni, DY MGR,
B Tech (Civil), M Tech (Quality
Management)

Jijo John, DY MGR,
B E (Mech)

Powder Plant & Dairy Project Site,
Himmatnagar
Manoj Gothwal, MGR,
B E (Civil)

Dhaval A Panchal, MGR,
B E (Elect)

Shailesh S Joshi, MGR,
B E (Mech)

Tarak Rajani, DY MGR,
B E (Civil)

Udupi Automated Dairy Project,
Uppoor
Ganesh Mohan Shenoy, MGR,
DCE, B E (Civil)

Animal Breeding

M U Siddiqui, GEN MGR,
BVSc & AH, MVSc (Vety Obst &
Gynaec)

D G Raghupathi, DY GEN MGR,
BVSc, PGDRDM

G Kishore, DY GEN MGR,
BVSc, M Sc (Dairying, Ani Gen
& Brdg)

S Gorani, SR MGR,
BVSc, MVSc (Vety Gynecology &
Obstetrics), PGDMM

N G Nayee, SR MGR,
BVSc, MVSc (Anim Brdg)

R K Srivastava, SR MGR,
B Sc, CIC, PGDCA, MCA

Ranmal M Ambaliya, MGR,
B.E (Comp Engg)

Dhara Patel, MGR,
BVSc & AH, PGD Agri Bus Mgmt

Swapnil G Gajjar, DY MGR,
BVSc, MVSc (Animal Gen &
Breeding)

Shiraj M Sherasia, DY MGR,
BVSc & AH, MBA (Agri Bus)

Surabhi Gupta, DY MGR,
BVSc & AH, PGDRM

Atul C Mahajan, DY MGR,
BVSc & AH, MVSc (Animal Gen &
Breeding), Ph D (Animal Gen
& Breeding)

Siddhartha S Layek, DY MGR,
BVSc & AH, MVSc (LPM), Ph D (LPM)

NDDB OFFICE, RANCHI

Satyapal Kurrey, DY MGR,
D Pharm, BVSc & AH, MBA

NDDB R&D Laboratory, Hyderabad
A Sudhakar, MGR,
BVSc, MVSc, Ph D (Ani Brdg)

Animal Health

S K Rana, SR SCI,
BVSc & AH, MVSc (Micro),
Ph D (Micro)

A V Hari Kumar, SR MGR,
BVSc & AH, MVSc (Micro)

K Bhattacharya, SR MGR,
BVSc, MVSc (Micro)

Pankaj Dutta, DY MGR,
BVSc & AH, MVSc (Micro)

Shroff Sagar I, DY MGR,
BVSc & AH, MVSc (Micro)

Sandeep Kumar Dash, DY MGR,
BVSc & AH, MVSc (Micro),
Ph D (Vet Micro)

NDDB R&D Laboratory, Hyderabad
Ponnanna N M, SCI II,
B Sc (Agri), M Sc (Micro), PhD
(Biotech)

Laxmi Narayan Sarangi, SCI I,
BVSc & AH, MVSc (Vety Micro),
Ph D (Vet Virology)

K S N L Surendra, SCI I,
B Sc, M Sc (Biotech)

Amitesh Prasad, SCI I,
BVSc & AH, MVSc (Micro)

Vijay S Bahekar, SCI I,
BVSc & AH, MVSc (Micro)

Animal Nutrition

M R Garg, GEN MGR,
M Sc (Anim Nutn), Ph D (Anim Nutn)

A K Garg, DY GEN MGR,
M Sc (Agri)

A K Verma, DY GEN MGR,
B Tech (Agri Engg)

A K Srivastava, SR MGR,
M Sc (Agri)

Rajesh Sharma, SR MGR,
M Sc (Agri), Ph D (Agro)

Romy Jacob, SR MGR,
M Sc (Agri)

Digvijay Singh, SR MGR,
M Sc (Agri), Ph D (Agro)

B M Bhanderi, SCI II,
BVSc, MVSc (Anim Nutn),
Ph D (Anim Nutn)

Pankaj L Sherasia, SCI II,
BVSc, MVSc (Anim Nutn)

Pritam K Saikia, MGR,
BVSc & AH, MVSc (Anim Nutn)

Mayank Tandon, MGR,
B Sc, M Sc Ag (Anim Nutn),
Ph D (Anim Nutn)

Bhupendra T Phondba, SCI II,
BVSc & AH, MVSc, Ph D (Anim Nutr)

Ajay Goswami, SCI II,
BVSc & AH, MVSc (Anim Nutr)

Asraf Hossain SK, DY MGR,
BVSc & AH, MVSc (Anim Nutr), Ph D
(Anim Nutr)

Chanchal Waghela, DY MGR,
BVSc & AH, MVSc (AN)

Alka Choudhari, DY MGR,
B Sc (H) (Agri), M Sc (Agronomy)

Sachin S Shankhpal, DY MGR,
BVSc & AH, MVSc (Anim Nutr),
Ph D (Anim Nutr)

PALANPUR

N R Ghosh, MGR,
BVSc & AH, M Sc (Anim Nutr)

CENTRE FOR ANALYSIS & LEARNING IN LIVESTOCK & FOOD

Rajesh Nair, Director,
B Sc, M Sc (Analy Chem),
Ph D (Chem)

Rajiv Chawla, SCI III,
B Sc, M Sc (Anim Nutr),
Ph D (Anim Nutr)

Harshendra Singh, MGR,
B E (Elect & Power Engg),
MBA (Mktg)

T V Balasubramanyam, MGR,
B Com, LLB (Gen)

S K Gupta, SCI II,
M Sc (Agri)

Swagatika Mishra, SCI II,
B Sc (Bot), M Sc (Micro)

R P Dodamani, DY MGR,
B Com, LLB

Amol S Khade, SCI I,
BVSc & AH, MVSc (Animal Gen &
Breeding)

Rajiv Kumar, SCI I,
B Sc, M Sc (Micro)

Dnyaneshwar R Shinde, SCI I,
B Tech (DT), M Tech (Dairy Chem)

Sushil G Gawande, SCI I,
B Tech (DT), M Tech (Dairy Chem)

Hriday B Darji, SCI I,
B Tech (DT), M Tech (DT)

Swati S Patil, SCI I,
B Sc (Food Tech & Mgmt)
M Sc (Food Tech)

Legal

Chandaka TVS Murthy, DY GEN MGR,
B Com, BL, LLM, PGD (Trnsp Mgmt),
PGD (Cyber Law & IPR)

Pallavi M Jadhav, DY MGR,
B Com, LLB

Administration

S K Kothari, SR MGR,
M A (Hindi), PGDM (PM & LW)

S S Vyas, SR MGR,
B Com, LLB, MLS

D C Parmar, MGR,
M Com, LLB (Gen), MSW, PGDHRM

Janardan Mishra, DY MGR,
MA (Hindi), M Phil (Translation
Tech), PGD in Mass Comm &
Communicative Hindi

Admin-Utility

S C Surchowdhury, DY GEN MGR,
B E (Elect)

S K Sharma, SR MGR,
DCE

R B Shah, MGR,
DEE

Rupesh A Darji, MGR,
B E (Elect)

Vipul L Solanki, MGR,
B E (ECE)

Jay Nagar, DY MGR,
B E (Civil)

Accounts

S Regupathi, DY GEN MGR,
M Com, ICWA, PGDRDM

A K Aggarwal, DY GEN MGR,
M Com

Vinai Gupta, MGR,
B Com, ICWA

Kynaz A Shah, MGR,
M Com, LLB, CA

Chirag K Sevak, MGR,
B Sc (Maths), PGDCA, PGDTP, ICWA

Kalpeshkumar J Patel, MGR,
BBA, M Com, ICWA, CS

Vipin Namdeo, MGR,
M Com, PGDCA, ICWA

M V Thakker, MGR,
B Com

R Arumugam, MGR,
M Com

Rashmi Prateesh, MGR,
M Com, ICWAI

Brajesh Sahu, MGR,
B Com, CA

Swapnil Thaker, DY MGR,
M Com, CA

Sanjay Nandi, DY MGR,
B Com, ICWAI

REGIONAL OFFICE, BANGALORE

S Rajeev, DY GEN MGR,
B Tech (Industrial Engg), PGDRM

P C Patnaik, DY GEN MGR,
M Com

S D Jaisinghani, SR MGR,
B Sc (DT), PGDHRM

G C Reddy, SR MGR,
M Sc (Stats), M Phil (Populn Studies)

M N Sathish, SR MGR,
M Sc (Stats)

S S Nyamagonda, SR MGR,
M Sc (Agro)

B Senthil Kumar, MGR,
B Sc, PGDCA, B Ed, MCA, MBA

T P Aravinth, MGR,
BVSc & AH, MVSc (Vet Micro)

M L Gawande, MGR,
BVSc, MVSc (Vet Med)

Pankaj Singh, MGR,
M Sc (Agri)

Halanayak A L, MGR,
B Sc (Agri Mktg & Coopn),
M Sc (Agri Eco)

Rajni B Tripathi, MGR,
B Sc (Bot), MSW, PGDIRPM

Nidhi Negi Patwal, MGR,
B Sc, M Sc (Chemistry), PGDRM

Vinod Uikey, DY MGR,
B Sc (Agri), M Sc (Agronomy)

Krushna M Beura, DY MGR,
BVSc & AH, MBA (Rural Mgmt)

NDDB OFFICE, ERODE

A Krithiga, MGR,
B Sc (Agri)

NDDB OFFICE, HYDERABAD

Latha Siripurapu, MGR,
B Com, PGDBA (Fin)

NDDB OFFICE, TRIVANDRUM

Thungayya Saliyan, MGR
B A, MSW, PGD-HRM

NDDB, VIJAYAWADA

B V Maheshkumar, SR MGR,
M Sc (Agri)

Regional Demonstration & Training
Centre, Erode

L C Nunes, DY GEN MGR,
BVSc

Karuppanasamy K, DY MGR,
BVSc & AH, MVSc (Vety Gynecology
& Obstetrics)

Divya TR, DY MGR,
BVSc & AH, MVSc (Animal Rep
Gynecology & Obstetrics)

REGIONAL OFFICE, KOLKATA

Aditya Nath Jha, GEN MGR,
B A (Eng), PGDRD

T T Vinayagam, SR MGR,
B E (Agri), PGDRM

T C Gupta, MGR,
B Sc (Hons), M Sc (Agri),
Ph D (Agro)

Dora Saha, MGR,
M Sc (Eco), M Phil (Eco)

Sabyasachi Roy, MGR,
B Sc (Agri) Hons, M Sc (Agri),
PGDRD

Shrestha, DY MGR,
BCA, PGDM (HR & Mktg)

Rituraj Borah, DY MGR,
BVSc & AH, MVSc

NDDB OFFICE, BHUBANESWAR

Dhanraj Khatri, MGR,
B A, MA (SW)

NDDB OFFICE, PATNA

Vishal Kumar Mishra, MGR,
B A, M A (SW)

Padam Veer Singh, DY MGR,
BVSc & AH, MVSc (Anim Nutn)

Regional Demonstration & Training
Centre, Siliguri

Srikant Sahoo, SR MGR,
B Sc, BVSc & AH, MBA

Chaitali Chatterjee, MGR,
B A, M A (Comparative Literature)

Samata Maji, MGR,
BVSc & AH, MVSc (Vety Gynaec &
Obst)

Kamlesh Prasad, DY MGR,
DMLT, B Sc, BVSc & AH

REGIONAL OFFICE, MUMBAI

M N Buch, GEN MGR,
B Sc, LLB, MLW

A S Hatekar, DY GEN MGR,
M Sc (Agri)

Swati Srivastav, MGR,
B Sc (Phy), PGDRM

Rahul Tripathi, MGR,
B.Com, MBA (Fin)

Jithin H Kaimal, DY MGR,
BBA, MBA

Chandrashekhar K Dakhole, DY MGR,
BVSc & AH, MVSc (AN)

NDDB OFFICE, AURANGABAD

Abhay Muley, MGR,
B Tech (DT)

NDDB OFFICE, BHOPAL

Subhankar Nanda, DY MGR,
BVSc & AH, MVSc (AN)

REGIONAL OFFICE, NOIDA

R O Gupta, DY GEN MGR,
BVSc, MVSc (Med)

Ananthapadmanabhan S N,
DY GEN MGR,
B Sc, BGL, PGD (PM & IR), PGDRDM

K Manek, SR MGR,
B Com, AICWA

Sujit Saha, SR MGR,
B Sc (Agri), M Sc (Dairying),
Ph D (Ani Gen & Brdg), MBA (Mktg)

V P Bhosale, SR MGR,
BVSc & AH, MVSc (Med)

Seema Mathur, MGR,
M A (Eng)

Arun Chandhok, MGR,
B Sc, PGD (IRPM), DCS, Exec MBA

M K Rajput, MGR,
B Sc, B E (Food Engg & Tech)

Ashutosh Singh, MGR,
M A (Eco), Ph D (Eco)

Sanjay Kumar Yadav,
MGR, B Sc, MBA (RD)

Alok Pratap Singh, MGR,
BVSc & AH, MVSc (Anim Nutn)

Manoj Kumar Gupta, DY MGR,
BVSc & AH, MVSc (Vet Micro)

B Vasanth Naik, DY MGR,
B Tech (CS & IT), M Tech (CSE)

Ruminpal Singh Bali, DY MGR,
BVSc & AH, MVSc (Animal Rep
Gynecology & Obstetrics)

Jitendra Singh Rajawat, DY MGR,
BVSc & AH, PGD in Agri Bus Mgmt

Avinash Chauhan, DY MGR,
B Sc (Agri), M Sc (Agronomy)

Nitin M Attupuram, DY MGR,
BVSc & AH, MVSc (LPM), Ph D
(LPM)

NDDB OFFICE, CHANDIGARH

S K Attri, SR MGR,
B Tech (DT)

Kuldeep Dudi, DY MGR,
BVSc & AH, MVSc (AN)

NDDB OFFICE, JAIPUR

Pretesh Joshi, MGR,
B E (Mech), PGDRM

Rajkumar Gami, DY MGR,
BVSc & AH, MVSc (AN)

NDDB OFFICE, LUCKNOW

Mohd Rashid, MGR
B A, PGDDM

Regional Demonstration & Training
Centre, Jalandhar

Parag R Pandya, SR MGR,
BVSc & AH, MBA (HRM)

Narayan K Nanote, MGR,
Dip in Agri, BVSc & AH

Ramesh Kumar, DY MGR,
BVSc & AH, MVSc (LPM)

ON SECONDMENT

Department of Animal Husbandry,
Dairying and Fisheries, New Delhi

Santosh K Sharma, MGR,
BVSc & AH, PGDRM

Rajesh Singh, MGR
BCA, PGDM (Mktg & Fin)

Pankaj Deori, DY MGR,
BVSc, MVSc (Animal Gen &
Breeding)

West Assam Milk Producers' Coop.
Union Ltd., Guwahati

S B Bose, DY GEN MGR,
B E (Mech), PGDRDM

S K Parida, SR MGR,
B E (Elect)

Tusar Kanti Patra, MGR,
B Com, ICWA, CA (Inter)

Kuldeep Borah, MGR
B Sc (Biotech), PGDDM

Alan Savio Ekka, DY MGR
B Sc (IT), PGDM-RM

Anish Nair, DY MGR
B Tech (Instrumentation), PGDRM

Jharkhand Milk Federation, Ranchi

B S Khanna, Managing Director
(JMF), B Sc (Agri) Hons, PGDRDM

R Majumder, MGR,
B Sc (Agri), PGDRM

Manish Kumar, MGR,
M Com, CA

Saikat Samanta, MGR,
BVSc & AH, MVSc (Anim Nutn)

Milan Kumar Mishra, MGR,
B Com, PGDDM

K B Pratap, MGR
BIBF (Int Business), PGDDM

Abhas Amar, DY MGR,
BBA, PGDM

Manojkumar B Solanki, SCI I,
B Tech (DT), M Tech (Dairy Chem)

Priyanka Toppo, DY MGR
B Com, PGDRM

Surbhi Pawar, DY MGR,
BBA, PGDM-RM

Prashant A Kanthale, DY MGR,
B Tech (DT), M Sc (Dairy Chem)

Vishnu Deth G, DY MGR
B Tech (CS), PGDRM

ON DEPUTATION

Food Safety and Standards Authority
of India (FSSAI), New Delhi

Sunil Bakshi, DY GEN MGR,
M Sc (Dairy Bacteriology)

Maahi Milk Producer Company
Limited, Rajkot

Y M Patel, DY GEN MGR,
B Sc (DT)

Abbreviations

GEN MGR: General Manager
DY GEN MGR: Deputy General
Manager
SR SCI: Senior Scientist
SR MGR: Senior Manager
SCI III: Scientist III
MGR: Manager
SCI II: Scientist II
DY MGR: Deputy Manager
SCI I: Scientist I

Acknowledgement

**District Cooperative Milk
Producers, Unions, Federations
and participating State and
Union Territory Governments.**

**Government of India,
especially the Department of
Animal Husbandry, Dairying
& Fisheries, Ministry of
Agriculture and Farmers Welfare,
Ministry of Finance and the Niti Aayog.**



www.nddb.coop



[https://www.facebook.com/
NationalDairyDevelopmentBoard](https://www.facebook.com/NationalDairyDevelopmentBoard)

Head Office

PB No. 40, Anand 388 001
Telephone: (02692)
260148/260149/260160
Fax: (02692) 260157
E-mail: anand@nddb.coop

Offices

PB No. 9506, VIII Block,
80 Feet Road, Koramangala,
Bangaluru 560 095
Telephone: (080)
25711391/25711392
Fax: (080) 25711168
E-mail: bangalore@nddb.coop

DK Block, Sector II,
Salt Lake City, Kolkata 700 091
Telephone: (033)
23591884/23591886
Fax: (033) 23591883
E-mail: kolkata@nddb.coop

PB No. 9074, Western Express
Highway, Goregaon (East),
Mumbai 400 063
Telephone: (022)
26856675/26856678
Fax: (022) 26856122
E-mail: mumbai@nddb.coop

Plot No. A-3, Sector-1,
Noida 201 301
Telephone: (0120) 4514900
Fax: (0120) 4514957
E-mail: noida@nddb.coop