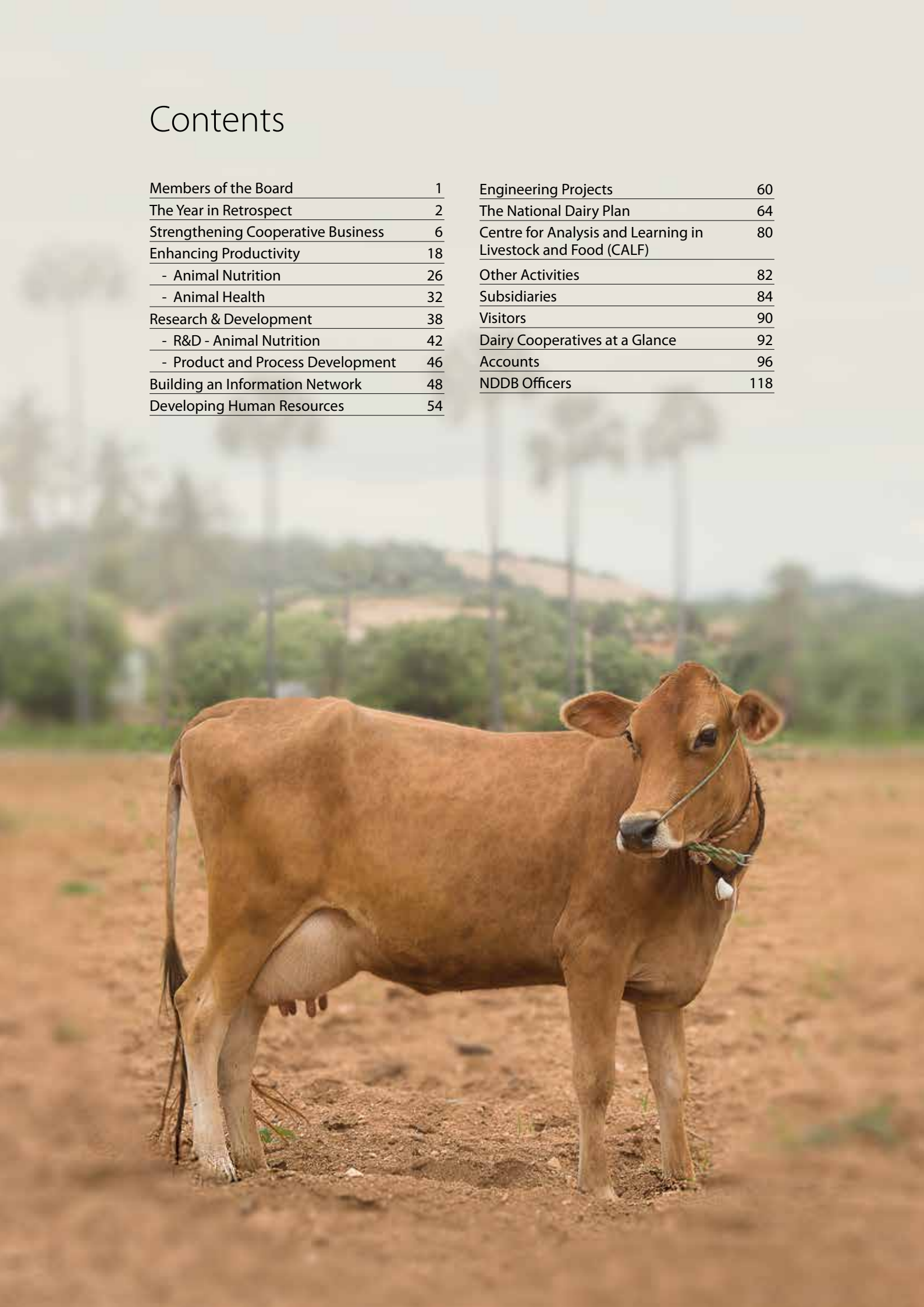
NATIONAL DAIRY
DEVELOPMENT BOARD

Annual Report
2015-2016

Contents



Members of the Board

Shri T. Nanda Kumar
Chairman

Smt. Rajni Sekhri Sibal *
Joint Secretary (Cattle & Dairy Development)
Department of Animal Husbandry, Dairying & Fisheries,
Ministry of Agriculture and Farmers Welfare
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Shri Sanjay Bhoosreddy **
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Gujarat Co-operative Milk Marketing Federation Ltd
Anand

Shri V. Kehie ****
Chairman
The Nagaland State Dairy Co-operative Federation Ltd
Kohima

Smt. L.H. Thangi Mannen *****
Chairman
The Nagaland State Dairy Co-operative Federation Ltd
Kohima

Dr. S. Ayyappan
President
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Shri Dilip Rath
Managing Director

Shri Sangram Chaudhary
Executive Director

* *Up to 23 February 2016*

** *With effect from 23 February 2016*

*** *Up to 4 March 2016. Reappointed with effect from 12 March 2016.*

**** *Up to 5 August 2015*

***** *With effect from 9 October 2015 up to 31 December 2015*

The Year in Retrospect

India continued to be the largest milk producing nation with an anticipated milk production of 155.49 million tonnes during 2015-16.

DOMESTIC DAIRY SCENE

According to the latest release of the Central Statistical Office, the growth in the agriculture and allied sectors is estimated to be 1.1 per cent in 2015-16. The Twelfth Five Year Plan (2012-13 to 2016-17) had envisaged a growth rate of 4 per cent for the agriculture and allied sectors. The realised growth rate during the last three years has been fluctuating at 1.5 per cent in 2012-13; 4.2 per cent in 2013-14; and (-) 0.2 per cent in 2014-15. The shortfall in growth in agriculture is explained by the fact that 60 per cent of agriculture is rain dependent and there have been two consecutive drought years – 2013-14 and 2014-15. During the last five years ending 2015-16, the average annual incremental production of food grain is 2.05 million tonnes. During the same period, the average annual incremental milk production was over six million tonnes. The variation between the growth rate in food grain production and milk production can be partially explained by the volatility factor in agricultural production and robustness in milk production.

India's estimated milk production in 2015-16 was 155.49 million tonnes, which is about 6.28 per cent higher than last year. Estimated per capita availability in 2015-16 was 337 grams per day, an increase of 4.7 per cent over the previous year.

155.49 million tonnes of milk production

The dairy cooperatives collectively procured 15.58 million tonnes of milk registering a growth of around 12 per cent compared to last year. Liquid milk marketing by the cooperatives stood at 12.08 million tonnes with an increase of around 2.73 per cent over the previous year.

Imports of milk and milk products increased nominally while exports declined by 30 per cent. Export of milk powder declined from 35,800 tonnes during 2014-15 to 12,000 tonnes during the current year.

The average price of skimmed milk powder declined from ₹206 per kg in April 2015 to ₹182 per kg in March 2016 in the domestic market. The decline in both domestic and international prices led to significant increase in milk procurement by the cooperatives and accumulation of stocks of conserved commodities.

There is clearly some stress in the current state of affairs in the dairy industry which has been continuing since last two years. Most of the dairy cooperatives however have continued to support the dairy farmers by ensuring that the price paid to the farmers is protected. This has resulted in excessive supply of milk to the dairy cooperatives resulting in the accumulation of a large quantity of Skimmed Milk Powder (SMP) with them. According to some reports, private companies have reduced the procurement volume and prices of liquid milk, thereby affecting farmers' income and the viability of smallholder dairy farms. Further, many private dairy plants that generally produce powder and other value-added products, have either closed down their

15.58 million tonnes of milk collected by cooperatives

operations or scaled down their milk collection causing hardship to the dairy farmers.

The Government of India took several initiatives to address the issues faced by the dairy sector: i) approval of the proposal of reprocessing cost of milk powder under Rashtriya Krishi Vikas Yojna; and ii) enhancement of custom duty on butter, butter oil and *ghee* from 30 per cent to 40 per cent.

THE INTERNATIONAL DAIRY SCENE

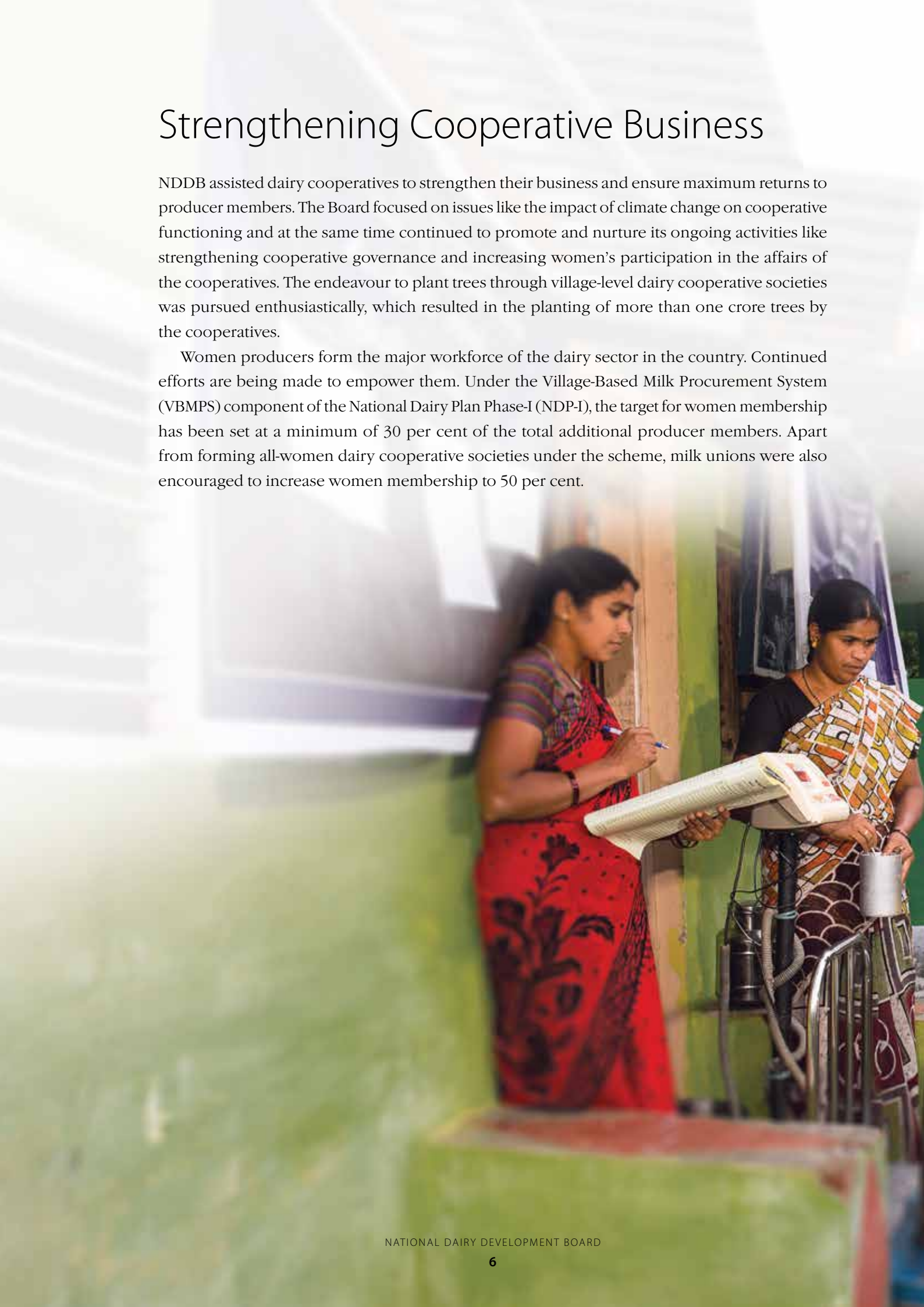
Since early 2014, international prices for milk and dairy products have been declining continuously. The farm gate price of liquid milk has dropped by almost 50 per cent from a peak of NZ$ 646 per tonne in April 2014 to NZ$ 354 per tonne in April 2015 and further to NZ$ 335 a tonne by March 2016 in New Zealand. A similar trend has also been observed in other major dairy exporting countries.

The average price Free-on-Board (FOB) New Zealand of SMP dropped by almost 40 per cent from a peak of US$ 4,988 per tonne in April 2014 to US$ 2,894 per tonne in April 2015 and further to US$ 1,750 a tonne by March 2016. According to the international market report, the world dairy trade of major dairy products other than SMP declined on account of reduced imports by China and the Russian Federation. The surplus liquid milk was channelled into SMP and butter production instead of whole milk powder and cheese. An un-conducive world dairy market discouraged the farmers to raise milk production through herd expansion or feeding supplements and the production is estimated to grow by 1.8 per cent from 789 million tonnes in 2014 to 803 million tonnes in 2015.

Strengthening Cooperative Business

NDDB assisted dairy cooperatives to strengthen their business and ensure maximum returns to producer members. The Board focused on issues like the impact of climate change on cooperative functioning and at the same time continued to promote and nurture its ongoing activities like strengthening cooperative governance and increasing women's participation in the affairs of the cooperatives. The endeavour to plant trees through village-level dairy cooperative societies was pursued enthusiastically, which resulted in the planting of more than one crore trees by the cooperatives.

Women producers form the major workforce of the dairy sector in the country. Continued efforts are being made to empower them. Under the Village-Based Milk Procurement System (VBMPS) component of the National Dairy Plan Phase-I (NDP-I), the target for women membership has been set at a minimum of 30 per cent of the total additional producer members. Apart from forming all-women dairy cooperative societies under the scheme, milk unions were also encouraged to increase women membership to 50 per cent.

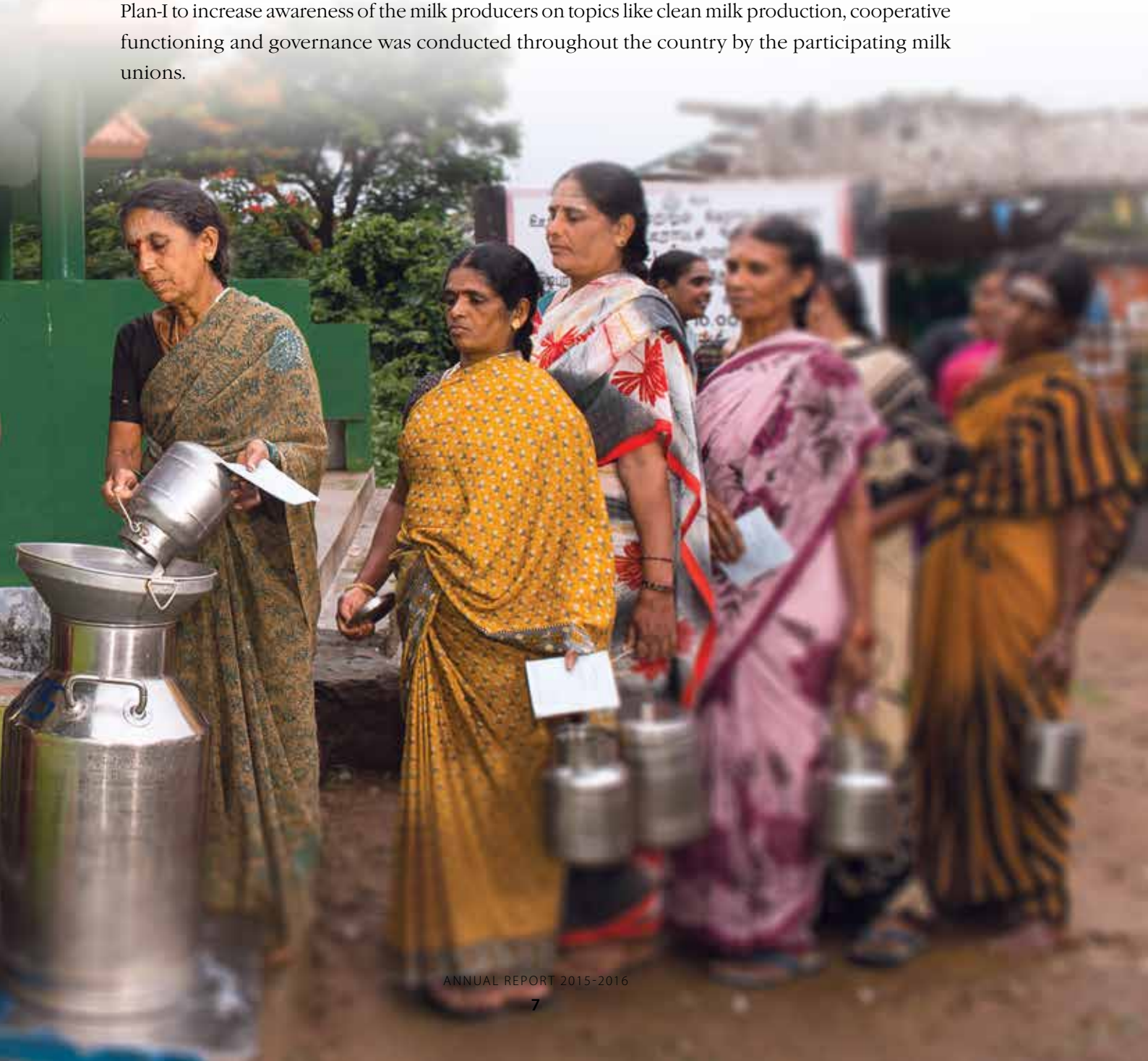


5.01 million women members in dairy cooperatives

Appointment of Lady Extension Officers by the milk unions under the aegis of VBMPS component has been helpful in creating awareness about the benefits of cooperatives among women producers. With all these efforts, the number of women members during 2015-16 reached 5.01 million. During 2015-16, the number of all-women dairy cooperative societies increased to 32,092 across the country.

Training and capacity building continued to receive major focus during the year. Trainings were facilitated for milk unions' employees, management committee members, producer members, field supervisors, procurement officers and Board of Directors. The participants were oriented on the values and principles of cooperatives, roles and responsibilities of various cooperative functionaries, importance of Business ethics and Good Governance. Participants were also exposed to advanced dairying practices, clean milk production practices and various measures to productivity enhancement.

'Dairy Sahakarita Jagruti Abhiyan', a one-day programme funded under the National Dairy Plan-I to increase awareness of the milk producers on topics like clean milk production, cooperative functioning and governance was conducted throughout the country by the participating milk unions.



During the year, the milk unions covered about 0.17 million village dairy cooperative societies, with a cumulative membership of 16 million milk producers. The cooperative milk unions procured an average of 42.56 million kg of milk per day compared to 37.95 million kg per day in the previous year, marking a growth of about 12.08 per cent. The sale of liquid milk reached 32.09 million litres per day, recording a growth of 2.73 per cent over the previous year.

As an endeavour to strengthen cooperative governance, a symposium on 'Governance Issues in Producer Organisations' was organised at NDDB, Anand, with the participation of Managing Directors of Federations and Milk Unions, CEOs of Producer companies, eminent academicians, experts, Government functionaries and NABARD officials. Topics discussed during the symposium included scope and challenges faced by producer-centric organisations and study of successful initiatives.

MANAGEMENT OF DAIRY COOPERATIVES

West Assam Milk Producers Cooperative Union Ltd

NDDB continues to manage West Assam Cooperative Milk Union Ltd (WAMUL) since April 2008. During 2015-16, the Union reported an average milk procurement of 21,783 kg per day with a peak procurement of 32,813 kg per day covering 3,894 dairy farmers organised into 169 functional milk producers' institutions/dairy cooperative societies. This year the Union has made a significant stride by distributing an additional milk procurement price of over ₹1.50 crore to its dairy farmers. Moreover, for promoting clean and hygienic handling of fresh milk by the dairy farmers this year the Union has distributed stainless steel milk jars with a capacity of five litres and 10 litres to over 1,700 dairy farmers.

32,092 all-women dairy cooperatives

During 2015-16, the Union sold 43,830 litres of packed liquid milk per day under the brand 'Purabi' and also launched 'Purabi Taza', a new product in 200 ml pouch. The Union has achieved a sales turnover of ₹725 million compared to ₹651 million in the previous year.

During the year, WAMUL received financial assistance from the Government of Assam under the World Bank-funded Assam Agricultural Competitiveness Project-Additional Funding (AACP-AF) Project. The support has enabled WAMUL to formally train 120 Mobile Artificial Insemination Technicians (MAITs) for carrying out doorstep AI delivery services in Nagaon district. As on March 2016, the MAITs have performed 43,076 AI services covering around 960 villages which have resulted in the birth of 5,091 calves of which 2,801 are female. The project has also initiated veterinary and animal health camps for enhancing the productive life cycle of animals. WAMUL had also initiated ration balancing advisory services by training 10 of its MAITs as Local Resource Persons (LRPs).

During the year, greater degree of transparency was established in the village-level milk collection process by installation of 25 Data Processor-based Milk Collection Units (DPMCUs) and two Automated Milk Collection Units (AMCUs) under the funding support received from the World Bank. This has resulted in a remarkable improvement in the quality of locally procured milk.

WAMUL organised a Milk Producers' Meet in May 2015 and celebrated Purabi Milk Day in December 2015. The function was graced by the Chief Minister, Government of Assam, and Chairman, NDDB. Progressive milk producers, including women, were felicitated during the programme.

Jharkhand Milk Federation

At the request of the Government of Jharkhand NDDB took over the management of the newly formed Jharkhand State Cooperative Milk Producers Federation (under a Memorandum of Understanding with the State Government) from April 2014 to give an impetus to dairy development in Jharkhand. The Jharkhand Milk Federation took over the activities related to milk procurement, processing and marketing of the existing Government dairies in August 2014.

During 2015-16, NDDB continued to provide technical and managerial support to Jharkhand Milk Federation. NDDB commissioned a state-of-the-art dairy plant of 1.0 lakh litres per day capacity at Hotwar, Ranchi, and an area-specific mineral mixture plant of 12 metric tonnes per day (MTD) capacity, on turnkey basis for the JMF with financial support from Government of Jharkhand. The Federation reached an average daily milk procurement of 57 thousand kg per day (TKgPD) during March 2016, with an annual average of about 45 TKgPD, through some 8,500 milk pourers spread over 736 villages and a network of 136 DPMCU/AMCU villages attached to 20 Bulk Milk Coolers (BMCs) and four dairy plants at Ranchi, Lohardaga, Deoghar and Koderma. The Federation deposits the milk proceeds of each farmer directly into the bank account every 10 days and was able to generate operational surplus to pay an average price difference of about 90 paisa per kg of milk to the suppliers.

FINANCIAL ASSISTANCE TO DAIRY COOPERATIVES

NDDB continued to provide technical and financial assistance to dairy cooperatives to augment processing facilities and implement their programmes. During 2015-16, while continuing to provide financial assistance to projects approved under the Perspective Plan, a new scheme for *"Providing financial assistance for infrastructure activities, skill development and training"* was introduced. Thirteen projects of dairy cooperatives with an outlay of ₹7,218 million were approved and financial assistance of ₹2,314 million was disbursed to them during the year. Working capital assistance of ₹780 million was also provided to dairy cooperatives during the year.

STRENGTHENING VILLAGE-BASED MILK PROCUREMENT SYSTEMS

During the year, states with relatively underdeveloped dairying infrastructure namely Uttarakhand, Chhattisgarh and Jharkhand, were covered under the Village-Based Milk Procurement System (VBMPS) sub project of the National Dairy Plan-I, making the scheme inclusive.

By March 2016, the total number of approved sub projects reached 116, including five sub projects of Producer Companies. The total approved outlay for these sub projects was ₹8,141.48 million, of which the grant component was ₹4,998.20 million and the milk union's contribution was ₹3,143.28 million.

During 2015-16, 8,834 villages were covered under strengthening village-based milk procurement services of which new DCS were established in 3,769 villages and 5,065 existing villages were strengthened by installation of DPMCUs, AMCUs or BMCs. During the same period, additional milk producer members of cooperatives increased by 1.68 lakhs. More than 50 per cent of this incremental membership comprised women dairy farmers, of which more than 90 per cent were smallholder farmers, having a dairy animal holding of three or less. As the coverage of the dairy cooperatives increased and the cold chain strengthened, milk procurement also increased by an additional 770 TKgPD during the year.

Apart from achievement on the key parameters, it was noticed that women and SC/ST members benefited significantly. Case studies and evidences collected from across the participating states have indicated that women producers have been highly enthusiastic in joining the cooperative mode of dairying.

One of the key benefits of the VBMPS component of the NDP-I has been the establishment of fair and transparent system for milk procurement and increasing the network of BMCs, which has been instrumental in improving the quality of milk procured. Awareness generation through the village-level programmes, farmer training, and orientation of newly appointed secretaries, milk unions employees, management committee members and Board of Directors were conducted during the year.

PROPOSAL ON STRENGTHENING PROCESSING INFRASTRUCTURE OF DAIRY COOPERATIVES

It is expected that the milk producer institutions in India would raise their milk procurement to an average of 670 lakh kg per day with a peak of 800 lakh kg per day registering an annual increase of 7.8 per cent, by 2021-22.

Currently, dairy cooperatives have a milk processing capacity of about 655 lakh litres per day. However, most of these capacities were commissioned during the Operation Flood period and the majority of them have never been expanded or modernised thereafter. Thus, it is imperative to emphasise the creation and strengthening of milk processing infrastructure by the milk producer institutions to handle increased milk procurement by 2021-22 and provide safe milk to the consumers. Hence, NDDB has prepared a Project Report on 'Dairying through Cooperatives – Key to Sustainable Livelihood for Rural Milk Producers' with an anticipated outlay of ₹70,000 million for a period of five years. The investments envisaged under the project will help in adopting

the environment-friendly, energy-efficient and upgraded technologies particularly keeping in view of stringent food safety norms being enforced by the Food Safety and Standards Authority of India (FSSAI) and also the varied consumer demand for milk and milk products. NDDB is currently exploring various avenues to avail funding for onward lending to Milk Cooperatives at a concessional rate of interest. The proposal has been submitted to the Department of Animal Husbandry, Dairying and Fisheries, Government of India, for consideration.

Further, in this regard consultations were held with dairy federations and milk unions in 13 major dairying states (Andhra Pradesh, Bihar, Chhattisgarh, Haryana, Karnataka, Kerala, Madhya Pradesh, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, and West Bengal) to assess the status of milk processing infrastructure and feed manufacturing facilities available with them and estimate the future requirements by 2021-22.

DAIRY DEVELOPMENT INITIATIVE IN VIDARBHA AND MARATHWADA REGIONS OF MAHARASHTRA

The Government of Maharashtra entered into a Memorandum of Understanding with NDDB to undertake dairy development activities in Vidarbha and Marathwada regions of Maharashtra. The Govt. of Maharashtra has agreed to support the initiative with a grant of ₹3,000 million to be invested in the area of productivity enhancement. NDDB and its subsidiaries will take up milk procurement, processing and marketing activities in the region and further take up the formation of Producer Companies once the operations are viable. Participation of willing voluntary agencies too will be sought along with various departments of Government of Maharashtra for implementation of productivity enhancement activities.

NDDB and the Department of Animal Husbandry, Govt. of Maharashtra, are preparing a detailed project report in this regard with the following objectives:

a. Improving the productivity of milch animals through scientific breeding activities by arranging quality AI services at farmers' doorstep, improved feeding practices by feed management services and preventive animal health care services at village level/farmers' doorstep in order to increase milk production.
b. Establishing effective milk producers' institutions for collection, processing and marketing of milk and also for ensuring greater livelihood opportunities for milk producers with a special focus on women milk producers.

QUALITY ASSURANCE

The concept of a 'Quality Mark' has been proposed as a part of a continuous endeavour to improve quality and food safety aspects of milk and milk products manufactured by cooperatives and producer-owned organisations. The initiative involves pre-assessment of the dairy units followed by detailed inspection by a panel of three members including an external subject expert. Display of the 'Quality Mark' on packages is expected to enhance the consumer confidence in the milk and milk products being marketed by the cooperatives and producer-owned organisations.

Presence of contaminants and residues in liquid milk and milk products significantly affects food safety and quality. NDDB has undertaken a programme wherein samples of milk and milk products from various regions in the country are analysed for contaminants and residue levels for creating a nation-wide database. In addition, a testing programme was undertaken to determine the fat and solids-not-fat (SNF) content in milk. This will help assess the effect on the composition of milk as a result of a change in the demography of the cattle population, due

to an increase in the exotic cattle population in the country. The first phase of the study was completed in select states across the country.

Apart from providing assistance on quality improvement initiatives to the cooperatives and producer-owned dairy organisations, NDDB also works as an interface between the dairy industry and the FSSAI, by providing expert opinion to the Authority for framing of domestic food regulations. Technical support to the Government of India was provided in matters related to the harmonisation of domestic food laws with those of CODEX.

As a result of continuous efforts by NDDB, cooperatives and producer-owned organisations, approximately 11,400 Bulk Milk Coolers with a chilling capacity of about 26 million litres of milk per day have been installed in the rural areas, which ensures receipt of good quality raw milk at milk processing units. The cooperatives and producer-owned dairy organisations have also set up approximately 1,05,000 automated milk collection units for fair, quick and transparent milk quality testing at the village level.

To strengthen the human resources' skill development initiative for cooperatives and producer-owned dairy organisations, NDDB imparted technical training for different stake holders – milk producers, dairy staff, officials and Board of Directors.

Type	BOP	BOD	Board Appreciation Programme		FOP	DPM/EIP
			Quality & Food Safety Management	Operation & Maintenance of Bulk Milk Chilling Units		
Nos.	4	17	30	19	66	2

BOP – Board Orientation Programme
BOD – Board of Directors
FOP – Farmers Orientation Programme
DPM – Dairy Plant Management
EIP – Employee Induction Programme

MILK PRODUCER COMPANIES

NDDB Dairy Services (NDS), a wholly-owned subsidiary of NDDB, assisted the milk producers in incorporation and operationalisation of five large Milk Producer Companies (MPCs) which include Paayas in Rajasthan, Maahi in Gujarat, Shreeja in Andhra Pradesh, Baani in Punjab, and Saahaj in Uttar Pradesh.

Together, these five MPCs have enrolled around 3.26 lakh milk producers as members as of March 31, 2016, of whom about 40 per cent are women. About 62 per cent of the members enrolled are smallholder milk producers. The five companies together procured about 19.3 lakh kg of milk per day during the year. The members of the five companies raised about ₹675 million towards share capital.

During the year, the Shreeja MPC began the sale of liquid milk to consumers. The Baani MPC also launched the sale of pouch milk along with fermented products such as buttermilk and curd. Paayas and Maahi continued to market milk and milk products under their own brand.

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

A total of about 5.8 lakh animals were covered under the Ration Balancing Programme (RBP) in about 9,700 villages through about 5,000 Local Resource Persons (LRPs) in the five MPCs. About 3.9 lakh AIs were performed in about 7,700 villages by more than 1,000 Mobile AI Technicians (MAITs) in the four MPCs.

Cattle feed and Area-Specific Mineral Mixture (ASMM) were introduced in Shreeja, Baani and Saahaj MPCs under the brand names Shreeja Feed, Baani Feed, Saahaj Sudana and Shreeja Min, Baani Min, Saahaj Min respectively.

The Society for Elimination of Rural Poverty (SERP) - Andhra Pradesh and Telengana, and Pudhu Vaazhvu Project (PVP) - Tamil Nadu, are implementing World Bank-funded projects for empowerment and poverty alleviation of the disadvantaged communities. The agencies have requested NDS to assist them in setting up Producer Companies and provide support to implement various interventions in the area of institution building, dairy value chain and input services such as animal breeding, nutrition and health services in their respective project areas.

NDS is assisting the Tata Trusts in setting up Milk Producer Companies in the states of Rajasthan, Uttar Pradesh, Punjab and Gujarat where the Trust is implementing livelihood projects.

NDDB FOUNDATION FOR NUTRITION

NDDB has set up the NDDB Foundation for Nutrition (NFN) along with its subsidiaries and dairy cooperatives to address the issue of malnourishment in children. The Foundation has been set up with an objective of providing nutritional support to school children through supply of milk and milk products to be contributed by a network of dairy cooperatives, producer companies and affiliated dairies in the country. The Foundation will also provide a platform for individuals and corporates to contribute funds under their corporate social responsibility (CSR) obligations or otherwise for the noble cause of ensuring nutrition to school children.

During 2015-16, NFN received a total of ₹17.5 lakh from NDDB's subsidiaries Mother Dairy Fruit & Vegetable Pvt Ltd (₹15 lakh) and Indian Immunologicals Ltd (₹2.5 lakh) for supply of milk to school children.

NFN covered Zilla Parishad High School, Rangareddy district of Telangana, and Sarvodaya Kanya Vidyalayas located at Chirag and East of Kailash, South Delhi, for milk distribution.

NDDB has also started an advocacy effort for promoting supply of milk to school children with budgetary support from state government. While a few states like Gujarat and Karnataka have been running successful school milk programmes, more states are likely to emulate these initiatives. NDDB will provide technical support for such activities.

As on March 31, 2016, NFN had covered 2,958 students and served 11,342 child milk days (CMD). The preliminary response received from the school children is found to be very encouraging.

AWARENESS GENERATION

NDDB organised awareness campaigns on Clean Milk Production, Ration Balancing Programme and Good Animal Management Practices for milk producers in Ichhamati Milk Union (West Bengal), Patna Milk Union (Bihar), Jharkhand Federation (Jharkhand), Udaipur Union (Rajasthan) and Cuttak Union (Odisha). The campaign focused on creating awareness about feeding a balanced ration to milch animals and adopting clean milk practices. About 800 milk producers from each state attended the programmes. The milk producers were also provided with extension materials like pamphlets, brochures and posters for their DCS. The films on green fodder and ration balancing generated considerable interest among milk producers.

Extension material on Animal Health, Nutrition and Breeding were prepared during the year and were distributed in large numbers. Films on RBP, Green Fodder, Village-Based Milk Procurement Systems, Mineral Mixture, Deworming and Vaccination were produced during the year and disseminated through milk federations and milk unions.

Enhancing Productivity

Under NDP-I, infrastructure to undertake various genetic improvement programmes has been put in place. Constant innovation and improvement in the processes to enhance productivity and thereby milk production have been the driving force under NDP-I. During the year, actions to introduce genomic selection procedures under existing programmes have been initiated.

ANIMAL BREEDING

To increase the genetic potential of cattle and buffaloes, the focus under NDP-I has been on building infrastructure for the following activities:

- Genetic evaluation and production of High Genetic Merit (HGM) bulls through genetic improvement programmes such as Progeny Testing (PT) and Pedigree Selection (PS);
- Production of disease-free high quality semen doses;
- Delivery of quality Artificial Insemination (AI) services, following Standard Operating Procedures (SOPs), at the doorstep of dairy farmers;
- Quality control of bull production, semen production and AI delivery; and
- Information network for capturing data and dissemination of information.

Thirteen PT and 10 PS programmes have been initiated to produce HGM bulls and 22 'A' and 'B' graded semen stations are being strengthened to produce the required high quality, disease-free semen doses. A modest AI delivery infrastructure has also been piloted to demonstrate how AI delivery services could be provided on a sustainable basis at farmers' doorsteps.

PROGENY TESTING

Evaluating the bulls on the basis of their daughters' performance and subsequent selection of top bulls and bull mothers to produce the next generation of genetically superior young sires.

The cattle breeds included under the Progeny Testing (PT) programme are pure Holstein Friesian, Cross-bred Holstein Friesian (CB HF), and Cross-bred Jersey (CB JY), and the buffalo breeds included are *Mehsana* and *Murrah*. The progress made under these programmes during 2015-16 is summarised below.

Breed	End Implementing Agency/State	No. of Bulls Put to Test	No. of HGM Bulls Distributed to Semen Stations
Murrah	Sabarmati Ashram Gaushala (SAG), Bidaj, Gujarat; Punjab Livestock Development Board (PLDB), Punjab; Haryana Livestock Development Board (HLDB), Haryana; Animal Breeding Centre (ABC), Salon, Uttar Pradesh	112	51
Mehsana	Mehsana and Banas Milk Unions, Gujarat	22	13
HF	Karnataka Milk Federation (KMF), Karnataka	60	50
HF Cross-bred	SAG, Bidaj, Gujarat; Uttarakhand Livestock Development Board (ULDB), Uttarakhand	103	89
Jersey Cross-bred	Andhra Pradesh Livestock Development Agency (APLDA), Andhra Pradesh; Tamil Nadu Cooperative Milk Producers Federation (TCMPF), Tamil Nadu	150	49
TOTAL		**447**	**252**

The SOPs and the Minimum Standards (MS) set under NDP-I have been followed for implementing these PT programmes. All the projects together, since the launch of the NDP-I in 2012-13, have so far put 1,077 bulls under test mating and supplied 446 young HGM bulls to different semen stations for the production and supply of high quality disease-free semen doses across the country.

During the year, the Government of India notified the formation of a nine-member Expert Committee for Estimation of Breeding Value of Bulls being progeny tested. The first meeting of the committee was held in November 2015. Breeding value estimation of 483 bulls tested by PT projects, namely SAG CB HF PT; SAG *Murrah* PT; Mehsana Milk Union *Mehsana* PT and Banas Milk Union *Mehsana* PT; and KMF HF PT; was carried out by a Test Day Random Regression method and the estimated breeding values were submitted to the Department of Animal Husbandry, Dairying & Fisheries (DAHD&F), Government of India, for their publication on the DAHD&F website.

Animal type classification/Animal Typing forms an integral part of a PT project. Weightage to type traits in selection of animals adds value in evaluation and selection of animals and

thereby improves the longevity of animals. Animal Typing has also been envisaged in approved sub project plans of PT projects under NDP-I. Five separate working groups were finalised for Animal Typing in Holstein Friesian, Cross-bred Holstein Friesian, Cross-bred Jersey, *Murrah* and *Mehsana* breeds. A workshop was conducted by NDDB during May 2015 for finalisation of Animal Typing methodology. Experiences of each working group were shared and following a brain-storming session, guidelines for Animal Typing were finalised and circulated to all end implementing agencies (EIAs).

PEDIGREE SELECTION

Selection of bulls of indigenous breeds of cattle and buffalo on the basis of performance of their parents and grandparents.

Realising the importance of some of the indigenous breeds of cattle and buffaloes, Pedigree Selection (PS) projects with a total outlay of ₹584.57 million for the conservation and development of six breeds of cattle – *Kankrej, Rathi, Gir, Sahiwal, Hariana* and *Tharparkar,* and three breeds of buffaloes – *Nili-Ravi, Jaffarabadi* and *Pandharpuri*, have been initiated in their respective native tracts under NDP-I.

In these projects, high-yeilding female animals available with farmers are identified through

a systematic milk recording programme and bred with the best bulls to produce future breeding bulls to bring about genetic improvement. As AI coverage in these breeds is very low, these programmes also aim at promoting AI and creating awareness among dairy farmers on conservation and development of indigenous breeds. The programmes mandatorily follow all the SOPs and Minimum Standards laid down under NDP-I. During the year, 10 PS projects together produced and distributed 23 HGM bulls to the semen stations. Some 392 AI centres have been established, which together carried out 70,876 AIs. The progress made under the PS projects is summarised below:

Indigenous Breed	End Implementing Agency & States	No. of AI Centres Established	AI Done	No. of Animals under Milk Recording	No. of Bulls Distributed to Semen Stations
Sahiwal	Sri Ganganagar Zila Dugdh Utpadak Sahkari Sangh Ltd (GANGMUL), Rajasthan; and Punjab Livestock Development Board (PLDB), Punjab	44	6,346	1,177	-
Gir	Sabarmati Ashram Gaushala (SAG), Gujarat	50	14,411	1,432	15
Kankrej	Banas Milk Union, Gujarat	50	7,335	1,146	-
Rathi	Uttari Rajasthan Cooperative Milk Union Ltd (URMUL Rural Health, Research and Development Trust), Bikaner, Rajasthan	48	10,940	928	3
Tharparkar	Rajasthan Livestock Development Board, Rajasthan	39	1,549	767	-
Nili-Ravi	Punjab Livestock Development Board, Punjab	48	7,863	751	-
Jaffarabadi	SAG, Gujarat	43	14,262	1,408	5
Pandharpuri	Maharashtra Livestock Development Board (MLDB), Maharashtra	30	5,160	383	-
Hariana	Haryana Livestock Development Board (HLDB), Haryana	40	3,010	2,558	-
TOTAL		**392**	**70,876**	**10,550**	**23**

STRENGTHENING SEMEN STATIONS

Producing disease-free, high-quality semen for AI at strengthened semen stations.

Under NDP-I, projects for strengthening of 22 semen stations with a total outlay of ₹2,558.48 million have been undertaken. The projects have resulted in development of infrastructure, especially for biosecurity and for production and processing of high genetic, disease-free semen doses complying with Minimum Standards (MS), notified by the Government of India, for production of bovine frozen semen. During the year, all the 22 semen stations together

produced 71.23 million semen doses, comprising about 70 per cent of the total doses produced in the country, for AI programmes being implemented by various agencies all over the country.

AI DELIVERY SERVICES

The AI delivery services to the farmers remained the core activity of input delivery services rendered by all cooperative milk unions. During 2014-15, the cooperative milk unions together performed 14.7 million AIs through 19,734 centres covering 58,682 villages.

IMPORT OF BULLS AND EMBRYOS

Taking advantage of genetic progress in dairy-advanced nations limited numbers of bulls and embryos were imported to enhance productivity.

During the year, NDDB imported 82 (42 Jersey and 40 Holstein Friesian) purebred exotic bulls from Denmark. Forty seven of these were quarantined at the Animal Quarantine and Certification Services (AQCS), Chennai, and the remaining 35 at AQCS, Kolkata, for 30 days. After successful completion of mandatory quarantine period, they were distributed to semen stations.

Semen doses produced by these bulls will primarily be used for breeding nondescript cattle to improve their genetic potential in compliance with the state breeding policies.

Four hundred and eighty embryos of pure Holstein Friesian (320) and Jersey (160) breeds were also imported and distributed to four identified Participating Agencies (PAs) that have the required expertise and infrastructure for production of offsprings through embryo transfer. Four sub projects were supported with an allocation of ₹149.99 million under 'Production of

Exotic Bulls by Transfer of Imported Embryos (BPTIE)'. These projects have transferred 295 HF (198) and Jersey (97) embryos in disease-free recipients. Till March 2016, 194 recipients were examined for pregnancy and 69 recipients were confirmed pregnant, signifying a 35.6 per cent pregnancy rate.

INFORMATION NETWORK FOR ANIMAL PRODUCTIVITY AND HEALTH (INAPH)

An information network covering all areas of productivity enhancement for real time monitoring and efficient decision making.

INAPH – an information network covering all areas of productivity enhancement – developed by NDDB has been used for monitoring implementation of Progeny Testing, Pedigree Selection, AI Delivery and Ration Balancing projects initiated under NDP-I. The use of INAPH continued to increase exponentially during 2015-16 covering 149 projects, spread across 250 districts in 17 states. About 5.8 million animals belonging to 3.1 million farmers spread over 38,340 villages have been registered in the system. To facilitate the process, during the year, eight INAPH Training of Trainers (TOTs) programmes were conducted by NDDB for 122 trainers to enable them to further train field users across the country.

Realising its effectiveness and efficiency in monitoring the performance of bovines in many projects, DAHD&F, GoI, has recommended its use for the implementation of another central sector scheme – National Programme on Bovine Breeding and Dairy Development. State Livestock Development Boards, State Animal Husbandry Departments and NGOs have also expressed

their desire to use INAPH for monitoring AI activities and performance recording of animals in their projects and farms.

On the advice of the DAHD&F, GoI, NDDB has been managing the allocation of unique numbers for animal identification in the country. During the year, NDDB generated and delivered 98.75 lakh unique numbers to 115 institutions in 19 states.

INNOVATION AND ADOPTION OF TECHNOLOGIES TO ENHANCE PRODUCTIVITY

Genomic Selection – a paradigm shift in animal selection and breeding.

Genomic selection, once standardised is a quick and cost-effective method for selecting bull mothers and breeding bulls at a young age. This method is now being used in dairy-advanced countries for genetic improvement of dairy animals. NDDB has already 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, cross-bred cattle and buffaloes.

TRAINING AND TECHNICAL WORKSHOPS

Continuous capacity building is essential for better implementation of the projects. Under NDP-I, during the year, 34 officers of PT and PS projects were trained at NDDB, Anand. Training of 81 semen station personnel was also facilitated by NDDB 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 training programmes. Eighteen officers attended exposure and training programmes on genetic improvement and semen production in Germany, Denmark and The Netherlands.

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

PROJECT MONITORING AND EVALUATION

Fifty one projects of Pedigree Selection, Progeny Testing, Strengthening Semen Stations, Production of Exotic Bulls by Transfer of Imported Embryos (BPTIE), and import of embryos/ bulls were monitored during the year. Regular monitoring, feedback and technical support to project authorities helped in the smooth implementation of these projects.

All Animal Breeding projects that completed one year of operation were evaluated by Evaluation Teams constituted by the Mission Director, NDP-I. A total of 13 PT, seven PS and 22 semen station projects were evaluated during the year. These evaluations helped the EIAs to examine the progress made, and to find solutions for the problems faced. The teams also gave constructive feedback to further improve qualitative and quantitative performance of the projects.

Animal Nutrition

To achieve the targeted milk production, productivity of dairy animals needs to be enhanced with the available feed resources through a variety of region-specific approaches, including balanced feeding. Due to limited availability of feed and fodder resources in the country, available feed resources need to be utilised judiciously, with value addition. Also, efforts to use certified/ truthfully labelled fodder seed for increasing green fodder yield from the available land need to be enhanced. Biomass presently wasted in the farmers' fields needs to be secured and used for animal feeding during scarcity period. Efforts to use the available feed resources judiciously, to enhance green fodder production and to secure biomass from the farmers' fields continued.

RATION BALANCING ADVISORY SERVICES AT FARMERS' DOORSTEP

The network for providing balanced ration advisory services at the farmers' doorstep that started three years ago was further strengthened in 2015-16 with inclusion of more projects on Ration Balancing Programme (RBP) under National Dairy Plan-I (NDP-I) covering all major dairying states. RBP sub project plans (SPPs) worth ₹909.55 million were approved for 30 end implementing agencies (EIAs) during the year. Till date, 97 SPPs from 84 milk unions, two federations and five producer companies with a financial outlay of ₹2,780.09 million and envisaged coverage of 2.38 million animals in 31,599 villages spread over 18 states have been sanctioned.

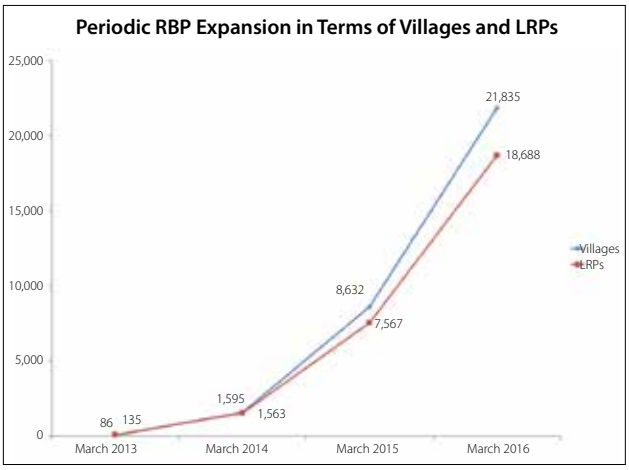
For programme implementation, monitoring and training of village-level functionaries, 232 identified technical personnel from 54 cooperative milk unions and producer companies were imparted RBP training during the year. Thirteen officers from the Animal Husbandry Department, Telengana, COMFED and WAMUL were also trained. In total, 545 officers, including 44 women were trained on RBP at NDDB Anand.

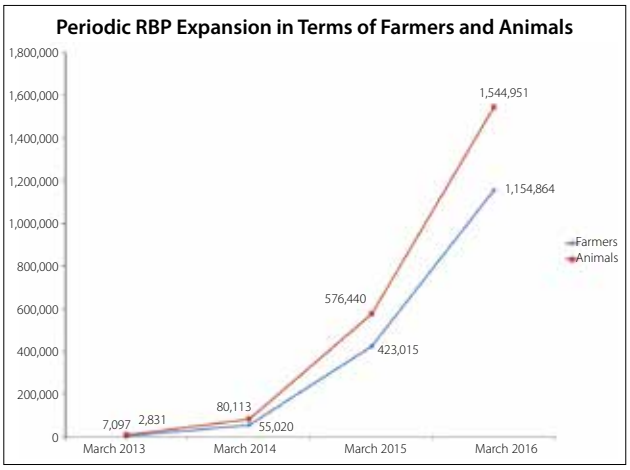
With a view to sharing experiences on RBP implementation and briefing on software enhancements, two refresher training programmes were conducted for 27 participants from 15 EIAs. Training on INAPH was also arranged for 29 information technology (IT) persons identified under RBP in 27 EIAs, to endow them with learning on software features and troubleshooting aspects.

In 2015-16, an additional 11,001 local resource persons (LRPs) were identified in 75 EIAs and were imparted RBP software and practical training by trained trainers from the respective EIAs. Out of a total 19,297 LRPs trained so far, 18 per cent are women, 11 per cent SC/STs and 63 per cent smallholders.

During the year, 38 new milk unions and producer companies commenced ration balancing advisory services in their milk shed areas; thus bringing 76 organisations under the fold of RBP. The remaining 17 EIAs are at different stages of implementing RBP. During the year, an additional 11,121 LRPs, 13,203 villages and 9.68 lakh animals were registered. Cumulatively, 18,688 LRPs tendered balanced ration recommendations for 15.45 lakh animals belonging to 11.54 lakh farmers in 21,835 villages. The yearly outreach of RBP is shown in the graphs below.

INAPH data indicates that balanced ration led to an increase in average daily milk yield of 0.26 kg and milk fat by 0.10 per cent per animal. Cost of feeding was reduced by ₹2.13 per kg of milk. The average net daily income of milk producers increased by about ₹24 per animal.





In the series of extension efforts for popularisation of the programme, a short film on RBP was dubbed in Bengali, Odiya, Gujarati, Marathi and Punjabi languages and uploaded on YouTube. Another documentary on mineral mixture 'Parivartan' was translated in various regional languages and its shorter version was uploaded on YouTube. For promotion of the programme, a RBP exhibition was put up in 'Krishi Unnati Mela', a National Level Agriculture Exhibition held at New Delhi.

Benefits of the programme were also shared with the participants of the 7th Agro-vision exhibition and conference on 'Dairy Management' held at Nagpur. An exhibit and presentation on ration balancing software was made in the Skoch Technology Award and Conference event in New Delhi. NDDB won the Skoch Smart Technology Award for its Ration Balancing Programme.

With an aim to make balanced ration services available to all farmers, Pashu Poshan, an android-based mobile application, was developed and launched in July 2015. Through this application, farmers themselves can register, assess nutritional status and prepare a balanced ration for their dairy animals. To promote the use of this application, meetings with farmers were organised at various locations.

MINERAL MAPPING PROGRAMME FOR DEVELOPING AREA-SPECIFIC MINERAL MIXTURE

Micronutrients, including mineral elements are considered to be essential for the normal metabolic and physiological processes of the animal system. The importance of minerals in regulating the biological system, growth, milk production and reproduction efficiency is well documented. However, dairy animals in India do not receive adequate mineral supplements. For improving productivity and productive life, supplementing the ration of dairy animals with an area-specific mineral mixture is absolutely necessary. So far, the Dairy Board has completed a mineral mapping programme in most of the major dairying states, which are now producing and making area-specific mineral mixture available to milk producers. During the current year, a mineral mapping programme was completed for the state of Chhattisgarh for developing area-specific mineral mixture. A large number of feeds, fodder and hair samples were collected and analysed for various macro- and micro-minerals, using Inductively Coupled Plasma-Optical Emission Spectroscopy (ICP-OES). Minerals such as calcium, phosphorus, magnesium, sulphur, copper, zinc, iodine, chromium and cobalt were found to be deficient in the ration. Based on these results, an area-specific mineral mixture formulation was developed for the state.

PRODUCTION OF SPECIALISED FEED SUPPLEMENTS

Promotion of bypass protein and fat supplements, area-specific mineral mixtures and calf starter continued during the year. Production of area-specific mineral mixtures based on the mineral mapping programme was started at the Jharkhand Milk Federation, Ranchi. For production and supply of area-specific mineral mixtures, two more mineral mixture plants, each of 12 tonnes per day capacity, were set up at cattle feed plants Kalyani in West Bengal, and Kaladera in Rajasthan. During the year, one bypass protein plant of 20 tonnes per day capacity was also set up at Ranchi in Jharkhand, for production of bypass protein supplement. In addition, the process for setting up a bypass protein plant of 50 tonnes per day capacity at Sabar Dairy was initiated.

GREEN FODDER PRODUCTION ENHANCEMENT

Enhanced use of quality seeds of improved high yielding varieties for fodder crops plays an important role in increasing green fodder yield. To increase production of fodder seed and to reduce the gap between demand and availability, 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, NDDB introduced in the seed multiplication chain newly notified fodder varieties like HJ 513, CSH 24 MF, CSV 27 in sorghum and Pratap Makka Chari 6 in fodder maize, which provide higher green fodder yield in the farmers' fields. During the year, about 7.0 metric tonnes of breeder seed of improved varieties of fodder crops was obtained from the Indian Council of Agricultural Research/Agricultural Universities and supplied to dairy cooperatives. Breeder seed was put in a seed multiplication chain for production of foundation seed.

The Fodder Demonstration Unit (FDU) played a significant role in the dissemination of improved forage production and conservation technologies among dairy farmers, field staff and fodder officers. It also demonstrated scientific methods to enhance fodder yields and production of green fodder round the year through cultivation of improved varieties of annual and perennial fodder crops like sorghum, maize, pearl millet, berseem, lucerne, oats, hybrid napier, etc. More than 5,500 farmers, field staff, officers, board of directors from milk unions/ EIAs visited the FDU of NDDB at Anand to see improved fodder production and conservation (silage making) technologies. To increase fodder availability during lean periods/scarcity months, silage making practices from cereal fodder crops like maize, oats and sorghum

were demonstrated. Mixed cropping system of cereal/grass crops with forage legumes were demonstrated to improve production of quality fodder.

For maintenance of soil health and soil fertility for longer periods in forage production system, use of bio-fertilizers like farm yard manure, liquid manure like cattle shed wash and bio-gas slurry were demonstrated, particularly in the cultivation of high biomass producing fodder crops like hybrid napier. Planting material consisting of 80,000 stem cuttings and root slips of new varieties of hybrid napier grass viz. BNH-10, CO-5, DHN-6 and Phule Jayawant (RBN-13) were provided to visiting farmers, milk unions' officers/staff for fodder cultivation and further propagation.

Fodder cultivation of new forage varieties of Marvel grass (Phule Govardhan), lucerne (CO-2), oats (OL-10), hybrid napier grass (RBN-13 & CO-5), fodder bajra (Baif Bajra-1) and sorghum (CSV 30 F) 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, fodder cultivation of thornless cactus *(Opuntia spp.)* with drip irrigation and plastic mulching system was demonstrated.

Under the collaborative project with Anand Agricultural University, Anand, on micro-propagation technology (tissue culture) in fodder cactus *(Opuntia)*, the protocol involving use of modern plant tissue culture methods for rapidly multiplying thornless cactus cladodes to produce large number of progeny plants was standardised. Hardened thornless saplings were tested in an open field for growth and development for biomass production. Hardened saplings are being transferred to the fields of farmers in arid/semi- arid areas.

Moringa *(Moringa oleifera),* popularly known as drumstick, is a multipurpose tree with the potential to produce nutritious and palatable green fodder all-round the year like any other

multi-cut fodder crop. It contains around 18 per cent crude protein, rich in minerals and vitamins. NDDB provided technical and financial support to Malabar Milk Union and Jharkhand Milk Federation (JMF) to introduce and popularise Moringa cultivation among farmers to supply quality and nutritious green fodder to milch animals. Agronomic practices for Moringa fodder cultivation were standardised and field demonstrations showed that Moringa can produce 100 tonne/ha green fodder annually at 2-3 months cutting intervals.

Under NDP-I, technical support was provided to 50 EIAs for implementing the Fodder Development Programme. A seed processing plant at Lucknow was completed and commissioned. Civil and mechanical work at Kota seed processing plant is in advanced stage of completion. The plants employ the most modern-specific gravity-based sorting techniques for guaranteed higher seed quality. Eight micro training centres (MTC) were established and made functional at different locations. EIAs produced 1,769 MT of quality seed of different fodder crops through registered seed growers under buy-back arrangement and supplied about 5,057 metric tonnes of certified/truthfully labelled fodder seeds of improved genetics to farmers. In different states, 682 silage demonstrations were organised at the village level. Seventy six officers were trained on fodder production and conservation and 20 officers on advanced seed production technology.

CROP RESIDUES MANAGEMENT

Crop residues are an important source of basal diet, especially for the resource-poor farmers. During harvesting, these by-products are available at a very cheap price or else they are picked up by the farmers free of cost from the field. In addition, a crop residue-based feeding system does not compete for land and water for growing human food, hence it is environment friendly.

Due to labour shortage many farmers are adopting grain harvesters intensively for managing food crops like wheat, rice, maize, oil seeds, pulses, resulting in huge field loss of crop residues, which were otherwise available to dairy animals in the manual harvesting method. Mowers are high speed fodder harvesting machines having inbuilt options for chopping, crushing, trailer loading, stem cracking and conditioning as per the specific needs of the biomass. For reducing the biomass wastage after combine harvesters, mowers and auto-pick up devices for effective recovery of straws and stovers were introduced in different states. During the year, 262 straw harvesting and biomass picker mowers were procured for field demonstration of biomass securing at the farmers' fields. In fodder deficient areas, 29 biomass bunkers were constructed for storage of biomass.

Crop residues are not evenly distributed across the country and are abundantly available during the harvesting seasons in certain pockets of different states. Conventional methods to transport and store dry fodder results in higher cost. Enrichment and densification of crop residues into blocks/pellets improves the nutritive value and saves transportation and storage cost. Enriched and densified biomass can be transported from surplus to deficit areas for their use during the scarcity period. Under NDP-I, two densification plants are being set up: at Sri Ganganagar in Rajasthan and at Kolhapur in Maharashtra.

Animal Health

NDDB attempts to address the entire range of issues related to animal health, benefiting all the stakeholders. By supporting pilot projects on disease control, NDDB endeavours to formulate robust, cost-effective, farmer-centric models which can be easily adopted across the country. In propagating the use of IT tools like the Information Network on Animal Productivity and Health (INAPH) software, NDDB seeks to provide a wealth of data which will aid in taking informed decisions at various levels – from farmers to the policy makers.

Continuous efforts are also being made to enhance animal health and biosecurity in bull production areas, and, in and around semen stations. NDDB played a pivotal role in formulating the 'Biosecurity and Biosafety Manual for Bovines', which was released by the Government of India.

Under the pilot project on brucellosis control which NDDB continued to support, around 11,700 cattle and buffalo calves have been vaccinated and uniquely identified by ear tags as on March 2016 since the commencement of the project in April 2013. The data related to each vaccinated animal is also being 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.

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

NDDB also continued to support a pilot project on mastitis control in Sabarkantha Milk Union from October 2014 covering 50 milk societies and 25 progressive farms spread across the district.

The pilot is for a period of 24 months with an outlay of ₹10.5 million with NDDB contributing ₹6.3 million. The model for mastitis control focuses on detection and management of sub-clinical mastitis, ensuring maximum coverage by equipping farmers to carry out the control measures by developing a set of simple practices for them to follow, and, by enabling them to appreciate its benefits in terms of profitability.

BIOSECURITY IN BULL PRODUCTION AREAS AND SEMEN STATIONS

Adequate technical competencies have been created for dealing with biosecurity under NDP-I in the bull production areas, semen stations and its 10 kilometre buffer zones by equipping Animal Health Officers (AHO) to facilitate the implementation of activities under animal health and biosecurity. AHOs from 13 Progeny Testing, 10 Pedigree Selection projects and, 20 semen stations have been trained at NDDB for this purpose. Animal Health and biosecurity assessment of semen stations is also being carried out on a regular basis.

Recognising the requirement for a mechanism to continuously upgrade the biosecurity processes at semen stations, NDDB was pivotal in facilitating the formulation of the *'Biosecurity and Biosafety Manual for Bovines'* released by DAHD&F in January 2016.

SEMINARS

INAPH Popularisation Seminar

A one-day seminar on the INAPH Animal Health (AH) module was held at Bengaluru for all the milk unions in Karnataka, and the Kolhapur and Solapur milk unions of Maharashtra. Thirty one participants from these unions attended the seminar and were given a live demo of the AH module and the reports it could generate. Following this, Kolhapur Union has initiated deployment of the AH module for which a two-day training was provided by NDDB to all the 61 veterinarians over a period of six days at Kolhapur.

Mastitis Control Seminar

A one-day seminar was organised under the mastitis control project to create awareness among the progressive farmers in Sabarkantha district on the significance of mastitis control with special emphasis on milking machine hygiene, for which a live demonstration was organised. Around 800 progressive dairy farmers participated in the seminar.

Success Stories of NDDB-supported Control Projects

Brucella Control Project

How Shri Punabhai was Cured of Brucellosis

Shri Punabhai, from Bhimasar village of Dudhai Taluka, Kutch district, who owns eight cows and two buffaloes, is a grazer by occupation, and has been in the dairying business since the last 40 years. He used to tend to the animals of the village, taking them for grazing and also used to carry out minor veterinary interventions, including attending to problematic deliveries. He always handled the animals and the placenta, etc. with bare hands. Unaware of brucellosis in animals and the risk it poses to humans, he was unable to identify the cause of the symptoms he experienced when he was infected with brucellosis. For two years he suffered from joint pain, headaches and undulant fever. Always exhausted, he found it difficult to milk more than two-three animals at a time. The doctors he visited were also unable to diagnose his condition.

When the brucellosis control project was being implemented in his village, Punabhai narrated his problem to the project personnel during a village awareness campaign. He was then tested using the Brucellosis Lateral Flow Assay (LFA) kit and was found to be infected. This was reconfirmed by a laboratory to which his serum sample had been sent.

He was then treated for brucellosis by a doctor. His joint pains, headaches and fever disappeared after the treatment was completed. He is now able to milk seven-eight animals at a stretch without feeling any fatigue.

Punabhai is now well aware of the various aspects of brucellosis and its control, both in humans and animals; and has also educated his wife and children on this zoonotic disease and ways to prevent it. He has stopped "treating" animals, too. Punabhai is grateful that the control programme not only thinks about the disease in animals but also deals with the deleterious effects it has on the productivity of the farmer if he contracts the disease.

Shri Punabhai milking his animal after he was cured of brucellosis.

Vaccinated and ear-tagged female calves of the Swaminarayan Gaushala Gurukul.

How a Gurukul and Gaushala Benefited from Brucella Control

The Swaminarayan Gaushala Gurukul in Koday, Mandvi Taluka, Kutch district, has a population of 200 cattle and produces 250 litres of milk per day. Well aware of the devastating effects diseases like Foot and Mouth Disease (FMD) and Haemorrhagic Septicaemia (HS), the Gaushala carries out regular vaccinations against these. They, however, were unaware of insidious diseases like brucellosis and its effect on animals as well as humans.

A residential Gurukul (school) with 800 students – attached to the Gaushala – regularly provided unboiled milk to students as they were unaware that brucellosis can spread from animals to humans by drinking raw milk.

Workers in the Gaushala also handled animals, their secretions, placenta, aborted foetuses, etc. without taking any precautions. All aborted material and after births were disposed openly. No control measures like disinfection or isolation of the animal post-calving were practised.

The project personnel of Rukmavati Rural Agro Producer Company, Mandvi, visited the Gaushala and provided details of the project and the disease, as a result of which the Gaushala agreed to test all the animals for brucellosis. It was a revelation to them when 13 out of the 40 in-milk animals were found positive for brucellosis. Immediate guidance was provided on the control measures to be adopted and all the 13 brucella positive animals were isolated.

The workers in the Gaushala now do not handle aborted material with bare hands. Afterbirths, both in case of normal delivery or from abortions, are disposed by proper burial. Animals that abort or calve normally are isolated and their surroundings disinfected till uterine discharges cease. Regular testing is being carried out to identify any new infection. All the eligible female calves are regularly vaccinated for brucellosis and ear-tagged for identification.

Only boiled milk is given to the children in the Gurukul now.

The Gaushala is grateful to the project for having created awareness on such an important disease, particularly because lack of knowledge could have impacted the health of the children of the Gurukul.

Mastitis Control Project

Bhuvel Brings Mastitis to Its Knees

Bhuvel Dairy Cooperative Society (DCS) procures around 1,800 litres of milk every day and is one of the 50 villages in which the pilot mastitis control project was initiated.

During the first CMT carried out at the DCS, out of 117 pooled milk samples brought to the society by farmers, 90 samples were positive – a whopping 77 per cent. The bulk milk of the DCS showed a Somatic Cell Count (SCC) of 7.64 lakh per ml and a Standard Plate Count (SPC) of 19 lakh per ml. There were also instances of milk spoilage.

The members of the cooperative were unaware of the concept of sub-clinical mastitis as it does not cause any apparent changes in the colour of milk or udder. Prior to the commencement of the project, mastitis was related only with the clinical form, which the farmer could easily discern due to the obvious changes in the colour of milk and in the appearance of the udder.

Under the control project, every infected animal of each farmer – whose supply of milk had tested positive for CMT at the DCS level – was identified by tests carried out at the farmers' homestead. Thereafter, infected animals were treated with a simple oral regimen of Trisodium Citrate (TSC) for 10 days.

The process of testing for CMT at the DCS followed by individual animal testing is being carried out every two months which is being followed up with TSC oral regimen in case of CMT positive animals. Farmers were also made aware of the significance of milking hygiene, regular CMT testing and management of animals with chronic mastitis through awareness classes.

After a year of intervention, CMT positivity of pooled milk samples at the DCS has drastically reduced from the initial 77 per cent to 33 per cent and the individual animal CMT positivity has dropped from 59 per cent to 39 per cent.

The occurrence of clinical mastitis in the village has also reduced and there has been a significant reduction in incidents of milk spoilage. The awareness level on the importance of sub-clinical mastitis control has also significantly increased.

Milk testing by CMT at the DCS.

Research & Development

The NDDB R&D laboratory, Hyderabad, remained focused on monitoring and surveillance of sexually transmitted viral, bacterial and protozoan diseases in semen stations, bull mother farms and Progeny Testing/Pedigree Selection (PT/PS) areas and for suggesting appropriate disease management measures towards building a disease-free herd.

Scientists engaged in the analysis of real-time PCR data.

The Laboratory has been incessantly striving to upgrade its proficiency and adopting cutting-edge technologies. To ensure consistent quality in laboratory processes, it has adopted quality management systems and achieved ISO 9001:2008 accreditation. Efforts are underway to obtain NABL (ISO 17025:2005) accreditation.

During the year, disease monitoring and surveillance was further strengthened focusing on more number of diseases and nearly 84,000 samples were processed from 22 states which is 59 per cent higher than the previous year. The laboratory could start operating fully automated Robotic Sample Processing Systems which supports rapid, accurate and high-throughput detection of diseases based on serological and molecular techniques. Consistent efforts are also being made for building a repository of well-characterised biological reference materials. This would aid in the development of improved tests and its interpretation.

The laboratory continued to monitor sexually transmitted infectious diseases of cattle and buffaloes in the organised herd (semen stations, bull mother farms and dairy farms) as well as in the area of PT/PS, so as to suggest appropriate disease prevention and control measures for achieving a disease-free herd. These diseases include Infectious Bovine Rhinotracheitis (IBR), Bovine Brucellosis (BB), Bovine Viral Diarrhoea (BVD), Johne's Disease (JD), Bovine Genital Campylobacteriosis (BGC) and Trichomonosis. Minimum Standard Protocol (MSP) of DADF, GoI, also recommends freedom of breeding bulls from the above diseases.

The laboratory also undertook Foot and Mouth Disease (FMD) sero-monitoring by post-vaccinal antibody assay against FMD virus types for the animals in semen stations, bull mother farms, organised dairy farms and PT/PS areas. Sero-monitoring not only provided immune status of the animals but also contributed valuable insights into the vaccine performance and facilitated the identification of intervention strategies.

Sero-surveillance in cattle and buffaloes indicated 1.71 per cent of 17,772 and 19.30 per cent of 15,282 samples were positive for brucellosis and IBR respectively. Further downstream analysis suggested 0.09 per cent and 21.05 per cent of the animals in the organised herd were positive for brucellosis and IBR respectively. Whereas at the village level, 4.14 per cent were positive for brucellosis and 17.84 per cent for IBR. Comparing this finding with the previous year suggested that the percentage positivity of brucellosis has reduced in the farms (from 1.57 per cent to 0.09 per cent). This can be further corroborated from the fact that in year 2014-15, 42 per cent (8 of 19) of organised farms were found positive for brucellosis whereas only 12 per cent (3 of 25) of the farms tested positive in the year 2015-16.

Although around 21 per cent animals in the organised herd were recorded positive for IBR, by adapting appropriate disease monitoring and surveillance protocols, two of the semen stations could be maintained IBR free. These observations suggest that by implementing disease monitoring, strict bio-security measures and good management practices, it is possible to maintain disease-free animals in the farm.

BVD has been recently introduced into MSP, and bulls in the semen stations need to be monitored for the presence of BVD viral antigen. This helps in identification and removal of persistently infected (PI) animals as these animals are lifelong carriers and act as a source of infection for other animals. A total of 8,428 serum samples from animals above six months of age were tested for BVD viral antigen by ELISA and none of the samples turned positive. Due to the possibility of interference of maternal antibody for detection of BVD viral antigen by ELISA, 333 serum samples of calves below six months age were tested by real-time PCR

technique for screening of BVD viral RNA and the result revealed all the animals were negative for BVD virus. JD caused by *Mycobacterium avium* subspecies *paratuberculosis* (MAP) results in chronic debilitating condition in animals. A total of 622 serum samples were screened for JD antibodies by ELISA and 1.4 per cent turned positive.

The laboratory established a protocol for collection of preputial washing from bulls, storage and transportation of the specimen to laboratory for identification of BGC and Trichomonosis by culture and molecular techniques. Training has also been imparted to the veterinarians in the semen stations for collection and dispatch of prepucial specimens. Bulls of all ages can remain infected indefinitely/establish chronic infections, and transmission can also occur when the semen from infected bulls is used for artificial insemination. A total of 672 and 508 bulls in semen stations were screened for BGC and Trichomonosis respectively in the laboratory by collecting the prepucial washing and none were found positive.

Contaminated semen from a IBR sero-positive bull may be a potential source for spreading bovine herpesvirus - 1 (BHV-1) infection through artificial insemination. OIE guidelines suggest that, Frozen Semen Batches (FSB) produced from IBR sero-positive bulls should be tested negative for BHV-1 by real-time PCR or cell culture for using in artificial insemination. For monitoring the excretion of BHV-1 virus in semen, a total of 17,988 batches of extended FSB produced from the IBR sero-positive bulls housed in various semen stations were screened for the presence of BHV-1 by real-time PCR and only 0.73 per cent of semen batches tested positive. The percentage of positive instances for BHV-1 in FSB during the year under report is found to be less than that of the previous year (2.69 per cent).

Vaccination against FMD is mandatory for the animals in areas surrounding the semen stations so as to prevent FMD outbreaks. To study the efficacy of vaccination, 6,474 serum samples were processed for assessment of post-vaccinal antibody titre against FMD virus types and providing necessary recommendations. Processing of serum samples from semen stations and bull mother farms at '0' day of vaccination suggested, 89 per cent, 76 per cent and 92 per cent animals had protective titre against FMD virus serotypes 'O', 'A' and 'Asia-1' respectively. The protective titre further increased after vaccination and 93 per cent, 87 per cent and 93 per cent of the animals exhibited protective titre at 30 days post vaccination (DPV) against FMDV serotypes 'O', 'A' and 'Asia-1' respectively. FMD antibody assay on randomly collected serum samples from the village indicated 45 per cent, 35 per cent and 49 per cent animals had protective titre against FMDV serotypes 'O', 'A' and 'Asia-1' respectively.

In order to study the effect of *B. abortus* S19 vaccination for control and prevention of Bovine Brucellosis in endemic farm, calf-hood and adult vaccination was carried out in an organised dairy farm and post-vaccinal antibody response was evaluated at monthly interval by ELISA. The results suggested that antibody titre could not be detected 180 days post vaccination in calf-hood vaccination and further investigation is in progress.

A repository of positive and negative serum samples has been created in the laboratory for using as internal control in the diagnostic test protocols and validating various new test methods. These serum samples are characterised after carrying out a battery of tests before including in the repository. In addition, certified reference positive and negative sera for various diseases *viz*., Brucellosis, IBR, JD and BVD have also been procured from commercial agencies and catalogued.

It is obligatory for a laboratory to generate rapid, precise and reproducible outcomes. To

Use of Robotic Sample Processing System for diagnosis of animal diseases.

accomplish these criteria the laboratory has introduced a high throughput robotic system for sample processing as well as implementing a quality management system in the line of national/international accreditations.

The inflow of samples to the laboratory has been increased 1.59 times in comparison to the previous year. To cope up with the increased number of samples and to generate error-free results in less turn-around time, Robotic Sample Processing Systems (RSPS) were commissioned for conducting serological and molecular assays. ELISA protocols for detection of antibody against BHV-1, Brucella, BVD virus and antigen against BVD virus has been optimised in RSPS. LPB-ELISA protocol for assessment of post-vaccinal antibody response against FMD virus serotypes (O, A, Asia-1) has also been augmented and currently twice the number serum samples can be processed in a stipulated time in comparison to the manual method. DNA extraction from semen batches by chelex-based method and genomic DNA from blood samples by silica membrane-based technology (vacuum protocol) has also been standardised. RSPS is currently being used to set up real-time PCR reactions for BHV-1 and BVD virus.

Research & Development - Animal Nutrition

CALF REARING PROGRAMME FOR BUFFALO CALVES AND INDIGENOUS COW CALVES

Due to inadequate nutrition and poor growth rate in early life, particularly indigenous cows and buffaloes, do not produce milk commensurate with their genetic potential, even if they are fed optimally at a later stage. It is, therefore, important that the calf is provided all essential nutrients right from its foetal phase. This will ensure the birth of a healthy calf. To demonstrate this, advanced pregnant buffaloes (n=86) and indigenous cows (n=67) of *Gir* and *Kankrej* were fed pregnancy feed @ 3 kg/day during the last two months of pregnancy. Subsequently, the healthy calves born were fed on calf starter and reared on improved management practices. The average birth weight and daily weight gain were significantly higher in buffalo and cow calves fed on pregnancy feed and calf starter as compared to the control group. There was also an improvement in immune status, and a reduction in parasitic load, which resulted in significant reduction in calf mortality. The study is in progress to observe age at first calving, lactation yield, inter-calving interval, etc.

EFFECT OF FEEDING A BALANCED RATION ON SNF CONTENT OF MILK

Low solids-not-fat (SNF) content in milk is a serious problem under field conditions, due to which milk producers are paid a lower amount for their produce. The impact of feeding

a balanced ration on SNF content of milk was studied in HF and Jersey cross-bred cows in Kozhikode district of Kerala. Seventy three lactating cows having low SNF in milk were identified for the study from Kodenchery and Puthuppaddy villages under Adivaram DCS. On feeding a balanced ration for eight weeks, there was significant improvement in SNF content of milk from 7.93 to 8.93 per cent. Average daily milk yield (kg) increased from 10.36 to 11.67 and fat (%) from 3.98 to 4.35. This translated into an average daily monetary benefit of about ₹44 per animal to the milk producers. There was significant improvement in rumen microbial protein synthesis and immune status in animals fed on balanced rations.

IMPACT OF FEEDING A BALANCED RATION ON ANTIBODY TITRES IN FMD VACCINATED ANIMALS

Foot and Mouth Disease (FMD) is a highly infectious disease of cows, buffaloes, sheep and goats. It inflicts heavy mortality in new born calves and affects milk production in adult dairy animals. It is known that higher antibody titres are associated with greater resistance to disease. Due to break down in immunity, FMD outbreak is reported in vaccinated animals from many parts of the country. Balanced feeding plays an important role in improving antibody titre and immune status of animals. To know the effect of balanced feeding on antibody titres of vaccinated animals, a study was conducted to estimate immune response against FMD in vaccinated animals fed on traditional and balanced rations for 60 days.

The antibody titres for FMD sero-types A, O and Asia-1 were significantly higher in vaccinated animals fed on a balanced ration (n=40) as compared to vaccinated animals fed on traditional ration (n=30). There was also significant improvement in immune status, milk yield and SNF content in vaccinated animals fed on balanced rations.

EFFECT OF SUPPLEMENTING TOXIN BINDER ON THE EXCRETION LEVEL OF AFLATOXIN B_1 FROM FEED INTO MILK AS M_1

The consumption of aflatoxin-contaminated feeds by dairy animals leads to adverse effect on animal health as well as increase in excretion in milk in the form of M_1. Aflatoxin M_1 in milk and milk products beyond a certain level poses health risk to human beings. Therefore, a toxin binder comprising sodium bentonite, hydrated sodium calcium allumino-silicate and mannan oligosaccharide was formulated and tested on lactating cows.

To test the efficacy of the toxin binder, a study was conducted on 18 cows yielding 10-14 kg milk/day in their early stage of lactation. Animals were divided into two groups of nine each, based on milk yield, fat per cent and stage of lactation. All animals were fed similar basal diet, comprising 15-20 kg green maize, 4-5 kg jowar straw and maize stover. Animals in the control group were fed with a concentrate mixture without the toxin binder, whereas, animals in the experimental group were fed the mixture with the toxin binder @ 2 g/kg of concentrate mixture, according to the level of milk production to meet the maintenance and production requirements. The total Aflatoxin B_1 intake from feeds and fodder in control and experimental groups was in the range of 390 to 400 µg/day. On feeding a toxin binder, Aflatoxin M_1 level in milk reduced to below the permissible limit of 0.5 ppb within 30 days in the experimental group. The daily dry matter intake, milk yield and milk composition were not affected on feeding the toxin binder. The study indicates that a toxin binder can be incorporated in cattle feed for reducing Aflatoxin B_1 excretion into milk as M_1 without affecting feed intake, milk yield and milk composition.

EFFECT OF SUPPLEMENTING BYPASS FAT ON THE REICHERT MEISSL VALUE OF MILKFAT

The Reichert-Meissl (RM) value is used to detect foreign fat in milk fat. The RM value which is a measure of the volatile fatty acids (butyric acid and some of caproic acid), is set at a minimum of 21 and 24 for cotton tract areas and areas other than cotton tract, respectively. While milk fat contains high proportions of volatile fatty acids, other fats from vegetable and other animal origin fats contain very little or no volatile fatty acids. Low RM value could be indicative for adulteration of milk fat with vegetable fats. Bypass fat is calcium salts of long chain fatty acids being prepared from palm fatty acid distillate (PFAD), for correcting energy deficiency in the ration for improving milk and/or fat yield. There is a perception among a few agencies that on feeding bypass fat, the RM value of butter fat/*ghee* is reduced and hence they discourage its use. In view of this, a trial was undertaken in 20 cross-bred cows to study the effect of supplementing bypass fat on RM value of butter fat.

Animals were divided into two groups of ten each, based on milk yield, fat per cent and stage of lactation (2-3 weeks of lactation). Animals in all the groups were fed similar basal ration, comprising 15 kg green maize fodder and 5-6 kg wheat straw. The concentrate mixture was given according to the level of milk production, to meet the maintenance and milk production requirements. In addition to basal ration, animals in groups II were fed bypass fat @ 200 g per day. On feeding the supplement, there was non-significant reduction in RM value of milk fat (26.17±0.30) in experimental groups. Average increase in daily milk yield was 0.86 kg ($P<0.05$) and fat by 0.34 per cent ($P<0.05$) in the experimental group, as compared to the animals in the control group. This study demonstrated that feeding bypass fat supplement in the ration of lactating cross-bred cows helps in improving milk and fat yield, without any detrimental effect on milk fat.

ENTERIC METHANE EMISSION REDUCTION ON FEEDING GREEN FODDER

Green fodder is an economical source of nutrients, as compared to concentrate feeds. In view of this, a field study on 28 early lactating buffaloes was undertaken in Kheda district, to study the impact of incorporating green fodder in ration on the economics of feeding and methane emission reduction. Buffaloes were divided into two groups of 14 each, based on milk yield and fat per cent. Buffaloes in the control group were fed a balanced ration prepared without green fodder, whereas buffaloes in the experimental group were fed a balanced ration prepared with green fodder.

Although there was no significant improvement in milk production, the cost of milk production reduced by 13.6 per cent in buffaloes fed on green fodder. In addition, methane emission (g/kg FCM) reduced by 12 per cent. Daily methane emission (g/head) was reduced by about 10 per cent on feeding a balanced ration prepared with green fodder, as compared to buffaloes fed on this ration without green fodder.

CARBON FOOTPRINT OF MILK UNDER SMALLHOLDER DAIRYING IN ANAND DISTRICT

A carbon footprint of milk is the sum of net greenhouse gas (GHG) emitted throughout the life cycle of milk within a set of system boundaries, measured in carbon dioxide equivalent (CO_2-eq) per unit of milk. To calculate the carbon footprint of milk under the smallholder

dairy production system, NDDB conducted a *cradle-to-farm-gate* life cycle assessment (LCA) study in Anand district. The study involved 60 smallholder dairy farms from 12 geographically distinct villages of the district. Total GHG emissions included CO_2, methane (CH_4) and nitrous oxide (N_2O) from feed production; CH_4 from enteric fermentation; and CH_4 and N_2O from manure management. The sum of GHG emissions was expressed in CO_2-eq/kg fat and protein-corrected milk (FPCM), using the economic allocation factor. The average carbon footprint was 1.9 and 2.5 kg of CO_2-eq/kg FPCM for cow and buffalo milk, respectively. The Food and Agriculture Organisation of the United Nations has reported the average carbon footprint of milk as 5.5 and 3.2 kg CO_2-eq/kg FPCM for cow and buffalo, respectively, for South Asia.

EFFECT OF RATION BALANCING ON CARBON FOOTPRINT OF MILK IN INDIA

Improving productivity through a balanced nutrition approach is one of the most promising ways to reduce the carbon footprint of milk. To evaluate the effect of ration balancing on carbon footprint of milk, a *cradle-to-farm-gate* LCA taking into account the lifespan milk production was performed using the data from 163,540 lactating cows and 163,550 lactating buffaloes in different states of India. The LCA boundary included feed production, enteric fermentation and manure management during the various stages of the animal's life i.e. heifer, lactation, dry period and unproductive stages. The study found that after feeding a balanced ration, the average carbon footprint based on economic allocation was reduced from 1.6 to 1.1 and 2.3 to 1.5 kg of CO_2-eq/kg FPCM in cows and buffaloes, respectively. Thus, implementation of the ration balancing programme has shown considerable potential to reduce carbon footprint of milk under the smallholder dairy production system.

Product and Process Development

In an endeavour towards enhancing food safety a chemical test kit for testing anionic detergent residues on food contact surfaces has been developed. The kit is based on same principle as used in the previous kit to detect the presence of anionic detergent in milk. The previous kit is now available for commercialisation and has a shelf life of nine months at room temperature. A patent application has been filed for the test kit for milk.

Large scale trials and shelf-life studies of *'Chhana Kheer'* and 'Milk Beverage with *Ragi*' have been completed. The product technologies can now be made available to the cooperative dairy industry.

Large scale trials have been successful for whey-based palatable beverages. This will result in an effective utilisation of whey (by-product of the dairy industry; specially cheese and *paneer* industry) reducing the bio-burden on the environment. The product technology is ready for transfer to the cooperatives.

An automated fermentation facility for the development of ready-to-use culture concentrate has been put to operation. Fifteen new lactic acid bacteria were isolated, identified and tested for activities of relevance to the dairy industry. NDDB deposited *dahi* and *mishti doi* culture strains with the internationally accredited facility. The cultures have been awarded a unique accession number by the repository.

The Dairy Board continued to support cooperatives (Dimul, Nagaland and Maahi Milk Producer Company Limited, Gujarat) with the supply of lyophilized starter cultures for the manufacture of fermented dairy products such as *dahi*, *lassi* and *mishti doi.*

Building an Information Network

The Internet Based Dairy Information System (i-DIS) is the only medium through which information related to the cooperative dairy industry is gathered, collated and disseminated for different purposes in the country.

NDDB is modifying the existing i-DIS to suit the requirements of contemporary needs and also to make it more user-friendly.

Information sourced from various published, unpublished, need-based studies and social media are gathered, analysed and interpreted for understanding their implication for planning, policy decisions and furthering the interests of cooperative dairying.

INFORMATION BUILDING

During the year milk unions of Jammu & Kashmir and Uttarakhand have been brought under the ambit of *i*-DIS taking the total number of reporting Units to 218.

For better understanding and implementation of *i*-DIS modification, NDDB organised workshops in Mumbai, Bhubaneswar, Bengaluru, Noida and Kolkata involving federations, regional milk unions, marketing dairies, cattle feed plants; and their views and suggestions were solicited. The software is being developed in-house, concurrently tested with live data and migration of past data into the new system is presently under process. It is expected that the new system will be rolled out by April 2017.

i-DGIS

NDDB received the 'India Geospatial Excellence Award' from Geospatial Media & Communications for exemplary innovations and practices in GIS, in its annual conference 'Geosmart India 2016', held in March 2016.

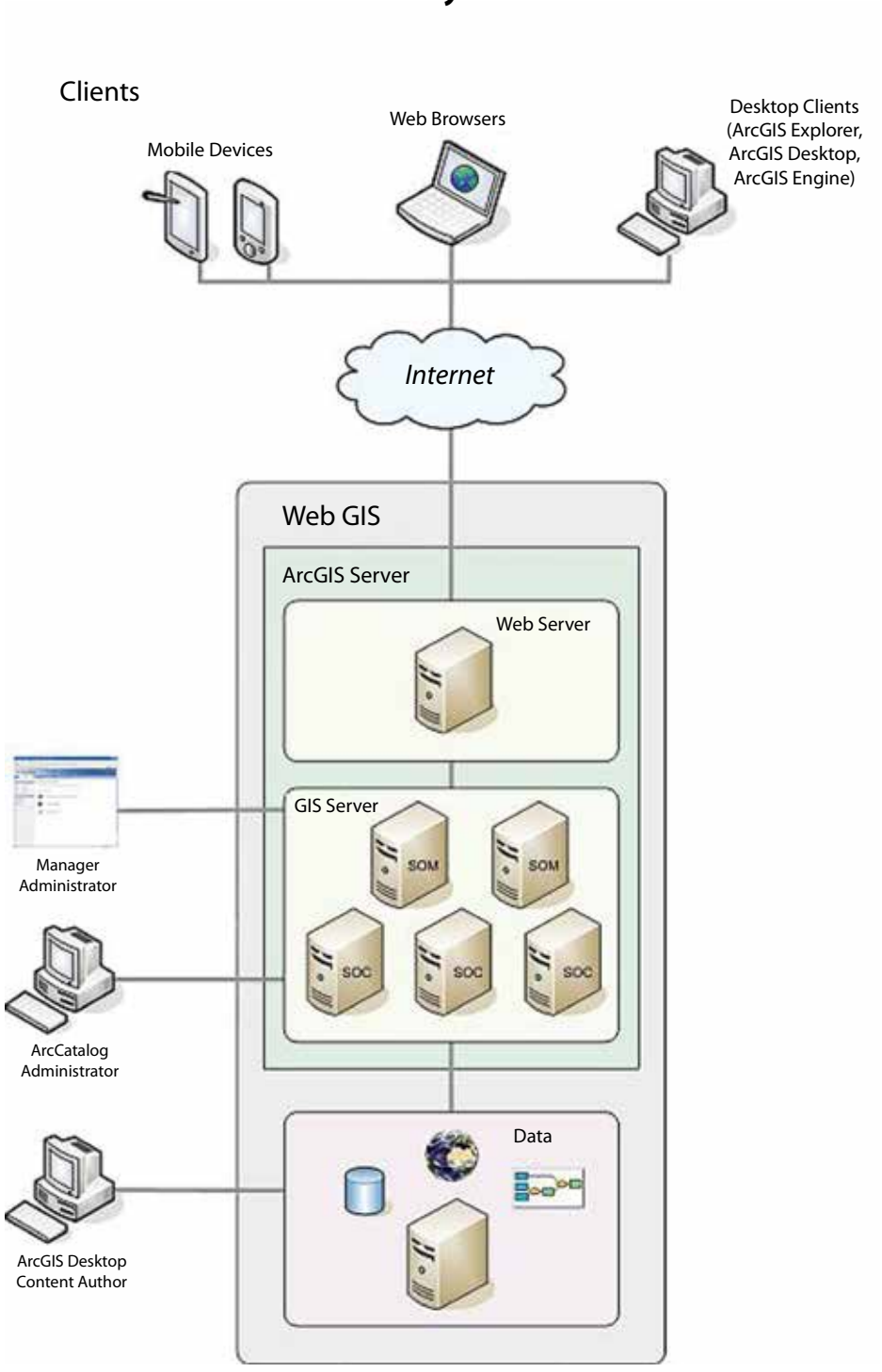
i-DGIS application is the first attempt of its kind in India, where village level integration of data has been done at a very large scale for the benefit of the major stakeholders in the dairy sector. During the year, workshops were held in 10 states, at which officers of 80 cooperative milk unions/Producer Companies were trained in utilising the *i*-DGIS application. By the close of the year, locations of over 35,000 village-level dairy cooperative societies of 30 milk unions have been uploaded.

STUDIES & SURVEYS

1. **Ascertaining the reasons for not achieving self-sufficiency in milk procurement by Ernakulum and Trivandrum Regional Milk Unions**

   The study conducted in the above milk-sheds found that of the total milk sold by the milk producers, about one-third quantity was sold to these milk unions and the balance to other

The ArcGIS Server System Architecture



agencies. Interestingly, of the total quantity procured by the village cooperatives, 27 per cent in Ernakulum Milk Union and 40 per cent in Trivandrum Milk Union was locally sold and the balance was sent to other unions.

2. Estimating quantity and value of feed and fodder consumed by bovine (cattle & buffalo) in Gujarat

The Directorate of Economics and Statistics (DES), Government of Gujarat, requested NDDB

Data collection at field level.

to conduct a study to estimate the quantity and value of feed and fodder consumed by bovine animals in the state. This was necessitated as contribution of feed and fodder fed to the bovine in estimating livestock GDP could not be prepared following any scientific survey. The survey covered six agro climatic zones, 18 talukas, 54 villages, 2,750 households and 10,560 bovine in two rounds of data collection following actual weighing method. The survey estimated that a total annual quantity of 42.8 million tonnes of green fodder, 42.6 million tonnes of dry fodder and 9.9 million tonnes of concentrates are consumed by all the bovine valued at ₹267 billion. This survey was a first of its kind wherein methodology developed by NDDB was accepted by the state government.

3. Study to ascertain Fat & SNF content in raw milk at udder level

NDDB undertook a scientific study to understand the prevailing Fat & SNF level of milk at the udder level in the seven states of Punjab, Rajasthan, Kerala, Karnataka, Odisha, Gujarat and Madhya Pradesh. Representative samples were collected following proper stratification of the districts by the type of animal reared and the density of production. The findings of the flush round revealed a lower Fat & SNF content in milk of cross-bred cows as compared to buffalo and local cattle breed, more so in the states of Karnataka, Kerala, Punjab and Odisha. The next round of survey is proposed to be carried out during the next summer.

4. Rapid study to understand the status of dairy farmers

Based on the feedback from various sources about the fall in milk prices and its implication on dairy farmers, a rapid study was conducted to understand the present status of dairy farmers in the three states of Maharashtra, Tamil Nadu and Uttar Pradesh. The study revealed that in view of the prevailing weak global outlook of the dairy sector, private organised

players had reduced their scale of operation considerably. In the process, the procurement price of buffalo milk was reported to have dropped by ₹5-6 per litre and in the case of cow milk, the same was about ₹10 per litre by the private aggregators and processors. This led to diversion of milk from private to dairy cooperatives.

5. Impressionistic survey in urban and rural areas of CAMUL and EAMUL, Assam

With a view to revive the Cachar and Karimganj Milk Union (CAMUL) and the East Assam Milk Union (EAMUL), a rapid milk market survey was completed in the towns of Silchar, Jorhat and Sivasagar to ascertain the milk consumption pattern, consumer behaviour, etc. Concurrently, a survey was also carried out in the representative villages of Cachar, Hailakandi, Jorhat and Sivasagar districts to understand dairy husbandry practices in these areas to identify potential talukas/pockets for milk procurement. The inputs from these surveys will be used for planning and programme intervention in milk procurement and marketing.

DESK RESEARCH

At the request of NDDB, the National Sample Survey Organisation (NSSO) conducted a three-day in-depth training and skill enhancement programme for NDDB officers for analysing unit level data of NSSO for customised analysis. Following this training, NDDB officers continued to analyse secondary data from different rounds of NSSO reports and bring out many unexplored facts which provided useful insights and enhanced the current knowledge.

The All India Debt Investment Survey (NSSO 70th Round) indicated that 44 per cent of the rural households own bovine animals and for about a quarter of the rural households in Tamil Nadu, Kerala (22 per cent), Andhra Pradesh (20 per cent), Haryana (15 per cent), Punjab (15 per cent), Rajasthan (11 per cent) and Gujarat (18 per cent) dairying is the chief source of livelihood. The survey also suggested that about 50 per cent of bovine owning households have bank accounts.

Another interesting insight was thrown up from the analysis of "Employment and Unemployment" survey of the NSSO (68th Round). An estimated 15.75 crore rural women in India are engaged in domestic duties out of which 5.29 crore women were willing to undertake additional work. Out of these, about one crore were willing to consider dairying as their preferred work over tailoring, poultry and spinning/weaving.

Analysis of Consumer Expenditure Survey of the NSSO (68th Round) reveal that a significant proportion of rural consumers of milk source their milk from "purchases" – numerically, rural milk purchasers outnumber milk producers by two times. In case of Tamil Nadu, Kerala, Andhra Pradesh, Maharashtra and West Bengal there are more "rural purchasers of milk" than "rural milk producers".

Milk has always played a critical role in addressing hunger and malnutrition. The analysis of milk consumption of families "with milk production" and "without milk production" reveals that the per capita consumption of milk is more in the milk producing family. The higher milk intake in the poor and marginal categories of milk producers is encouraging with respect to addressing nutrition concerns.

With a view to understand the socio-economic status of the people of the major milk producing states, NDDB analysed the Socio Economic and Caste Census (SECC) data published by Government of India. It was found that 56 per cent of the rural households did not own any

land, 30 per cent of the rural households are cultivators and 51 per cent are engaged as manual casual labourers. It was found that in 74 per cent of the rural households the monthly income of the highest earning family member was less than ₹5,000. About 50 per cent of the rural households suffer from some kind of deprivation. It was also found that 30 per cent of rural households fall under deprivation criterion D7 (landless households deriving a major part of their income from manual casual labour).

During the year, the GoI released the Agricultural Census data of 2010-11. The analysis of the census data reveals that 85 per cent of farmers are either marginal or smallholders (< 2 ha), own 45 per cent of operational land and 75 per cent of bovines, reinforcing the fact that bovine ownership in the rural landscape is more equitably distributed than land.

STATE REPORT ON DAIRYING

NDDB published a State Report on Dairying for the states of Maharashtra, Odisha and Kerala. These reports were widely circulated across all functionaries of the government, administrators, research institutions, academic and policy-making bodies which have been found to be useful for planning and development purposes by various stakeholders.

SAMPLE SIZE TO DETECT TRACEABILITY OF SEMEN DOSES OF IMPORTED BULLS

In order to develop useful statistics for determination of optimum sample size for detecting traceability of the semen doses of imported bulls, a scientific analysis was completed from the already existing data of about one lakh AI records under the PT project. Our analysis leads us to recommend that at least 5,500 semen doses produced from each imported bull should be followed till the daughters completed their milk recording along with other parameters like conception rate per bull, calves born and age at first calving.

Developing Human Resources

NDDB considers that training is a continuous process to be undertaken over a longer period. Based on our experience with implementation of dairy development projects, the National Dairy Plan Phase-I also envisages intensive and focused capacity building and training. NDDB is organising various training programmes for milk producers, village resource persons, executives and Board of Directors of the unions. Through such efforts, participants can learn new information, re-learn and reinforce existing knowledge and skills and most importantly have time to think and consider what new options can help them effectively and efficiently carry out various tasks pertaining to dairy value chain.

During the year, around 14,043 participants were trained to strengthen the human resources for sustainable dairy development. The number of women milk producers who participated in trainings increased to 3,344 in 2015-16 as compared to 2,556 in the previous year.

Trainings in AI, dairy animal management, DCS secretary level were conducted at regional training centres; trainings for executives and Board of Directors were conducted at NDDB Anand.

During the year, four cross-learning/post-training follow-up workshops were conducted at different regions where 154 participants (29 of these being women BoDs) actively shared their impact of the training.

Training Programmes

Programme Name	No. of Programmes	No. of Participants
COOPERATIVE SERVICES		
Farmer Orientation Programme	47	1,483
Farmer Induction Programme	155	5,410
Board of Directors Orientation Programme	32	444
Training for P&I Executives	28	536
Lady Extension Officers training	1	12
New supervisors training in Producer Relationship Management (PRM)	8	157
Training of Trainers in Business and Producer Relationship Management	5	78
Management Committee Members training	19	436
Total	**295**	**8,556**
PRODUCTIVITY SYSTEMS		
Training on Micro-training Concept	1	16
Training on INAPH	41	731
Training on Mastitis Control	4	900
Training in collection of preputial washing from breeding bulls for detection of diseases	1	5
Training in Detection of Bovine Herpesvirus-1	1	8
Training of Milk Testers & Other Officers	6	79
Training on Ration Balancing Module of Information Network for Animal Productivity and Health (INAPH) Software	2	29
Technical officers & trainers training in Rational Balancing Programme	17	237
Orientation on Progeny Testing (PT) & Pedigree Selection (PS)	3	42
Orientation on Fodder Production and Conservation Practices	4	76
Advanced Seed Production Technology	1	20
Customised programme for Animal Health Officers	2	41
Artificial Insemination (Basic)	19	458
Artificial Insemination (Refresher)	15	430
Resource Person Training	38	849
Dairy Animal Management	20	521
Lab testing under Brucella & Mastitis control	4	22
Total	**175**	**4,442**
QUALITY ASSURANCE		
Clean Milk Production	7	266
Quality Assurance training	8	125
Training in Microbiology as per NABL guidelines and documentation	1	2
Operation & Maintenance of Dairy Equipment and Management	1	24
Total	**17**	**417**
SECTORAL ANALYSIS AND STUDIES		
Internet-based Dairy Information System (i-DIS)	40	128
GIS training	10	229
Total	**50**	**357**
NDP TRAININGS		
Orientation in World Bank procurement procedure	5	125
Trainers Training in INAPH	10	119
Training in environmental & social aspects under NDP-I	2	27
Total	**17**	**271**
GRAND TOTAL	**554**	**14,043**

CAPACITY BUILDING THROUGH TRAINING, MENTORING AND SECTORAL EXPOSURE

Development of human resources through training and development continued to be an area of focus along with other employee engagement initiatives. Training programmes in Project Management, Interviewing Skills, Dairy for Non-Dairy Professionals, Emotional Intelligence & Leadership, Impact Evaluation, Communication and Inter-personal Skills focused on functional and organisational needs, were organised in-house for NDDB employees. Based on specific needs, NDDB employees were also sponsored to specialised training programmes, seminars and workshops at premier institutions. In all, 501 employees were trained during the year.

NDDB also organised a one-day workshop on 'Disaster Management' in co-ordination with the National Disaster Management Authority (NDMA), Delhi, in which NDDB employees, employees from sister organisations and senior officials from the District Administration, Anand, also participated. Programmes for employees on financial wellness; and for their spouses on self-development were also organised. Two induction programmes were organised for new inductees. With the objective of providing effective guidance to the new recruits and to enable them to get good sectoral exposure, mentoring and exposure programmes were institutionalised during the year.

Other important employee engagement initiatives like meeting the leader and training presentations were also organised throughout the year. Under the 'Knowledge Forum' initiative, lectures on contemporary themes by eminent personalities were organised in which employees participated in large numbers.

Training of NDDB Employees

Programme Name	No. of Programmes	Participants	
		Total	SC/ST
A Step Towards Healthy Living	1	22	5
General Awareness of ISO/IEC 17025:2005	1	13	
Analysis of Unit Level Data of NSSO	1	13	
Communication & Interpersonal Skills	1	24	5
Project Management	1	14	
Contract Labour, PF, ESI/Workmen Compensation, etc.	1	28	2
Interviewing Skills	2	32	3
Dairy for Non-Dairy Professionals	1	22	2
Emotional Intelligence & Leadership	1	17	
Holistic Stress Management and Self Development	1	22	6
Unnati	5	115	19
Training of Trainers	1	20	2
Managing Assets and Properties	1	22	2
First Aid	1	28	
Other programmes (sponsorship of employees at outside institutions)	44	109	11
TOTAL		**501**	**57**

Automatic storage
& retrieval system,
Banas Dairy, Palanpur.

Engineering Projects

NDDB continued to provide 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. Services were also extended to execute Bio Security Labs and Semen Stations. The group also started the study of existing plants for improving energy efficiencies, ensuring food safety and reducing product handling losses.

Eight projects were completed during the year. These included two fully Automated Liquid Milk Processing Plants of 100 TLPD at Hotwar (Jharkhand) and 200 TLPD Liquid Milk Plant at Bharuch (Gujarat); Expansion of two Dairy Plants – 100 to 500 TLPD at Mohali (Punjab) and 100 to 200 TLPD at Tumkur (Karnataka); two Product Dairy Plants – one Product Dairy at Bengaluru (Karnataka) and one 10000 LPD Ice Cream Plant at Ambattur – I (Tamil Nadu); one Cattle Feed Plant - 150 MTPD at Kaladera (Part I) (Rajasthan); and one 20 TPD Bypass Protein and 12 TPD Mineral Mix Plant at Hotwar (Jharkhand).

In addition to the above, NDDB completed renovation and upgradation of Animal Quarantine facilities at Mumbai, Kolkata and Chennai under the NDP-I.

NDDB also carried out the infrastructure expansion of IRMA (Phase II) Anand by creating an additional hostel block.

NDDB maintained its emphasis 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 estimates of the required capital investment and payback period.

The dairy plants covered during the year include Nainital, Dehradun and Lalkuan (Uttrakhand) and Behrampur (West Bengal).

100 TLPD LIQUID MILK PLANT AT HOTWAR

NDDB commissioned the automated 100 TLPD Liquid Milk Plant along with manufacturing facilities for milk products such as curd, *lassi, paneer,* etc. The plant building has a unique design to have sufficient natural light during day time for industrial operation.

The project was completed within 12 months from the commencement of the civil works and was inaugurated by the Chief Minister of Jharkhand in February 2016.

CHEESE & WHEY POWDER PLANT, PALANPUR

The whey powder plant (designed/suitable for skim milk powder also) was commissioned ahead of its schedule in December 2015. The work on a fully automated plant for Cheddar, Mozzarella and Processed Cheese is progressing well for its targeted commissioning in April/ May 2016.

NDP-I

NDDB provided consultancy services for the design of a new Semen Station, with a capacity of 10 million semen doses per annum, being established by NDDB Dairy Services at Rahuri (Maharashtra). The works of the semen station have been completed.

Solar Energy Implementation

NDDB received an Excellence award from the Ministry of New and Renewable Energy (MNRE) for taking the initiative in promoting CST (Concentrating Solar Technology) 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.

A Solar Cell has been established in NDDB for the establishment of solar projects. A team conducted feasibility studies in Karnataka, Maharashtra and Punjab and submitted 15 project reports to MNRE for their approval. Six projects in Maharashtra have been approved by MNRE and the others are in the advance stage of their evaluation.

NDDB has also taken up the project for strengthening of a Semen Station at CFSP & TI at Hessarghatta, Bengaluru. The project is nearing completion.

BIO-SAFE LABORATORIES

The BSL Project Cell is responsible for setting up a specialised R&D facility for animal pathogens where bio-safety is of prime concern. Setting up of bio-safety laboratories and an Experimental Animal Facility is a highly complex task. It necessitates an integrated approach in planning and implementation of multiple layers of bio-containment involving controlled climate with highly reliable heating, ventilation and air conditioning and building management systems. World over there are limited bio-containment facilities with BSL3+ and higher level laboratories.

The major projects undertaken by the BSL Cell during 2015-16 are:

1. **International Centre for Foot and Mouth Disease (ICFMD),** a BSL3+ facility, at Bhubaneswar: A prestigious state-of-the-art R&D facility of ICAR with BSL3+ Laboratory & Animal Experiment Facility for conducting biomedical research in the area of Foot and Mouth Disease (a highly infectious disease in animals affecting the national economy). This facility will also serve as a regional resource laboratory for SAARC countries.

   Status: The Animal holding facility is completed, and the Main Laboratory building is in an advanced stage of completion.

2. **Clean Room for Cell Culture & Hybridoma, and BSL2 Lab Facility at TANUVAS, Chennai.**

   Status: The facility has been successfully commissioned and handed over to the project authority during the year 2015-16.

3. **BSL3 Laboratory including Laboratory Animal Testing Unit (LATU) at TANUVAS, Chennai** for handling animal pathogens.

   The project is under advanced stage of planning.

Planning & Designing for the following projects is in progress – agreement with the project authority is likely to be executed in 2016-17:

a. **Anthrax Spore Production, Blending and Filling, and QC facility** including an Animal Experimental Unit at IVPM Ranipet, for Department of Animal Husbandry (Government of Tamil Nadu).

b. **Poultry diagnostics & feed water analysis laboratory**, Department of Animal Husbandry at Palladam, Tamil Nadu.

c. **Centre for Advancement of Bovine Breeding (CABB) at Gachibowli, Hyderabad,** for R&D in IVF and Animal genomics.

d. **Quality control (QC) laboratories** for 15 dairies across UP for PCDF Lucknow.

Chocobar manufacturing, Ambattur, Tamil Nadu.

On-going Projects

Project	Capacity	Location
Northern Region		
ETP (Dairy Plant Phase-I)	TLPD 2000	Jaipur, Rajasthan
Dairy Plant Expansion (Phase-II)	TLPD 1000	Jaipur, Rajasthan
Cattle Feed Plant (Part-II)	TPD 150	Kaladera, Rajasthan
Ice Cream Plant	LPD 10000	Bhatinda, Punjab
Western Region		
Cheese and Whey Powder Plant	TPD Cheese 30 / TPD Whey Powder 45	Banaskantha, Gujarat
Baby Food Plant with milk processing facility	TPD 120	Sabar, Gujarat
Dairy Plant Expansion	TLPD 700 - 1200	Kolhapur, Maharashtra
Eastern Region		
Cattle Feed Plant	TPD 150	Khurda, Odisha
International Centre for Foot and Mouth Disease (BSL-3+)		Bhubaneswar, Odisha
Southern Region		
Powder Plant with milk processing expansion	TPD PP 30 / TLPD 400 -700	Channarayapatna, Karnataka
Dairy Plant	TLPD 100	Padalur, Tamil Nadu
Fermented Product Plant (Phase-II)		Ambattur, Tamil Nadu
Cattle Feed Plant	TPD 150	Erode, Tamil Nadu
Semen Station		Hessarghatta, Karnataka
Bio-Security Laboratory (BSL-2)		Bengaluru, Karnataka

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

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 NDDB in 18 states with a network of 150 End Implementing Agencies (EIAs) for the period 2011-12 to 2018-19 with the following objectives:

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

The project is a scientifically planned multi-state initiative with a total project outlay of ₹22,420 million.

During 2015-16, three additional states were included under NDP-I and the project period was extended up to 2018-19. The Cabinet Committee on Economic Affairs (CCEA) gave its approval for:

- Inclusion of Uttarakhand, Jharkhand and Chhattisgarh in the list of states to be covered under the NDP-I; and
- Extension of the implementation period of NDP-I up to 2018-19 in order to achieve its key outputs.

SUB PROJECT APPROVALS

During 2015-16, 54 sub projects were approved with the total outlay of ₹3,183.52 million out of which ₹2,387.91 million was provided as grant assistance from NDP-I and ₹795.61 million to be contributed by the EIAs implementing Village-Based Milk Procurement System sub projects.

Till 2015-16, 342 sub projects of 150 EIAs from 18 states have been approved with a total outlay of ₹18,667.04 million out of which ₹15,523.76 million would be grant assistance and ₹3,143.28 million would be contributed by the EIAs. The approved sub projects include 23 sub projects for Project Management and Learning Activities.

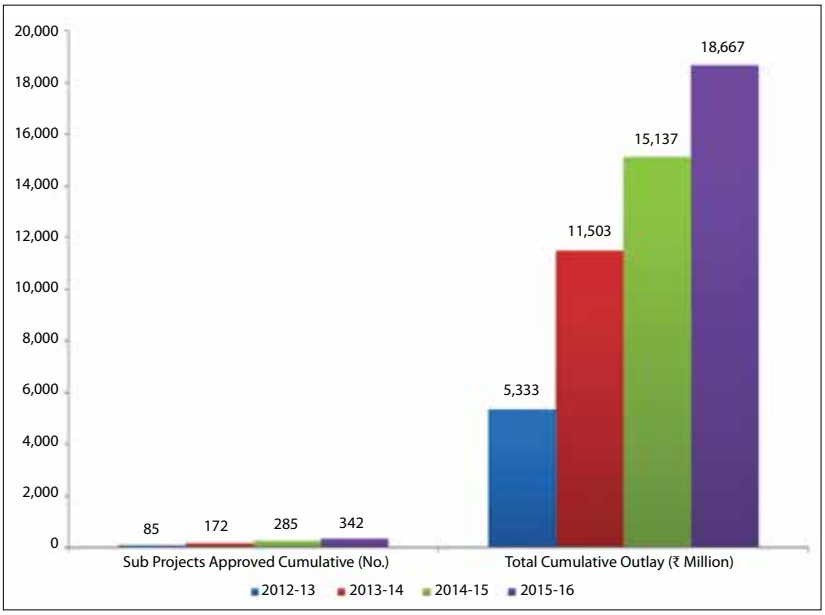
Activity-wise approved sub projects during 2015-16 and cumulative till 2015-16:

Activity	No. of Approved Sub Projects		Amount in ₹ Million		
			Outlay of Sub Projects Approved till 2015-16		
	2015-16	Cumulative till 2015-16	Grant Assistance	EIA Contribution	Total Outlay
Animal Breeding	**2**	**55**	**6,699.63**	**0.00**	**6,699.63**
Progeny Testing Programme	0	13	2,380.86	0.00	2,380.86
Pedigree Selection Programme	0	10	584.57	0.00	584.57
Strengthening of Semen Stations	0	22	2,558.48	0.00	2,558.48
Pilot AI Delivery Services	2	4	632.49	0.00	632.49
Import of Bulls	0	1	231.46	0.00	231.46
Import of Embryos/Bull Production through Imported Embryos	0	5	311.77	0.00	311.77
Animal Nutrition	**30**	**148**	**3,522.64**	**0.00**	**3,522.64**
Ration Balancing Programme	30	97	2,780.09	0.00	2,780.09
Fodder Development	0	51	742.56	0.00	742.56
Village-Based Milk Procurement System	**17**	**116**	**4,998.20**	**3,143.28**	**8,141.48**
Sub-total	**49**	**319**	**15,220.48**	**3,143.28**	**18,363.75**
Project Management & Learning	**5**	**23**	**303.29**	**0.00**	**303.29**
TOTAL	**54**	**342**	**15,523.76**	**3,143.28**	**18,667.04**

State-wise approved sub projects during 2015-16 and cumulative till 2015-16:

State	No. of Approved Sub Projects		Amount in ₹ Million		
	2015-16	Cumulative till 2015-16	Outlay of Sub Projects Approved till 2015-16		
			Grant Assistance	EIA Contribution	Total Outlay
Andhra Pradesh	3	13	795.02	178.53	973.55
Bihar	1	22	382.16	6.57	388.73
Chhattisgarh	2	2	41.67	19.32	60.99
Gujarat	6	44	3,376.71	815.32	4,192.02
Haryana	0	17	716.77	8.34	725.11
Jharkhand	2	2	66.11	33.22	99.34
Karnataka	5	30	1,460.20	555.91	2,016.11
Kerala	1	11	454.88	54.16	509.03
Madhya Pradesh	3	11	211.40	22.54	233.94
Maharashtra	4	35	1,037.84	217.33	1,255.17
Odisha	1	13	180.86	33.67	214.53
Punjab	2	20	1,038.69	278.83	1,317.52
Rajasthan	4	30	2,099.11	596.02	2,695.13
Tamil Nadu	2	16	823.49	49.92	873.41
Telangana	0	6	200.88	39.83	240.70
Uttar Pradesh	5	26	1,519.99	224.60	1,744.59
Uttarakhand	4	7	296.53	0.00	296.53
West Bengal	4	13	286.71	9.18	295.89
Centralised Import of Bulls	0	1	231.46	0.00	231.46
Sub-total	**49**	**319**	**15,220.48**	**3,143.28**	**18,363.75**
Project Management & Learning	**5**	**23**	**303.29**	**0.00**	**303.29**
TOTAL	**54**	**342**	**15,523.76**	**3,143.28**	**18,667.04**

Year on year cumulative approved sub projects and approved total outlay till 2015-16:



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, various animal breeding interventions are being undertaken which include: 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 end of the project period.

Progeny Testing Programme:

"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."

Thirteen sub projects submitted by 12 EIAs with operations in nine states have been approved with a total outlay of ₹2,380.86 million. Till March 2016, these sub projects have made available 469 HGM bulls out of which 446 bulls have been distributed.

An agreement has been signed between NDDB and Anand Agricultural University to promote and facilitate collaborative research projects in the field of animal genetics and breeding to develop methodologies for collection of performance records of various cattle and buffaloes in the field with current Progeny Testing (PT) programmes.

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."

Ten pedigree selection sub projects with an outlay of ₹584.57 million are being implemented by eight EIAs in five states. Till March 2016, these sub projects have made available 64 HGM bulls out of which 27 bulls have been distributed.

Regular farmer contact programmes are being organised in Pedigree Selection sub project areas to build awareness about the importance of AI programmes. During 2015-16, 796 village meetings and 758 fertility improvement camps have been organised and cumulatively till March 2016, 1,900 village meetings and 1,688 fertility improvement camps have been organised.

SAG Bidaj organised a mega workshop exclusively for farmers on *Gir* at KVK, Ambujanagar, Kodinar in Gujarat which was attended by 775 participants. Farmers and subject matter specialists from NDDB, KVK, NGOs and veterinary colleges were present during the workshop. Invited subject matter specialists presented and shared various aspects of *Gir* cattle like historical perspective, performance, importance of AI, and ear-tagging; they also interacted with the progressive farmers of this region during the workshop.

Most of the sub projects have distributed Sire Directory of indigenous breeds of bulls to AI technicians to make farmers aware about the quality of bulls used for upgradation of the breed.

Import of Bulls/Embryos and Bulls Production through Imported Embryos:

"To meet the requirement of pure Jersey and Holstein Friesian bulls for high quality semen production to make available breedable animals of Jersey and Holstein Friesian breed."

Till March 2016, 76 purebred breeding bulls of HF breed have been imported which after successful quarantine have been distributed to 14 A and B graded semen stations. These bulls are being closely monitored for their growth. A meeting was organised at NDDB, Anand, with the officers from 14 semen stations which received the imported bulls to discuss management, housing, monitoring of growth and traceability issues. A seminar on 'Record Keeping and Ensuring Traceability of Imported Bovine Germplasm' was held at NDDB Anand.

480 embryos of HF and Jersey breeds were imported by SAG, Bidaj from Canada which were distributed to four EIAs for bull production through imported embryos. As per recipient herd protocols, disease screening of all recipients have been carried out and embryo transfer to recipients was initiated by the EIAs from May 2015. All the imported embryos have been distributed to EIAs and till March 2016, 295 embryos have been transferred with a success rate of 35.6 per cent.

STRENGTHENING OF SEMEN STATIONS

Under NDP-I, existing 'A' and 'B' graded semen stations are being supported to expand and upgrade their facilities to meet the increasing demand for frozen semen doses for Artificial Insemination.

The semen stations have placed the civil work orders and most of them are in advance stages of completion. It is expected that all civil works will be completed by 2016-17. The quality of civil works is being checked by the consultant hired under NDP-I by making periodic visits

to the sites. Based on suggestions of the consultant, corrective measures are being undertaken by the respective EIAs.

Overseas exposure and a training programme on 'Advanced Frozen Semen Technology and Breeding' was organised at Wageningen University, The Netherlands, for 15 officers working in/monitoring semen stations being strengthened under NDP-I. Topics covered during the training programme were recent advances in frozen semen technology and reproductive technology, basic principles of genetic improvement and cattle breeding programme, hoof care management, cow signals and semen-sexing technology.

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

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.

Establishment of Biogas Plant under NDP-I in SAG, Bidaj, Semen Station Sub Project

A biogas plant was installed under NDP-I at SAG, Bidaj. The biogas plant is of floating dome type (85 cubic meter capacity) and was obtained from Gujarat Energy Development Agency (GEDA). The plant is operational and fresh cow dung (2,000 kg) and equal quantity of water are fed at the inlet and mixed using the hand-held rotor. After 30-40 days the dome rises with the establishment of bacterial activity and biogas production. Thereafter, regular daily feeding is done. It utilises 2,000 kg of dung per day. Regular feeding of the biogas plant is done every day at morning and the biogas produced within 24 hours is utilised for running the generator. The slurry produced as a by-product is used as organic fertiliser. About 4,000 litres of slurry is pumped daily into the agriculture lands for production of fodder.

Electricity generation by biogas plant

- Total electricity produced = 3140 KW hrs (1 kilowatt hr =1 unit)
- Total working hours = 746 hrs
- Daily use = 5 hrs/day (as per hour meter records)

Generated electricity is sufficient to run a gas-operated generator of 15 KW capacity.

PILOT DOORSTEP AI DELIVERY SERVICES

"To set up a model for viable doorstep AI delivery services operating in a financially self-sustainable manner using Standard Operating Procedures including animal tagging and performance record."

During the year 2015-16, two new sub projects of the Saahaj and Shreeja Milk Producer Companies were approved for undertaking Pilot Doorstep AI Delivery Services and cumulatively, four sub projects are under implementation. Till March 2016, the approved sub projects have covered 7,704 villages through 1,014 deployed MAITs who carried out 3.94 lakh AIs.

The extension activities have also been intensified. Posters, paintings, etc. have been placed in strategic locations around villages. An AI awareness film was produced in regional languages which is aimed at creating awareness about AI, the importance of SOP and addressing various misconceptions about AI and ear-tagging.

Banwari Becomes a MAIT; Earns a Livelihood and Respect

Banwari (Sanjhariya AI Centre, Bindayaka, Jaipur) hails from a poor tribal family, dependent on agriculture for livelihood. Hardships made him leave his studies and assist his father in farming. He came to know about Breeding Services being provided by Paayas and enrolled for a MAIT position. Post-selection he obtained his basic training from NDDB Regional Demonstration and Training Centre - Jalandhar.

During the launch of the centre, he was introduced to the community as a MAIT. Initially, farmers did not take him seriously, treating him just as the boy next door. Unfazed, he pursued his work honestly and provided AI services following SOP. In course of time, he managed to change the farmers' perception towards AI services.

Presently, Banwari performs over 100 AIs per month covering 10 villages and earns around ₹10,000 every month. His father, Moongaram, expresses his pride for his son and happily recounts how his efforts have enhanced the image of his family in the village.

RATION BALANCING PROGRAMME

Under this programme, the Local Resource Person (LRP) formulates a least-cost balanced ration for milch animals from locally available feed resources using the software INAPH. A balanced ration fed to milch animals helps in ensuring that the milch animals produce milk commensurate with their genetic potential. Feeding the balanced ration to milch animals not only reduces the cost of feeding per kg of milk but also helps in significantly reducing the methane emissions.

An Empowered Savita Helps Dairy Farmers See the Light

Smt. Savita Suresh Patil of Pohale Tarf Borgaon village, Panhala taluk, Kolhapur district, started working as an LRP under the RBP programme implemented by Gokul Dairy spurred by the confidence she earned through the Women's Dairy Cooperative Leadership Programme. When she started working as an LRP in Jan 2014, she quickly realised that the farmers were looking for grant or subsidy under the ration balancing programme and were hesitant to join it.

Determined to meet the challenge, she started implementing ration balancing in one buffalo and two cows of her own household and for few animals of some progressive farmers in the locality, which gave visible improvement in milk yield, quality and profit from dairying. She devoted extra time in convincing farmers through the RBP documentary and other extension materials. Her persistent approach yielded results. Farmers of the village understood that the monetary benefit that they will be getting by adopting ration balancing would be their subsidy.

Now, she is providing RBP services to 109 milk producers in her village. She regularly visits them, discusses and analyses the nutrient status of the covered animals. The RBP impact on 183 animals of the village shows an average increase in milk yield by 100 gm, fat content by 0.14 per cent and reduction in feeding cost by ₹2.10 per day per animal. There is a remarkable reduction in digestive disorders in the dairy animals along with increased productivity and reproductive efficiency.

Smt. Savita is efficiently managing her household work and work as an LRP. She is saving her yearly stipend of around ₹52,000 under RBP for the higher education of her children who are about to finish their schooling. The vocation of LRP has earned her a good reputation in the society.

Kaira Leads the Way in Implementing RBP

Kaira District Cooperative Milk Producers Union Limited (Amul Dairy) is the fastest EIA across the country to achieve physical targets under RBP. The procurement process under RBP was completed within four months of signing the grant agreement. LRP trainings started in June 2015 and 213 LRPs were trained in eight batches by first week of January 2016. The animal coverage target of 20,000 was crossed by first week of March 2016 (around eight months after the project roll-out started).

RBP impact data of 7,800 animals in the milk shed area of Amul Dairy shows an increase of 290 gm of milk per day per animal, improvement in milk fat by 0.14 per cent, reduction of ₹3.66 in feed cost per kg milk production (19.61 per cent cost reduction by RBP) and an increase of ₹46 in the net daily income of farmers by implementation of the programme.

Convincing farmers through repeated village awareness programmes, well-planned trainings and field induction of LRPs, rigorous field monitoring by the RBP team, support from the management, continuous review, monitoring and encouragement to LRPs are the key factors

that can be attributed to this special feat of achieving the project targets in the shortest time.

Convergence of RBP with Progeny Testing and Pedigree Selection activities has happened in various sub projects. Out of 4,946 villages proposed for Progeny Testing and Pedigree Selection interventions, 2,657 (54 per cent) of the villages have been converged with ration balancing services.

FODDER DEVELOPMENT PROGRAMME

Under the Fodder Development Programme, certified/truthfully labelled seeds are being promoted to increase fodder production and field demonstrations of mowers, silage making and biomass storage silos are being carried out to popularise these technologies among farmers.

Under the Fodder Development Programme, till March 2016, 51 sub projects of 50 EIAs from 13 states have been approved for implementation. These sub projects have undertaken 1,251 fodder demonstrations, 1,396 mower demonstrations and have constructed 60 biomass storage silos.

These demonstrations have resulted in the adoption of the technology by farmers and till March 2016, more than 1,100 farmers have adopted the fodder conservation practices.

Till March 2016, four fodder seed processing plants have been set up and made operational and more than 90 per cent of civil work of a fifth seed processing plant at Kota has been completed. Civil work in the crop residue enrichment and densification plant at Sri Ganganagar is at an advanced level of completion while the civil work order has been placed for the second plant at Kolhapur.

Extension material in the form of a handbook *'Compendium on Fodder Production'* in Hindi was published during the year. Pamphlets on weed (Coronopus didymus), silage making from maize stover and posters on silage making have also been developed.

VILLAGE-BASED MILK PROCUREMENT SYSTEM

The Village-Based Milk Procurement System (VBMPS) under the NDP-I aims at providing rural milk producers with greater access to the organised milk-processing sector by forming and strengthening dairy cooperatives and Producer Companies. Apart from forming new societies/ pooling points, existing societies/pooling points are also being strengthened by providing village level capital items like bulk milk coolers, milk cans, etc. Strengthening of the dairy cooperative societies and Producer Companies though DPMCUs and AMCUs has resulted in more transparency and fairness in milk procurement operations while installation of BMCs has given farmers more flexibility in pouring milk as well as improvement in quality of milk.

Under VBMPS, during 2015-16, 17 sub projects were approved for implementation and cumulatively till 2015-16, 116 sub projects of 107 EIAs are under implementation from 17 states which include five sub projects of Producer Companies.

Till March 2016, 26,095 villages have been covered out of which new Dairy Cooperative Societies/Milk Pooling Points have been established in 10,528 villages. A total of 7.42 lakh additional milk producers have been enrolled by the approved sub projects. Out of the total milk producers enrolled, 3.41 lakh (46 per cent) are women milk producers.

In Chandola, the Women Emerge at the Forefront

Chandola is a remotely located village in Puri District where the milk producers had no option but to sell the surplus milk available in the village to private vendors who used to exploit them. With the initiative of the milk union and the women milk producers, the Chandola Women Dairy Cooperative Society (WDCS) was organised in Aug 2015 under VBMPS sub project of NDP-I with around 20 members, which subsequently went up to 57 members. Among them 32 are from the general category, eight are OBCs, and there are 13 SC and four ST members.

The initial milk procurement was 46 litres per day which had increased to 170 litres per day within three months. The members are paid based on the quality of the milk and the minimum price paid to members is around ₹26 per litre (4.0 per cent fat, 8.5 per cent SNF) which is about ₹7 per litre more than what they used to receive from private vendors.

Smt. Bijayalaxmi Nayak has been elected as president of the DCS, who conducts management committee meetings every month for the smooth management and to increase the business of the DCS. These meetings have increased the confidence of the women members. The union has also organised various training programmes for the members, MCM members and secretary under VBMPS sub project to create awareness on clean milk production, animal husbandry practices and good management of DCS. Few members of the DCS have been oriented at NDDB, Anand through farmer induction/orientation programmes and were also given exposure visits to the DCSs in Gujarat which has helped them to envisage the development of their DCS on similar lines. Post training and exposure, farmers in the village have adopted scientific feeding practices.

The VBMPS sub project has benefitted the milk producers in the village, especially women producers and has created trust in the system ensuring more women becoming members of the DCS.

PROJECT MANAGEMENT AND LEARNING

The NDP-I project monitoring and evaluation system is in place which is supported by the ICT-based Management Information System (MIS) and has facilitated learning and evaluation along with internal and external monitoring, evaluation, quality assurance, special studies, etc. Till March 2016, 23 sub projects have been approved under the sub component Learning and Evaluation of Project Management and Learning.

Various ICT-based MIS applications being used for reporting and analysing the progress made include:

- Enterprise Project Management (EPM)
- Information Network for Animal Productivity and Health (INAPH)
- Procurement MIS (ProcMIS)
- Grievance Redressal System (GRS)
- Fund Utilisation Tracking System (FUC Tracker)

NDP-I regional review meetings are being organised at regular periodicity to review the progress made, identifying bottlenecks/shortcomings, highlighting the success and working out the future action plans, etc. These regional review meetings are attended by NDDB representatives, DADF representatives, secretaries and directors of State AH department, MDs of Federations, CEOs and project coordinators of concerned EIAs. The World Bank team has also participated in some of the regional review meetings. During 2015-16, 12 regional review meetings were organised.

Progress of the ongoing studies under Project Management and Learning Activities are mentioned in the table below:

Study	Status
External M&E of NDP-I	The inception report of the mid-term survey has been submitted. The survey is under progress and its draft interim report would be submitted in April 2016.
Strengthening Women Empowerment in Indian Dairy Sector (IRMA, Anand)	The study has been completed. The final report has been submitted in February 2016.
Impact Assessment & Evaluation of Ration Balancing Programme – Northern and Western Region (NDRI, Karnal)	The inception and interim reports have been submitted. Field study and data collection have been completed.
Impact Assessment & Evaluation of Ration Balancing Programme – Southern Region (IRMA, Anand)	The inception report has been submitted. Field study and data collection have been completed and are being analysed.
Methane Emission Measurement Study – Western Region (AAU, Anand)	The inception and interim reports have been submitted by the consultant. Samples have been collected and are being analysed.

To facilitate effective monitoring of the approved sub projects and to provide implementation support to EIAs implementing the sub projects each of the approved sub projects has been assigned to a monitoring officer to monitor and support EIAs in sub project implementation.

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 NDDB and EIAs

During the year 2015-16, 5.78 lakh participants have been trained/oriented in programmes organised by NDDB and EIAs. Cumulatively, 7.29 lakh participants have been trained/oriented under NDP-I.

Training Programmes Conducted at NDDB

Activity/Training Programme	Category of Participants	No. of Participants 2015-16	Cumulative Participants till Date
Training of Trainers on INAPH	Executives		39
Customised Ration Balancing Programme			16
Animal Health Officers' Training		17	81
Training in Environment and Social Aspects		27	188
World Bank Guidelines Induction		125	789
Lady Extension Officers-BAP		12	31
TOTAL		**181**	**1,144**

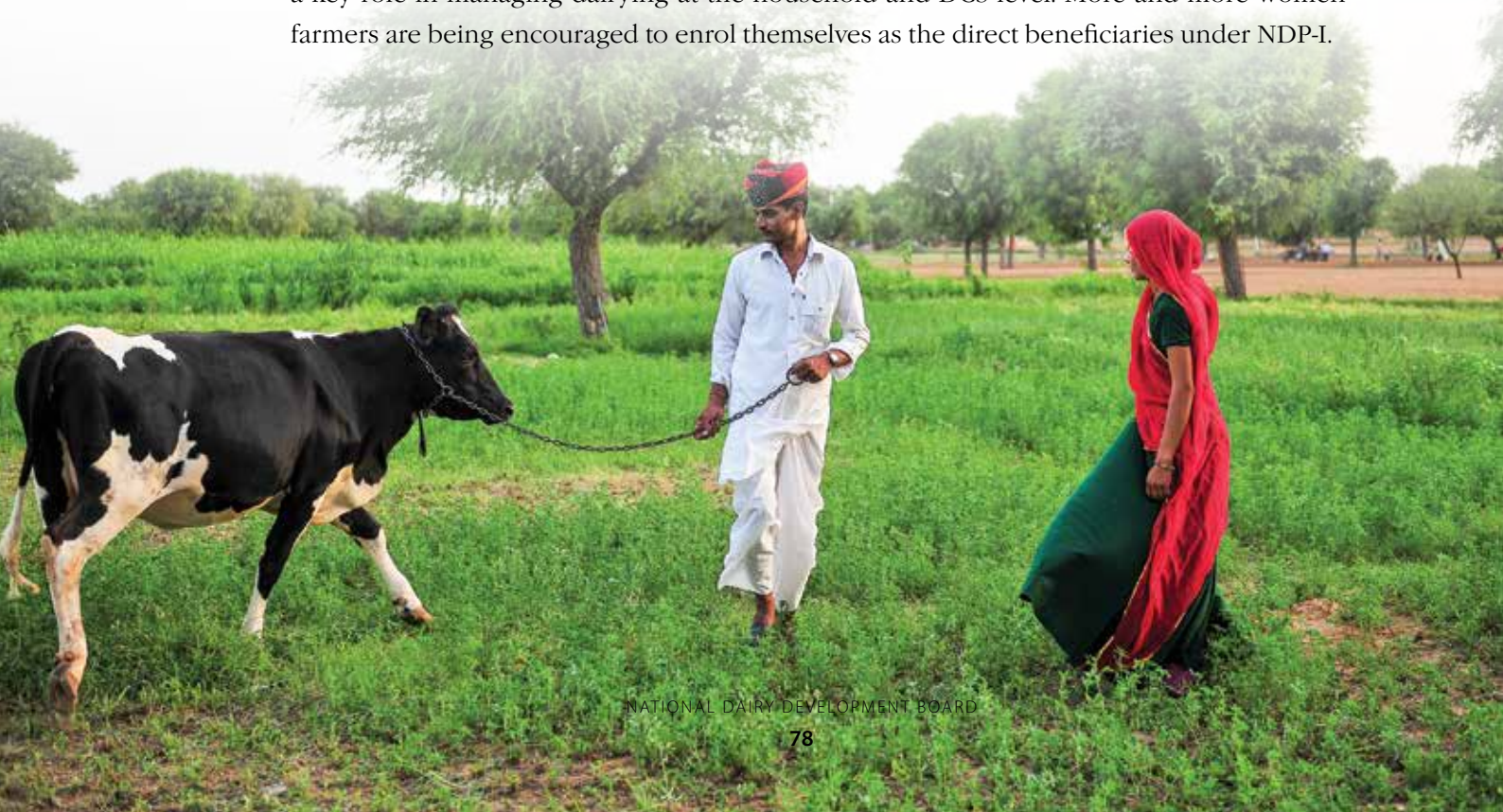
Training Programmes Conducted by NDDB

Activity/Training Programme	Component	Category of Participants	No. of Participants 2015-16	Cumulative Participants till date
Farmers Induction	*VBMPS – Coops*	Milk Producers	5,409	10,269
Farmers Orientation			3,619	7,708
Board Orientation		Board of Directors	413	732
Business Appreciation		Executives	454	1,505
Training of Trainers			78	195
New Supervisors Training			100	398
Sub-total			**10,073**	**20,807**
Training of Technical Officers on RBP	*Ration Balancing Programme – Coops*	Executives	151	363
Refresher Training on Training of Trainers			18	46
Training of Information Technology on RBP			26	54
Sub-total			**195**	**463**
Training of Technical Officers on RBP	*Ration Balancing Programme – PCs*	Executives	82	125
Refresher Training on Training of Trainers			9	10
Training of Information Technology on RBP			3	7
Sub-total			**94**	**142**
Fodder Production & Conservation Practices	*Fodder Development – Coops*	Executives	125	289
Sub-total			**125**	**289**
Fodder Production & Conservation Practices	*Fodder Development – PCs*	Executives	26	42
Sub-total			**26**	**42**
Orientation/Refresher to AIOs	*Progeny Testing*	Executives	0	44
Orientation/Refresher to Project Coordinators			5	18
Orientation/Refresher to District Coordinators			15	54
Orientation/Refresher to Calf Rearing In-charges			6	14
Sub-total			**26**	**130**
Orientation/Refresher to Project Coordinators	*Pedigree Selection*	Executives	8	15
Orientation/Refresher to Area Coordinators			6	14
Sub-total			**14**	**29**
Basic AI Training for MAITs	*Pilot AI Delivery*	Village Resource Persons	285	285
Sub-total			**285**	**285**
TOTAL			**10,838**	**22,187**

ENVIRONMENT AND SOCIAL MANAGEMENT

NDP-I also focuses on mainstreaming environmental and social safeguards viz., social inclusion, management of natural resources and mitigating environmental impacts. The key activities being undertaken during the year to ensure this include:

- Two batches of E&S officers of EIAs were trained on Environment and Social Management which were attended by 27 officers from 27 EIAs.
- 40 E&S sessions were facilitated in orientations and training programmes conducted at NDDB Anand covering social and environmental issues and their management under NDP-I.
- 43 Sub Project Proposals were appraised on environment and social management aspects. Further funding for Environment and Social Action Plan (ESAP) has been sanctioned to 43 previously sanctioned sub projects by the Project Steering Committee.
- For monitoring the E&S progress, 41 EIAs were visited and E&S implementation support was provided to 65 sub projects. Environment and social management measures undertaken by EIAs are being compiled and documented during field visits.
- Success stories are being documented during the monitoring visits to EIAs. Two sets of compendium of success stories have been prepared during the year.
- The guidelines on conducting awareness programmes and other activities proposed under ESAPs in different sub projects and biomedical wastes management system for vaccination programmes were prepared and shared with the respective EIAs.
- Five model sub projects were selected, one for each activity, to showcase the best environmental and social management practices under NDP-I: For all the five model sub projects, action plans have been prepared after discussion with the project officials of EIAs. After finalisation, the same has been shared with EIAs for implementation.
- The special study 'Impact of NDP-I Interventions on Strengthening Women's Empowerment in India's Dairy Sector' has been completed by IRMA and the final report has been received.
- Social inclusion of vulnerable groups like women, SC, ST, smallholders milk producers, etc. are also being taken care of in all the sub projects under NDP-I. Women have been playing a key role in managing dairying at the household and DCS level. More and more women farmers are being encouraged to enrol themselves as the direct beneficiaries under NDP-I.



FINANCIAL MANAGEMENT

Till 2015-16, ₹7,307.94 million has been received by the Project Management Unit, NDDB, from the Department of Animal Husbandry, Dairying & Fisheries (DADF) for implementation of NDP-I while ₹7,375.69 million has been disbursed to EIAs as advance and for expenditure on centralised activities. During the financial year 2015-16, ₹3,000.00 million has been received from DADF while the fund release has been ₹3,143.79 million.

Fund utilisation during the financial year 2015-16 has been ₹3,587.60 million while the cumulative fund utilisation has been ₹6,455.79 million. Additionally, ₹1,432.70 million has been contributed by EIAs till 2015-16 out of which ₹836.36 million has been contributed during 2015-16.

To streamline the submission of audited FUCs by the EIAs and its processing, CAG-empaneled auditors have been hired region-wise to undertake the audit of FUCs. FUC Audit by CA firms hired under NDP-I are ensuring:

- Timely submission of FUCs;
- Standardisation of reporting;
- Cost saving to EIAs towards the audit of FUCs; and
- Adherence to NDP-I Financial Management guidelines.

External audit of NDP-I for 2014-15 has been completed and the audit report has been released and shared with the GoI and World Bank.

Key Achievements: National Dairy Plan Phase-I

- 342 sub projects approved from 18 states from 150 EIAs with a total outlay of ₹18,667.04 million.
- 469 bulls made available for distribution under Progeny Testing of which 446 have been distributed to semen stations.
- 64 bulls made available under Pedigree Selection Programmes for indigenous breeds of which 27 bulls have been distributed.
- 76 Holstein Friesen bulls imported and distributed to 'A' and 'B' graded semen stations.
- 480 embryos of Holstein Friesen and Jersey breeds imported and bull production through these imported embryos are being undertaken by four participating EIAs.
- 22 approved Strengthening of Semen Stations sub projects produced 71.23 million semen doses in 2015-16.
- 7,704 villages covered by 1,014 MAITs under Pilot Doorstep AI Delivery Services.
- 15.45 lakh animals covered in 21,835 villages under the Ration Balancing Programme with about 12 per cent reduction in cost of feeding per kg of milk.
- 12 per cent reduction in methane emission reported due to balanced feeding.
- 2,707 Fodder Demonstrations organised under the Fodder Development Programme.
- 7.42 lakh additional milk producers enrolled under VBMPS of which about 46 per cent are women and 68 per cent are smallholders.
- Project Management and Learning Activities are being undertaken such as internal and external monitoring and evaluation, quality assurance, and special studies.
- ICT-based Management Information System implemented.
- 153 sub projects funded for Environment and Social Action Plan.
- 12 Regional Review Meetings organised during 2015-16 wherein all approved sub projects were reviewed.

Centre for Analysis and Learning in Livestock and Food (CALF)

Testing is an integral part in ensuring the quality of any production system. Dairying is one of the most complex animal production systems which has different components in the form of feed ingredients, animal, milk and milk products. CALF supports the dairy industry by providing testing services for most of the components so that the quality is ensured in the food chain to safeguard consumer health. In order to meet the milk requirement of the country, NDDB has implemented genetic improvement and ration balancing programmes in the field under NDP-I. CALF plays an important role in supporting these programmes by testing of samples.

CALF offers its service across the country to various dairy cooperatives and state federations, government departments, universities, private parties manufacturing animal feed and milk products, apart from internal groups of NDDB. About 25,000 samples with various parameters were successfully analysed by skilled manpower using the latest technology and the feedback received from customers confirmed their faith in the Centre's testing abilities. CALF's constant endeavour has always been to keep up with emerging trends and to ensure that the services of the laboratory remain consistently excellent. CALF participated in the IDA exhibition held at Karnal to update the dairy industry on upcoming Food Safety Challenges.

During 2015-16, about 6,200 samples of feed, mineral mixture and mineral salts, and vitamin premixes were analysed for their compositional and safety parameters. The results of these samples helped the concerned industry to evaluate and take firm decisions on the raw ingredients and quality of finished products. In addition to this, the laboratory also analysed samples of feed, water, non-conventional feed ingredients to aid NDDB's field programmes like Ration Balancing and Mineral Mapping.

The laboratory analysed more than 1,600 samples for various dairy and food products to judge the nutritional composition, microbiological concerns, safety parameters, and stability

A view of Residue Analysis by LCMS-MS.

Screening of Chromosomal Abnormalities.

studies and also supported R&D initiatives. The laws pertaining to milk and food products is governed by national and international regulatory agencies, as the health of the consumer which is of primary importance, is directly affected by consumption of these products. The laboratory upgraded and strengthened its capability by acquiring advanced and highly sensitive machinery like LCMS-MS, GCMS-MS and ICP-OES under the grant from Ministry of Food Processing and Industries (MOFPI), Govt. of India, New Delhi, for analysis of pesticides, antibiotics, mycotoxins, mineral elements, emerging contaminants and dioxins in dairy and food products. The methods have been standardised for about 30 pesticides to meet the requirement of food safety regulation.

CALF supported the genetic improvement programme by analysing about 17,500 samples covering the tests like parentage verification, genetic disorders, chromosomal abnormalities and genotyping of sires.

The laboratory is accredited as per the ISO/IEC 17025 for chemical and biological (microbiological and genetics) testing and has successfully completed the re-assessment conducted by the National Accreditation Board for Testing and Calibration Laboratories (NABL). CALF is also recognised as a referral food laboratory for milk and milk products by the Food Safety and Standards Authority of India (FSSAI). A special recognition status is also granted by the Bureau of Indian Standard (BIS) for milk and milk products, cattle feed and mineral mixture under Group-2 specialised laboratories.

In order to ensure the accuracy and reliability of results the laboratory follows a robust quality control programme and continuously participates in Proficiency Testing (PT) and Inter-Laboratory Comparison (ILC) tests. During the year, CALF participated in three such programmes covering about 60 parameters like compositional analysis, vitamins, mineral elements, amino acids, Aflatoxin B_1 and pesticides. In each PT programme about one hundred laboratories participated across the world. CALF satisfactorily qualified in these tests thereby indicating a high level of accuracy and competency standards maintained at the laboratory.

Training is viewed as an effective way to impart knowledge and skills and CALF ensures that necessary training is provided in-house to individuals for enhancing their potential and growth. The laboratory had also conducted training to several quality control personnel from dairy cooperatives.

Other Activities

PROGRESSIVE USE OF HINDI

With a view to promoting Hindi in the official work, concerted efforts were made during the year. NDDB's Annual Report, website contents, training material 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 2015. Apart from a lecture by a prominent Hindi scholar, competitions like on-the-spot Hindi Essay Writing, Translation, General Knowledge and Poetry Recitation were organised during the year. A large number of employees participated in these competitions and winners were awarded cash prizes. Those who could not win a cash prize were given a book written in Hindi as a token of recognition of their participation. A presentation and demonstration were organised for the use of the voice typing tool in Hindi which will facilitate the use of Hindi in day-to-day office work.

NDDB has introduced various incentive schemes for promotion of Hindi in office work. One such scheme is Hindi Noting and Drafting Incentive Scheme. Thirty six employees participated in this scheme and were given cash incentives. Fifteen 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.

During the year 2015-16, NDDB Anand was associated with Town Official Language Implementation Committee (TOLIC) Anand and actively participated in its half yearly meetings and other activities. During March 2016, a General Knowledge Competition in Hindi was organised by NDDB and a good number of employees of the organisation associated with TOLIC Anand also participated. NDDB employees from different groups were also nominated in various competitions organised by TOLIC Anand and three NDDB employees got awards in these competitions.

The NDDB library has a large number of books in Hindi. During the year, books on Hindi, amounting to about ₹100,315 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

NDDB continued with its welfare and capacity-building measures for SC/ST employees during the year. Fifty seven SC/ST employees were sponsored to participate in training programmes and workshops to enable them to update themselves with recent developments in the field. SC/ST employees were reimbursed expenses incurred on education as well as books for their children. Meritorious children of SC/ST employees were awarded cash prize and certificates for achieving academic proficiency during the year.

Ambedkar Jayanti was celebrated in all offices of NDDB at which distinguished speakers shared their thoughts on the life and contributions of Dr. Ambedkar.

Subsidiaries

IDMC LIMITED

IDMC (Indian Dairy Manufacturing Company) offers processing and packaging solutions to make food safe. The company manufactures food grade packaging films, laminates and pouches and provides packaging solutions for liquid milk and milk products, edible oils, frozen vegetables, personal care products and other consumer goods.

During 2015-16, IDMC registered a substantial growth in the area of design, supply, installation, testing and commissioning of dairy projects. By the end of the year, IDMC had completed 12 dairy projects and another 24 dairy projects were under execution. The completed dairy projects included a large fully automatic dairy plant with an automatic milk pouch and crate conveying system. The other dairy projects were moderate-capacity automatic and semi-automatic milk and milk product plants, with a mix of facilities to manufacture ice cream, butter, *ghee, paneer,* flavoured milk, yoghurt and sterilised milk. IDMC exported a recombined milk processing facility and a syrup processing line.

During the year IDMC successfully completed and handed over a cattle feed plant project of 100 MTPD. Another similar cattle feed plant project was under execution. In addition, the company was executing an expansion project of a cattle feed plant to enhance its capacity from 500 MTPD to 800 MTPD and a silo storage system of 1,500 MT.

During 2015-16, IDMC commissioned a double circuit CIP system for processing beverages and also commissioned a 5 KLPH high brix sugar dissolving system. It executed an order for supply of equipment with piping for a biotech company and exported its first PED-approved mixing vessels to a MHRA certified pharmaceutical company.

IDMC supplied and commissioned three glycol-based ammonia refrigeration packages, specially designed to mitigate potential risk arising from the use of ammonia as a refrigerant. The company also supplied large PHEs to a power project. Two HVAC projects are under execution.

During the year, IDMC's packaging film plant's ISO 22000:2005 certification was renewed and it operated at its rated capacity.

The research and development activities of IDMC continued to focus on making its products and processes more efficient and competitive; including the development of scientifically-designed and cost-effective milking machines.

IDMC's operations are backed and bolstered by prompt after sales service.

In FY 2015-16, IDMC reported a total income of ₹5,412.82 million with a profit before tax of ₹151.39 million.

INDIAN IMMUNOLOGICALS LTD

The year 2015-16 was a challenging one for Indian Immunologicals Ltd (IIL) due to the change in policy of vaccine procurement introduced by both the Ministry of Agriculture and Ministry of Health. IIL was also affected by the reduction in budgets by DADF for vaccine procurement. IIL however has been able to bag 66 per cent of the total FMD vaccine orders placed and 69 per cent of orders for the human anti-rabies vaccine. IIL's retail business in Animal Health and Human Health grew by 16 per cent and 26 per cent respectively. In the first year of introduction itself, it was able to sell 10 million doses of a new vaccine for an unmet need (Blue Tongue vaccine). This will definitely help the small sheep farmers keep their stocks safe from disease.

IIL's state-of-the-art anti-rabies vaccine manufacturing facility in Karakapatla was commissioned and inspected by the regulatory authorities to grant licence for manufacture.

Through its dedicated team of scientists, IIL continued to add new products to its portfolio. It is the only manufacturer of the companion animal vaccine in India; and developed a 7 in 1 combination vaccine (Megavac 7). In collaboration with GALVMED and University of Melbourne, IIL also developed the world's first recombinant Cysticersosis vaccine (Cysvax). This will be a very cost-effective intervention for prevention of epilepsy.

IIL has successfully completed the Phase I/II clinical studies for its Pentavalent vaccine and Phase III trials are currently underway in multiple centres all over India. Pre-clinical Toxicology (PCT) studies for the Hepatitis A vaccine have been completed. PCT studies on IIL's Chikungunya vaccine candidate is currently underway.

As a part of its Corporate Social Responsibility initiatives, IIL continues to provide health coverage to destitute cattle in *Goushalas* and has now adopted a government school in Laxmapur village, Medak district, Telengana state. Infrastructure at the school has been significantly

Foot and Mouth Disease virus quantification by plaque assay technique.

upgraded and the children are also provided with uniforms, school bags, note books, etc.

IIL's overseas subsidiary, Pristine Biologicals NZ Ltd was fully commissioned and obtained the required manufacturing and export licences. About 60 per cent of the material – including equipment from IDMC – used to build the plant was sourced from India – a true demonstration of "Make in India" slogan.

The company registered a sales turnover of ₹3,644.3 million and incurred a net loss of ₹440 million.

MOTHER DAIRY FRUIT & VEGETABLE PVT LTD

Mother Dairy's heritage is intrinsically linked to the cooperative movement in India, and 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 and on an ongoing basis. This is made possible by ensuring the supply of quality products for consumers at competitive prices; and by formulating institutional systems that empower milk producers and farmers through equitable processes.

The Board of Mother Dairy recently approved an investment proposal for setting up of a F&V processing facility in the Jharkhand region to benefit the farmers from that area. The new Green Field plant is under constrution and is likely to start operating in December 2016-January 2017. This facility is likely to benefit around 50,000 farmers from the region offering the right price for their produce.

Mother Dairy also initiated a digital campaign to commemorate the birth anniversary of

Dr. Verghese Kurien aimed at connecting farmers with consumers. The campaign, '#Tweet to Farmers', was planned to unfold in two phases. The first phase invited users of digital media to share their appreciation of farmers and their efforts in nation-building. The second phase involved sharing these words of appreciations with the farmers. Later, a video capturing the gratitude of farmers was released on social media to further strengthen the rural-urban bond – the tie between farmers and consumers. The campaign received huge traction from the masses with more than 2.4 million unique people reached.

Through its horticulture division, Mother Dairy is also working on a traceability project aimed at providing better realisation for farmers; and, on the other hand, enabling good, wholesome, safe produce to reach consumers.

Mother Dairy has also entered the pulses category with the objective of marketing the produce procured from Farmers Producer Organisations (FPOs). The company has begun procuring pulses from 284 farmers through five FPOs in and around Akola.

The company is consistently working towards the use of natural and non-renewable resources aimed to reduce waste and emission with a focus on improving operational efficiencies. Towards this, MDFVPL has installed Solar Photo Voltaic Modules at its factories in Patparganj (100KW), Pilkhua (100KW), Etawah (100KW) and Balaji (500KW). In addition, the company has also invested in Concentrated Solar Technology for hot water generation (300000 kcal) at Patparganj. These initiatives are expected to meet approximately 12 per cent of the company's total power requirement while helping in saving the environment.

Mother Dairy also strives to actively engage the consumer by delivering best-in-class products at competitive prices backed by the strong back-end support of farmers. MDFVPL's plan is to drive growth ahead of the industry by focused distribution efforts and strengthening brand preference in existing large markets while extending its footprint to newer geographies.

The Mother Dairy milk business comprising Bulk Vended Milk (BVM) and Poly Pack Milk showed a positive growth trend in the markets of Delhi/NCR, Eastern UP and Mumbai. BVM, mainly sold in Delhi/NCR, has been a challenge due to changing consumer needs and a preference for having milk delivered at home.

The company plans to scale up the newly introduced Automatic Vending Machines (AVM) in Mumbai and Delhi for the convenience of consumers and to reach out to the marginal areas with affordably priced and safe milk. Work on a few innovative solutions for home delivery of milk, by exploring partnerships with different players, is underway. There are plans to launch additional variants like cow milk in major cities, along with ensuring adequate trade and advertising support.

MDFVPL's dairy products business has been consistently registering healthy growth rates in recent years. The growth momentum will continue in fresh fermented dairy products and ice creams with stronger presence across all metros and top cities of the country. Even as the company builds volumes through the mass appeal of its products and drives value through differentiated offerings, it will nurture the newly launched long shelf life ambient dairy products such as dairy whitener, UHT cream and beverages.

The edible oil business witnessed an encouraging growth led by an expansion of its distribution reach to 1 lakh+ people. Going forward, a comprehensive market strategy has been worked out with a campaign based on the theme, 'Winning with the Retailers' being rolled out. The business is confident of clocking higher growth rates for the upcoming financial year.

The horticulture business segment remained flat. While the fresh business encountered headwinds, the frozen business posted a healthy growth over last year. The focus was on consumer packs and strengthening brand presence. The SBU also looked at new opportunities like pulses to meet the growing demand and for the first time, the company began the bulk procurement of pulses.

The fresh F&V business will focus on revamping the 'Safal Booths', growing the institutional customer base and exploring tie-ups with alternate distribution channels. The value-added F&V business is looking towards portfolio expansion supported by increased penetration in existing markets.

The pulp business was challenging due to a poor mango crop, resulting in lower demand from the beverage industry. There was a focus on the export market, adding new customers and reinitiating grapes exports to European countries after a gap of four years.

In 2015-16, MDFVPL achieved a turnover of ₹71,860 million registering an overall growth of 4 per cent; profit before tax however increased significantly from ₹650 million in 2014-15 to ₹2,330 million in 2015-16, largely as a consequence of lower commodity prices and the operating cost control measures undertaken.

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). During the year, two new mega semen stations were set up in Alamadhi in Tamil Nadu and Rahuri in Maharashtra. About

358 acres of land was allotted by Government of India at the Central Cattle Breeding Farm, Alamadhi, and about 250 acres of land by the Government of Maharashtra at Mahatma Phule Krishi Vidyapeeth, Rahuri, to establish the semen stations. Each of the new semen stations has a capacity to house about 300 bulls under collection and produce at least 10 million semen doses in a year.

NDS continued to support the five large Milk Producer Companies (MPCs) which were incorporated and operationalised with assistance from NDS, namely Paayas in Rajasthan, Maahi in Gujarat, Shreeja in Andhra Pradesh, Baani in Punjab, and Saahaj in Uttar Pradesh.

NDS assisted the Paayas, Maahi and Shreeja MPCs in the implementation of the Enterprise Resource Planning (ERP) system – SAP, under the World Bank-funded NDP-I, the first such project approved by the World Bank in the dairy sector in India. The ERP provides a single IT system for processing all member-related transactions like MPC membership; payments based on quality of the milk supplied by the members; deductions for the cattle feed and share capital; and the timely monitoring of whether the members fulfil the criteria for continuation of membership. It also provides for automation of the Milk Pooling Points to ensure integrity of the member milk pouring data and the calculation of payment for the milk supplied.

NDS supported the MPCs in the capacity building of the various stakeholders of the MPCs. As a follow-up on the 'Leadership through Policy Governance' workshop held during the previous year, the Board of Directors of both Paayas and Maahi MPCs deliberated on the different policy areas and finalised the 'Policy Register' for their respective MPCs.

A training programme was organised for the Board of Directors of Paayas MPC on 'Understanding Financial Statements' which facilitated them to analyse and interpret information contained within the income statement and the balance sheet.

Awareness training programmes were held on 'Quality and Food Safety' for the Board of Directors of Shreeja, Baani and Saahaj MPCs. The programme covered the topics of Food Safety Compliances, Licensing and Registrations in Food Business and Offences & Penalties. The Quality Assurance officers of the MPCs were also trained in Laboratory Testing, Good Manufacturing Practices and were introduced to ISO & HACCP certifications.

NDS assisted in developing the model farms which were set up with the producer members of Shreeja MMPC into model learning centres where farmer members were introduced to good farm-management practices and over 500 farmers were trained. NDS also assisted Saahaj and Baani MPCs in setting up ten and eight such model farms, respectively, which would be then turned into micro training centres.

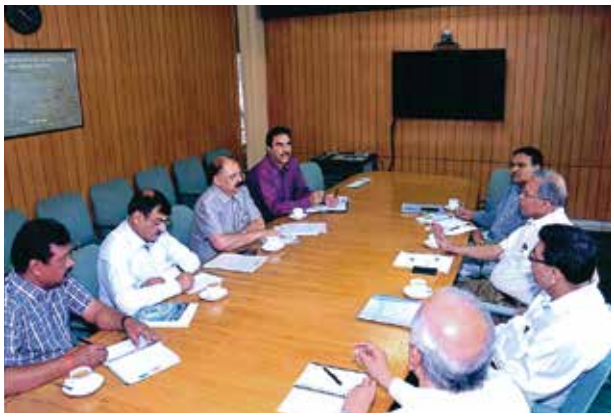
NDS facilitated the incorporation of two milk producer companies – Sakhi Mahila Milk Producer Company in Alwar; and Asha Mahila Milk Producer Company in Pali, Rajasthan – based on the request from Tata Trusts. Both these companies are 'all-women member-based' and all the producer-directors on the Board are women.

The Ministry of Rural Development (MoRD), GoI supported by the World Bank is implementing the National Rural Livelihood Mission (NRLM), one of the world's largest initiatives to improve the livelihood of the economically weaker sections through mobilisation and organisation of the rural poor and by building their financial and economic inclusion. MoRD/World Bank would like NDS to partner them in assisting the 13 implementing states in setting up Producer Companies in their respective project areas and providing institutional building and human capacity development support.

Visitors

During 2015-16, NDDB received 659 visitors from India and abroad.

Overseas visitors came from Afghanistan, Australia, Germany, Japan, Kenya, Korea, Liberia, Malawi, Mongolia, the Netherlands, Paris and Sri Lanka.



Dr. Pradeep Kumar, Secretary, Animal Husbandry & Fisheries, Government of Jharkhand.

Shri Randhir Kumar Singh, Minister, Agriculture, Animal Husbandry & Fisheries, Government of Jharkhand.

Dr. Arvind Subramaniam, Chief Economic Advisor, Government of India.

Mr. Abdul Qadeer Jawad, Hon'ble Deputy Minister of Agriculture, Irrigation and Livestock, Islamic Republic of Afghanistan.

Shri Haribhau Bagade, Maharashtra Legislative Assembly, Maharashtra.

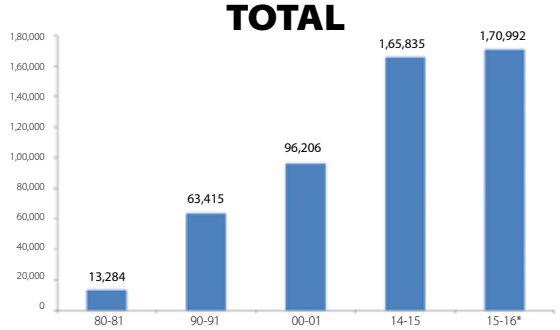
Dr. Nitin Kulkarni, Secretary, Department of Agriculture, Animal Husbandry and Cattle, Government of Jharkhand.

Dairy Cooperatives at a Glance

Dairy Coop Societies

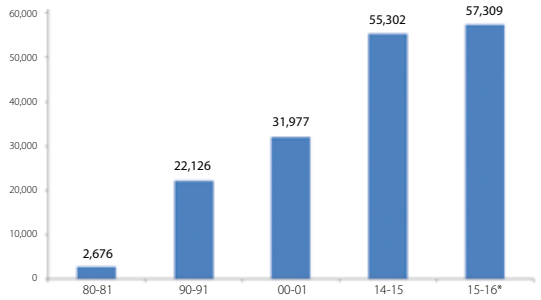
(in numbers)@

TOTAL



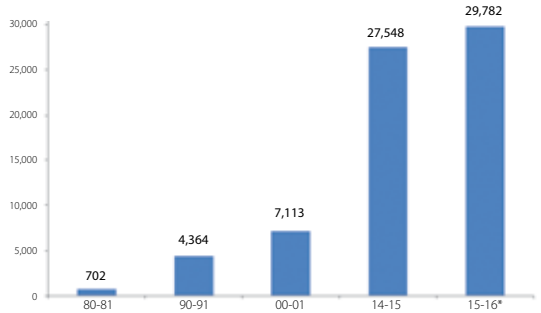
NORTH

NORTH	80-81	90-91	00-01	14-15	15-16*
Haryana	505	3,229	3,318	7,035	7,157
Himachal Pradesh		210	288	845	860
Jammu & Kashmir		105	**	326	366
Punjab	490	5,726	6,823	7,411	7,575
Rajasthan	1,433	4,976	5,900	14,618	14,620
Uttar Pradesh	248	7,880	15,648	22,674	22,790
Uttarakhand				2,393	3,941



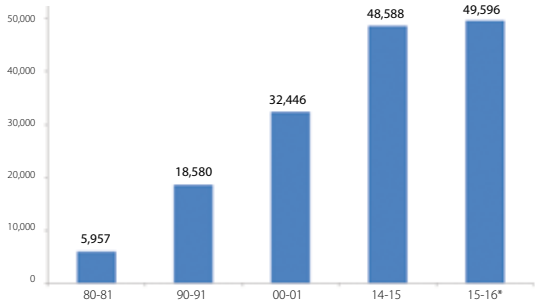
EAST

EAST	80-81	90-91	00-01	14-15	15-16*
Assam		117	125	294	332
Bihar	118	2,060	3,525	17,718	19,483
Jharkhand				60	60
Meghalaya				66	97
Mizoram				37	37
Nagaland		21	74	51	52
Odisha		736	1,412	5,348	5,541
Sikkim		134	174	389	433
Tripura		73	84	98	99
West Bengal	584	1,223	1,719	3,487	3,648



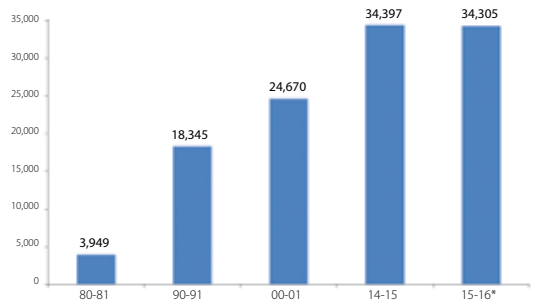
WEST

WEST	80-81	90-91	00-01	14-15	15-16*
Chhattisgarh				766	859
Goa		124	166	180	180
Gujarat	4,798	10,056	10,679	18,536	18,545
Madhya Pradesh	441	3,865	4,877	8,024	8,341
Maharashtra	718	4,535	16,724	21,082	21,671



SOUTH

SOUTH	80-81	90-91	00-01	14-15	15-16*
Andhra Pradesh	298	4,766	4,912	3,425	3,464
Karnataka	1,267	5,621	8,516	14,377	14,794
Kerala		1,016	2,781	3,836	3,240
Tamil Nadu	2,384	6,871	8,369	10,997	10,986
Telangana				1,660	1,719
Puducherry		71	92	102	102

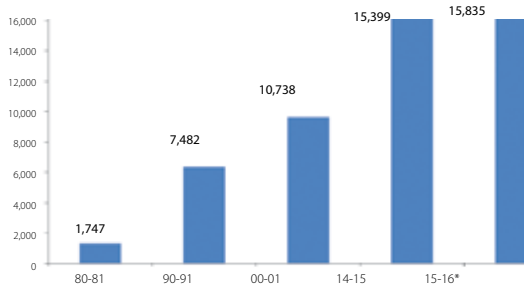


@ Organised (cumulative), includes conventional societies and Taluka unions formed earlier
* Provisional ** Not reported
Information of Meghalaya, Mizoram, Telangana and Uttarakhand included from 2014-15

Producer Members

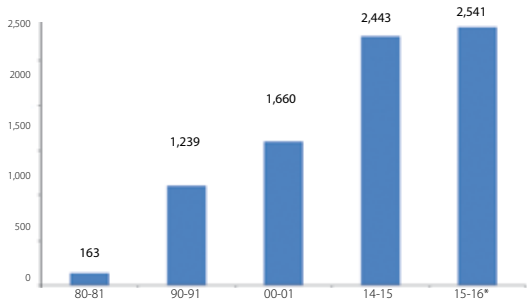
(in thousands)

TOTAL



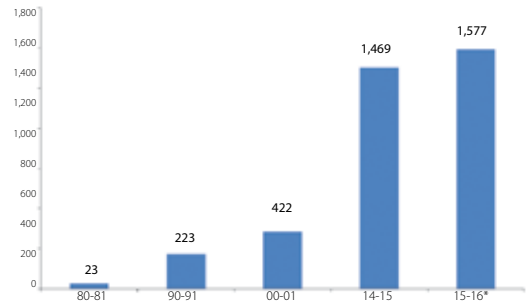
NORTH

NORTH	80-81	90-91	00-01	14-15	15-16*
Haryana	39	184	185	297	305
Himachal Pradesh		17	20	35	36
Jammu & Kashmir		2	**	6	7
Punjab	26	304	370	394	399
Rajasthan	80	340	436	731	763
Uttar Pradesh	18	392	649	877	878
Uttarakhand				103	153



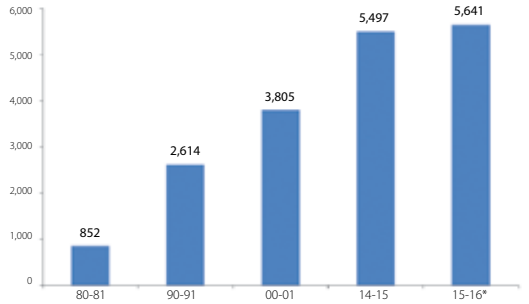
EAST

EAST	80-81	90-91	00-01	14-15	15-16*
Assam		2	1	12	16
Bihar	3	100	184	920	1,004
Jharkhand				1	1
Meghalaya				4	4
Mizoram				1	1
Nagaland		1	3	2	2
Odisha		46	111	271	280
Sikkim		4	5	10	12
Tripura		4	4	6	6
West Bengal	20	66	114	242	252



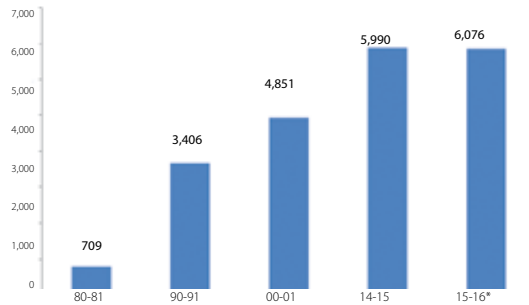
WEST

WEST	80-81	90-91	00-01	14-15	15-16*
Chhattisgarh				32	35
Goa		12	18	19	19
Gujarat	741	1,612	2,147	3,365	3,452
Madhya Pradesh	24	150	242	311	321
Maharashtra	87	840	1,398	1,770	1,814



SOUTH

SOUTH	80-81	90-91	00-01	14-15	15-16*
Andhra Pradesh	33	561	702	637	649
Karnataka	195	1,013	1,528	2,359	2,400
Kerala		225	637	919	940
Tamil Nadu	481	1,590	1,957	1,922	1,923
Telangana				115	127
Puducherry		17	27	38	38



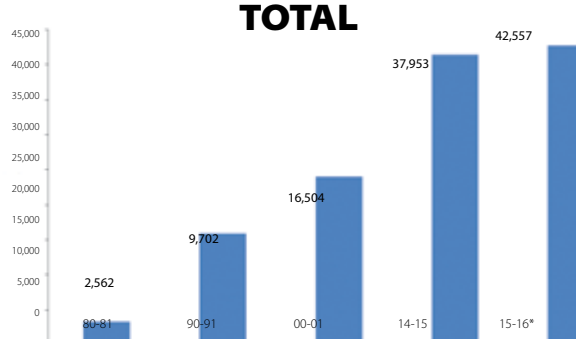
* Provisional ** Not reported

Information of Meghalaya, Mizoram, Telangana and Uttarakhand included from 2014-15

Milk Procurement

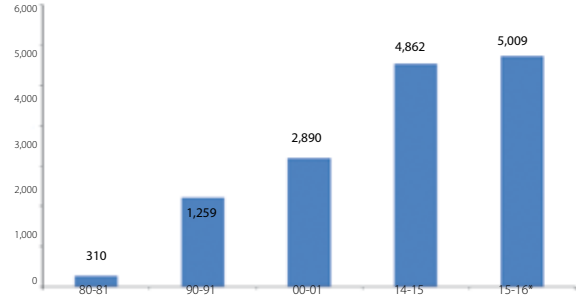
(in thousand kilograms per day)#

TOTAL



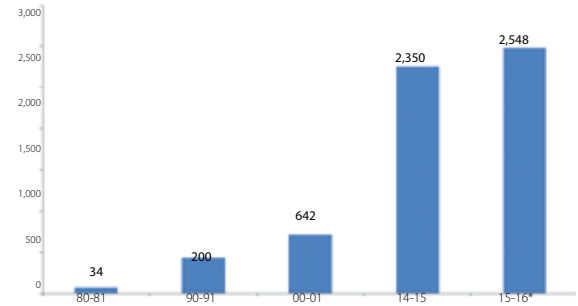
NORTH

NORTH	80-81	90-91	00-01	14-15	15-16*
Haryana	33	94	276	437	450
Himachal Pradesh		14	24	55	57
Jammu & Kashmir		11	**	13	12
Punjab	75	394	912	1,279	1,392
Rajasthan	138	364	887	2,535	2,603
Uttar Pradesh	64	382	791	404	322
Uttarakhand				139	173



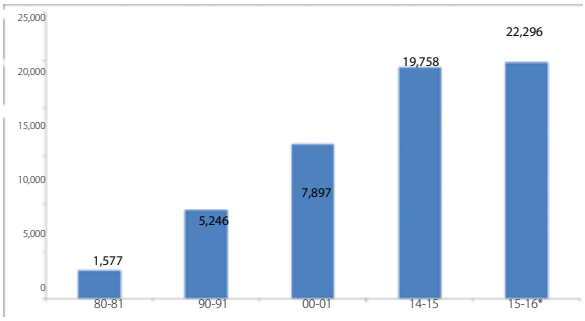
EAST

EAST	80-81	90-91	00-01	14-15	15-16*
Assam		4	3	23	22
Bihar	3	95	330	1,676	1,726
Jharkhand				14	61
Meghalaya				10	11
Mizoram				7	7
Nagaland		1	3	2	6
Odisha		41	94	440	525
Sikkim		4	7	17	28
Tripura		3	1	5	5
West Bengal	31	52	204	156	158



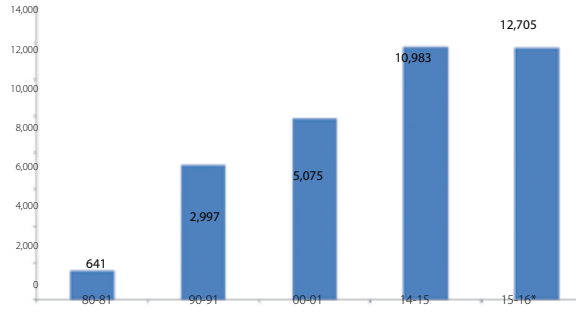
WEST

WEST	80-81	90-91	00-01	14-15	15-16*
Chhattisgarh				52	74
Goa		16	32	65	66
Gujarat	1,344	3,102	4,567	15,295	17,481
Madhya Pradesh	68	256	319	1,103	1,029
Maharashtra	165	1,872	2,979	3,243	3,645



SOUTH

SOUTH	80-81	90-91	00-01	14-15	15-16*
Andhra Pradesh	79	763	879	1,221	1,332
Karnataka	261	917	1,887	5,861	6,480
Kerala		185	646	1,018	1,099
Tamil Nadu	301	1,106	1,618	2,435	3,040
Telangana				423	712
Puducherry		26	45	26	43

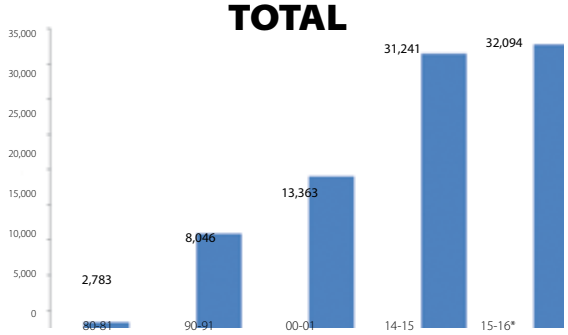


Milk procurement includes outside state operations * Provisional ** Not reported
Information of Meghalaya, Mizoram, Telangana and Uttarakhand included from 2014-15
Gujarat's total procurement in 2015-16 includes 2,643 TKPD from outside the state.
In 2014-15, the corresponding figure was 2,078 TKPD.

Liquid Milk Marketing

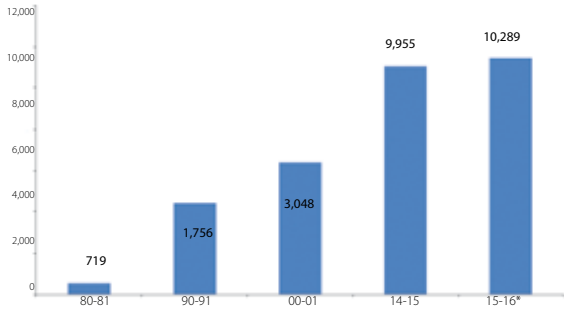
(in thousand litres per day)+

TOTAL



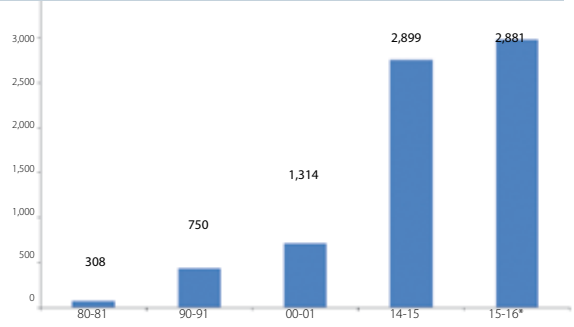
NORTH

NORTH	80-81	90-91	00-01	14-15	15-16*
Haryana	2	80	108	368	335
Himachal Pradesh		15	20	18	23
Jammu & Kashmir		9	**	13	14
Punjab	7	139	420	944	965
Rajasthan	12	136	540	2,005	2,084
Uttar Pradesh	1	326	436	592	689
Uttarakhand				130	145
DELHI	697	1,051	1,524	5,885	6,032



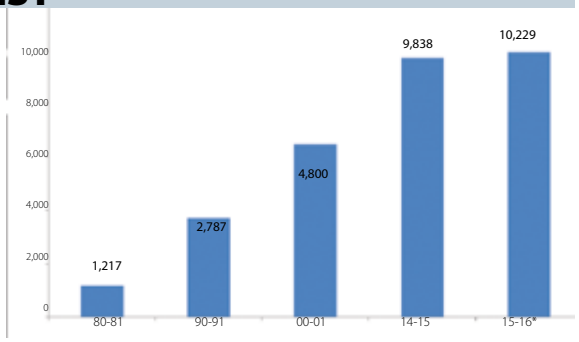
EAST

EAST	80-81	90-91	00-01	14-15	15-16*
Assam		10	7	40	42
Bihar	8	111	324	840	880
Jharkhand				308	304
Meghalaya				10	12
Mizoram				6	6
Nagaland		1	4	3	4
Odisha		65	98	474	406
Sikkim		5	7	28	31
Tripura		6	7	10	11
West Bengal	17	26	27	32	28
KOLKATA	283	526	840	1,148	1,158



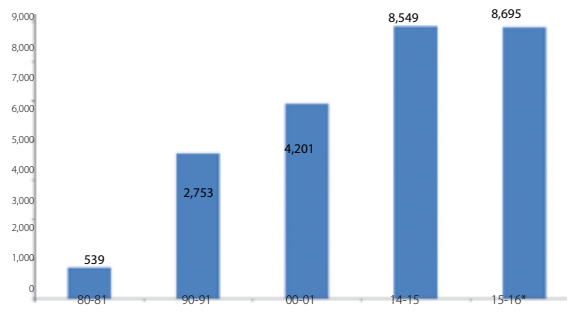
WEST

WEST	80-81	90-91	00-01	14-15	15-16*
Chhattisgarh				132	132
Goa		36	83	79	83
Gujarat	210	1,052	1,905	4,468	4,749
Madhya Pradesh	39	279	244	800	795
Maharashtra	18	363	1,178	2,574	2,686
MUMBAI	950	1,057	1,390	1,785	1,784



SOUTH

SOUTH	80-81	90-91	00-01	14-15	15-16*
Andhra Pradesh	19	552	733	1,121	1,139
Karnataka	166	889	1,501	3,219	3,344
Kerala		223	640	1,232	1,264
Tamil Nadu	109	405	559	1,023	989
Telangana				736	790
Puducherry		22	43	105	99
CHENNAI	245	662	725	1,113	1,071



+ Includes Metro Dairies and outside state operations * Provisional ** Not reported
Information of Meghalaya, Mizoram, Telangana and Uttarakhand included from 2014-15
Gujarat's total marketing of milk including outside the state in 2015-16 stands at 10,835 TLPD.
In 2014-15, the corresponding figure was 9,932 TLPD.

Accounts

Deloitte
Haskins & Sells LLP

Chartered Accountants
19th Floor, Shapath-V
S. G. Highway
Ahmedabad - 380 015
Gujarat, India

Tel:+91 (079) 6682 7300
Fax: +91 (079) 6682 7400

INDEPENDENT AUDITORS' 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 31st March, 2016, the Income and Expenditure Account and also the Cash Flow Statement for the year then ended, and a summary of Significant accounting policies and Notes to Accounts.

Management's responsibility for the Financial Statements

The Board's Directors and 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 and fair presentation of the financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements, based on our audit. We conducted our audit in accordance with Standards on Auditing issued by the Institute of Chartered Accountants of India. Those Standards require that we comply with the 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 the disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risks assessments, the auditor considers the internal controls 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 the accounting policies used and the reasonableness of the accounting estimates made by the 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 aforesaid financial statements of the Board for the year ended 31st March, 2016 are prepared, in all material respect, in accordance with the provisions of the Act.

For **DELOITTE HASKINS AND SELLS LLP**
Chartered Accountants
(Firm's Registration No. 117366W / W – 1000018)

Kartikeya Raval
Partner
Membership No. 106189

Place: Anand
Date: 14th July, 2016

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, 2016

₹ in million

	ANNEXURE	31.03.2016	31.03.2015
LIABILITIES			
NDDB Funds	I	28,032.67	26,887.73
Secured Loans	II	752.84	13.89
Current Liabilities and Provisions	III	6,575.01	7,110.03
Total		**35,360.52**	**34,011.65**
ASSETS			
Cash and Bank Balances	IV	8,422.88	7,772.71
Inventories	V	1.40	1.40
Sundry Debtors		72.56	83.58
Loans, Advances and Other Current Assets	VI	17,295.39	16,382.06
Investments	VII	7,532.17	7,679.32
Fixed Assets	VIII	1,907.75	1,902.28
Deferred Tax Assets	XVI (Note 9 and 10)	128.37	190.30
Total		**35,360.52**	**34,011.65**
Significant Accounting Policies	XV		
Notes to Accounts forming part of Financial Statements	XVI		

In terms of our report of even date attached.

For Deloitte Haskins & Sells LLP
Chartered Accountants

For and on behalf of the Board,

Kartikeya Raval
Partner

T Nanda Kumar
Chairman

Dilip Rath
Managing Director

Y Y Patil
General Manager
(Accounts)

Anand, 14th July, 2016

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, 2016

₹ in million

Particulars	ANNEXURE	2015-2016	2014-2015
INCOME			
Interest		1,919.32	1,927.93
Service Charges	IX	175.65	120.15
Rent		169.37	161.97
Dividend		130.14	24.43
Other Income	X	600.55	27.34
Total (A)		**2,995.03**	**2,261.82**
EXPENDITURE			
Interest and Financial Charges		121.65	148.71
Remuneration and Benefits to Employees	XI	638.44	642.98
Administrative Expenses	XII	175.95	157.18
Grants		13.14	7.92
Research and Development		134.84	104.32
Maintenance of Assets	XIII	193.02	191.46
Other Expenses	XIV	78.47	59.02
Bad Debts Written off	XVI (Note 11)	319.92	-
Depreciation	VIII	133.29	200.31
Total (B)		**1,808.72**	**1,511.90**
Surplus during the year before tax (C) = (A - B)		**1,186.31**	**749.92**
Less: Provision for Taxation			
Deferred Tax	XVI (Note 9)	61.93	14.17
Wealth Tax		-	1.08
Surplus during the year after tax		**1,124.38**	**734.67**
Less: Appropriations to -			
Special Reserve		135.98	120.47
Balance carried to General Funds		988.40	614.20
Total (D) = (B + C)		**2,995.03**	**2,261.82**
Significant Accounting Policies	XV		
Notes to Accounts forming part of Financial Statements	XVI		

In terms of our report of even date attached.

For Deloitte Haskins & Sells LLP
Chartered Accountants

For and on behalf of the Board,

Kartikeya Raval
Partner

T Nanda Kumar
Chairman

Dilip Rath
Managing Director

Y Y Patil
General Manager
(Accounts)

Anand, 14th July, 2016

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, 2016

₹ in million

PARTICULARS		2015-16	2014-15
Surplus during the year before tax		1,186.31	749.92
Adjustments for :			
Depreciation	133.29		200.31
(Write back)/Provision for inventory obsolescence	-		(25.59)
(Profit)/Loss on disposal of investments	(11.35)		4.61
Interest income on fixed deposit and bonds	(964.68)		(1,038.48)
Dividend Income	(130.14)		(24.43)
(Profit)/Loss on sale of fixed assets (including loss on assets given on grant)	(129.94)		(1.22)
Employee Retirement Benefit	59.51		129.68
Interest and financial charges to banks	4.45		(1.90)
Bad debts written off	319.92		-
		(718.94)	(757.02)
Operating Cash flow before changes in working capital		**467.37**	**(7.11)**
(Increase) / Decrease in Inventories	-		25.79
(Decrease) / Increase in Sundry Debtors	11.02		6.22
(Decrease) / Increase in Loans, Advances and Other Current Assets	(1,906.52)		(2,151.55)
Tax (paid) / refunded	(34.74)		(122.57)
Increase/(Decrease) in current liabilities	273.96		358.03
		(1,656.28)	(1,884.08)
Net cash flow (used in) / generated from operating activities (A)		**(1,188.91)**	**(1,891.19)**
Investing activities			
Interest Income	804.21		1,081.30
Dividend Income	130.14		24.43
Proceeds from maturity of investments (Bonds)	158.50		545.39
Purchase of Investments (Bonds)	-		(700.34)
(Increase) / Decrease in FDRs with banks with original maturity of more than 90 days (net)	(683.00)		1,650.65
Proceeds from sale of fixed assets	198.58		43.64
Purchase of fixed assets (net of grant received)	(186.85)		(197.21)
Net cash flow generated from / (used in) investing activities (B)		**421.58**	**2,447.86**

₹ in million

PARTICULARS		2015-16	2014-15
Financing activities			
Proceeds / (Repayment) of borrowed funds	738.95		(527.01)
Interest and financial charges to banks	(4.45)		1.90
Net cash flow generated from / (used in) financing activities (C)		734.50	(525.11)
Net Cash flow during the year (A+B+C)		(32.83)	31.57
Cash and Cash Equivalents at the beginning of the year		38.41	6.84
Cash and Cash Equivalents at the end of the year		5.58	38.41
Cash and Cash Equivalents			
Balances with Banks:			
In fixed deposits		8,417.30	7,734.30
Less: Deposits with maturity more than 90 days		8,417.30	7,734.30
		-	-
In current accounts		5.23	38.24
Cash and Cheques on hand		0.35	0.17
Total		**5.58**	**38.41**
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 - 'Cash Flow Statements'.

In terms of our report of even date attached.

For Deloitte Haskins & Sells LLP
Chartered Accountants

For and on behalf of the Board,

Kartikeya Raval
Partner

T Nanda Kumar
Chairman

Dilip Rath
Managing Director

Y Y Patil
General Manager (Accounts)

Anand, 14th July, 2016

NDDB Funds

ANNEXURE I

₹ in million

		31.03.2016	31.03.2015
General Reserve (Note a)			
Balance as per last balance sheet		3,885.63	3,885.63
Grant for Fixed Assets (Note b)			
Balance as per last balance sheet	10.22		10.58
Add: Grant received during the year	24.94		
Less: Recoupment of depreciation (Refer Note 4 of Annexure VIII)	4.38		0.36
		30.78	10.22
Special Reserve under section 36 (1) (viii) of the Income Tax Act, 1961 (Refer Note 10)			
Balance as per last balance sheet	822.75		702.28
Add: Transfer from Income and Expenditure Account	135.98		120.47
		958.73	822.75
Income and Expenditure Account			
Balance as per last balance sheet	22,169.13		21,554.93
Add: Surplus after appropriation during the year	988.40		614.20
		23,157.53	22,169.13
Total		**28,032.67**	**26,887.73**

Notes :

a. To promote, plan and organise programmes for development of dairy and other agriculture based and allied industries and biologicals as per the NDDB Act, 1987.

b. In accordance with Accounting Standard - 12 - 'Accounting for Government Grants'

Secured Loans

ANNEXURE II

₹ in million

	31.03.2016	31.03.2015
Bank Overdraft (Secured against lien on fixed deposits with Banks)	752.84	13.89
Total	**752.84**	**13.89**

Current Liabilities and Provisions

ANNEXURE III

₹ in million

		31.03.2016	31.03.2015
a) Current Liabilities			
Advances and deposits		21.06	17.04
Sundry creditors		223.79	224.90
Net liability on account of Turnkey Project			
Funds received	15,066.51		12,569.02
Add: Due to suppliers for expenses	902.27		612.76
	15,968.78		13,181.78
Less: Expenditure incurred	13,179.28		10,300.76
Advance to suppliers	291.53		733.99
	2,497.97		2,147.03
Add: Payable to NDDB (Per contra, Refer Annexure VI)	14.54		44.83
		2,512.51	2,191.86

b) Provisions for :			
Non-performing assets	2,578.16		3,444.30
General contingency on Standard Assets	32.81		28.69
Contingency	611.32		616.77
		3,222.29	4,089.76
c) Provisions for :			
Leave encashment (Refer Note 7 of Annexure XVI)	280.18		246.31
Post retirement medical scheme (Refer Note 7 of Annexure XVI)	76.84		76.86
Gratuity (Refer Note 7 of Annexure XVI)	11.27		16.59
VRS monthly benefits	44.54		63.15
Wealth tax	0.00		1.03
		412.83	403.94
Provisions for income tax (net of taxes paid)		182.53	182.53
Total		**6,575.01**	**7,110.03**

Cash and Bank Balances

ANNEXURE IV

₹ in million

		31.03.2016	31.03.2015
Balances with Banks			
In fixed deposits	8,417.30		7,734.30
In current accounts	5.23		38.24
		8,422.53	7,772.54
Cash and cheques on hand		0.35	0.17
Total		**8,422.88**	**7,772.71**

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

Inventories

ANNEXURE V

₹ in million

		31.03.2016	31.03.2015
Stores, spares and others	2.30		2.03
Project equipments	4.30		4.57
	6.60		6.60
Less : Provision for obsolescence	5.20		5.20
		1.40	1.40
Total		**1.40**	**1.40**

Loans, Advances and Other Current Assets

ANNEXURE VI

₹ in million

		31.03.2016	31.03.2015
Loans to cooperatives			
Milk - Secured	9,198.07		7,521.72
Unsecured	130.17		152.14
		9,328.24	7,673.86
Oil (including interest accrued) - Unsecured		2,412.83	3,271.30
Loans and advances to subsidiary companies / managed units			
Secured	2,493.26		3,201.96
Unsecured	1,242.12		569.04
		3,735.38	3,771.00
Loans to employees			
Secured	1.56		2.04
Unsecured	8.71		8.57
		10.27	10.61
Interest accrued on -			
Loans and advances	70.64		73.41
Fixed deposits and investments	524.05		363.57
		594.69	436.98
Advances to suppliers and contractors		3.97	3.29
Recoverable on account of turnkey projects			
(Per contra, Refer Annexure III)		14.54	44.83
Sundry deposits		16.13	13.96
Income taxes paid (net of provisions)		1,167.71	1,134.00
Other receivables		11.63	22.23
Total		**17,295.39**	**16,382.06**

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

Investments

ANNEXURE VII

₹ in million

		31.03.2016	31.03.2015
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
NDDB 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)		2,657.37	2,804.52
(aggregate market value of bonds is ₹ 2,679.61 million			
(Previous Year ₹ 2,852.81 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		**7,532.17**	**7,679.32**

Fixed Assets

Annexure - VIII

₹ in million

Particulars	Gross Block (at Cost)				Depreciation				Net Block	
	As at 01.04.2015	Additions	Deductions/ (adjustments)	As at 31.03.2016	As at 01.04.2015	For the year (refer note 4)	Deductions/ (adjustments)	As at 31.03.2016	As at 31.03.2016	As at 31.03.2015
Freehold Land *(refer note 1 to 3)*	451.17	-	-	451.17	-	-	-	-	451.17	451.17
Leasehold Land	64.16	-	-	64.16	10.03	0.77	-	10.80	53.36	54.13
Building and Roads	1,933.59	69.80	17.89	1,985.50	886.17	52.52	8.89	929.80	1,055.70	1,047.42
Plant & Machinery	60.97	0.32	5.57	55.72	59.45	0.30	5.58	54.17	1.55	1.52
Electrical Installations	283.87	23.63	141.62	165.88	191.78	7.67	94.57	104.88	61.00	92.09
Furniture, Computers and Other Equipment	1,406.30	98.44	636.12	868.62	1,234.46	73.96	623.50	684.92	183.70	171.84
Rail Milk Tankers	217.83	-	4.33	213.50	217.83	-	4.33	213.50	-	-
Vehicles	23.10	4.85	0.84	27.11	19.97	2.45	0.85	21.57	5.54	3.13
Total	**4,440.99**	**197.04**	**806.37**	**3,831.66**	**2,619.69**	**137.67**	**737.72**	**2,019.64**	**1,812.02**	**1,821.30**
Previous Year	*4,733.81*	*146.10*	*438.92*	*4,440.99*	*2,815.52*	*200.67*	*396.50*	*2,619.69*	*1,821.30*	*1,918.29*
Capital Work in Progress including capital advances									95.73	80.98
Total Fixed Assets									**1,907.75**	**1,902.28**

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 ₹ 4.38 million (Previous year : ₹ 0.36 million) on account of recoupment from grants received.

Service Charges

ANNEXURE - IX

₹ in million

	2015-2016	2014-2015
Training fees	5.79	2.61
Management fees	0.66	1.78
Procurement and technical service fees	166.10	112.71
Fees from consultancy and feasibility studies	1.04	0.34
Royalty and process knowhow fees	2.06	2.71
Total	**175.65**	**120.15**

Other Income

ANNEXURE - X

₹ in million

	2015-2016	2014-2015
Profit on sale of fixed assets (net)	135.22	1.22
Profit on disposal of Investments	11.35	-
Excess provision and NPAs written back	423.38	-
Miscellaneous income	30.60	26.12
Total	**600.55**	**27.34**

Remuneration and benefits to employees

ANNEXURE - XI

₹ in million

	2015-2016	2014-2015
Salaries and Wages (including ex-gratia and retainership fees)	497.77	482.86
Contribution to Provident, Superannuation fund and Gratuity	89.20	111.85
Staff welfare expenses	51.47	48.27
Total	**638.44**	**642.98**

Remuneration excludes ₹19.53 million (Previous year : ₹13.18 million) shown as part of Research and Development expenses.

Administrative Expenses

ANNEXURE - XII

₹ in million

		2015-2016	2014-2015
Printing and stationery		6.49	5.90
Communication charges		7.90	6.45
Audit fees and expenses (including service tax)			
Audit fees	0.77		0.74
Tax audit	0.25		0.25
Fees for other services	0.02		0.08
Out of pocket expenses	0.10		0.05
		1.14	1.12
Legal fees		2.39	0.90
Professional fees (Note 4 of Annexure XVI)		42.97	44.46

Vehicle expenses	3.45	3.56
Recruitment expenses	0.67	0.48
Advertisement expenses	13.72	4.23
Travelling and conveyance expenses	66.98	61.00
Electricity and rent	25.61	24.66
Other administrative expenses	4.63	4.42
Total	**175.95**	**157.18**

Maintenance of Assets

ANNEXURE - XIII

₹ in million

	2015-2016	2014-2015
Repairs and maintenance		
Buildings	135.40	129.44
Others	51.36	56.74
Rates and taxes	4.28	3.86
Insurance	1.98	1.42
Total	**193.02**	**191.46**

Other Expenses

ANNEXURE - XIV

₹ in million

	2015-2016	2014-2015
Training expenses	26.41	24.22
Computer expenses	16.20	10.87
Loss on sale of investment (net)	-	4.61
Other expenditure	35.86	19.32
Total	**78.47**	**59.02**

NATIONAL DAIRY DEVELOPMENT BOARD ("NDDB" or "the Board")

Significant Accounting Policies forming part of financial Statement

Annexure XV

1. Method of Accounting

The financial statements are prepared on accrual basis, using the historical cost convention and generally accepted accounting principles in India including accounting standards issued by the Institute of Chartered Accountants of India, as applicable to the Board.

2. Use of Estimates

The preparation of financial statements in conformity with the Generally Accepted Accounting Principles in India which requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, revenues and expenses and the disclosure of contingent liabilities. Such estimates and assumptions are based on the Management's evaluation of relevant facts and circumstances as on the date of the financial statements. 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

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

4. Revenue Recognition

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

Interest income on fixed deposits with Bank and 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 expenses 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.

Further, the Board has participated 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 equipments	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.

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

Premium on purchase of debentures / bonds in Government Companies, Financial Institutions and Banks is charged to Income & Expenditure Account over the maturity period. Discount on purchase of these investments is recognised in the year of realisation.

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 exgratia 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 : ₹ 39.95 million (Previous Year : ₹ 343.92 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) ₹ 736.84 million (Previous Year : ₹ 735.28 million)

2.4. Service tax demands ₹ 446.72 million (Previous Year: ₹ 517.48 million)

2.5. Other Demands

Particulars	Authority	₹ in million	
		2015-16	2014-15
Settlement of Land dues	Land and Land Reform Department, Siliguri	0.39	0.39
Interest Demand on delayed payment of municipal taxes	Collector, Mumbai Suburban	-	1.71
Combined Effluent Treatment Plant (CETP) charges, Ground Rent and Maintenance Charges	Delhi State Industrial and Infra-structure Development Corporation Limited, Narela	7.32	3.30
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 Professional fees include ₹ 0.83 million (Previous Year: ₹ 1.09 million) paid to the firm in which one of the partner of the audit firm is a partner.

5 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.

6 Disclosure of related party and Transactions with them for the year ended 31st March, 2016 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
NDDB 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.
NDDB Foundation for Nutrition

3) **Key management personnel**

Mr. T Nandakumar	Chairman
Mr. Dilip Rath	Managing Director
Mr. Sangram Chaudhary	Executive Director

b) Transactions with related parties
(figures in Itlic represent previous year figures)

₹ in million

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)
											Principal	Interest	
Subsidiary Companies													
IDMC Limited	106.45	12.14	0.79	-	-	-	0.04	-	0.06	1,107.40	442.67	101.65	1,580.75
	75.94	*10.93*	*1.49*	-	-	-	*0.15*	*0.03*	*0.03*	*589.36*	*361.92*	*75.21*	*916.02*
Indian Immunologicals Limited	100.55	18.00	21.41	-	0.14	-	0.13	1.84	(1.14)	777.96	785.94	95.59	980.47
	67.81	*13.50*	*22.10*	-	-	-	*1.61*	*2.93*	*(8.86)*	*350.00*	*140.16*	*59.84*	*988.46*
Mother Dairy Fruit and Vegetable Private Limited	77.20	100.00	113.02	-	15.03	-	0.56	45.36	51.29	38.85	814.28	-	336.45
	93.45	-	*101.98*	-	*40.97*	-	*0.55*	*41.57*	*65.59*	*311.13*	*54.84*	*93.45*	*1,111.87*
NDDB Dairy Services	3.07	-	1.82	-	-	72.92	4.07	-	0.31	499.09	199.93	0.09	831.58
	6.25	-	*1.49*	-	-	-	*0.04*	-	*1.02*	*734.65*	*327.58*	-	*532.42*
Total	**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**
	243.45	***24.43***	***127.06***	**-**	***40.97***	**-**	***2.35***	***44.53***	***57.78***	***1,985.14***	***884.50***	***228.50***	***3,548.77***
Other enterprises where management has significant influence over the management													
The West Assam Milk Producers Co.op Union Ltd	0.55	-	-	-	-	-	0.07	-	-	-	24.49	0.55	6.13
	0.95	-	-	-	-	-	*0.12*	-	*0.02*	*31.00*	*29.09*	*0.95*	*30.62*
Animal Breeding Research Organisation (India)	-	-	-	0.28	-	-	1.33	0.01	-	-	-	-	-
	-	-	-	-	-	-	*0.81*	-	*0.53*	-	-	-	-
Anandalaya Education society	-	-	0.66	-	-	-	0.04	-	0.11	-	-		-
	-	-	*0.48*	-	-	-	*0.04*	-	*0.34*	-	-		-
Jharkhand State Cooperative Milk Producers' Federation Ltd.	-	-	-	0.10	-	-	1.07	-	0.81	-	-	-	-
	-	-	-	-	-	-	*0.11*	-	-	-	-	-	-
NDDB Foundation for Nutrition	-	-	-	-	-	-	-	0.10	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**0.55**	**-**	**0.66**	**0.38**	**-**	**-**	**2.51**	**0.11**	**0.92**	**-**	**24.49**	**0.55**	**6.13**
	0.95	**-**	***0.48***	**-**	**-**	**-**	***1.08***	**-**	***0.89***	***31.00***	***29.09***	***0.95***	***30.62***

Remuneration to key management personnel	
Mr. T Nandakumar	2.68
	2.33
Mr. Dilip Rath	3.16
	2.74
Mr. Sangram Chaudhary	2.98
	2.91
Total	**8.82**
	7.98

7. Disclosure as per Accounting Standard 15 (Revised 2005) regarding Employee Benefits is as under:

Employee benefit plans

Defined Contribution Plans

The Board makes Provident Fund and Superannuation Fund contributions to defined contribution plans for qualifying employees. Under the Schemes, the Board is required to contribute a specified percentage of the payroll costs to fund the benefits. The Board recognised ₹ 45.19 millions (Year ended 31 March, 2015 : ₹ 39.74 millions) for Provident Fund contributions and ₹ 30.24 millions (Year ended 31 March, 2015 : ₹ 26.59 millions) for Superannuation Fund contributions in the Income and Expendiutre Account. The contributions payable to these plans by the Board are at rates specified in the rules of the schemes.

Defined Benefit Plans

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

i. Gratuity

ii. Post-Retirement medical benefits schemes (PRMBS)

iii. 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, 2016			Year ended 31 March, 2015		
	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	9.56	-	18.25	8.91	-	14.01
Interest cost	21.30	6.15	19.09	20.58	6.13	17.38
Expected return on plan assets	(22.89)	-	-	(19.78)	-	-
Actuarial losses/(gains)	5.82	(3.97)	6.20	37.46	5.69	38.31
Total expense recognised in Income and Expenditure Account	**13.79**	**2.18**	**43.54**	**47.17**	**11.82**	**69.70**
Actual contribution and benefit payments for year						
Actual benefit payments	(19.83)	(2.20)	(9.67)	(14.60)	(1.18)	(11.24)
Actual contributions	19.09	-	-	35.34	-	-
Net asset / (liability) recognised in the Balance Sheet						
Present value of defined benefit obligation	(291.71)	(76.84)	(280.18)	(274.86)	(76.86)	(246.31)
Fair value of plan assets	280.44	-	-	258.27	-	-
Net asset / (liability) recognised in the Balance Sheet	**(11.27)**	**(76.84)**	**(280.18)**	**(16.59)**	**(76.86)**	**(246.31)**

Particulars	Year ended 31 March, 2016			Year ended 31 March, 2015		
	Gratuity	Post-Retirement medical benefits schemes (PRMBS)	Leave Encashment	Gratuity	Post-Retirement medical benefits schemes (PRMBS)	Leave Encashment
Change in defined benefit obligations (DBO) during the year						
Present value of DBO at beginning of the year	274.86	76.86	246.31	222.51	66.22	187.85
Current service cost	9.56	-	18.25	8.91	-	14.01
Interest cost	21.30	6.15	19.09	20.58	6.13	17.38
Actuarial (gains) / losses	5.82	(3.97)	6.20	37.46	5.69	38.31
Benefits paid	(19.83)	(2.20)	(9.67)	(14.60)	(1.18)	(11.24)
Present value of DBO at the end of the year	291.71	76.84	280.18	274.86	76.86	246.31
Change in fair value of assets during the year						
Plan assets at beginning of the year	258.27	-	-	217.72	-	-
Expected return on plan assets	22.89	-	-	19.78	-	-
Actual Board contributions (Excluding Contribution made by Gratuity Trust and charges deducted by LIC)	19.11	-	-	35.37	-	-
Actuarial gain / (loss)	-	-	-	-	-	-
Benefits paid	(19.83)	-	-	(14.60)	-	-
Plan assets at the end of the year	280.44	-	-	258.27	-	-
Actual return on plan assets	22.89	-	-	19.78	-	-
Composition of the plan assets is as follows:						
Government bonds	50%	-	-	55%	-	-
PSU bonds	45%	-	-	40%	-	-
Equity & Equity related Investments	5%	-	-	5%	-	-
Others	0%	-	-	0%	-	-
Actuarial assumptions						
Discount rate	8.00%	8.00%	8.00%	7.75%	7.75%	7.75%
Expected return on plan assets	9.29%	NA	NA	9.09%	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 (1994-96) ultimate Mortality Rates	Indian Assured Lives (2006-08) ultimate Mortality Rates

Particulars					
Experience adjustments					(₹ in million)
	2015-2016	**2014-2015**	**2013-2014**	**2012-2013**	**2011-2012**
Gratuity					
Present value of DBO	291.71	274.86	222.51	203.05	162.30
Fair value of plan assets	(280.44)	(258.27)	(217.71)	(205.13)	(179.06)
Funded status [Surplus / (Deficit)]	(11.27)	(16.59)	(4.80)	2.08	16.76
Post-Retirement medical benefits schemes (PRMBS)					
Present value of DBO	76.84	76.86	66.22	78.71	71.36
Other defined benefit plans (Leave Encashment)					
Present value of DBO	280.18	246.31	187.85	181.85	137.49

	For the year ended 31 March, 2016	For the year ended 31 March, 2015
Actuarial assumptions for long-term compensated absences		
Discount rate	8.00%	7.75%
Expected return on plan assets	8.70%	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 2016-17 has not been ascertained.

8 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, 2016	Depreciation for the year	Accumulated Depreciation as at 31st March, 2016
Buildings and Roads#	1,621.71	43.27	787.15
	1,624.06	*46.23*	*746.23*
Electrical Installations#	31.63	1.24	21.01
	173.87	*9.85*	*118.09*
Plant and Machinery	0.38	-	0.38
	0.38	-	*0.38*
Furniture, fixtures, computers, software and office equipment	8.13	0.16	7.40
	587.33	*47.17*	*574.63*
Rail Milk Tankers	194.55	-	194.55
	195.39	-	*195.39*
Total	**1,856.40**	**44.67**	**1,010.49**
	2,581.03	***103.25***	***1,634.72***

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.

9 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, 2015	Adjustment during the year	Closing Balances at 31st March, 2016
Deferred Tax Assets:			
Depreciation	76.26	(65.21)	11.05
	80.32	*(4.06)*	*76.26*
Expenditure allowable on payment basis	86.44	11.57	98.01
	67.31	*19.13*	*86.44*
Gratuity	5.74	(1.84)	3.90
	1.63	*4.11*	*5.74*
Voluntary Retirement Scheme	21.86	(6.45)	15.41
	55.21	*(33.35)*	*21.86*
TOTAL	**190.30**	**(61.93)**	**128.37**
	204.47	***(14.17)***	***190.30***

(Figures in italic represent previous year figures)

10 The Board has no intention to make withdrawal from the Special Reserve created and maintained under section 36(1)(viii) of the Income-tax Act, 1961 and hence it becomes a permanent difference. The Board does not create any deferred tax liability on the said reserve in accordance with the clarification of the Accounting Standard Board of the Institute of Chartered Accountants of India.

11 The Shri Krishnadevaraya Co-operative Oil Seeds Growers Union Limited, Sri Vijayavardhani Cooperative Oil Seeds Growers Union Ltd and Tamil Nadu Co-operative Oil Seeds Growers Federation Limited are under liquidation over a long period of time. The required claims have been lodged with the respective liquidator. During the year unsecured loans outstanding from them amounting to ₹ 319.80 million are written off to the Income and Expenditure Account.

12 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	3,444.30	28.69	616.77
	3,492.62	*23.29*	*580.99*
Created during the year from contingency	1.33	4.12	(5.45)
	-	-	-
Write-off of interest receivable	(444.09)	-	-
	(7.14)	-	-
Amount transferred	-	-	-
	(28.45)	*28.45*	-
Transferred (to)/from Contingency*	-	-	-
	(12.73)	*(23.05)*	*35.78*
Reversed during the year	(423.38)	-	-
	-	-	-
Closing balance	**2,578.16**	**32.81**	**611.32**
	3,444.30	***28.69***	***616.77***

(Figures in *italic* represent previous year figures)

* General Contingency provision/NPA provision in excess of regulatory requirement is transferred to Contingency Provision during the year.

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

In terms of our report of even date attached.

For Deloitte Haskins & Sells LLP
Chartered Accountants

For and on behalf of the Board,

Kartikeya Raval	**T Nanda Kumar**	**Dilip Rath**	**Y Y Patil**
Partner	Chairman	Managing Director	General Manager (Accounts)

Anand, 14th July, 2016

NDDB Officers

(As on March 31, 2016)

HEAD OFFICE, ANAND

Chairman & Chief Executive

T Nanda Kumar,
MSc (Phy), IAS (Retd)

Managing Director

Dilip Rath,
MA (Eco), MSc (Eco)

Executive Director

Sangram Chaudhary,
MSc, PGDRM

Chief Executive's Office

A Rajasekaran, *DY GEN MGR,*
MSc (Agri), PGDRM

T V Balasubramanyam, *MGR,*
BCom, LLB (Gen)

Financial and Planning Services

S K Dalal, *GEN MGR,*
BVSc & AH, MSc (Anim Sci), PGDRDM

Pramod N Menon, *MGR,*
BCom, MBA (Fin)

Chintan Khakhariawala, *MGR,*
BE (Chem), MBA (Fin)

P V Subrahmanyam, *MGR,*
BBM, MBA (Fin)

Kahnu C Behera, *MGR,*
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BSc (Zoo), PGDM (Mktg & Fin)

Smriti Singh, *DY MGR,*
BA (Eng), PGDM (Mktg & HR)

Rohan B Buch, *DY MGR,*
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Chandni A Bhatt, *DY MGR,*
BCom, PGDBM (E-Com), MBA (Fin)

Shilpa P Behera, *DY MGR,*
BMS, PGDRM

Saurabh Kumar, *DY MGR,*
BTech (Elect & Comm), PGDM

Reeti, *DY MGR,*
BSc (Zoo), PGDM (Fin & Mktg)

Harsh Vardhan, *DY MGR,*
BTech (Electro), PGDM (Fin)

Cooperative Services

NDDB, Anand

Meenesh C Shah, *DY GEN MGR,*
BSc (DT), PGDRDM

M Govindan, *SR MGR,*
MA (SW)

Dhanraj Sahani, *SR MGR,*
MBA (Mktg), DPCS

Hrishikesh Kumar, *MGR,*
BSc (Phy), PGDRM

Niranjan M Karade, *MGR,*
BE (Mech), PGDRM

Sandeep Dheeman, *MGR,*
BCom, MA (SW)

Sandeep Bharti, *MGR,*
BSc, PGDDM

Priyadarshini Paliwal, *DY MGR,*
BSc (Genetics), PGDRM

Surbhi Pawar, *DY MGR,*
BBA, PGDM-RM

Prakashkumar A Panchal, *DY MGR*
BTech (DT), MSc (ICT-ARD)

Denzil J Dias, *DY MGR*
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Quality Assurance

D K Sharma, *DY GEN MGR,*
MSc (Dairy Micro), PhD (Dairy Bacteriology)

Narinder Sharma, *DY GEN MGR,*
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Suresh Pahadia, *MGR,*
BTech (DT), MSc (Dairying)

Jyothis J Mazhuvanchery, *DY MGR,*
BTech (Dairy Sc & Tech), MSc (DT)

Prashant A Kanthale, *DY MGR,*
BTech (DT), MSc (Dairy Chem)

Product & Process Development

D K Sharma, *DY GEN MGR,*
MSc (Dairy Micro), PhD (Dairy Bacteriology)

A K Jain, *SR MGR,*
BSc (DT), MSc (Dairying)

Jitender Singh, *SCI II,*
BSc, MSc (Micro), PhD (Dairy Micro)

Sougata Das, *SCI I,*
BTech (DT), MSc (Dairy Micro)

Harendra P Singh, *SCI I,*
BTech (DT), MSc (Dairy Chem)

Vishalkumar B Trivedi, *SCI I,*
BTech (DT), MTech (DT)

Lalita Oraon, *SCI I,*
BTech (DT), MTech (DT)

Quality Mark & NDDB Foundation for Nutrition Cell

M S Sayed, *GEN MGR,*
BE (Civil), ME (Env Engg)

M Jayakrishna, *SR MGR,*
MA (Eco), MPhil (Eco), PhD (Eco)

Coordination & Monitoring Cell

Aditya Nath Jha, *GEN MGR,*
BA (Eng), PGDRD

V K Ladhani, *DY GEN MGR,*
MCom, SAS (Comm), ICWA (Inter)

A Anand, *DY GEN MGR,*
MSc (Dairy Eco), PhD (Dairy Eco)

M R Mehta, *SR MGR,*
MSc (Stats), Dipl (Comp Sc)

Arvind Kumar, *MGR,*
BSc (Agri), MSc (Agri Mktg & Coopn)

Naveen Kumar, *MGR,*
MSc (Env Sc), MTech (Env Sc & Engg), MSc (Env Mod & Mgmt)

Mamata Mishra, *MGR,*
BA (Sociology), MA (Sociology), PhD (Sociology), MBA

Hemali Bharti, *MGR,*
BE (Power Elect.), MBA (Fin)

Rajesh Kumar, *MGR,*
BA (Eco), PGDRM

Ashutosh K Mishra, *MGR,*
BSc (E&I), PGDBA (Fin)

Ravindra G Ramdasia, *DY MGR,*
BCom, CA, CS

Vibhavini Singh, *DY MGR,*
BSc (Stats), PGDRDM

Human Resource Development

Sujit Kumar Bhuniya, *GEN MGR,*
BCom (Hons), MA (PM & IR)

Ashok Kumar Gupta, *DY GEN MGR,*
MSc (Agri), PGCHRM

P K Mehta, *SR MGR,*
MSc (Dairying)

Rajesh Gupta, *SR MGR,*
BSc, MSW

Jaidev Biswas, *SR MGR,*
BSc (Chem), PGDRD, PGDHRM

S B Padhiar, *SR MGR,*
BA (Socio)

S S Gill, *SR MGR,*
BSc (Geo), MSW, PhD (SW),
Dipl (Trg & Dev)

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

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BCom, LLB (Gen), LLB (Spl), DTP

Mohan Chander J, *MGR,*
BE (Mech), MTech (HRD)

S Mahapatra, *MGR,*
BA, LLB, PGDM

Shelly Topno, *MGR,*
BA (Hons), MA (SW)

BJ Hazarika, *MGR,*
BSc (Stats), MBA

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MA (Dev Admn)

Bhimashankar Shetkar, *DY MGR,*
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Sameer Dungdung, *DY MGR,*
BCom, PGDM-HRM

Mansinh Institute of Training, Mehsana

S S Sinha, *DY GEN MGR,*
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DEE

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BTech (DT)

Arvind Kumar Yadav, *DY MGR,*
BTech (Mech), MBA (Infra)

Hitendrakumar B Raval, *DY MGR,*
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Information & Communication Technologies

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DEE

R K Jadav, *SR MGR,*
BSc (Phy), MCA, PGDM

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BSc, PGDCA, BEd, MCA, MBA

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BE (Comp Sc), PGDBM

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Dipl (Exp Mgmt)

Anil P Patel, *SR MGR,*
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Mena H Paghadar, *MGR,*
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Purchase

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Nilesh K Patel, *MGR,*
BE (Prodn)

Bhadrasinh J Gohil, *MGR,*
BE (Mech)

Amol M Jadhav, *MGR,*
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Nidhi Trivedi, *MGR,*
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NDDB, Delhi

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V E E Sundar, *DY GEN MGR,*
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Santosh Singh, *DY GEN MGR,*
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S Goswami, *DY GEN MGR,*
BE (Mech), PGDRDM

U B Das, *DY GEN MGR,*
BE (Mech)

G S Sarvarayudu, *DY GEN MGR,*
BTech (Civil)

A B Ghosh, *SR MGR,*
MTech (D & F Engg)

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BE (Civil)

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BE (Mech)

S Talukdar, *SR MGR,*
BE (Mech), MIE

S K Nasa, *SR MGR,*
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Jasbir Singh, *SR MGR,*
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DME

R Soundhararajan, *SR MGR,*
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Saumitra Das, *MGR,*
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Shailendra Mishra, *MGR,*
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Mihir B Bagaria, *MGR,*
DCE, BE (Civil), MBA (Fin)

Dhaval A Panchal, *MGR,*
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D B Lalchandani, *MGR,*
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Nikesh V More, *MGR,*
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Manish Sharma, *MGR,*
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Abhishek Gupta, *MGR,*
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BE (Elect)

Balbir Sharma, *DY MGR,*
DEE, BTech (Elect)

Gaurav Singh, *DY MGR,*
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Bibhash Biswas, *DY MGR,*
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BE (Civil)

Ashish Ravi, *DY MGR,*
BTech (Civil)

Vatsal Patel, *DY MGR,*
BE (Mech)

Pratik K Agrawal, *DY MGR,*
BE (Civil)

Vivek Kumar Singh, *DY MGR,*
BTech (Civil)

Vivek Jaiswal, *DY MGR,*
BE (Civil)

Sumeet Shekhar, *DY MGR,*
BE (Mech)

Shantanu Kr Shukla, *DY MGR,*
BTech (Env Engg), MBA (EMS)

Banas Dairy Project-III, Palanpur

Manoj Gothwal, *MGR,*
BE (Civil)

Shreyas Jain, *MGR,*
BE (Elect)

Sandipkumar P Patel, *DY MGR,*
BE (Civil), MTech (Civil)

Charan Singh, *DY MGR,*
Dip (Civil), BTech

Jijo John, *DY MGR,*
BE (Mech)

Bharuch Dairy Project Site, Bharuch

Shailesh S Joshi, *DY MGR,*
BE (Mech)

Bhatinda Dairy Project Site, Bhatinda

Balram Niboriya, *DY MGR,*
BTech (Civil)

Cattle Feed Plant-Erode

Dharmendra K Behera, *MGR,*
BE (Mech), MBA (Mktg & Syst)

P Murukesan, *DY MGR,*
DCE, BBA, MBA

Cattle Feed Plant-Kaladera, Jaipur

Aditya Sharma, *MGR,*
BTech (Civil), MTech (CPM)

Akshay Mandora, *DY MGR,*
BE (Mech)

Cattle Feed Plant, Khurda

Dhiraj B Tembhurne, *MGR,*
BE (Civil)

Surjeet K Choudhary, *DY MGR,*
BE (Mech)

Central Frozen Semen Production & Training Institute Project - Hessarghatta

Sudhir Kumar Gangal, *MGR,*
DCE, BE (Civil)

Dairy Plant Project, Padalur

Jasdev Singh, *MGR,*
BTech (Elec), MTech (Power Engg)

Kousik Roy, *MGR,*
BTech (Elec)

Ganesh Mohan Shenoy, *DY MGR,*
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F Pradeep Raj, *DY MGR,*
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Gokul Dairy Expansion Project, Kolhapur

K J J Ahmed, *DY GEN MGR,*
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Hotwar Dairy Project, Hotwar

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IRMA/NDDB Project, Anand

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Jaipur Dairy Expansion Project, Mohali

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Shashank V Telang, *DY MGR,*
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Mohali Dairy Expansion Project, Mohali

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Powder Plant & Dairy Expansion Project, Channarayapatna

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Prudhvi Pathaneni, *DY MGR,*
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Product Dairy Project, Ambattur

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NDDB, Noida

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ICFMD, ICAR Project, Bhubaneswar

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Dairy Plant Management Cell

Y M Patel, *DY GEN MGR,*
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BVSc & AH, MVSc (Vety Obst & Gynaec)

D G Raghupathi, *DY GEN MGR,*
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BVSc, MSc (Dairying, Animal Genetics & Breeding)

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

Saqib Khan, *DY MGR,*
MCA

Surabhi Gupta, *DY MGR,*
BVSc & AH, PGDRM

Siddhartha S Layek, *DY MGR,*
BVSc & AH, MVSc (LPM), PhD (LPM)

Abha Kumari, *DY MGR,*
BVSc & AH, MVSc (Extn)

NDDB Office, Patna

Rituraj Borah, *DY MGR,*
BVSc & AH, MVSc

NDDB Office, Ranchi

Satyapal Kurrey, *DY MGR,*
DPharm, BVSc & AH, MBA

Indian Immunologicals Limited, Hyderabad

A Sudhakar, *MGR,*
BVSc, MVSc, PhD (Animal Genetics & Breeding)

Progeny Testing Project, Mehsana

Atul C Mahajan, *DY MGR,*
BVSc & AH, MVSc (Animal Genetics & Breeding), PhD (Animal Genetics & Breeding)

Animal Health

G K Sharma, *GEN MGR,*
BVSc & AH, MVSc (Bacteriology)

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), PhD (Vet Micro)

Indian Immunologicals Limited, Hyderabad

S K Rana, *SR SCI,*
BVSc & AH, MVSc (Micro), PhD (Micro)

Ponnanna N M, *SCI II,*
BSc (Agri), MSc (Micro), PhD (Biotech)

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BVSc & AH, MVSc (Vety Micro), PhD (Vet Virology)

K S N L Surendra, *SCI I,*
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Abbreviations

EXE DIR: Executive Director

GEN MGR: General Manager

DY GEN MGR: Deputy General Manager

SR SCI: Senior Scientist

SR MGR: Senior Manager

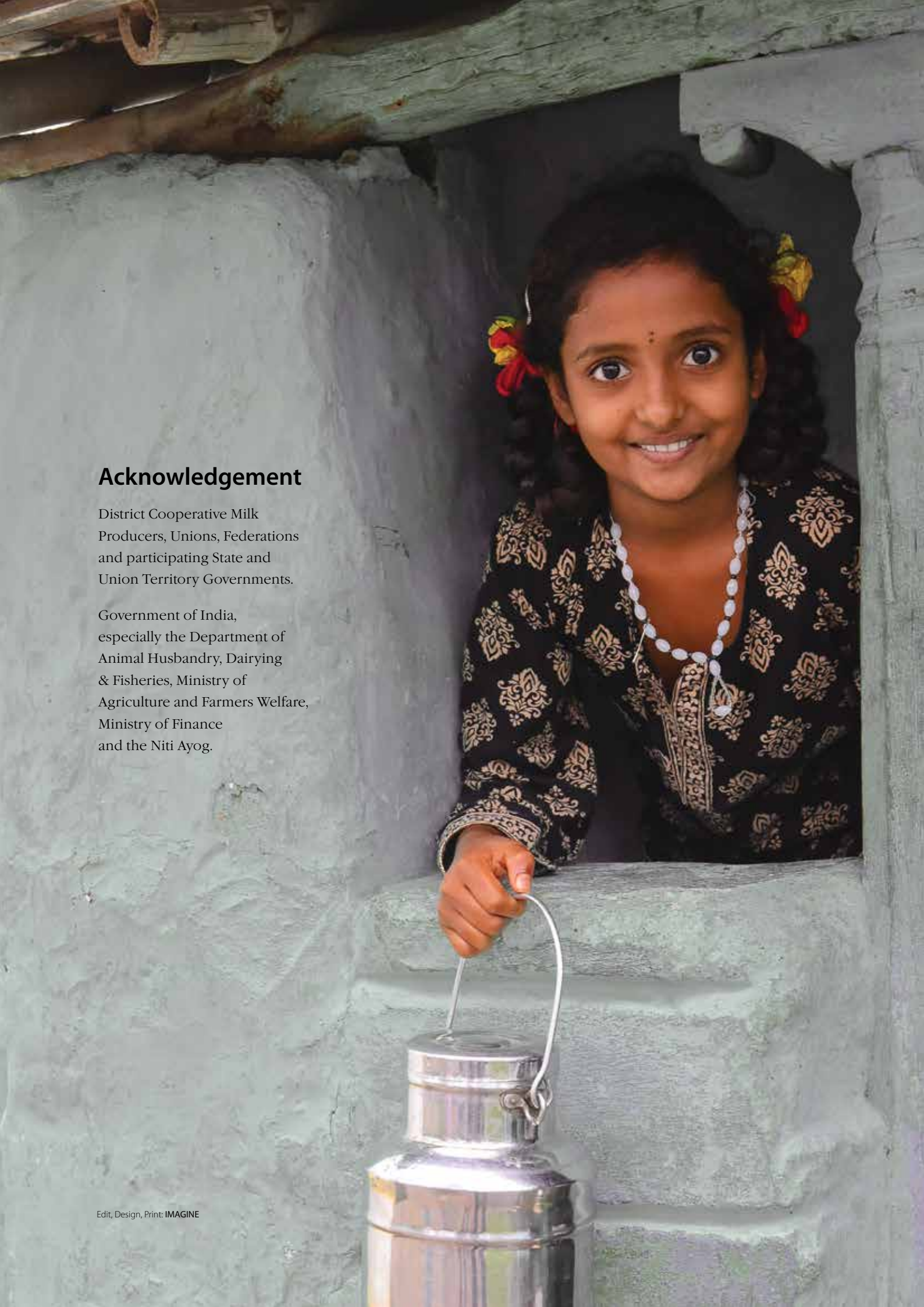
SCI III: Scientist III

MGR: Manager

SCI II: Scientist II

DY MGR: Deputy Manager

SCI I: Scientist I



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