



## 1. Project Data

**Project ID**

P107648

**Project Name**

National Dairy Support Project

**Country**

India

**Practice Area(Lead)**

Agriculture and Food

**L/C/TF Number(s)**

IDA-50740

**Closing Date (Original)**

31-Dec-2017

**Total Project Cost (USD)**

218,542,088.07

**Bank Approval Date**

15-Mar-2012

**Closing Date (Actual)**

29-Nov-2019

**IBRD/IDA (USD)**
**Grants (USD)**

Original Commitment

352,000,000.00

0.00

Revised Commitment

254,785,793.00

0.00

Actual

218,542,088.07

0.00

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## 2. Project Objectives and Components

### a. Objectives

The Project Development Objective (PDO) of the National Dairy Support Project (NDSP) as articulated in the Project Appraisal Document (PAD, paragraph 17) was identical to the PDO as stated in the Financing Agreement (page 4) and aimed to:

***"increase the productivity of milch animals and improve market access of milk producers in project areas."***



The project aimed to cover about 40,000 villages across 14 major dairying states (Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal). In 2014, four additional states were added to the NDSP: Uttarakhand, Telangana, Jharkhand and Chhattisgarh, bringing the total states participating in the project to 18.

As stated the PDO includes two elements that will be assessed independently:

1. To increase the productivity of milch animals in project areas, and
2. To improve market access of milk producers in project areas.

**b. Were the project objectives/key associated outcome targets revised during implementation?**  
No

**c. Will a split evaluation be undertaken?**  
No

**d. Components**

The PDO was supported by the following three components:

**1. Productivity Enhancement (appraisal cost: US\$258.3 million, actual cost: US\$132.30 million).** This component aimed to increase bovine productivity through improved animal breeding and nutrition services. It included the following sub-components:

**1.1. Animal Breed Improvement (appraisal cost: US\$164.30 million, actual cost: US\$89.37 million):**

This sub-component would support: a) Production of high genetic merit bulls (HGM) through: (i) Progeny Testing (PT) program in selected breeds; (ii) Pedigree Selection (PS) program in selected indigenous breeds; and (iii) Import of exotic bulls/embryos/frozen semen. b) Semen Production: Strengthening of existing semen production stations and establishment of new semen stations. c) Delivery of Artificial Insemination (AI) Services through trained mobile AI technicians (MAIT) at farmers' doorstep.

**1.2. Animal Nutrition (appraisal cost: US\$94.00 million, actual cost: US\$42.93 million):** This sub-component would support: a) Ration Balancing Program (RBP): A comprehensive RBP whereby extension advice would be provided to dairy farmers through trained local resource persons (LRP) for advising on animal feed and nutrition. Research shows that feeding balanced rations has the potential to increase milk yield, reduce production costs, and contribute to reduced methane emissions. b) Fodder Development: Extension initiatives/interventions for fodder development, including support for improved fodder seed production, fodder contracting, demonstrations for silage making, and reducing wastage of dry fodder through processing and enrichment.

**2. Milk Collection and Bulking (appraisal cost: US\$166.30 million, actual cost: US\$151.33 million).** This component would improve access to markets by developing village level milk collection and bulking facilities. This would include: a) community mobilization and institution building through: (i) expansion of selected existing dairy cooperative societies (DCS) registered under the Cooperative Societies Act, and (ii) promotion of new milk producer institutions which would be organized and registered as producer companies under the Companies Act; b) training and capacity building of milk



producers and functionaries; and c) village level infrastructure for milk collection and bulking such as milk cans, bulk milk coolers for a cluster of villages, associated weighing and testing equipment, and related IT equipment.

**3. Project Management and Learning (appraisal cost: US\$29.30 million, actual cost: US\$10.95 million).** This component would ensure smooth implementation and coordination of project activities, regular and timely monitoring of implementation progress and outputs/outcomes achieved, and learning through feedback to management.

#### **e. Comments on Project Cost, Financing, Borrower Contribution, and Dates**

**Project Cost.** The estimated total project cost was US\$453.9 million. In 2014, this amount was revised down to US\$328.56 million. The actual total cost of the project was US\$298.54 million (ICR Data sheet, page ii). The difference was due to lower disbursed IDA amount and lower counterpart financing (see below for more details).

**Financing.** The project was to be financed through an IDA Credit worth US\$352 million to the Government of India (GoI). The IDA credit would flow as a grant from the GoI, through a line item in the Department of Animal Husbandry, Dairying and Fisheries (DADF) budget, to the National Dairy Development Board (NDDB). In 2014, this amount was revised downwards to US\$254.79. According to the ICR (Data Sheet, page ii) the actual amount disbursed was US\$218.54 million or 62% of the appraisal amount and 85.7% of the revised amount. These differences stemmed from the cancellation of US\$97.00 million equivalent of the IDA Credit in 2014; lower than expected expenditures stemming from procurement-related cost savings; exchange rate effects over time (at approval, the exchange rate was INR 45/USD 1 and by 2014, INR 60/USD 1, a depreciation of 33%); and, under-delivery of pilot artificial insemination (AI) services (ICR, paragraph 15).

**Borrower Contribution.** The borrower was expected to contribute US\$39.10 million of counterpart funds, also the project beneficiaries were expected to contribute US\$62.80 million, which totaled US\$101.90 million. At restructuring, these amounts were revised down to US\$28.31 million for the borrower and US\$45.47 million for the beneficiaries, totaling US\$73.78 million. The actual amounts were US\$24.28 million (62% of the appraisal amount and 86% of the revised amount) and US\$51.76 million (82% of the appraisal amount and 114% of the revised amount) for the borrower and the beneficiaries, respectively (ICR Data Sheet, page ii). The total actual amount was US\$76.04 million.

**Dates.** The project was approved on March 15, 2012 and became effective three months later on June 22, 2012. The Mid-term Review (MTR) was conducted on May 15, 2015, which was in-line with the expected date in the PAD (three years after effectiveness). The original closing date was on December 31, 2017. The project closed 23 months later on November 29, 2019. According to the ICR (paragraph 20) "a 23-month extension enabled completion/fulfillment of the Project Implementation Plan (PIP), achievement of the PDO, and planning for post-project consolidation."

The project was restructured twice, both level 2 restructuring as follows:

1. On April 7, 2014, when the amount disbursed was US\$5.03 million, in order to authorize the cancellation of US\$97.00 million equivalent of the IDA Credit. This cancellation reflected cost savings from exchange



rate fluctuations. At approval, the exchange rate was INR 45/USD 1 and by 2014, INR 60/USD 1, a depreciation of 33% (ICR, paragraph 20).

2. On September 3, 2015, when the amount disbursed was US\$41.54 million, in order to authorize a 23-month extension of the closing date to November 29, 2019; and add four more states to the project. The States of Uttarakhand, Telangana, Jharkhand and Chhattisgarh were added to the project bringing the total states participating to 18 (ICR, paragraph 19).

### 3. Relevance of Objectives

#### Rationale

**Context at Appraisal.** In India, more than half the country's population derived the bulk of their income through the agricultural sector. The sector was identified by the Government and the Bank as one of the areas of focus for making growth more inclusive. Within agriculture, dairying was an important economic activity, accounting for about 18% of agriculture GDP. India is the world's largest producer of milk with annual production of about 112 million tons, most of which is consumed domestically by India's 1.2 billion largely vegetarian population. More than 70 million of the reported 147 million rural households depend on dairy, in varying degrees, for their livelihood. However, the dairy sector was facing a number of challenges: emerging demand-supply imbalances, rising milk prices, low productivity levels, weak service delivery, limited farmer access to organized milk processing sector, and environmental challenges related to methane emission, overgrazing and animal waste management. The project aimed to increase domestic milk supply through investments designed to improve productivity of milk animals.

At appraisal, the project objective was in line with the GoI's priorities for the dairy sector as envisioned in the a National Dairy Plan (NDP, 2008). The NDP envisaged a focused multi-state initiative to improve animal productivity, strengthen/expand infrastructure for milk procurement at the village level, and enhance milk processing capacity and marketing, backed with appropriate policy and regulatory measures. The project supported and operationalized the first phase of NDP through investments to enhance animal productivity and improve farmer access to organized milk marketing channels. The project objective was also in line with the Bank's India Country Strategy (FY09-FY12) which sought to achieve rapid and inclusive growth, ensure development was sustainable, and increase the effectiveness of service delivery.

At completion, the project objective remained in line with the GoI's priorities for the dairy sector as emphasized in the Department of Animal Husbandry and Dairying (DAHD) National Action Plan (Vision 2024). The plan called for increasing the number of productive animals and per animal productivity, thus increasing milk production and marketable surpluses, all of which were in line of the project's objective. Also, the Borrower Completion Report (BCR, 2020) stated that: "the long-term outcome of the NDSP remains compatible with the country's national priorities and development policies". The project objective was also in line with Bank's Country Partnership Framework for India (CPF, FY18-22) which emphasized three themes for the Bank engagement: (a) sustainable, resource-efficient growth; (b) improving competitiveness and enabling job creation; and, (c) investing in human capital. Improving competitiveness was to achieved through: food safety, food processing, and food/commodity supply and distribution



infrastructure, and improving land and water use efficiencies in agriculture. While improving the business environment was achieved through innovation, quality standards and managerial skills, which were in line with the PDO's "productivity" and "organized markets" themes. Also, enabling more quality jobs for women was in line with financial inclusion.

The project's objectives, in light of the measurable PDO indicators specified in the PAD, were clear and focused, but lacked an explicit connection to higher level objectives, namely, sustainable, inclusive economic growth and poverty reduction in the smallholder dairy sector. Nevertheless, on the basis that the project was directed at small-scale dairying operations in villages and was intended to generate broad-based longer term outcomes, the Relevance of Objectives is rated High.

## **Rating**

High

## **4. Achievement of Objectives (Efficacy)**

### **OBJECTIVE 1**

#### **Objective**

To increase the productivity of milch animals in project areas.

#### **Rationale**

**Theory of Change (ToC).** To achieve the stated objective (to increase the productivity of milch animals in project areas), the project would support genetic improvement of the dairy herd (cows and buffalos) and optimal use of feed and fodder. This would be achieved through support for long term investments in animal breeding, extensive training of dairy farmers and doorstep delivery of ration balancing advisory services and AI services, integrated with veterinary support, together with development of related information network and databases. These activities were expected to result in more milk per animal and increased proportion of in-milk female animals to adult female animals. Anticipated longer term outcomes included: sustainable, inclusive economic growth and poverty reduction in the smallholder dairy sector National self-sufficiency in milk production.

The achievement of this element of the PDO was underpinned by the following assumptions: first, producers need to accept project technologies, and second, trained manpower needs would be filled.

The ToC reflected clear connections between the intended activities and the expected outcomes. Also, the stated assumptions were realistic.

#### **Outputs**



The following outputs are as reported in the ICR (Annex 1) unless referenced otherwise.

### **Animal Breed Improvement**

- 14 Progeny Testing projects were implemented (no target).
- 249 Pedigree Selection projects male calves were distributed (target: 501, 50% achievement rate).
- 2,456 bulls were available for distribution to the 54 Semen Stations nationwide, replacing up to 33% of the 7,406 existing breeding bulls in collection and rearing (ICR, paragraph 38).
- 1,330 Mobile AI Technicians (MAITs) completed over 2.67 million AIs (about 0.8 million annually) and reached a 46% conception rate.
- 28,830 dairy animals were included in Milk Recording: 28,830 (no target).
- 44 Calf Rallies were organized to promote AI (no target).
- 28 semen Stations were strengthened by the project (target: 28, achieved). These semen stations produced 88.18 million semen doses compared to an annual target of 122.74 million (72% achievement rate).
- 171 pure-bred bulls imported (Holstein, Friesian and Jersey) (no target).
- 824 imported embryos (Holstein/Jersey) were transferred (target: 835, exceeded).
- 88 male (Holstein/Jersey) calves were made available for distribution (target: 108, 81% achievement).
- 32,000 village-level meetings were held to create AI awareness (no target).
- 12,322 villages were covered by a Mobile Artificial Insemination Technician (target: 23,800, 52% achievement) and 783,000 AIs were carried out under the AI pilot (just over 20% of the appraisal estimate, ICR, paragraph 41).

### **Animal Nutrition**

- 2.86 million milch animals (target: 2.7 million, 106% achievement) in 33,389 villages were covered by Ration Balancing Program (RBP) (86% of the target, ICR, paragraph 29).
- 572,548 women farmers were covered by Ration Balancing Program (no target).
- 300,312 Scheduled Tribe (ST) /Scheduled Cast (SC) farmers covered by Ration Balancing Program (no target).
- 2.0 million dairy animals were covered by Ration Balancing Program (no target).
- 32,787 Local Resource Persons were inducted to deliver through Ration Balancing Program doorstep Services (no target).
- 603,720 ha land brought under fodder production (no target).
- 7 fodder seed processing plants were established (target: 7, achieved).
- 30,185 metric ton (MT) fodder seed sales were achieved (target: 20,330 MT, exceeded).
- 2,033 farmers were covered under the Fodder Development program (no target).
- At closing, 4,333 dairy farmers adopted silage production based on NDSP demonstrations (ICR, paragraph 34).

### **Outcomes**



By project completion, 172 End Implementing Agencies (EIAs) implemented 477 sub-projects across 18 states benefiting 3.7 million organized, mostly smallholder, milk producers, versus the 1.7 million estimated at appraisal (ICR, paragraph 25). Also, 52,509 villages were newly organized and/or strengthened for dairy activities, enrolling an additional 1.7 million milk producers in DCSs and DPCs compared to target of 1.2 million. According to the ICR (paragraph 26), improvements in milk productivity were expected from "technologically advanced practices in dairy animal nutrition and, over a longer timeframe, genetic improvement."

The outcome was assessed through two PDO level outcome indicators: #1. Percentage increase in milk production per animal, and #2. Proportion of "in-milk" female animals to adult female animals. The in-milk to adult female ratio is an indicator of scientific animal management practices focused on animal nutrition and health care, and scientific breeding. The higher the ratio, the higher the number of animals "in-milk" (i.e., under lactation) at any point and higher the milk production. By project completion, milk production per animal (PDO indicator #1) increased by 21% compared to a target of 10% (target exceeded by 210%), and the proportion of in-milk female animals to adult female animals (PDO indicator #2) increased to 68% (target: 66%, and baseline was 63%) (target was exceeded by 103%).

The increase in milk production per animal was a result of a seven-year program that integrated advanced feeding and improved breeding practices (primarily through artificial insemination), which were not used before in India for smallholder dairying (ICR, paragraph 27). The result was measured using the weighted average of the daily milk yield per in-milk animal for indigenous cows, crossbreds and buffaloes. The End-line Survey (DRS, 2019) showed that average milk yields per dairy animal across all 18 participating states increased 21% from a baseline of 5.03 liters/day to 6.09 liters/day (vs. target of 5.53 liters/day, or 10%). Also, a separate household-level study, revealed that the average milk production for milk-producing households in project villages was 14.5 liters/day compared to 11.7 liters/day in control villages, and for buffalo, averaged 9.4 liters/day in project villages compared to 6.0 liters/day in control villages (ICR, paragraph 27). The adoption of the Ration Balancing Program (RBP) resulted in better-nourished cows/buffaloes and more days in milk (i.e., greater persistence of lactation). According to the ICR (paragraph 30) RBP increased the average lactation period by an additional 26 days for cows and 50 days for buffaloes. In addition, RBP improved milk quality as the average fat content increased from 4.70% to 4.78%, and Solids-non-Fat (SNF) rose from 7.86 to 8.54% in cows, and from 8.12 to 9.12% in buffaloes. This improvement in milk quality increased its market value, which puts a premium on fat content. Other benefits of RBP included the reduction of feeding costs by 10.2% per liter of milk (146% of target) where the cost of production was reduced from INR 19.49/liter of milk to INR 17.19/liter (ICR, paragraph 31). Also, according to the ICR (paragraph 36), RBP reduced average methane emissions in lactating cows and buffaloes by 13.8% (138% compared to a target of 10%). Milk productivity also benefited from the higher conception rates in herds where AI was piloted as this increased the days in milk. i.e., increasing the conception rate from a baseline of 35% to 46% under AI, which resulted in around one additional month of milk per animal (ICR, paragraph 28).

According to the ICR (paragraph 28), the improvement in the proportion of in-milk female animals to adult female animals was also a result of the RBP intervention. Adoption of RBP resulted in better-nourished cows/buffaloes and more days in milk (ICR, paragraph 28). Also, higher conception rates in herds where AI was piloted increased the days in milk. Further improvements to the in-milk to adult female ratio was envisaged coming mainly from the genetic improvement through animal breeding, which is a longer-term and its impact on the so-called "wet ratio" of the herd was not envisaged within the project lifetime (ICR paragraph 28). Anticipated genetic improvements were expected to become significant by 2027.



The evidence provided in the ICR point to the success of the project in increasing productivity of milch animals in project areas as the targets for both PDO level indicators were exceeded and arguably attributable to the productivity enhancement programs. However, the project fell short on achieving its intermediate outcome targets for the AI pilot program where village coverage reached 52% of the target and the number of AIs completed annually reached about 20% of the target (0.78 million compared to a target of 3.8 million). The ICR (paragraph 71) attributed the shortfall in the AI pilot program to limited manpower in the technical labor market to perform AI, which was compounded by the scarcity of accredited AI training centers; failure of the Shreeja and Baani DPCs to participate in the AI pilot due to resistance from their State Animal Husbandry Departments; uneven policy support to create the enabling environment for AI; low awareness of AI in states where buffalo dominated; and the effect of local grazing practices with free-roaming bulls and resistance to ear-tagging negatively affected AI uptake.

Based on the above-mentioned assessment, the efficacy with which Objective 1 was achieved achieving is rated High.

**Rating**  
High

## **OBJECTIVE 2**

### **Objective**

To improve market access of milk producers in project areas.

### **Rationale**

**Theory of Change (ToC).** To achieve the stated objective (to improve market access of milk producers in project areas), the project would raise farmers' awareness about the importance of good quality milk and build their capacity for hygienic milk production, collection and sale. Specifically, the project would support milk collection and bulking through supporting village-level collection and milk chilling infrastructure as well as supporting community mobilization and institution-building (Dairy Cooperative Society, Dairy Producer Company). These activities would result in additional producers joining Coops and Dairy Producer Companies; women and Scheduled Tribe/Scheduled Cast would participate in Village-based Milk Procurement System, which would expand transparent quantity- and quality-based milk procurement, End Implementing Agency training would build long-term management capacity. In sum, this would allow dairy small-holders to access an organized milk market in the project area with a higher proportion of milk produced being sold to the organized sector. Collective sales would strengthen farmers' negotiating power and reduce transaction costs for such a highly perishable commodity. Anticipated longer term outcomes include sustainable, inclusive economic growth and poverty reduction in the smallholder dairy sector, and national self-sufficiency in milk production.

The achievement of this PDO was underpinned by the assumption that decentralized dairy organizations would be strengthened, and inclusive design would increase participation of women and Scheduled Tribe/Scheduled Cast members of the community.

The ToC included activities that were directly linked to the PDO. The stated assumptions were logical and realistic.



## Outputs

The following outputs are as reported in the ICR (Annex 1) unless referenced otherwise.

### Milk Collection and Bulking

- 243 Village-based Milk Procurement System sub-projects were implemented (no target).
- 52,471 Villages covered (target: 31,900, exceeded)
- 21,361 New villages were covered (target: 21,188, exceeded).
- 4,209 Bulk Milk Chillers installed: 4,209 (target: 4211, achieved)
- 29,577 Automated Milk Collection Units/Data Processor and Milk Collection Unit (Village-based Milk Procurement System facilities) were installed (target: 29,582, 99.9% achievement rate).
- 5.37 million kg/day additional milk were procured per day by project completion (no target).
- 1.686 million additional producers were enrolled in Dairy Cooperative Society and Dairy Producer Company.
- 1.135 million Scheduled Tribe/Scheduled Cast members of the community participated in the project activities (no target).
- Six Dairy Processing Companies were created/supported under NDSP account for 834,400 producers (ICR, paragraph 48) (139% of target).
- 853,154 producers were organized in Dairy Cooperative Societies across 39,259 villages of which 14,371 (121% of target) were new villages (ICR, paragraph 48).

### Outcome

This outcome was assessed through two PDO level indicators, indicator #3 that measured "the increase in the share of milk sold to the organized sector" , and indicator #4 "proportion of total milk sold to total production." By project completion, the share of milk sold to the organized sector increased by 75% compared to target of 56% (target exceeded by 134%), while the share sold to organized markets in the control areas was 51% (ICR, paragraph 44). The proportion of total milk sold to total production reached 74.3% compared to a target of 65%, baseline was also 65%. The ICR (Annex 1) explained that the original PAD baseline value was 54% but was increased to 65% following the 2013 Baseline Study. Average production and sale by the intervention group was 10.9 liters/8.1 liters respectively and for the control group 9.4 liters/6.8 liters respectively (ICR, Annex 1).

This increase was a direct result of the project-supported technological innovation that included equipping DCSs and DPCs with capital items such as Bulk Milk Chilling Units (BMCs), Automated Milk Collection Units, and Data Processor Milk Collection Units, all of which contributed to increased milk procurement (ICR, paragraph 44). By 2019-20 the project had installed aggregate BMC capacity of 12.5 million liters/day compared to the targeted 1.36 million (918% of target), which allows for accommodating future growth. According to the ICR (paragraph 47) "installation of BMCs also helped to sustain milk quality by filling gaps in existing milk routes and creating new BMC milk tanker routes." Another important factor was the automation of the milk procurement process which improved transparency of the milk procurement process. This improved the producer confidence as it allowed the producer to "view the weight and fat content of their milk and knew that the price received was merit-based (ICR, paragraph 44)." Over five years, the project areas saw the milk price per liter received by milk producers from their DCSs increase by an average 8-11%



(ICR, paragraph 45). Also, according to the ICR (paragraph 45) the Borrower Completion Report stated that 88% of the Village-based Milk Procurement System (VBMPs) beneficiaries reported increased milk prices, 74% reported reduced milk wastage and 43% reported reduced milk marketing time. According to the ICR (paragraph 48) additional milk procurement from newly organized producers reached 2,950 MT/day (97% of target) with an annual turnover exceeding US\$350 million equivalent. Also, the project supported organizing 1.67 million producers into Dairy Cooperative Societies/Milk Unions and Dairy Processing Companies (130% of target).

Milk quality assessed using methylene blue reduction (MBR) showed an average of 126 minutes which was 105% of the target (ICR, paragraph 46). The MBR test measures the bacteriological quality of milk at the Bulk Milk Coolers level. Results varied as milk at the Dairy Cooperative Societies had a range of 60 to 280 minutes, and milk at the Dairy Processing Companies had a range of 58 minutes to 133 minutes. The ICR did not provide an explanation for the variation in the MBR readings between the Dairy Cooperative Societies and the Dairy Processing Companies. However, variation in general could partially be attributed to the season of the year, where milk quality drops during hot summer months (ICR, paragraph 46). Water scarcity during hot summer months negatively impacts the overall hygiene of the milking process (particularly washing cans and animals) and results in an increased bacterial load (ICR, paragraph 46).

Based on the above-mentioned assessment, the efficacy with which Objective 2 has been achieved is rated High.

**Rating**  
High

## OVERALL EFFICACY

### Rationale

The project succeeded in increasing the productivity of milch animals in project areas. By project completion, milk production per animal (PDO indicator #1) increased by 21% compared to a target of 10% (target exceeded by 210%), and the proportion of in-milk female animals to adult female animals (PDO indicator #2) increased to 68% (target: 66%, and baseline was 63%) (target was exceeded by 103%). The project also improved market access of milk producers in project areas. By project completion, the share of milk sold to the organized sector increased by 75% compared to the target of 56% (target exceeded by 134%), while the share of milk sold to organized markets in the control areas was 51% (ICR, paragraph 44). Finally, most intermediate outcome indicators were met or exceeded, except for the number of artificial inseminations in a pilot program, which fell short of the envisaged target.

This review concludes that the overall efficacy with which the project's objectives were achieved was high.

### Overall Efficacy Rating



High

## 5. Efficiency

### Economic and Financial Efficiency

#### *ex-ante*

- The Economic and Financial Analysis (EFA) in the PAD at appraisal estimated the overall economic Rate of Return (ERR) at 23.5% and the Financial Rate of Return (FRR) at 22.1 %. Project costs and benefits were estimated at 2011 prices over 20 years with 12% opportunity cost of capital.
- Benefits. (a) Animal nutrition was expected to lead to increased milk productivity due to nutrition, reduced cost of milk production, and reduced methane emission. (b) Animal breed improvement would produce high genetic merit bulls to supply about 3.85 million disease free semen doses annually for project AI services, leading to the benefit of increased milk productivity through better genetics. (c) Improved milk collection and bulking would result in increased producer price and reduced transaction costs.
- Methodology. The projects benefits were quantified separately for indigenous and cross bred cattle and buffaloes. Next, benefits were aggregated at project sub-component and component levels (in that order), and then finally aggregated for the project as a whole. Financial analysis was done at market prices. Economic analysis involved making appropriate adjustments to financial benefits and costs.
- Cost-benefit analysis was conducted separately for major investment activities: breed improvement and AI service delivery, animal nutrition management, and milk collection and bulking investments, which together account for 93.6% of project costs.
- Sensitivity and Risk Analyses. A number of sensitivity and risk analyses were conducted using various scenarios. Project costs were allowed to increase up to 30% above the base level, and the three sources of benefits were allowed to decrease up to 50% below their base levels. This risk analysis estimated the effects of uncertain returns to investments and generated confidence limits for realizing expected benefits. The variations caused the ERR to vary between 11.8% and 20.4% with a coefficient of variation of 8% . The expected ERR was estimated at 16.2% and was reasonably stable because the risk model predicted 0.84 probability of ERR exceeding 15%.

#### *ex-post*

- The ex-post EFA followed the same approach as the one at appraisal. The overall Internal Rate of Return (IRR) was estimated at 60% with a Net Present Value (NPV) of US\$475 million, and the FRR was estimated at 57% with a NPV of US\$492 million. Costs and benefits were estimated at 2018 prices over 20 years with a 10% discount rate.
- Benefits. The project benefits for the ex-post EFA were measured for: (a) Productivity Enhancement: increased milk productivity through improved animal breeding, nutrition, and delivery of AI services (48% of total project cost); and (b) Milk Collection and Bulking: improved access to markets by investing in Village-based Milk Procurement System facilities and the formation of Dairy Producer Companies and Dairy Cooperative Societies (50% of total project cost).
- Cost-Benefit Analysis (CBA). The CBA was conducted separately for major project interventions: breed improvement and AI service delivery, animal nutrition management, and milk collection and bulking



investments. Benefits were then aggregated and compared to overall project costs, including contingencies and costs associated with project management. Costs and benefits were estimated at 2018 prices over a 20-year horizon with 10% discount rate.

- The ex-post analysis showed higher net benefit from the project compared to the ex-ante EFA. These ex-post results were due to several factors including: (a) Higher actual scale of benefits derived from key project activities compared to the ex-ante analysis. For example, the ex-ante analysis estimated a 5% reduction in feed and fodder cost (INR /liter milk produced) due to RBP. At project closing, impact assessment studies on actual RBP delivered show a higher average cost reduction of 12%. (b) Under the Village-based Milk Procurement System (VBMPS), the number of milk producers organized into Dairy Cooperative Societies (DCSs) and Dairy Producer Companies (DPCs) surpassed targets by 141% and 126%, respectively, resulting in more producers being organized at a lower unit cost (ICR, Annex 4).
- The total cost of the project was US\$294.58 million, with an average cost of US\$78 per beneficiary .At project completion, 2.85 million animals were included in the program, net benefit in the form of aggregate profit for these producers amounted to US\$302 million (ICR, Annex 4).
- Sensitivity Analysis. For component 1, a reduction in project benefits could occur if the Local Resource Persons (LRPs) did not perform satisfactorily and/or if the AI delivery services, particularly the Mobile Artificial Insemination Technicians (MAITs) services, were unsatisfactory. For the MAITs, an assumption was made that 25% performed below par, while for LRPs, the project's documented LRP attrition rate was used-about 25%. In both these scenarios, the IRR (financial) declined to 41% and 59%, while for IRR (economic), only declined to 40% and 58%, respectively. Also, changing the impact of the DCSs/DPCs on milk price from 21% to 15% and 10%; and changing the Bulk Milk Coolers (BMC) capacity utilized from 100% to 75% and 50% were analyzed. The analysis showed that decreasing the utilized BMC capacity from 100% to 75% and 50% resulted in a reduction in the IRR from 46% to 38% and 29% respectively; and a reduction in the NPV from US\$102 million to US\$74 million to US\$46 million respectively. The sensitivity analysis also showed that decreasing the impact of the DCS/DPC on the milk price from 21% to 15% and 10% caused the IRR to decrease from 46% to 33% and 21% respectively; and caused the NPV to decrease from US\$102 million to US\$64 million and US\$32 million, respectively.

## **Administrative and Institutional Efficiency**

While the project closed 23 months later than its original closing date, it did not experience any cost overruns (ICR, Annex 4). According to the ICR (Annex 4, paragraph 19) "the project was efficiently managed with a relatively low administrative cost of 4%, considering that it was a large-scale national program covering 18 States." The project disbursed 100% of the IDA Credit and implementation benefited from an efficient financial management system. However, implementation experienced a slow start of activities. The 23 months extension enabled the project to achieve or exceed its intended outcome targets and helped to derive additional benefits in animal health and renewable energy.

Overall, efficiency is rated High. This rating reflects a significantly higher ex-ante IRR at 60% compared to 23% at appraisal. The project also, had an overall efficient implementation performance relative to its size, despite the initial delays.

## **Efficiency Rating**



High

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

|              | Rate Available? | Point value (%) | *Coverage/Scope (%)                              |
|--------------|-----------------|-----------------|--|
| Appraisal    | ✓               | 23.50           | 93.00<br><input type="checkbox"/> Not Applicable |
| ICR Estimate | ✓               | 60.00           | 98.00<br><input type="checkbox"/> Not Applicable |

\* Refers to percent of total project cost for which ERR/FRR was calculated.

## 6. Outcome

The Relevance of Objectives in this project was rated High because the objectives were clear and aligned with both Government and World Bank development strategies for India. Overall Efficacy was rated High. The project succeeded in increasing the productivity of milch animals in project areas. By project completion, milk production per animal (PDO indicator #1) increased by 21% compared to a target of 10% (target exceeded by 210%), and the proportion of in-milk female animals to adult female animals (PDO indicator #2) increased to 68% (target: 66%, and baseline was 63%) (target was exceeded by 103%). The project also improved market access of milk producers in project areas. By project completion, the share of milk sold to the organized sector increased by 75% compared to target of 56% (target exceeded by 134%), while the share sold to organized markets in the control areas was 51% (ICR, paragraph 44). Efficiency was rated High based on a significantly higher ex-ante IRR at 60% compared to 23% at appraisal.

Given that all of the three assessed criteria (Relevance of Objectives, Efficacy and Efficiency) were rated High there were no shortcomings in the project's achievements, its overall outcome is therefore rated Highly Satisfactory.

### a. Outcome Rating

Highly Satisfactory

## 7. Risk to Development Outcome

The ICR (paragraph 92) discussed the following risks that could potentially impact the project's development outcome:

1. Policy risk. NDSP provided a roadmap for the second phase of the National Dairy Plan. According to the ICR (paragraph 92) the policy and strategic environment continue to be favorable with the strong social and



economic rationale for consolidation and continued expansion of NDSP's proven technologies beyond the 10% of dairy producers, mostly smallholders, supported under the first stage.

2. The risk related to the sustainability of NDSP's decentralized institutions including the Dairy Cooperative Societies (DCS), End Implementing Agencies (EIAs), Dairy Producer Companies (DPCs) and Local Resource Persons (LRPs). Sustainability of the DCS, and of the EIAs (Milk Unions) is likely to continue. NDSP built capacity to support EIAs as dairy businesses. However, more attention is needed to staffing issues and the lack of human resource (HR) plans and strategies. DPCs established under NDSP demonstrated promising financial sustainability. A World Bank study (2020) asserts that the liquidity, solvency and efficiency of new DPCs is average with an overall upward trend. Recommendations are made to boost financial strength and viability. Sustainability of LRPs is also likely to continue after addressing the reasons of attrition through expanding LRP roles to include MAIT and milk recorder functions to provide a livable income. Also, female LRPs may be more sustainable because they seek part-time income, and are less likely to out-migrate for jobs.

3. The risk that youth will not seek dairying as an employment option. A 2017 study by IEG ( Research Report: Understanding Existing Knowledge/Skill Level and Attitude/Motivation of Rural Youth towards Dairying as an Employment Activity in NDP I Intervention Villages) showed that knowledgeable youth are concerned by their prospects as dairy farmers. The local context and agro-climatic environment are the main influencing factors. The ICR paragraph 92) predicts that the future engagement of youth in dairying as an occupation may depend on women.

4. This risk related to the sustainability of the Ration Balancing Program (RBP). NDSP supported RBP through financial provisions for two years. According to the ICR (paragraph 92) "milk unions ran the RBP until end-of-project and were keen to continue." Producers are demanding that EIAs continue RBP and many are doing so, e.g., the State of Maharashtra allocated funds to implement RBP in 3,000 villages, post-project.

5. The risk related to the sustainability of the NDSP breeding program. Sustainability of AI depends on farmers' willingness to pay for doorstep delivery of AI services, the conception rates achieved, and continued adherence to the Standard Operating Procedure.

## **8. Assessment of Bank Performance**

### **a. Quality-at-Entry**

The project was well aligned with the country and sector strategies of achieving inclusive growth, promoting sustainable development, and improving effectiveness of service delivery. While the project had a technically and operationally complex design, activities were linked to the needs of the dairy sector (ICR, paragraph 68). The project design was informed by analytical activities, namely, a livestock sector review conducted by the Bank in 2009. Design also benefited from the experience of previous Bank-funded operations. Notable lessons reflected in the design included: the importance of a participatory approach with strong producer involvement in the milk procurement system; and securing alternative sources of funding for investments in dairy processing once a certain level of dairy production and



infrastructure is in place. Design also took into account the Government's experience in the dairy sector, notably, the importance of the genetic quality of bulls, attention to animal identification and recording, and adoption of standard operating protocols in cattle and buffalo breeding programs (PAD, paragraph 35).

The project components included well-defined complimentary activities that were aligned to the PDO. The enabling policy and regulatory environment supporting project investments was reflected in the requirement that states commit to time-bound policy changes to trigger certain project investments (AI delivery, RBP/fodder development, and VBMPs). Implementation readiness benefited from the pre-identification of nine out of the proposed fourteen states for participation along with a set of pre-approved investments at appraisal (ICR, paragraph 68). According to the ICR (paragraph 89) "close engagement of Bank safeguards, fiduciary and sector specialists in ensuring the analytical, technical and operational integrity of project design." Six main risks were identified in the PAD. The overall risk to achievement of the PDO was assessed to be medium (PAD, paragraph 49). Important risk areas identified in the PAD included: the extended geographic coverage, activities in multiple states and through multiple EIAs, along with financial management (FM) and procurement capacities/practices. According to the ICR (paragraph 69) "the PAD risk assessment was generally accurate in practice." However, the PAD risk analysis did not anticipate the challenges that arose from the massive need for technical manpower recruitment and training needs to implement a decentralized project that was geographically dispersed across 18 States (ICR, paragraph 69). Finally, M&E benefitted from a well-designed Results Framework (RF) with indicators that were aligned to PDOs, and with a comprehensive monitoring plan (see section 9a for more details).

Overall, Quality at Entry is rated Satisfactory. This rating reflects alignment with dairy sector priorities, sound project design, and robust M&E design. While the project had notable implementation readiness measures, it still suffered from early implementation delays.

### **Quality-at-Entry Rating** Satisfactory

#### **b. Quality of supervision**

Implementation was challenging given that the project was implemented over an extended geographic area across 18 States. The Bank conducted 19 supervision missions and field visits to participating States. With only two Bank Task Team Leaders through the implementation period, the project benefited from stability and strong relations with the implementing agency. According to the ICR (paragraph 90) the Bank missions included an "appropriate mix of specialists." The Bank supervision worked with the borrower to address initial implementation delays, extend the Credit closing date, and alleviate implementation bottlenecks. The Bank also worked with the implementing agency to contract an M&E firm, an Indian research institute, and consulting bodies that helped ensure high quality analytical M&E products (ICR, paragraph 90). The Borrower Completion Report (BCR, 2020) acknowledged the Bank supervision and noted that the Bank demonstrated "timely, appropriate support stressing problem-solving; consistently timely release of project funds; clear/detailed project reporting; strong, multi-level procurement support including FA facilitation and rapid resolution of issues; "phenomenal" technical support including at the field level; and, a focus on innovative solutions and a long-term perspective (ICR, paragraph 90)."



Quality of Supervision is rated Satisfactory. This rating reflects effective, responsive and results-focused supervision that guided this complex project to successfully achieve its PDO as reported in the ICR.

Overall Bank Performance is rated Satisfactory.

### **Quality of Supervision Rating**

Satisfactory

### **Overall Bank Performance Rating**

Satisfactory

## **9. M&E Design, Implementation, & Utilization**

### **a. M&E Design**

The PAD did not include a Theory of Change (ToC), which was not required at the time of appraisal. Nonetheless, the ICR (paragraph 8) included a ToC that reflected the connections between the project activities, outputs, outcomes and long-term impacts. The ToC also reflected the assumptions that underpinned the achievement of the PDO. M&E design was comprehensive with an advanced MIS system and included participatory monitoring of physical and financial progress; surveys at baseline, mid-term and completion; and, special thematic studies as determined, as well as smaller, interim annual surveys (ICR, paragraph 79). The first objective (to increase the productivity of milch animals in project areas) was to be assessed through two PDO level indicators: #1. Percent Increase in Milk production/animal, and #2. Proportion of in-milk female animals to adult female animals. The second objective (to improve market access of milk producers in project areas) was to be assessed through two PDO level indicators: #3. Proportion of total milk sold to total production, and #4. Percent increase in share of milk sold to the organized sector (as a share of production). These four indicators were directly linked to the stated objectives, measurable and had realistic end of project targets. The RF also included 17 intermediate results indicators to assess the different activities supported by the project. The meaning/measurement of the intermediate indicators were generally well-described and appropriate for monitoring progress (ICR, paragraph 79). The project management unit (PMU) would coordinate various consultancy services, including an external M&E agency responsible for measuring performance of the project against targets outlined in the Results Framework (PAD, paragraph 30).

Overall, M&E design was robust with a detailed RF that included relevant indicators to assess the PDO and the project activities.

### **b. M&E Implementation**

The ICR (paragraph 80) assessed M&E implementation through four main criteria:

**Data collection, analysis and reporting.** M&E activities included participatory monitoring of physical and financial progress; surveys at baseline, mid-term and completion (ICR, paragraph 79). According to the ICR (paragraph 80) the project achieved high standards and multi-level institutional buy-in which was



demonstrated through the collection and organization of data in sector-specific data systems by the National Dairy Development Board (NDDB); using trained field personnel to conduct decentralized, methodologically sound data collection/entry for the MIS; and developing and deploying a web-based, single-platform Integrated NDSP Portal.

**Studies and Reports.** According to the ICR (paragraph 80) all envisioned studies/reports were delivered. The Baseline was completed in Year 1, the Mid-term and Final evaluation reports (End-line Survey) were delivered, as well as a Borrower Completion Report (BCR). In addition, 16 methodologically thematic studies were financed. These provided an analytical perspective for future dairy operations and public policymaking.

**Development and operationalization of ICT systems.** Two ICT systems were developed under the project, first the Information Network for Animal Productivity and Health (INAPH). This was a Desktop/Netbook/Windows/Phone-based field IT application that enabled real-time capture of comprehensive data on individual dairy animals. Second, the Semen Station Management System (SSMS) which monitored supply, demand, production, pricing, revenue and biological parameters (such as bull fertility and dilution rates).

**Mainstreaming the NDSP approach to M&E into country systems.** The NDDB mainstreamed the NDSP approach to M&E-where decision-making became based on data-analytics. Also, the INAPH was adopted formally as India's National Dairy Information System and its deployment was required for Central Sector Schemes related to animal husbandry and health and it became the backbone of the National Animal Disease Control Program.

Based on the above-mentioned evidence, it is evident from the ICR that the project benefited from an effective implementation of M&E activities.

### **c. M&E Utilization**

The ICR assessed M&E utilization through three main criteria:

**Utilizing M&E data, products and best practice cases.** According to the ICR (paragraph 81) the NDDB utilized the project data to monitor and report on the project implementation progress to the Bank, to other central-level institutional stakeholders and to the IEAs/local stakeholders. Data were also used to support targets and activities for annual project planning; and, to promote knowledge dissemination at workshops and seminars. According to the ICR (paragraph 80) the project's M&E data "facilitated planning and decision-making based on data-driven progress reporting."

**Performance and results data had immediate, practical application.** Two important examples emerged from the project experience: First, an accurate Progeny Testing/Pedigree Selection program was feasible through utilizing monitoring data from the Information Network for Animal Productivity and Health (INAPH) which proved fundamental to complete test inseminations under Progeny Testing, milk recording, and numbers of daughters/contemporaries evaluated. Second, through Semen Stations biosecurity, it became evident that initial coverage rates for Foot and Mouth Disease (FMD) were substandard and monitoring these results guided vaccination campaigns (ICR, paragraph 81).



**External studies supported and complemented project implementation.** According to the ICR (paragraph 81) external studies provided project-level indicators of progress; facilitated the evaluation of outcomes/impacts; and ensured validation of project progress and course corrections.

The above-mentioned information point to strong utilization of project data, which was also confirmed by the use of the data in the ICR.

Overall, M&E quality is rated High. The project benefited from a robust M&E design that included competent institutional leadership and relevant indicators to assess the project's results. Implementation was effective and utilization was strong with the NDSP ICT systems formally mainstreamed/deployed to stakeholders as part of GoI's planning and operational system for dairy industry modernization.

## **M&E Quality Rating**

High

## **10. Other Issues**

### **a. Safeguards**

The project was classified environmental category B. It triggered three safeguard policies: Environmental Assessment (OP4.01), Pest Management (OP4.09) and Indigenous peoples (OP 4.10). The project was likely to provide opportunities for an overall positive impact on the environment through better manure and waste management, balanced feed and nutrition program, and improved cattle breeds. However, some activities had potentially adverse environmental impacts that would require mitigation measures. These activities included: construction related activities, handling and management of wastes from livestock sector, and effluent treatment from large dairy farms. The project did not finance any direct procurement of pesticides. However, limited pesticides use was possible while growing high quality fodder seeds. Therefore, a pest management plan was developed to address any likely adverse impacts of handling, management and disposal of pesticides. The project was not expected to adversely impact the tribal and other vulnerable groups but because of their marginalization they might have had differential access to project benefits. An Environmental and Social Assessment (SESA) was disclosed in-country on June 14, 2011 and at the Bank's Infoshop on July 4, 2011.

**Environmental Compliance.** The ICR (paragraph 84) stated that the "overall environmental compliance was satisfactory" and environmental safeguards were "in full compliance." Mitigation measures were mainstreamed through the Ration Balancing Program and Fodder Development programs to manage livestock-based methane production and the potential for increased free-grazing to harm natural habitats. Capacity-building was provided to EIAs for managing animal waste and animal health care waste. EIAs also benefited from regular field visits and awareness programs to better understand environmental safeguards procedures/practices including safe use by fodder farmers of permissible pesticides under the Pest Management safeguard policy.

**Social Compliance.** According to the ICR (paragraph 85), social compliance was overall "Satisfactory" and "the project applied due diligence and no adverse social impacts were reported." Social safeguards were an integral part of sub-projects at the village level, i.e., base-level accountability. While the Indigenous Peoples (IP) policy was triggered, it included no set target. In 2017, an Equity Action Plan (EAP) focused on the



vulnerable (SC/ST), and set a combined target of 17%. At closing, 302,309 producers had benefited from awareness programs on dairy livelihood options, and the SC/ST target of 17% was achieved (ICR, paragraph 85). The project successfully established a Grievance Response Mechanism (GRM) which according to the ICR (paragraph 86) was "widely publicized at the national, state and village levels and was accessible to all project-affected people." The ICR provided no information on the number or nature of grievance cases.

## **b. Fiduciary Compliance**

**Financial Management (FM).** FMS technology enabled effective management of complex accounts for 477 projects covering 172 End Implementing Agencies (EIAs). Also, the decentralized, multi-layered audit structure was well-suited for micro-management of a large-scale project with multiple EIAs and project accounts. In addition, training and capacity building on project FM guidelines/processes ensured smooth and relatively problem free FM (ICR, paragraph 88). According to the ICR (paragraph 88) "FM reviews determined that an adequate FM system was in place to provide accurate and timely information verifying that WB credit proceeds were being used as intended." Annual audited financial reports had unqualified opinions and were timely submitted to the Bank.

**Procurement.** Procurement activities benefited from frequent procurement training for EIAs to build capacity. A global accounting firm conducted 12 semi-annual procurement post reviews, and "none of which identified serious procurement issues/discrepancies (ICR, paragraph 87)."

## **c. Unintended impacts (Positive or Negative)**

"Gender: The project explicitly targeted and measured women's participation. This focus resulted in the formation of 4,400 women-only DCSs, and Shreeja Mahila, an all-women DPC. By the time the project closed, the EIAs had trained 2.4 million milk producers, DCSs/Milk Unions/DPC management, LRPs, MAITS and field technicians, covering vulnerable groups including 784,000 women (45 percent) and 271,000 SC/ST farmers (10 percent). Greater focus is needed in such projects on women as cooperative members and service providers (e.g., LRPs), and in the case of DPCs, to involve female shareholders.<sup>21</sup>As evidenced by the Equity and Inclusion Study,<sup>22</sup> women's involvement in NDSP showed significant evolution with potential to be leveraged in new operations. NDSP women were more likely to access one/more of the three project extension services: AI, animal health and nutrition, devote additional time to improving milk quality and participate in milk selling decisions. Women as service providers significantly affected their standing in the village which contributed to their empowerment and income. However, the frequency of extension services use by women needs improvement, and women would benefit from more training on RBP and VBMPs. Women-only DCSs and DPCs are a striking example of a community institution working towards women's economic independence (ICR, paragraph 57)."

Also, the project supported clean energy pilots: "(i) Pilot rooftop solar panels: Installation of 61 rooftop solar Photovoltaic (PV) systems supported the adoption of clean alternative sources at affordable cost and reduced dependence on the unreliable, grid-connected power supply; and, (ii) Pilot Flexi Biogas Plants:



1,000 biogas plants generated additional income for producers using biogas as a clean cooking fuel, and bio-digested slurry both as a fertilizer and for sale. Indicative results show GHG emissions declined by 817 metric tons (CO<sub>2</sub> equivalent), by replacing LPG use (ICR, paragraph 64)."

#### d. Other

"Milk Fortification: A grant from the South Asia Food and Nutrition Security Initiative successfully explored the potential for micro-nutrient fortification in the liquid milk supply chain, reaching Milk Federations, DPCs and Milk Unions in 20 States. Fortifying just 13,000 liters/day in 2017, the pilot reached 5.5 million liters of milk per day by 2019, and access for six million consumers. Early adopters included the large, integrated dairy firms Mother Dairy India, Verka and Saras (ICR, paragraph 65)."

## 11. Ratings

| Ratings          | ICR                 | IEG                 | Reason for Disagreements/Comment |
|------------------|---------------------|---------------------|----------------------------------|
| Outcome          | Highly Satisfactory | Highly Satisfactory |                                  |
| Bank Performance | Satisfactory        | Satisfactory        |                                  |
| Quality of M&E   | High                | High                |                                  |
| Quality of ICR   | ---                 | High                |                                  |

## 12. Lessons

The ICR included seven lessons. The following three are emphasized with some adaptation of language:

**1. Data collection and analytics are critical elements needed to successfully drive project implementation, anchor needed course correction and allow transparent and objective assessment of impact.** The Information Network for Animal Productivity and Health (INAPH), with its multi-million data records, is now at national scale and officially mainstreamed. This system permitted the calculation of Estimated Breeding Values (EBVs) and estimation of genetic progress. Milk recording and production costs captured in INAPH on 2.85 million milch animals supported the business case for optimal nutrition management as a least-cost, productivity-enhancing approach. The National Dairy Development Board's (NDDB) use of INAPH data in scheduled regional review meetings with End Implementing Agencies (EIAs) allowed objective assessment of implementation progress and the formulation of action plans to prevent and recoup delays.

**2. Improved animal nutrition plays a critical role in the efforts to modernize smallholder dairying.** The benefits of ration balancing program (RBP) and Fodder Development transferred to a receptive clientele cannot be overstated and they are confirmed by the results in milk productivity and quality. Tangible, measurable gains emerged rapidly when the RBP regime was correctly delivered, adopted and practiced. The resulting boost in producer incomes motivated further growth



in DCS/DPC membership and producers' commitment to the wellbeing of their animals and to milk quality. A major co-benefit of RBP was reduced GHG emissions and water footprint, a message which needs constant reiteration. The instruments for delivering such services/messages must be both financially and technically sustainable.

**3. Ensuring access to organized markets is a critical initial requirement to sustain increases in productivity.** Unless a producer sees increased direct remuneration from selling more and higher quality milk, there is little incentive to invest in productivity-enhancing technologies. The Village-based Milk Procurement System (VBMPS) unequivocally provided this incentive. That said, the enabling conditions for the VBMPS as designed may not be easily replicated outside India, as they depend on a well-established system of cooperatives, village and matrix organizations, a technically and operationally advanced and well-connected lead institution, IT connectivity and economies of scale. Careful consideration is needed to determine whether such system can be used/adapted to other conditions and contexts.

### 13. Assessment Recommended?

No

### 14. Comments on Quality of ICR

**Quality of Evidence.** M&E benefited from a robust design, satisfactory implementation and strong utilization. Overall, the M&E system, the Government's BCR and the external studies provided important inputs to the ICR and efficiency analysis. However, there were minor discrepancies between the outputs reported in Annex 1 and those reported under the discussion of outcomes.

**Quality of Analysis.** The ICR provided clear linking between evidence and findings and skillfully used the evidence base to serve the arguments under the different sections, in particular the discussion on outcomes.

**Lessons.** Lessons reflected the project experience and were based on evidence and analysis.

**Results Orientation.** The ICR included a comprehensive discussion on the two objectives. It provided a well balanced discussion between reporting on the achievement of outcomes in relation to the indicators and what the project actually achieved on the ground.

**Internal Consistency.** Various parts of the ICR were internally consistent and logically linked and integrated.

**Consistency with guidelines.** The ICR successfully used the available data to justify the assigned ratings. Discussion of outcomes was comprehensive, and the efficiency analysis was robust.

**Conciseness.** The ICR was well written and provided comprehensive coverage of the implementation experience and candidly reported on shortcomings. There was enough clarity in the report's messaging. The outputs in Annex 1 included targets, and the ICR discussed clearly the risks and mitigation



measures. Also, the sections on M&E design, implementation and utilization were all well structured and informative.

Overall, the Quality of the ICR is rated High.

**a. Quality of ICR Rating**  
High