CONFIDENTIAL
INTERNAL USE
PUBLIC UPON APPROVAL

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK
MULTILATERAL INVESTMENT FUND

MEXICO

MARGARITA PROJECT: A SUSTAINABLE MILK SUPPLY STRATEGY TO IMPROVE THE QUALITY OF LIFE IN JALISCO

(ME-T1385)

DONORS MEMORANDUM

This document was prepared by the project team consisting of: Lorena Mejicanos Rios (MIF/GRU), Project Team Leader, Tatiana Virviescas (MIF/CME), José Luis Enríquez (MIF/CME), Lorena Barrenechea (GCL/GCL), Luis Guillermo Alarcón (IFD/CMF), César Bustamante (RND/CME), Ann Smith (DSP/DVF), Jesús López (INO/SMC), and Gmelina Ramírez (CSD/CCS).

CONTENTS

PROJECT SUMMARY

MARGARITA PROJECT: A SUSTAINABLE MILK SUPPLY STRATEGY TO IMPROVE THE QUALITY OF LIFE IN JALISCO
(ME-T1385)

Mexico has a milk shortfall of 39%, and it is the world's leading importer of powdered skim milk. Some 40% of the milk produced in the country comes from family farms with fewer than 60 dual-purpose cows. Small-scale milk producers face various obstacles in integrating themselves into higher-value markets: these include their low level of technical sophistication, quality, and productivity, in addition to the effects of climate change and considerable volatility in the price of their product.

A strategic partner in this project is Danone. In the Mexican state of Guanajuato, Danone has the world's largest yogurt-producing plant. The output of that plant supplies 45% of the country's yogurt market, and therefore access to a supply of fresh liquid milk is very important. The Margarita Project was launched in 2010 as a sustainable milk supply strategy that would enhance the livelihood of small-scale producers. This project has supported the development of more than 300 small-scale, low-income dairy farmers, allowing them to transition from basic production practices in an unstable and unreliable market to a more prosperous scenario. To achieve this, Danone created a strategic commercial partnership with the Regional Cattle Farmers' Union of Jalisco (UGRJ), which operates two bulking centers in Guadalajara, in the state of Jalisco. As a result of this project, those producers that made the recommended changes have seen their incomes triple, on average, over a period of five years.

The Bank and Danone signed a strategic partnership agreement in June 2017 to promote inclusive and sustainable development initiatives, taking advantage of Danone's value chain in the region. In the context of that partnership, the MIF project will support the expansion phase of the Margarita Project (phase 3) and will include substantive improvements, suggested by the MIF on the basis of its experience, that will be strategic for bolstering the approach, outcomes, sustainability, commitment, and ownership of the project on the part of the beneficiaries and local entities. MIF support will be focused in particular on the use of disruptive technologies, such as the "Internet of Things" (IoT), including monitoring sensors attached to the cows to determine when they are ovulating and to track their movements, which will help to improve aspects relating to their productivity. This system will include an artificial intelligence module that will draw upon the information generated by a large volume of livestock. It will also help to develop the Margarita Information Platform, an enterprise resource planning (ERP) system, which will incorporate the traceability and administration system of the UGRJ. This information platform is a mechanism that will make it easier to manage and systematize the **multibuyer milk sales model**, the first in the region, and in this way will make it possible to incorporate and connect more small-scale producers, at one end of the chain, while enlisting more dairy industry companies that wish to buy from "last mile" suppliers. It will be necessary to add at least one new corporate milk buyer in order to proceed with this new phase of the project.

Nuup is the executing agency for the project. The total cost of the project is US$3,717,938, of which US$1,305,000 (35.1%) will be provided by the MIF as nonreimbursable technical cooperation and US$2,412,938 (64.9%) will constitute the counterpart contribution.

ANNEXES

Annex I	Results Matrix
Annex II	Summary Budget

APPENDICES

Proposed resolution

INFORMATION AVAILABLE IN THE TECHNICAL DOCUMENTS SECTION OF THE MIF PROJECT INFORMATION SYSTEM

Annex III	Itemized budget
Annex IV	Diagnostic needs assessment (DNA) of the executing agency (including due diligence and integrity analysis)
Annex V	Project status reports (PSR) and fulfillment of milestones and fiduciary agreements
Annex VI	Procurement plan

ABBREVIATIONS

ERP	Enterprise resource planning
FIRA	Fideicomisos Instituidos en Relación con la Agricultura [Agricultural Trust Funds]
INAES	Instituto Nacional de Economía Social [National Social Economy Institute]
IoT	Internet of Things
ROSCA	Rotating savings and credit association
SINIIGA	Sistema Nacional de Identificación Individual de Ganado [National Livestock Identification System]
UGRJ	Unión Ganadera Regional de Jalisco [Regional Cattle Farmers' Union of Jalisco]
UNAM	Universidad Nacional Autónoma de México [National Autonomous University of Mexico]

EXECUTIVE SUMMARY

MARGARITA PROJECT: A SUSTAINABLE MILK SUPPLY STRATEGY TO IMPROVE THE QUALITY OF LIFE IN JALISCO
(ME-T1385)

Country and geographic location:	Mexico, specifically in seven municipios[1] of the state of Jalisco		
Executing agency:	Plataforma Nuup AC (Nuup)		
Access area:	Climate-smart Agriculture		
Coordination with other donors/ Bank Group operations:	Coordination with IDB Invest for a potential loan operation.		
Direct beneficiaries:	772 small-scale producers and the Regional Cattle Farmers' Union of Jalisco (UGRJ).		
Financing:	Technical cooperation	US$1,305,000.00	35.1%
	Total MIF contribution:	US$1,305,000.00	35.1%
	Counterpart contribution:	US$2,412,938.00	64.9%
	Cofinancing	-	-
	Total project budget:	US$3,717,938.00	100%
Execution and disbursement periods:	36 months of execution and 42 months of disbursement		
Special contractual conditions:	Conditions precedent to the first disbursement: (i) agreement signed between Nuup and Union Ganadera Regional de Jalisco (UGRJ), setting out the roles and responsibilities of the parties; (ii) letter of interest in participating in the project from an additional corporate buyer of milk, and (iii) proposal for selection of the project coordinator.		
Environmental and social impact review:	This project was analyzed and classified as a Category "C" operation on 1 October 2018, in accordance with the Bank's Environment and Safeguards Compliance Policy (Operational Policy OP-703).		
Unit with disbursement responsibility:	MIF/CME		

[1] Tepatitlán, San Juan de los Lagos, Arandas, San Miguel el Alto, Atotonilco el Alto, Unión de San Antonio, and Valle de Guadalupe.

I. THE PROBLEM TO BE ADDRESSED

A. Context and description of the problem

1.1 Mexico has a milk shortfall of 39%,[2] and it is the world's leading importer of powdered skim milk.[3] Some 40% of the milk produced in the country comes from family farms with fewer than 60 cows and a dual-purpose herd.[4] Mexico is free from foot-and-mouth disease (aftosa). It has 95,453 specialized milk production units, a figure that conveys the social importance of the activity. The state of Jalisco has around 18,000 producers, accounting for approximately 20% of Mexico's milk output[5] and making it the country's leading producer of cow's milk[6]

1.2 Milk production follows a cycle that is inverse to the demand cycle, which is seasonal, creating production surpluses at times of low demand (January to June) with the attendant impact on prices, but a production shortfall in the months of greatest demand, such as the back-to-school period (August and September), when prices rise significantly. In addition, the effects of climate change, such as higher temperatures and humidity and lower rainfall (e.g. the drought in 2005) have had an impact on milk production volumes due to the stress generated by heat or the diseases (mastitis) from which dairy cows suffer. The country's more efficient large-scale milk operations achieve yields of more than 32 liters per cow per day, with production cycles of fewer than 150 days open,[7] while small-scale farmers for the most part have yields of less than 14 liters per cow per day, and production cycles of more than 190 days open,[8] which means less milk per cow and per production cycle, and hence higher production costs.

1.3 **Small-scale milk producers** make little use of advanced technology and their productivity is low, they lack access to stable and reliable buyers to whom they can supply on steady basis, and they lack the knowledge to improve their operations and to meet market and financing requirements. Producers are exposed to a great number of variables that affect the competitiveness and even the survival of their business. These variables include the great volatility in the selling price of the product, high production costs, and a lack of organization and economies of scale that would facilitate the purchase of inputs at more competitive prices. They also depend on imports of the principal grains used to feed the animals, with a high indexing to the peso-dollar exchange rate. Their product lacks traceability, and moreover environmental conditions and climate change have a strong impact on

---

2 Source: National Chamber of Dairy Producers (CANILEC) based on data from SIAP-SAGARPA, Customs Administration, Department of the Economy.

3 Source: Fonterra-México, March 2018 and Department of the Economy (March 2012), "Análisis del Sector Lácteo," Dirección General de Industrias Básicas, available at www.economia.gob.mx/files/.../informacionSectorial/analisis_sector_lacteo.pdf.

4 Source: Last agricultural census, 2007: the 2016/17 census was canceled.

5 Padrón Ganadero Nacional.

6 Idem.

7 "Days open" are the period between calving and the cow's next pregnancy. The ideal period is 85 to 90 days, making for an interval between parturitions of one year, i.e. the cow would give birth to one calf and have one period of lactation every year (R. Salgado et al., 2003). These times are influenced by the nutritional management of the cow postpartum, as well as the suckling of calves, factors that affect production.

8 Data developed by Danone.

production both of forage and of milk itself. These producers lack high-quality technical assistance: most of what they receive comes from sellers of inputs, and this is not always the best source. Their milk has problems of quality (fat and protein content, colony-forming units, somatic cell counts), they have no access to the formal market, and they lack long-term purchase contracts that would lend certainty to their business. In many cases, producers find themselves cut adrift, with nothing to favor their greater productivity or their insertion into value chains. Because of this, small-scale producers will at certain times of the year be able to sell their output at a positive margin, but at other times they must sell below the cost of production, and occasionally they will simply dump the milk because they cannot find any client for it. The **problem** facing small-scale milk producers in Jalisco is their low productivity, and the fact that they are not linked to value chains that would assure them the ability to remain and grow in the business.

1.4 **The Margarita project and its achievements.** Danone is a strategic partner in this project. It has in Mexico the world's largest yogurt manufacturing plant, located in Irapuato in the state of Guanajuato, which supplies 45% of the domestic market for yogurt: hence the importance of a fresh fluid milk supply to the plant. The Margarita Project was launched in 2010 as a sustainable strategy of milk supply for improving the livelihood of small-scale producers. This project has supported more than 300 small-scale, low-income dairy farmers in eliminating the obstacles referred to above, allowing them to transition from basic production practices in an unstable and unreliable market to a more prosperous scenario where they can produce milk of better quality and are assured a constant market to which they can sell a steady supply of milk at stable prices, as well as having access to specialized technical assistance and financing. Danone has established a strategic commercial partnership with the Regional Cattle Farmers' Union of Jalisco (UGRJ), which operates two bulking centers in Guadalajara in the state of Jalisco, with a view to helping local small-scale producers develop their production and bulking and purchasing their milk on a steady basis and at competitive prices. Thanks to the project, over a period of five years, those producers that made the recommended changes have seen their incomes triple, on average, and Danone obtains 17% of its milk supply from small-scale farmers.[9] This economic impact on the family farm unit reflects a combination of changes, including: (i) technical assistance provided by TechnoServe and the National Autonomous University of Mexico (UNAM) and financed by Danone's Ecosystem Fund leading to the adoption of best practices and a 27% increase in production, which today stands at 19.9 liters per cow per day; and (ii) the mobilization of public funds,[10] the forging of partnerships with financial organizations such as Caja SMG[11] and the creation of a guarantee fund with €675,000 in resources from Danone's Ecosystem Fund to provide them with credit and investment for their businesses. This has improved their resilience to climate change, providing access to green technology (such as solar panels for generating the energy used in the cooling tanks and operations),

[9] Source: Danone and TechnoServe.

[10] Agricultural trust funds (FIRA) and the National Social Economy Institute (INAES).

[11] Financial entity (a savings and loan cooperative) regulated by the National Banking and Securities Commission (CNBV).

improving their barns, making their production more efficient, and increasing the number of cows per barn by 36%, for an average of 27 cows[12] in 2017

1.5 Milk production and supply is one of the principal sources of greenhouse gas emissions in the dairy industry, and the adoption of sustainable production practices offers a great opportunity to reduce these emissions. The project's training plan for producers calls for reducing the carbon footprint of milk production in the barn, identifying sustainable practices that reflect the needs and conditions of each type of production system, training farmers, and providing technical support during the adoption process.

1.6 **The milk value chain in Jalisco and markets.** The value chain consists of a base of 18,000 producers of varying scale, formal and informal bulkers, and 10 processing companies (domestic and foreign) that produce cheese, cream, butter, and dairy products.[13] The Margarita Project is designed to meet the needs of the domestic market for milk and dairy products. Given the country's milk shortage, a number of processing companies now rely on purchases of milk powder of unknown origin and with no traceability, in order to produce cheese, cream, and butter.

1.7 With the Margarita Project, in contrast, producers deliver fresh whole milk on a daily basis to the UGRJ, of which they are members, and the UGRJ delivers it directly to Danone at its plant in Irapuato, thereby guaranteeing the purchase of all milk produced that meets the required quality. Given the success of the business model, which is generating a win-win relationship for the farmers and Danone, there is an interest on the part of Danone and other partners[14] to expand the project into an initiative involving multiple corporate buyers that would incorporate an additional 422 small-scale producers as well as other buyers and would ensure a permanent supply of high-quality traceable milk.

1.8 **Profile of the small-scale Margarita producers.** These are for the most part individual farmers operating in family units: most are men (12% are women) between the ages of 40 and 60 years who have completed basic education up to grade 3 and are low-income. Some of them (or their children) have migrated to the United States and returned, and they are the farmers who have the best production infrastructure (barns). A farmer will have from 3 to 100 cows (on average 30 cows) of the Holstein breed, and their average output is 19.9 liters per cow per day.[15] In all, 64% of producers have between 10 and 40 cows, 24% have more than 100, and 10% have fewer than 10. They have access to financing, they use banking services, they have been formalized, and they issue invoices. Most have electricity (connected to the network) and cell phones. Women also take part in the activities of the business, although generally it is the father or the husband who is officially registered in the project.

1.9 **The problems facing farmers in the Margarita Project.** Margarita producers demonstrate better management of their herd and of their business. However, there is still room for improvement. As the size of the herd and the operation increases,

---

12 Source: Danone and TechnoServe.

13 Idem.

14 BIMBO and Mondelez have expressed interest in participating.

15 Under optimal conditions, the largest and most efficient herds in the country produce 32 liters per cow per day.

control becomes more complex, and it is harder to provide timely care for the cows and to handle aspects that bear directly on production, such as their health and reproductive cycle. Farmers do not have precision technologies for timely detection of when a cow is sick or ovulating, which would help determine the ideal time for artificial insemination and boost the cycles of pregnancy and production. At the level of the individual farm, only 20% of farmers keep full production records (logbook).[16] Moreover, while the technicians collect data on production costs and management during their visits, this information is not left with the producer and provides no feedback for improving his or her knowledge and decision-making abilities. As well, some producers are rather unclear as to the benefits of the pricing system offered by the project, and most continue to operate individually, without any collaborative arrangements that might, for example, facilitate the purchase of inputs and services at better prices.

1.10 **Problems with the UGRJ.** The UGRJ provides its members with bulking and traceability services, storage (it operates two bulking centers), and milk marketing. It also keeps records on deliveries, shortfalls, discounts (in the case of credit), and payments to producers, among other items. However, this administration and control is performed manually (using Excel spreadsheets), and this is neither reliable or efficient. Margarita program operations are managed by means of processes that are hard to scale up, due to the way in which data is generated, aggregated, and distributed. For example, when delivering milk, each producer is given a paper receipt, and the truck driver keeps a copy. At the bulking center, the driver delivers the receipts to the person responsible for consolidating this information in the Excel document. The receipt serves various purposes (control of product delivery, payment to the producer, etc.) and passes through the hands of several individuals, generating errors that in the end undermine the farmer's trust and loyalty to the program. Producers are currently paid weekly, for each week's deliveries, and this imposes a significant administrative burden on the UGRJ.

1.11 **MIF additionality.** In June 2017, the Bank and Danone signed a memorandum of understanding to promote inclusive and sustainable development initiatives based on Danone's value chain in the region. Pursuant to this partnership, the MIF project will support the third expansion phase of the Margarita Project and will include substantive improvements, suggested by the MIF on the basis of its experience, that will be strategic for bolstering the approach, outcomes, sustainability, commitment, and ownership of the project on the part of the beneficiaries and local entities. MIF support will be focused in particular on **Component II** (see paragraph 2.10) and will involve the introduction of disruptive technologies such as the "Internet of Things" in a group selected from among the 350 producers in the first phase who demonstrate the greatest maturity and the best conditions of success for its testing and use, as well as for testing and demonstrating its cost effectiveness. This will mean facilitating the participation of new suppliers of technology to the Mexican market, in order to expand options and competition. As well, it will help to develop the Margarita Information Platform, an enterprise resource planning (ERP) tool that will integrate the traceability system and the seven modules that the UGRJ is now managing manually, in order to run automatically. This information platform constitutes a mechanism that will make it easier to manage and systematize the

[16] Technical audit conducted by UNAM between August and September 2018.

multibuyer milk sales model, and in this way will make it possible to incorporate and connect more small-scale producers, at one end of the chain, while enlisting more dairy industry companies that wish to purchase from “last mile” suppliers.

1.12 TechnoServe will continue to provide training geared to current and new producers, an activity that will be financed with funds from the counterpart contribution, and it will also be responsible for executing components I and III. The training will incorporate improvements suggested by the MIF, designed to make it more cost efficient, targeted, and specialized so as to reflect the growth and changing needs of producers. The idea is to create greater capacity at the local level as a strategy for ensuring sustainability and providing work opportunities for young people, who tend to migrate for lack of opportunity, and who could well constitute the next generation of producers. At the present time, producers cover around 17% of the technical assistance costs.

II. THE PROPOSED INNOVATION

A. Project description

2.1 The **objective** is to help improve the competitiveness of small-scale dairy farmers while enhancing their resilience to climate change. The **main results** that are expected at project completion are as follows: 422 additional producers integrated into the dairy value chain (90% men (380), 20% women (42)); average productivity at 20.5 liters per cow per day; sales of 126 million liters of milk by the UGRJ (64% with Danone and 36% with buying partners); a 100% increase in the income of new producers; adoption of IoT technology by at least 60 producers following the completion of the pilot project (5 women and 55 men); an increase to 20% in the portion of Danone’s supply sourced from small-scale producers; records at SINIIGA (the national livestock identification system) for 100% of the animals covered by the project; traceability using IoT technology of 100% of the milk delivered to UGRJ; and reduction of emissions of carbon dioxide equivalent.

2.2 **Innovation.** This is the first experiment in Mexico, and indeed in Latin America, for providing a permanent supply of fluid fresh milk from small-scale producers to a **group of companies** in the dairy industry, without informal intermediaries. It is also the first initiative that proposes the adoption of IoT technology for small-scale producers. This project is designed to add producers (currently more than 300) and buyers (currently one) at each end of the value chain, through a multibuyer sales platform that will be headed by the UGRJ. The project will serve to incorporate greater numbers of small-scale farmers into the formal market, by offering them an array of services and support that will help them boost their productivity and their incomes. This project also represents the first attempt to introduce IoT and artificial intelligence technology to guide farmers in the best approaches to herd management and health: this will be possible thanks to the integration of at least 1,000 head of cattle into the artificial intelligence system of each technological solution, in order to feed the initial information system. The innovation lies not only in introducing and using sensors that will detect the movements of animals on a permanent basis and reveal when they are ovulating but also in providing the kind of analytical information that would be difficult for individual farmers to collect and interpret but should improve farmers’ productivity and business operations.

2.3 The project will facilitate the use of technology for: (i) monitoring cows' health and ovulation (24 hours per day, 7 days per week); (ii) product traceability, through the use of a mobile technology platform based on the Internet of Things (IoT), which involves the incorporation of commonplace objects and devices into a digital network that uses the Internet: the objects must have specialized hardware that enables Internet connection and the programming of specific actions. The IoT technology will help with the management of inventories (milk and livestock), bulking logistics, and payment to producers; and (iii) measuring milk temperature precisely. Geographic positioning will be used to optimize collection and reduce the carbon footprint. Training in digital technology will be provided, and young people will be encouraged to participate as a way of mitigating the region's high emigration rate by offering local opportunities for work and income generation.

2.4 This project represents an excellent opportunity to **reduce waste** in the dairy sector, especially on the side of the producers who must often discard their product for lack of market. To offset the adverse seasonality of milk production and its impact on the market, agreements will be negotiated between the dairy companies to create a market for basic dairy products (skim milk, cream, butter or butyric fat, and milk powder) that will absorb surpluses of whole fresh milk, favoring the Mexican industry over imports.

2.5 **Eligibility criteria for producers to participate in the agtech pilot (IoT).** This initiative is intended to reward producers who: (i) have been part of the Margarita Project for at least two years; (ii) have a herd of between 30 and 100 cows (iii); are able to read; (iv) have a technically adequate barn (with a cooling tank and a milking room); (v) are entered in the Federal Taxpayer Registry; (vi) can show that they have registered their animals in the SINIIGA; (vii) maintain proper control of records and logbooks concerning activities in the barn; (viii) have access to electricity; and (ix) have a cell phone that meets the specifications of the application to be installed, and are skilled in using mobile applications. These producers must be located in places that have mobile data coverage.[17] To the extent possible, women will be encouraged to participate in production, in training, or in the provision of technical services as required by the project (trainers, veterinarians etc.). The farmers selected will sign an agreement with Nuup, defining the role and responsibilities of the parties, whereby the producers undertake to share information on their production as well as records and logbooks concerning activities in the barn, to change their approach to herd management based on the recommendations of the system, to absorb part of the cost of the agtech package once the pilot test stage has been finalized (recognizing that the portion to be covered by the farmer will rise over time), and to allow their barn and experience to serve as learning input for other farmers and for documenting the case study, among other things. Nuup will prepare a draft agreement of this kind, which will have the Bank's no objection.

[17] 3G/4G at speeds of at least 1 megabit per second for uploads and 4 megabits per second for downloads. In the event that these areas have connectivity problems, the possibility of providing coverage via an external antenna, integrated with an Access Point, will be considered.

2.6 **Geographic location.** The project will be pursued in seven municipios of Jalisco,[18] where the Margarita Project is currently underway, given their proximity to the two milk bulking centers operated by the UGRJ (located in Tepatitlán and San Juan de los Lagos). The localities selected have an installed base of milk production with the potential to interest other small-scale producers in joining the project and to achieve significant production volumes to supply the milk industry. Based on experience to date, the expansion phase of the Margarita Project will include the participation of producers in a more competitive way, with the introduction of invitations to apply based on selection criteria, and in turn will measure results in order to determine whether producers can continue to participate in the project (based on the adoption of good practices, commitment, and productivity indicators). The selected producers will be offered technical assistance, and their product will be purchased immediately if it is of the required quality. In return, the producers will accept the commitment to meet the requirement for registering their entire herd with the SINIIGA, within a period of time to be determined. The project will assist them in this respect.

2.7 **Component I. Upgrade of training and technical assistance (MIF: US$62,853; Counterpart: US$1,773,949).** The objective is to restructure and reinforce the methodology and content of the training and technical assistance provided to dairy farmers. This training is geared to improving the farmer's herd management and milk production activity, as well as ensuring the adoption of best practices. The technical content of its eight modules (a total of 28 hours of training) will be refined. This includes: induction into the program and the importance of training, production records, milk quality and milking routines, administrative management and small-scale dairy microfinance, feeding of dairy cattle, veterinary nursing and preventive medicine, reproductive and genetic management of milk cows, and productive management practices on the farm to mitigate the environmental impact.

2.8 TechnoServe will be responsible for adapting the learning methodology and for coordinating the work of the technical experts contracted by UNAM under the aegis of the Department of Veterinary Economics to conduct training workshops and technical assistance visits. At this time, each technical expert is responsible for a portfolio of 20 producers, which allows for to two visits per month to each producer. In the expansion phase, the number of producers per technician will increase, requiring use of the new support modality to verify the adoption of good practices in the field. Recognizing that a portion of the technical assistance is paid for by the

[18] According to the 2010-2015 poverty measurement of the National Council for the Evaluation of Social Development Policy (CONEVAL), all these municipios have succeeded in reducing the population living in extreme poverty, and six have reduced the numbers of the poor population in total. It now ranges from 32.3% to 46.2%, and only the municipio of Valle de Guadalupe recorded an increase (from 32.2% to 38.7%).

producers themselves, it will be essential to guarantee a value proposition, which although it may change will have to be attractive and show results in the barns. The introduction of IoT technology for small dairy herds is an innovation and should therefore be supported by a system of technical assistance that moves away from an individualized approach towards a collective approach while promoting self-management so that the model will be sustainable over the long run for the small-scale producers.

2.9 The **expected results** are: (i) training manuals adapted and validated; (ii) communication strategy developed for invitations to participate and selection of new producers; (iii) a new company purchasing milk from the UGRJ; (iv) training for 30 trainers (2 women and 28 men); (v) 422 new producers trained in the 8 modules of good practices (10% women (42) and 90% men (380)); and (vi) establishment of dairy farmers' association.

2.10 **Component II. Access to new disruptive information technologies (MIF: US$850,231; Counterpart: US$48,000).** The objective is to introduce and test the use of disruptive information technology aimed at improving farm productivity and efficiency (agtech pilot project) and program management by the UGRJ (development and implementation of the Margarita Information Platform).

2.11 **(a) Agtech pilot project.** As a means of improving farm management, IoT technology will be introduced and its cost effectiveness tested, and the necessary knowledge will be generated so that, if it is successful, it can be adopted in the future by the remaining producers. This exercise will also foster the incorporation of new suppliers of technology interested in entering this market segment. The agtech pilot will include the **use and testing of IoT technology** involving the use of sensors (attached at the neck, the ear, or the foot) that will detect the temperature (ovulation) and movements of the animal, as well as feeding behavior, and transmit information on each animal (on a round-the-clock basis) with respect to its activity, together with concrete recommendations to the farmer for actions to be taken with respect to animal health, treatments, ovulation, optimal insemination times, feeding, etc. This pilot will **test two of these technologies,** with the expectation of involving 20 producers and 1,000 cows in each technology (total of 40 producers and 2,000 cows). Paragraph 2.6 lists the selection criteria for the group of producers that may participate. This pilot project will be implemented in phases, the first with a limited number of farmers, thereby allowing the technicians to familiarize themselves with the new technology, while the supplier companies can fine-tune their customer assistance in the field. A second stage will include more farmers, selected by means of open competitive invitations. MIF funds will cover the **servicing** costs of access to this technology, while the companies will take care of the investment and equipment maintenance and will focus on providing good service and instruction to the producer. In a manner similar to the cellular telephone service, this will facilitate entry and exit for producers who want to adopt this technology. At the end of the first year of testing, a case study will be prepared on the experiment, demonstrating the concrete benefits in terms of improved productivity, the cost efficiency of each technology, thereby confirming the return on investment, the challenges involved in farmers' use of IoT technology, connectivity, support, user (producer) satisfaction, etc., which will provide lessons prior to any scaling up. To date, three potential technological solutions have been identified: Connecterra, Farmnote, and Madero. The corresponding contracts will ensure that the information generated by the

project will be handled in accordance with local laws and regulations.[19] Nuup has an initial proposal for an agtech pilot execution mechanism, which will be fine-tuned with support of the winning companies, so as to take their experience into account. For this pilot exercise, support and advice will be provided by the Bank's Connectivity, Markets, and Finance Division (IFD/CMF), and up to US$30,000 will be made available to carry out the following activities: notification of the tests to the Federal Telecommunications Institute (IFT), specialized telecommunications services for the certification of terminals and registration of the solution with the competent authorities, integration of coverage solutions via external antennas and access points, legal advisory services on the protection of personal data held by private parties, protection of intellectual property, and information security.[20] The final execution mechanism will require the Bank's no objection before implementation. The financial mechanism already offered by the Margarita program can be used to finance the adoption of this technology (see paragraph 1.4 (ii)).

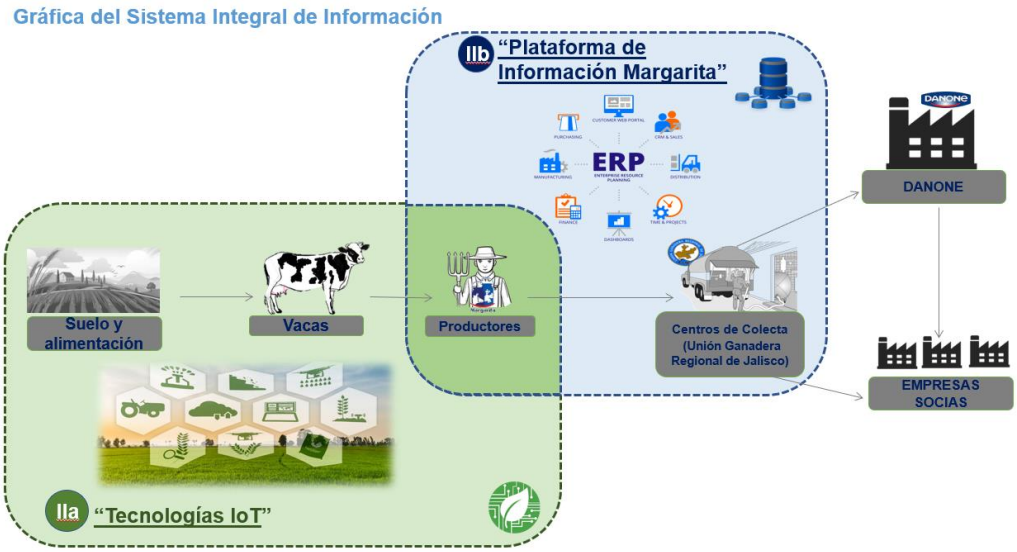
2.12 **IoT technology.** The technology solutions (whether a collar, a ring attached to the ear, or a band at the hoof) must reach the farmer directly, though some kind of mobile communication device, so that he or she can understand the situation and take action without spending much time, thus making for more efficient management and boosting earnings potential. This pilot must ensure that the farmer receives timely information needed not only to improve management of the dairy herd but also to take prompt and appropriate actions. These are the actions that in practice will allow for better management of the barn, improved working conditions, and greater productive efficiency (in the use of inputs per liter of milk produced). Hence the importance of ensuring a shift in culture, through coaching and monitoring. These new technology solutions are also an opportunity to bring young people permanently into farming, to ease the workload, and to optimize the time spent working. This technology will also provide direct benefits in terms of animal comfort and well-being in the barns, as it is expected to improve disease prevention, ensure consumption of the right amounts of food and water at the right times, and identify any unusual behavior caused, for example, by heat stress or insufficient rest.

2.13 In addition, the plan is to work with supplier companies to generate feedback loops that can capture intelligence on the specific needs of small-scale farmers and on how to optimize the use of their technology solutions so that they can further develop their own products and services. All of this will trigger benefits for the supplier companies, by helping them enter a new segment of the market in Latin America, namely the market of small-scale dairy producers.

---

[19] Federal Law for the Protection of Personal Data Held by Private Parties.

[20] These items are to be covered by the technology providers, but funds will be set aside for contingencies.



2.14 **(b) Margarita Information Platform – ERP.** The seven information modules[21] that the UGRJ currently maintains manually will be systematized, and this will improve overall administration of the project, both with the farmers and with their markets. Steps will be taken to ensure that the information generated by the IoT technologies is compatible with this information system. This ERP will provide strategic strengthening to improve operations at the UGRJ. The platform will facilitate the integration of more producers and buyers. It will use the Cool Farm Tool device, an online calculator that can measure the carbon footprint for each barn, with a view to adopting best environmental practices and boosting efficiency in the use of inputs (water, energy etc.) in the production of milk. Climatological information will be provided to farmers through their cell phones, so that they can take timely steps as needed to mitigate the effects of climate change. The climatological data management system developed by the United Nations will be used: its purpose is to process and visualize daily data in their original format from individual stations, CLICOM (CLImate COMputing Project) – CLICOM en Malla.

2.15 The **expected results** are: (i) IoT implementation strategy fine-tuned; (ii) financing strategy for each invitation designed; (iii) 40 small-scale producers have tested the adoption of IoT technology (2 women and 38 men); (iv) an analytical database has been generated on the behavior of at least 2,700 cows, 700 of which are enlisted by decision of the farmer in addition to the pilot (artificial intelligence module functioning); (v) training of at least two technicians in IoT technology; (vi) case study developed and disseminated among farmers; (vii) audit of the UGRJ; (viii) identification of technology and selection of the package; (ix) development and implementation of seven modules for the information management system; (x) manuals on operational processes in the administration of the seven control systems of the UGRJ; (xi) training of at least two technicians from the UGRJ in management of the systems, validated by the organization responsible for

[21] Producer profile, payment management, quality management, milk collection routes management, loss management, productivity, costs, and earnings associated with herd management, notices and information management.

development and implementation; (xii) information system operating and approved by the UGRJ; and (xiii) website up and running with information on the project and its results.

2.16 **Component III. Strengthening of the UGRJ (Counterpart: US$88,867).** The objective of this component is to improve the technical and administrative capacity of the UGRJ so it can take the lead on the project once MIF financing ends. At present, responsibilities are distributed across various entities: Danone México coordinates the milk bulking centers and TechnoServe coordinates the training and technical assistance provided by UNAM. In the medium term, the idea is to strengthen the UGRJ so that it can assume some responsibilities and ensure that the Margarita Project is sustainable over time. TechnoServe will be responsible for this component.

2.17 Financing will be provided for a comprehensive assessment of the UGRJ, with special emphasis on gauging its capacity in terms of corporate governance, administration, planning, operational capacity at the bulking centers, transparency, etc. This diagnostic assessment will be used to determine which functions to transfer to the UGRJ and other actors with the ability to perform them. In the end, support will be provided to generate the competencies both at the UGRJ and the identified organizations so that they are able to perform the activities for which they are responsible in a sustainable manner. To this end, operations manuals will be prepared, and institutional strengthening and personnel training programs will be developed.

2.18 The **expected results** of this component are: (i) a diagnostic assessment of capacity gaps at the UGRJ and a strengthening action plan approved by the UGRJ and the Strategy Council for the project; (ii) preparation of procedures on roles to be transferred, documented through operations manuals, job profiles, and monitoring functions and metrics; (iii) a program to build capacity at the organizations taking on roles, with at least two people trained per role; and (iv) manuals of procedures on running the program within the UGRJ, approved by TechnoServe and Danone.

B. Results, measurement, monitoring, and evaluation of the project

2.19 The key indicators for measuring the expected results of the project are as follows: 450300, number of producers adopting new practices or technologies; 450600, number of markets or sectors emerging with MIF support; sale of 126 million liters of milk traced; and 340100, greenhouse gas emissions avoided (in tons of carbon dioxide equivalent, to be defined).

2.20 The project will design and implement a **baseline and a monitoring and evaluation system** in order to conduct semiannual measurements and record progress and compliance with the purpose- and component-level results indicators established in the project Results Matrix. The project will be subject to a **midterm evaluation** or a **final evaluation**, as decided by the Bank, once 60% of the execution period has elapsed or 50% of the MIF's contributon has been disbursed (whichever occurs first), to which end the Nuup undertakes to cooperate, to provide all information requested, and to facilitate access as required by the Bank and whomever it may designate. This evaluation will be financed from the MIF contribution and will assess, among other things, the business model implemented in the project.

2.21 Nuup and the Bank will organize a **closing workshop** at least four months before the end of the project execution period, to perform a joint evaluation of the results achieved, to determine any additional tasks required to ensure the sustainability of the actions financed by the project, and to identify the lessons learned.

III. ALIGNMENT WITH THE IDB GROUP, SCALABILITY, AND PROJECT RISKS

A. Alignment with the IDB Group

3.1 The project is aligned with the IDB's institutional strategy inasmuch as it will support the integration of small-scale farmers into value chains and will address crosscutting issues such as climate change, environmental sustainability, and biodiversity. It is aligned with the IDB Country Strategy with Mexico 2013-2018 (document GN-2749) inasmuch as it supports rural development, specifically with the objective of fostering production-related activities that will improve living conditions for the rural population and will promote the generation of value added. The project is also aligned with the IDB initiative to strengthen Mexico's productivity through the Mexican government's "Mexico Próspero" program, in that it will promote value chains and provide a way to improve quality of life for indigenous groups. The Bank recently approved loans ME-L1145, First Program for the Financing of Rural Sector Production Restructuring and Investment Projects, and ME-X1021, a conditional credit line for investment projects for strengthening the productivity and competitiveness of rural economic units, promoting the rational use of natural resources, and facilitating access to rural financing, respectively. Also in execution is loan ME-L1268, Land Management to Achieve Results under the Climate Change Agenda, where the Bank has focused on promoting measures to mitigate greenhouse gas emissions and adapt to climate change. This project complements the efforts of those three initiatives.

B. Scalability

3.2 The project's scalability will depend, first, on the extent to which the UGRJ builds the capacity needed to take leadership of this initiative, which will entail activities to facilitate the incorporation of more small-scale producers, promote technology that increases their productivity, and identify with greater precision the size of the market of small-scale producers to which it can offer its services. Second, it will also depend on attracting more corporate markets to source from those producers, through Danone. The project will operate in a milk-producing zone where there is a significant base of dairy farmers with the potential to become formally integrated into this value chain. Once the success of this business model is demonstrated, Danone and its corporate partners will be able to implement it in other countries where they operate.

C. Project and institutional risks

3.3 The project represents an experiment to test a new business model with "last mile" producers, who will, for the first time, use precision technology to optimize the management and productivity of their dairy operations. Project results and execution could be affected by the following risks:

3.4 **Failure to purchase milk from new producers. Mitigation:** At least two companies have expressed interest in joining this initiative. Their commitment to participate will be a condition precedent to the first disbursement, and this will also be validated with the purchases recorded by the project, disaggregated by company.

3.5 **Limited capacity of the UGRJ to achieve project results. Mitigation:** Due to the change in corporate governance, the UGRJ was not involved in preparing this project. To ensure its commitment and participation, it will sign an agreement with Nuup as a condition precedent to the first disbursement. As well, the diagnostic needs assessment will include an audit, and follow-up will be conducted for the findings. Milestones have also been set, and fulfillment will be a condition for decisions about subsequent disbursements or project continuity.

3.6 **Low connectivity in the geographic zone of intervention. Mitigation:** The agtech pilot project will be launched initially in areas of demonstrably good Internet connectivity and functioning.

3.7 **Change in the model for providing training and technical assistance from individualized to group-based and sporadic. Mitigation:** The design of the model to be implemented has been successfully tested in other livestock projects. Nevertheless, it will be adapted based on feedback about the context and from the farmers involved in order to ensure that their needs are met satisfactorily.

3.8 **Complexity of multilevel coordination arrangements. Mitigation:** This arrangement has already been operating with proven results, but aspects that bear on the project's success will be fine-tuned and simplified based on experience over time.

IV. FINANCING INSTRUMENT AND PROPOSED BUDGET

4.1 The total cost of the project is US$3,717,938, of which US$1,305,000 (35.1%) will be provided by the MIF as nonreimbursable technical cooperation and US$2,412,938 (64.9%) will constitute the counterpart contribution. The execution period will be three years. The counterpart funds will come from Danone México, Danone Ecosystem, and other sources, including the farmers themselves. Danone's financing is now in the process of approval.

Category	MIF (US$)	Counterpart (US$)	Total (US$)
Component I: Upgrade of training and technical assistance	62,853.00	1,773,949.00	1,836,802.00
Component II: Access to new disruptive information technologies	850,231.00	48,000.00	898,231.00
Component III: Strengthening of the UGRJ	-	88,867.00	88,867.00
Execution unit	337,727.00	502,122.00	839,849.00
Evaluation (midterm or final)	15,000.00	-	15,000.00
Baseline and monitoring and evaluation system	23,514.00	-	23,514.00
Ex post reviews	15,000.00	-	15,000.00
Contingencies	676.00	-	676.00
Total	1,305,000.00	2,412,938.00	3,717,938.00
%	**35.1%**	**64.9%**	**100%**

V. EXECUTING AGENCY AND IMPLEMENTATION STRUCTURE

A. Description of the executing agency

5.1 The Nuup Platform AC is the executing agency selected by Danone to carry out the project. Its head office is in Mexico City. Nuup is a Mexican corporation founded in 2015 by Iván Córdova, Vincent Lagacé and Maria Luisa Luque. It was founded in recognition of the need to create an entity that would focus on generating information, cooperation, and transparency in the agrifood value chains. Nuup works specifically to help small-scale producers who farm, ranch, and fish to integrate themselves effectively into formal value chains, so that buyers can identify opportunities to include them in their value chains and fine-tune their operating models to make them more inclusive, and so that NGOs working in the field with farmers will have methodologies and tools to support them as they transition from an agricultural operation to a business operation. To fulfill this mission, Nuup generates solutions for capturing, managing, and visualizing information that the various actors in the value chain can use to share or receive information that will improve their decision-making. It generates cooperation among various actors with a view to finding solutions to common challenges; it generates content and knowledge that can be shared among stakeholders with a view to making experiments more transparent. Nuup has a team of six people. Other strategic partners are the UGRJ, Danone México, the Danone Ecosystem Fund, TechnoServe, and UNAM.

B. Implementation mechanism and structure

5.2 Nuup will establish an execution unit and the structure needed to carry out project activities and manage project resources effectively and efficiently. The execution unit will report directly to the Nuup Steering Committee and will consist of a project coordinator, an accounting and administrative assistant, and technology specialists (maximum of two). The coordinator and the accounting and administrative assistant will divide their time between fieldwork in Jalisco and the Mexico City office, in order to maintain close communication and coordination with Nuup management, and also to allow the coordinator to participate in the various project committees, such as the Strategy Council, the Steering Committee and the Operations Committee, which will meet in Mexico City. The coordinator will make field visits to supervise execution of the components and to maintain relations with the parties involved, particularly the UGRJ and the beneficiaries. The execution unit will be responsible for overall project execution, planning and operational management, resource administration, risk evaluation, and the preparation of progress reports. In hiring technical staff, every effort will be made to recruit young people from the Irapuato area, ideally the sons and daughters of dairy farmers who are familiar with the new veterinary technologies and know-how and/or running a barn. These technicians will be based in the project zone and will report to the Project Coordinator.

5.3 Nuup will manage the MIF resources and TechnoServe will administer the counterpart funds, as well as overseeing the execution of components I and III: to this end, their respective coordinator and accounting and administrative assistant will maintain due coordination with their Nuup peers.

5.4 As the Margarita project is a collaborative effort that will bring together a variety of stakeholders, know-how, and capacities, a three-tier governance structure will be

established in which decision-making is separated so as to ensure that responsibilities are distributed among the various bodies. With this structure, careful communication and inter-tier information-sharing will be necessary. Since the Margarita program is already operating with the support of various institutions and with Ecosystem's experience in generating collaborative projects supported by sound governance, the phase that is about to begin will inherit a series of functional governance structures that will require adjustments to incorporate the new operational actors such as the new corporate buyers and the executing agency as administrator of the MIF funds. With the combination of project financing from various sources—private (Danone), social (Ecosystem Fund), public (FIRA, INAES, and other government entities), and international (MIF)—as well as the farmers themselves through their contributions for technical assistance, effective governance will be needed in which good practices with respect to transparency and accountability prevail.

5.5 The program will maintain a three-tier structure: **Tier 1, the Strategy Council,** will meet every six months to approve the program strategy and evaluate its progress and the efforts of the Steering Committee. It will share technical know-how and recommendations with the Director of the Council, led by the Vice President of Purchasing at Danone México, who will pass this on to the Steering or Operations Committee, as appropriate. Members will include Danone México, TechnoServe, UGRJ, UNAM, a buyer representative, Nuup, and a consultant. **Tier 2, the Steering Committee,** will meet every month and will set the operating rules and procedures, oversee and monitor the criteria for making the project successful, and define and implement action plans based on the strategy approved by the Council. In addition, it will provide recommendations and information for two subcommittees: it will generate commercial information inputs that can be used in decision-making by the Credit Subcommittee and recommendations concerning training models for the Education Subcommittee. The subcommittees will consist of members of the Steering Committee and they will coordinate their daily work in order to move forward with piloting and implementing components to strengthen the project. These subcommittees will report to, and coordinate with, the Steering Committee as a whole. Members will include Danone México, TechnoServe, UNAM, UGRJ, Nuup, junior representatives of corporate buyers, and a financial consultant. **Tier 3, the Operations Committee,** will meet frequently to monitor, assess, and fine-tune the processes under way. It will facilitate communication between the actors involved in the program and maintain direct contact with public agencies (FIRA and INAES) to ensure that funding opportunities are tapped. Members will include Danone México, TechnoServe, UNAM, UGRJ, Nuup, and a financial consultant.

VI. Fulfillment of Milestones and Special Fiduciary Arrangements

6.1 **Disbursement by results and fiduciary arrangements.** The executing agency will adhere to the standard MIF arrangements with respect to disbursement by results and the Bank's procurement[22] and financial management[23] policies, as specified in Annex V. The Bank will perform annual ex post reviews of disbursements, and a firm will be contracted directly by the Bank to conduct an audit of financial statements at

[22] Link to Policies for the Procurement of Works and Goods Financed by the IDB.

[23] Link to Operational Guidelines for Financial Management.

project completion. The Bank will hire the services of an audit firm to perform semiannual ex post reviews in accordance with the findings of the diagnostic needs assessment of the executing agency. The scope of that audit will include, among other things: (i) ex post reviews of a sample of disbursement requests and procurement processes, including the supporting documentation for both; (ii) financial statements or other procedures agreed upon for the period of analysis; and (iii) evaluation and recommendations on internal control findings.

6.2 Project disbursements will be contingent upon verification that the milestones have been met, in accordance with the means of verification agreed upon between the execution unit and the MIF. Achievement of milestones does not exempt the executing agency from its responsibility to meet the indicators in the results matrix and the project objectives. Under the risk- and performance-based project management approach, the amounts of project disbursements will be determined in light of the project's estimated liquidity needs for a maximum period of six months. These will be agreed upon between the MIF and the executing agency and will reflect the activities and costs scheduled in the annual planning exercise. The first disbursement will be contingent upon fulfillment of the conditions precedent, and subsequent disbursements will be made when the following two conditions have been fulfilled: (i) the MIF has verified that the milestones have been met, as agreed upon in the annual plan; and (ii) the executing agency has provided supporting documentation for at least 80% of cumulative advances of funds.

VII. ACCESS TO INFORMATION AND INTELLECTUAL PROPERTY

7.1 **Access to information.** In accordance with the Bank's Access to Information Policy, this document is available to the public.

7.2 **Intellectual property.** All works financed by the Bank and the results obtained under the project will be the intellectual property of the IDB. The Bank will grant a nonexclusive license, free of charge, to the executing agency, including the rights to dissemination, reproduction, and publication of any output in any medium. Such dissemination, reproduction, and publication must indicate that it has been financed by the MIF. For these purposes, any use of the name or logo of the Inter-American Development Bank and the Multilateral Investment Fund by the executing agency, for any purpose whatever, will require prior written authorization from the Bank.