



Building a Competitive and Inclusive Livestock Sector in Nicaragua

A Case Study of the Ganadería Empresarial Project (2012-2016)



TECHNOSERVE
BUSINESS SOLUTIONS TO POVERTY

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Front Cover, Clockwise L to R: (1) Álvaro Valerín on his farm in RAAS Region; (2) Worker at Lácteos Vado makes cheese; (3) Mariano Gomez tests milk at COOSEMUP coop.

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A LETTER FROM THE VICE PRESIDENT



TechnoServe is pleased to present “Building a Competitive and Inclusive Livestock Sector in Nicaragua,” a case study of a four-year program to assist smallholder livestock farmers in Nicaragua to increase their productivity, quality, and market access – with a goal of improving incomes and livelihoods.

In partnership with the U.S. Department of Agriculture, TechnoServe implemented the Ganaderia Empresarial project in four regions of Nicaragua from 2012 to 2016. Intervening across the dairy and beef value chains, we worked with farmers, producer organizations, and processors to improve their efficiency and competitiveness. We partnered with key market actors, including input suppliers, financial institutions, and disease diagnostic laboratories, to incorporate small farmers into their business models.

Through these efforts, TechnoServe strengthened the productive and commercial capacity of over 5,500 livestock farmers and 25 producer organizations. As a result, beef and dairy production now offers an improved livelihood for these farmers, small business owners, and their families.

This case study discusses the project’s background and context, documents the intervention framework, and analyzes insights and lessons learned. TechnoServe believes that the project’s model has strong potential to be scaled up in both Nicaragua and other countries. This document is intended as a tool for organizations considering similar interventions.

Sincerely,

A handwritten signature in black ink that reads "Andrei Belyi". The signature is fluid and cursive, with a small flourish at the end.

Andrei Belyi
Vice President, Latin America and the Caribbean
TechnoServe

A worker pours fresh milk into a cooling tank at COOSEMUP cooperative.



I. EXECUTIVE SUMMARY

In 2012, TechnoServe leveraged its 10 years of experience in Nicaragua's livestock sector to launch a comprehensive program to help farmers become more competitive and build a more inclusive livestock sector. By supporting small farmers with training and technical assistance, building the capacity of key market actors (including cooperatives and dairy processors), and partnering with agricultural businesses (such as lenders and input suppliers), TechnoServe believed it could create sustainable economic improvements for farmers and their families. With support from the U.S. Department of Agriculture (USDA), TechnoServe designed the Ganaderia Empresarial - or Managerial Livestock - project, known by its Spanish acronym GANE.

From September 2012 to September 2016, TechnoServe implemented GANE in four regions of Nicaragua. The program trained more than 5,500 smallholder livestock farmers (4.1 percent of the total in Nicaragua), who increased their milk production by an average of 28 percent. Working with these farmers and 25 dairy producer organizations (which included both cooperatives and private businesses), GANE generated incremental sales (directly attributable to the project) of raw milk, live animals, and processed dairy products worth more than US\$27.4 million.

GANE achieved these results by pursuing four business opportunities in the livestock sector:

1. Improve the productivity and quality of livestock and milk produced by small farmers;
2. Increase access to key agricultural inputs;
3. Improve dairy processing and expand access to dairy markets; and
4. Develop Nicaragua's national livestock traceability system.

Simply put, GANE worked with small livestock farmers to produce more and better beef, milk, and dairy products that could be sold into stable and well-paying markets.

To address these four business opportunities, the

project intervened across the livestock value chain. GANE trained farmers to improve production using CREAR (TechnoServe's proprietary adult learning methodology); expanded access to production inputs through public-private partnerships; worked with producer organizations to improve dairy processing, business management, and market access; and improved access to Nicaragua's national livestock traceability system by developing certified private traceability operators.

When GANE completed its scope of work in September 2016, TechnoServe took the opportunity to reflect on the project. This case study discusses the state of the livestock market and value chain in Nicaragua, reviews the project's four main intervention areas (production, access to inputs, processing and market access, and traceability), and examines the key lessons learned.

The case study identifies insights and recommends next steps in five areas. First, TechnoServe believes that GANE's farmer training curriculum and adult learning methodologies should be scaled up, given the project's success in increasing farmers' adoption of recommended practices to improve productivity. Second, future interventions should focus on improving dairy quality and ensuring that farmers are compensated for the quality of milk they produce. Third, more farmers need access to livestock production inputs, disease diagnostic services, and artificial insemination. Fourth, farmers need greater access to formal dairy markets, which can be best achieved by strengthening producer organizations and increasing their membership. And lastly, GANE's model to provide traceability services through independent operators should be scaled up, while simultaneously strengthening farmers' demand for those services.

GANE generated incremental sales of raw milk, live animals, and processed dairy products worth more than \$27.4 million.

II. LIVESTOCK SECTOR OVERVIEW

LIVESTOCK VALUE CHAIN IN NICARAGUA

Nicaragua’s 135,000 livestock farmers – 90 percent of whom are smallholder producers – raise approximately 5 million head of cattle on 3.26 million hectares of land. This herd – the largest in Central America – produces 768,000 metric tons of milk every year. These livestock farms are mainly dual-purpose businesses, producing and selling milk on a daily basis and live cattle more infrequently.

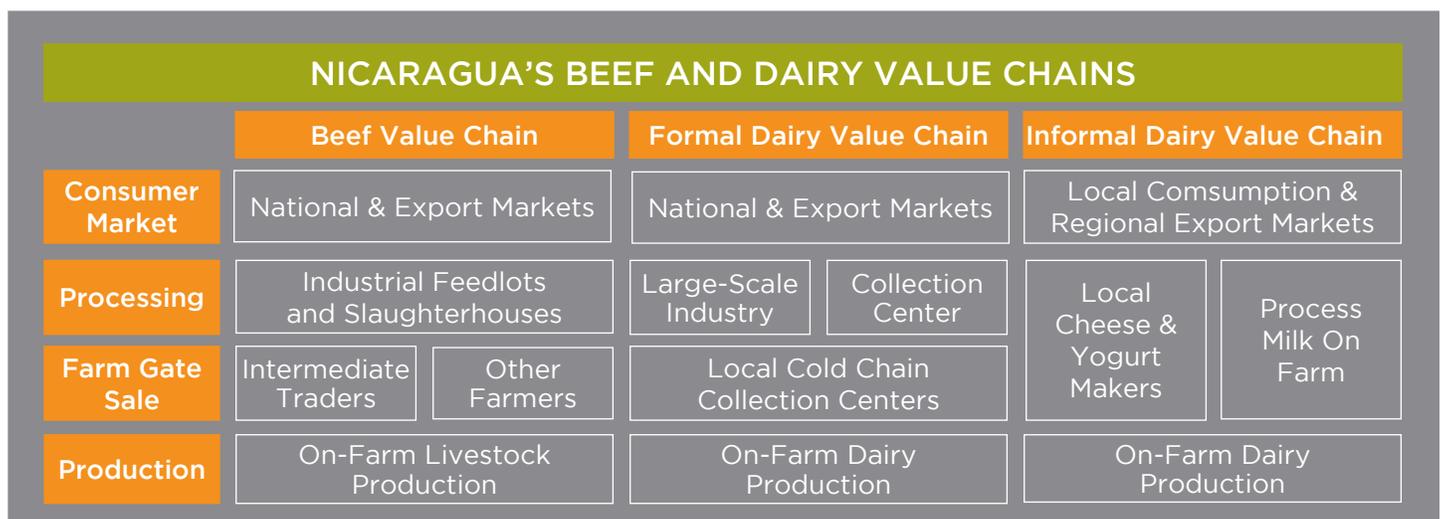
Nicaraguan livestock farming is characterized by a low yield and low quality production model. However, the sector also has low costs, because poor farmers invest little and have substantial amounts of land, relative to the rest of Central America. (According the UN FAO, Nicaragua’s production density of just 1.14 cows per hectare is the lowest in the region.) Small farmers are reluctant to invest in inputs (such as forage and mineral salts) and infrastructure (such as fencing and water systems) to intensify production because they lack knowledge of these technologies and can still achieve substantial output across their relatively large land holdings. In this context, Nicaragua’s livestock producers sell cattle and milk through three parallel value chains.

Informal Dairy Value Chain: Small farmers either process the milk they produce directly on farm or sell it to small-scale local processors, who mainly produce simple, un-aged cheeses. This is a risk management strategy (rather than a value adding

activity) because producing cheese preserves un-refrigerated milk. The final product is either consumed locally or exported by an intermediary to other Central American countries. About 75 percent of Nicaragua’s dairy production passes through the informal value chain, with about half exported.

Formal Dairy Value Chain: Some farmers sell milk to collection centers (both cooperatives and individual businesses) where it enters the formal cold chain. Some collection centers produce value added products (such as cheese or yogurt), while others sell cold milk directly to large-scale industrial processors. The milk, cheese, and yogurt in the formal cold chain are sold to national and regional consumers through formal marketing channels. Approximately 25 percent of Nicaragua’s dairy production passes through the formal value chain.

Beef Value Chain: Farmers typically sell weaned calves either to another farmer that develops or fattens the calf or to an intermediary that sells that calf to other farmers to develop or fatten, until they eventually make their way to a feedlot or slaughterhouse. After slaughter, beef and other byproducts are sold into national and international markets. In 2015, Nicaragua slaughtered over 677,000 head of cattle, of which 83 percent went to just five large-scale abattoirs that mainly export their products.



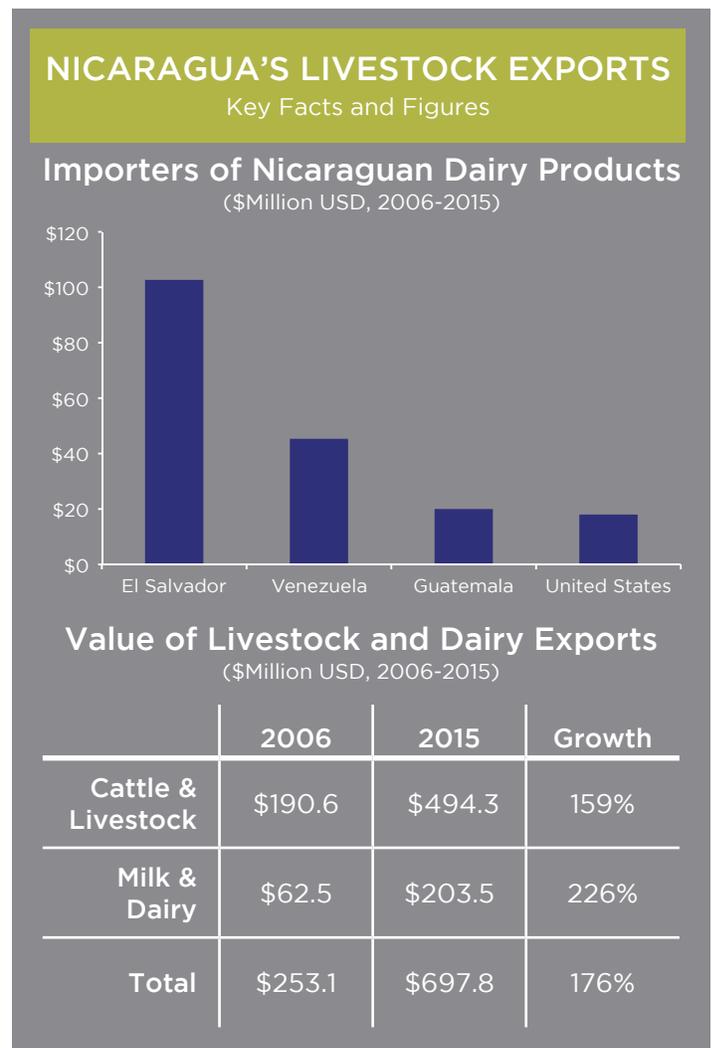
LIVESTOCK AND DAIRY MARKETS IN NICARAGUA

In Nicaragua, there are three markets for farm gate sales of livestock and milk, which correspond to the three value chains described above. When selling live cattle, farmers typically sell a few calves at a time, either to other farmers or to intermediary traders who aggregate and sell cattle to other farmers or to industrial feedlots and slaughterhouses. In contrast, the market for farm gate milk sales is more complex. A minority of farmers sells milk to a cooperative that aggregates dairy products – either by making cheese or by collecting and chilling milk for sale to large industry. Cooperatives that aggregate chilled milk pay higher prices than those that make cheese, although they also enforce higher quality standards. Farmers that do not sell to cooperatives instead sell milk to local cheese makers or make cheese themselves. The highly competitive market for these locally processed cheeses comprises about 75 percent of Nicaragua’s total dairy market and has low profit margins and low quality standards.

Processed livestock and dairy products are a keystone of the Nicaraguan economy. Slaughterhouses and dairy processors of all sizes export what they produce – providing Nicaragua with its largest and most important source of export earnings. In 2015, Nicaraguan businesses exported over 222,000 metric tons of livestock and dairy products, valued at nearly US\$700 million, which represents 176 percent growth since 2006. (See the table to the right.) Despite livestock exports’ economic importance, the domestic market consumes the majority of Nicaragua’s milk production – even though Nicaragua has relatively low per capita dairy consumption of just 84 kilograms per person annually (which is substantially lower than neighboring Central American countries). As the industry grows in the future, exports will be an important source of growth.

The majority of Nicaragua’s dairy exports are sold to other Central American countries (principally El Salvador), although non-tariff barriers such as

regulation and occasional political interference can sometimes complicate trade. For large dairy companies, regional exports are key to making profitable investments. Daniel Prato, the Director of Operations at LALA, a large dairy processor, noted that his company’s investment in a new processing plant in Nicaragua was predicated on exporting a substantial volume of production to other Central American markets. Complicating the industry’s future, Nicaragua’s dairy producers will likely face an increasingly competitive market. By 2021, signatories to the US-Central America Free Trade Agreement will complete a gradual liberalization process, resulting in tariff-free trade for most dairy products in Central America.



III. PROGRAM OVERVIEW

PROGRAM CONTEXT AND INTERVENTIONS

Livestock and dairy are a critical business for many of Nicaragua's small farmers – milk provides a daily income, and the herd itself is a long-term asset that can be sold as needed. However, most small livestock farmers follow the traditional low-cost, low-productivity, low-quality production model and sell their milk through unstable marketing channels.

In this context, in 2012, TechnoServe and USDA identified four business opportunities in the livestock sector that formed GANE's core strategy to increase incomes and improve livelihoods: (1) production, (2) access to inputs, (3) processing and market access, and (4) livestock traceability. The interventions that addressed these four business opportunities are summarized below and discussed in more detail in the subsequent sections of this case study.

Production: Given farmers' relatively large land-holdings and low-cost, low-input production model, there was an opportunity to intensify production and improve quality. TechnoServe used its CREATE adult training methodology to build farmers' technical capacity and promote profitable investments that improve cattle's nutrition (including improved pastures, mineral salts, fencing for pasture management, and watering systems). While focused on milk production, these interventions also increased beef production by improving the overall health and size of farmers' herds.

Access to Inputs: In order to support investments to improve livestock productivity and quality, there was scope to expand access to key agricultural inputs. TechnoServe partnered with agricultural input businesses to improve the availability and affordability of key inputs and equipment. GANE also partnered with microfinance institutions to facilitate access to credit needed to invest in inputs. With support from the project, producer organizations helped link their members to these new services.

Processing and Market Access: Producer organizations, which include farmer cooperatives and small dairy processing enterprises, are critical actors that aggregate, process, and market raw milk – providing farmers with a critical entry point into both the informal and formal dairy value chains. There was an opportunity to work with these organizations to build management capacity, develop infrastructure, improve processed products, and expand commercial relationships. Specifically, TechnoServe facilitated investment in dairy equipment, provided technical assistance to improve milk collection and processing, and provided management and marketing training.

Livestock Traceability: TechnoServe identified scope to better incorporate small farmers into the Nicaraguan Government's national livestock traceability system (which assigns a unique identifying number to every cow to track their origin and movement in a national database). By certifying private operators to register cattle on a fee-for-service basis, the project simplified needless bureaucracy and improved farmers' access to this important public good.

It should be noted that GANE's central focus was on supporting development of the formal and informal dairy value chains (rather than beef). TechnoServe developed this strategy because milk provides farmers with a daily income, and the dairy value chain is complex and fragmented. However, many of the project's interventions paid a double dividend and also benefited the beef value chain. For example, GANE's farmer training and input activities enhanced productivity in the beef value chain by improving the health and size of producers' cattle herds. Moreover, traceability interventions helped build a foundation for future livestock exports to Europe, because a national traceability system is a prerequisite for access to the European Union market.

IMPLEMENTATION AND RESULTS

With funding provided by the U.S. Department of Agriculture's Food for Progress Program, Techno-Serve and its partners implemented the GANE project over four years, from September 2012 through September 2016. Initially a three-year program, USDA provided a one-year grant extension as recommended by the project's midterm evaluation. GANE trained and supported over 5,500 farmers and 25 producer organizations in four regions of Nicaragua: Jinotega, Matagalpa, the Southern Caribbean Coast Autonomous Region, and the Northern Caribbean Coast Autonomous Region.

Over the course of implementation, the project served more than 33,950 individuals with training, technical assistance, agricultural inputs, traceability services, and market information. GANE facilitated \$6.03 million of finance and investment to complement capacity building efforts. These interventions translated into an average improvement in milk production (as measured by liters of milk produced on the farm per day) of 28 percent – driven by a 12 percent increase in the cow reproductive rate and



a 14 percent improvement in the milk yield per cow. Together, project-supported farmers and producer organizations generated \$27.4 million of incremental sales and created 6,240 new livestock sector jobs.



Álvaro Valerín, GANE lead farmer, and his family, Matagalpa Department

IV. PRODUCTION

INTERVENTIONS: PRODUCTION

Given farmers' role at the heart of the dairy value chain, GANE carried out a set of interventions designed to improve the quantity and quality of milk produced by 5,500 livestock farmers. These interventions simultaneously strengthened the beef value chain, by improving the health and size of farmers' livestock herds.

At the nucleus of GANE's intervention was farmer capacity building training to promote good agricultural practices (GAP) in livestock production. TechnoServe delivered 15 training modules over 30 months (through two training cycles), covering topics including: planting and managing pastures for improved forage, correct use of vitamins and mineral salts, construction of water systems and electric fencing, sanitary milking practices, and vaccination and bovine health. This curriculum was complemented by "farmer field days" to reinforce the GAP promoted in training.

The training curriculum was designed with two goals in mind. First, the trainings aimed to augment the quantity of milk that farmers produce by increasing the average daily milk yield per cow, and by expanding the size of the herd over time (through improved cow reproductive rates and reduced mortality). Second, training aimed to improve the quality of milk produced, by promoting practices that improve the key drivers of milk quality, such as milk fat content, water content, acidity level, and the presence of bacteria.

To deliver training, TechnoServe worked with 110 lead farmers to establish demonstration plots that utilized the GAP promoted by the project. Trainings were either held on these demonstration plots or on a GANE-supported producer's farm so that farmers could actually see and practice that they learned. Additionally, 53 community trainers delivered the GANE curriculum to groups of 20 to 30 farmers. These trainers lived in the communities that they served. Because of their proximity to project-supported farmers, community trainers

also provided follow-up technical assistance on the farm to help reinforce the correct adoption of GANE techniques.

In order to maximize the efficacy of GANE's training, TechnoServe delivered all training modules using a proprietary adult learning methodology called "CREATE." The methodology is based on the adult learning cycle - preparing, discovering, practicing, and applying. CREATE is an acronym that stands for: Connect, Reflect, Engage, Activate, Test and try out, and Encourage. Each training lesson plan, developed by an adult learning education specialist, uses the methodology to help adults to absorb and apply GAP, and community trainers are taught to use CREATE as a tool when facilitating trainings.

In an effort to deliver more inclusive training and optimize the project's results, GANE utilized strategies to engage women and youth. Key gender-based approaches included changing training curriculum language to be more inclusive and providing capacity building for TechnoServe staff to increase gender sensitivity. Additionally, trainers encouraged project-supported farmers (the majority of whom are men) to bring a family member to trainings, in order to increase participation by both women and younger family members.

GANE carried out a set of interventions designed to improve the quantity and quality of milk produced by 5,500 livestock farmers. These interventions simultaneously strengthened the beef value chain, by improving the health and size of farmers' livestock herds.



RESULTS: PRODUCTION

Over the life of the project, TechnoServe trained 5,583 farmers (20 percent of whom were women) on 110 demonstration plots. Furthermore, when including spouses and youth in these farmers' households, the project built the capacity of over 8,800 farmers (28 percent of whom were female). The rate of adoption of GAP in livestock production rose from a baseline of 41 percent to 83 percent of all GANE-supported farmers - an incremental increase of 42 percent. The application of these improved techniques increased farmers' total milk production by 28 percent. Two effects drove this improvement. First, GANE-supported farmers' average milk yield (per cow per day) increased by 14 percent. Second, farmers' cow reproductive rates grew (on average) by 12 percent - meaning that a higher share of the herd was producing milk at any given time. The improved health of the herd benefitted farmers' sales of both beef and milk. Over three years, project-supported farmers generated incremental sales of \$14.1 million of raw milk and \$8.7 million of live animals.

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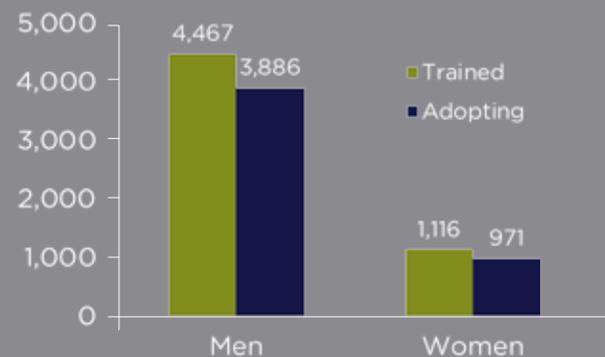


Álvaro Valerín,
Farmer, RAAS

PRODUCTION: BY THE NUMBERS

Number of Farmers Trained by GANE

(Disaggregated by sex and adoption)



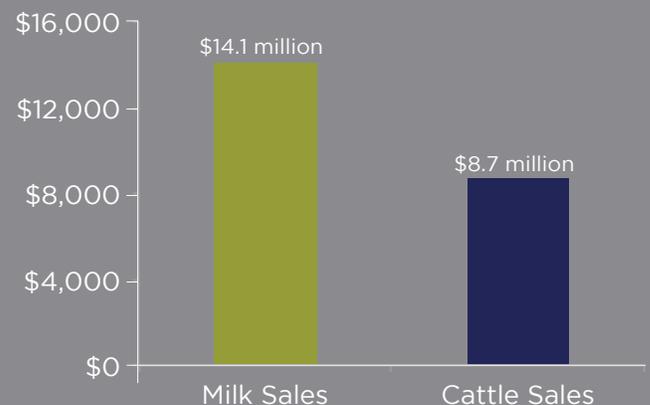
Milk Yield Before & After GANE

(Liters per cow per day, 2013-2015)



Incremental Sales of Milk & Live Cattle

(US\$, 2013-2015)



THE VELASQUEZ FAMILY TRANSFORMS ITS FARM

A Production Success Story



The Velasquez family on their farm.

“I feel thankful for GANE, for all that we learned in trainings, applied on our farm, and what we have achieved so far,” noted 64 year-old Santos Cristobal Velasquez, months after participating in this project.

Santos lives on his farm in the Talolinga community in Nueva Guinea, with his wife, Irma Romero Chica, who he married 44 years ago, and his children, Olman, Leonel, and Elizabeth, who built their homes on the same farm, where everyone works together to grow the family business.

Their farm sits on 44 hectares, which prior to Santos participating in GANE trainings, contained native pastures of poor nutritional value divided into four paddocks. Motivated by what he learned in trainings, Santos decided to invest in improving his farm. He planted 28 hectares of improved pastures and divided them into 17 paddocks.

According to Santos, “we were able to access a \$5,000 loan from Fundeser, and we have already paid off the loan.” Santos and his family used this loan to construct a roof over their cattle’s corral and to purchase fencing material to construct the divisions of his paddocks. His family even partnered

with neighboring farmers to purchase cables and other materials required to bring electricity to his farm.

Santos shares that “with electricity in our homes we now feel better. My children purchased televisions, and we can now charge our mobile phones every day. Before, we had to travel to town every three days in order to charge them. Today we are able to communicate better.”

Santos and his family are motivated to continue investing in their farm. Over the next several months he plans to purchase a pump to transfer water from a nearby river so that his cattle have fresh water to drink.

Prior to joining the GANE project, Santos’s cows produced 10 gallons per day. Since adopting practices he learned at GANE trainings, his cows are now producing 19 gallons each day. Before, he sold \$380 worth of milk each month. Today, he earns \$700 each month, an 84 percent increase. Now that his cows are well fed, they are reproducing – and thus producing milk – more often. Their reproductive rate increased from 62 to 90 percent, increasing his annual income by \$2,759.

V. ACCESS TO INPUTS

INTERVENTIONS: ACCESS TO INPUTS

Before GANE, most project-supported farmers did not demand many agricultural inputs because they raised cattle using the traditional low-cost, low-input, low-productivity model that is common among Nicaragua's small livestock farmers. However, the GAP promoted by GANE required farmers to invest in new inputs and equipment in order to improve the productive capacity of their farms. For this reason, the project included several interventions to expand access to these key inputs.

TechnoServe helped increase access to inputs and equipment – including forage seeds, mineral salts, fencing, and veterinary supplies – needed to implement GAP for livestock production. The project improved access to these inputs in two ways. First, TechnoServe provided technical assistance and business planning services to help ten GANE-supported cooperatives to start input supply divisions or strengthen existing ones. By directly supplying to their members, cooperatives made buying inputs easier (farmers can buy inputs when they drop off milk) and cheaper (by purchasing in bulk, cooperatives can offer members lower prices). Additional management and administrative capacity building – which included topics in finance, sales, accounting, and marketing – helped these cooperatives to manage their new input supply businesses. These input supply divisions can also help cooperatives to increase their membership, as farmers are typically more attracted to cooperatives that offer these types of additional services. Second, the project formed partnerships with eight Nicaraguan input supply companies. These partners sent technicians

to GANE farmer trainings and field days, where they demonstrated inputs in the field and offered on-the-spot input and equipment sales at preferential prices negotiated by TechnoServe.

Additionally, TechnoServe facilitated access to credit to purchase inputs – essential for farmers to have sustainable access to inputs. GANE partnered with Fundeser and Fondo de Desarrollo Local (FDL), two well-regarded financial institutions in Nicaragua. Together, TechnoServe and these banks developed a loan product called the “GANE Package” that was designed for farmers to invest in inputs like mineral salts and forage seeds as well as infrastructure like electric fences and water systems. Because GANE's training and technical assistance reduced the risk associated with these loans, TechnoServe was able to negotiate preferential interest rates, no collateral requirement for loans under \$10,000, and flexible repayment terms. FDL and Fundeser promoted this loan product through independent “field agents,” who met with project-supported cooperatives and attended farmer trainings to explain the benefits of the GANE package. TechnoServe complemented these interventions by training project-supported farmers in financial skills such as understanding credit history, managing loans, and making borrowing decisions. Lastly, in Nueva Guinea, one of GANE's most important areas of intervention, TechnoServe identified a strong need for physical banking infrastructure, so GANE co-invested \$14,000 with FDL to open a new office, which now administers millions of dollars of loans.

*“For me, achieving financial independence is a wonderful thing...
I will do all that I can to increase my capital. That way, I can guarantee my future.”*

—Cristian Montenegro, GANE participant



Noelia Muñoz sells inputs at COOSEMUP cooperative.

RESULTS: ACCESS TO INPUTS

Over the course of the project, TechnoServe provided capacity building training to 190 board members and administrative staff at GANE-supported cooperatives. These producer organizations either started or strengthened input supply divisions that have sold \$937,000 of inputs needed to implement improved livestock production techniques. Furthermore, GANE facilitated 2,242 loans to farmers, worth \$4.95 million, that were used to improve farms and implement the GAP promoted by the project.

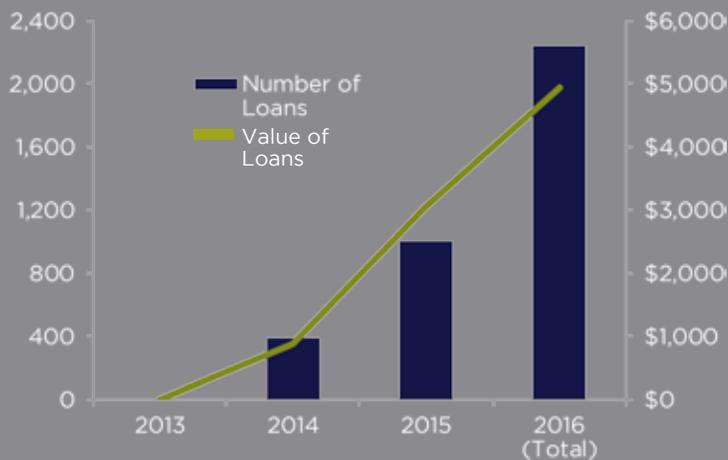
GANE facilitated 2,242 loans to farmers, worth \$4.95 million, that were used to improve farms and implement best practices promoted by the project.



ACCESS TO INPUTS: BY THE NUMBERS

Number & Value of Loans Facilitated

(#Loans & US\$, cumulative, 2013-2016)



Value of Inputs Sold by Producer Organizations

(US\$, 2013-2016)



CRISTIAN OPORTA: BUILDING A FUTURE WITH FINANCE

An Access to Inputs Success Story



Cristian with one of her cows.



Cristian Montenegro Oporta is a 21-year-old dairy farmer who lives in San Andres, a small village located two hours from the city of Río Blanco, Nicaragua. Dreaming of a better future, Cristian joined the GANE project, with support from her mother who watched Cristian's 30 cows while she participated in project trainings.

After completing the training course, Cristian decided to obtain financing to invest in improved livestock production techniques. In June 2014, she received her first formal loan of \$900 from FDL. Through a partnership with the GANE project, FDL and TechnoServe designed a financial product specifically for GANE beneficiaries that wanted to implement livestock production techniques promoted by the project.

Cristian used her \$900 loan to implement the most important practices she learned in training. She purchased forage seeds and inputs and then hired laborers to plant 10 hectares of improved pasture. She used the remainder of the loan along with personal savings to purchase two new dairy cows. This investment initially increased Cristian's milk produc-

tion substantially. And when drought struck Nicaragua in 2015, Cristian believes that the new pastures helped her cattle to survive the dry spell.

Through GANE training, Cristian learned to analyze credit opportunities and manage loan repayments. She says, "People may think that because I am young, I am not responsible. But when they get to know me, they change their opinion. When one applies for a loan, it is a very serious decision. Before applying, one must think about how they are going to pay it back and what they are going to do with the money they borrow."

Moreover, Cristian is happy that she is now building a credit history so that she can borrow in the future. "That is why I am careful to repay my loan on time," she explains. She is already thinking of applying for another loan, which she will use to purchase additional cattle. According to Cristian, "for me, achieving financial independence is a wonderful thing. I like having my own money, and not having to work for someone else. I will do all that I can to increase my capital. That way, I can guarantee my future."

VI. PROCESSING AND MARKET ACCESS

INTERVENTIONS: PROCESSING AND MARKET ACCESS

For farmers, improving the quantity and quality of milk production alone is not enough – they also need access to stable markets that pay a fair price. One of the best ways for farmers to do this is to achieve scale through producer organizations (including cooperatives and small enterprises). By selling milk and dairy products at the scale demanded by major buyers, farmers can access markets that allow them to monetize their improved milk production. To achieve this objective, GANE worked with producer organizations to improve milk collection and processing, develop market linkages, and increase management capacity.

Producer organizations provide farmers with an important entry point into the dairy value chain in two key ways. First, many producer organizations are milk collection points, where farmers drop off milk into refrigerated storage tanks. The cooperative pays farmers upon delivery and then sells bulked milk to large industrial buyers. Second, some project-affiliated cooperatives produce and sell processed products, such as cheese and yogurt. Accordingly, GANE focused its processing and marketing interventions at the producer organization level.

Both milk collection and processing are technically complex, so TechnoServe provided training to help producer organizations improve the quality of the milk they collect from farmers and the processed products they produce. As well, TechnoServe facilitated investment in milk collection and processing equipment, because these items can be prohibitively expensive for small cooperatives. Specifically, GANE linked producer organizations to financing, supported grant applications to other development agencies, and brokered agreements with private dairy companies to provide equipment in exchange for guaranteed sales. In some cases, the project also co-invested with cooperatives, sharing the cost of new equipment to test milk quality.

Beyond milk collection and processing, GANE also linked producer organizations with buyers for their dairy products – forging sustainable connections between farmers and markets. TechnoServe facilitated

sales in three ways: by organizing “business roundtables” (which are comparable to speed dating for sellers and buyers), directly putting buyers in touch with cooperatives, and organizing trade missions to major importing countries, such as El Salvador. To support these three efforts, TechnoServe trained producer organization representatives in marketing and negotiation to prepare them to meet with buyers. This training also supported the project’s long-term sustainability, helping producer organizations to continue marketing their products after the project ends.

GANE promoted gender-inclusive approaches at several producer organizations in order to increase participation, leadership, and decision-making among women members. Including women is important because they often play a significant but invisible role in livestock farming – contributing time and labor to production, while men control most sales transactions. In this context, producer organizations can empower women livestock farmers. To support these objectives, TechnoServe helped several GANE-supported producer organizations to redesign organizational rules and statutes to empower women members – for example, requiring both male and female household heads to acknowledge receipt of payment from the cooperative. Additionally, TechnoServe conducted gender sensitivity training for management at four cooperatives, and it provided technical assistance for these organizations to establish and implement gender policies that set specific goals and targets for the cooperative – for example, the number of women members and directors.

Lastly, as noted in the access to inputs section, TechnoServe provided training and technical assistance to strengthen producer organizations’ administrative and management capacity. This training (which included topics such as finance, sales, and marketing) improved the execution of producer organizations’ milk processing businesses and marketing of dairy products. To complement these efforts, TechnoServe supported producer organizations

in developing business plans to start new service divisions (such as the input supply stores discussed in the previous section). GANE's Business Advisory Toolkit helped Producer Organizations to assess their strengths and weaknesses, identify new service opportunities, tailor services to meet their members' need, and develop and implement an action plan to grow their new services.

GANE-supported producer organizations signed 38 new sales agreements with buyers, generating incremental sales of processed dairy products worth \$4.6 million.



RESULTS: PROCESSING AND MARKET ACCESS

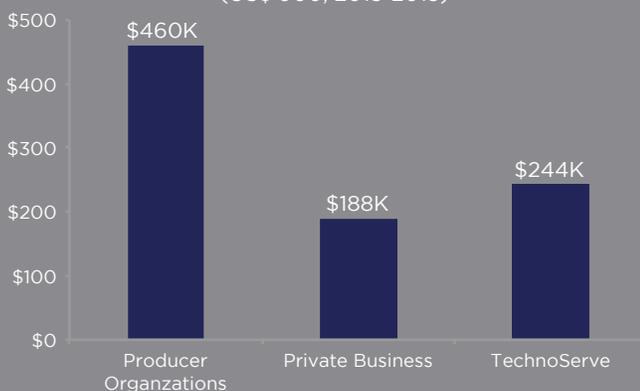
Over four years, TechnoServe worked with 25 producer organizations to facilitate \$647,970 of new investment in milk cooling and processing equipment. Because of these investments, GANE-supported farmers now have access to an additional 51,500 gallons of milk-cooling and storage facilities. Furthermore, 190 producer organization staff (23 percent of whom were women) received capacity building training to improve cooperative manage-

ment, dairy processing, marketing, and sales. Together these efforts led GANE-supported producer organizations to sign 38 new sales agreements with buyers, generating incremental sales of processed dairy products worth \$4.6 million. It is worth noting that much of the milk sold by producer organizations to major industrial buyers went on to be exported to other countries in Central America and beyond.

PROCESSING AND MARKET ACCESS: BY THE NUMBERS

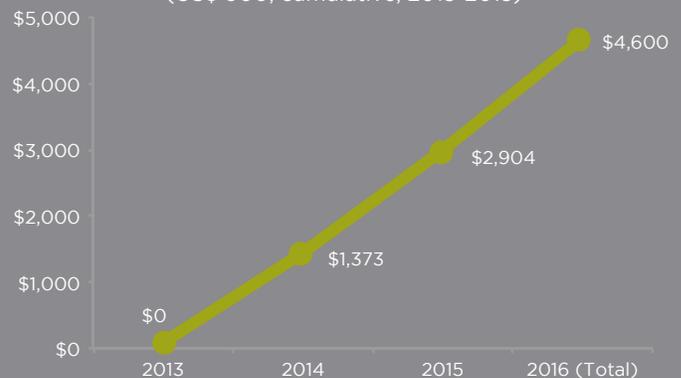
Investment Leveraged by GANE

(US\$'000, 2013-2015)



Incremental Sales of Processed Products

(US\$'000, cumulative, 2013-2015)



LÁCTEOS VADO: A FAMILY TRANSFORMED

A Processing Success Story



(L) A worker makes cheese.
(R) Douglas at his factory.

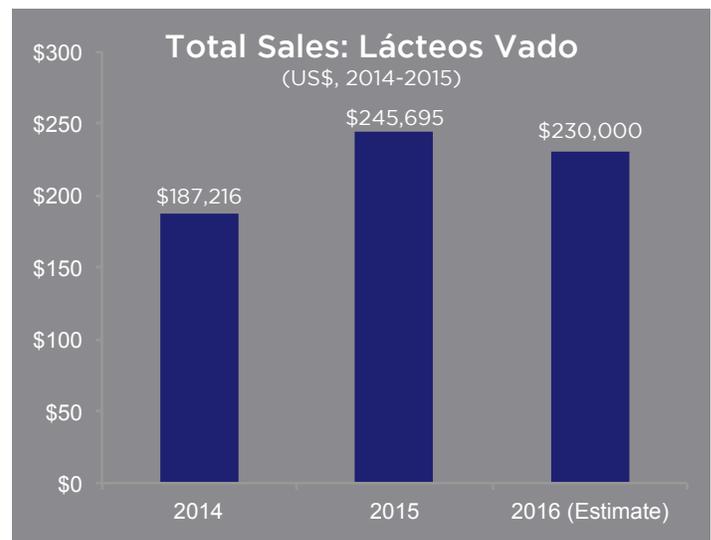
Douglas Vado and his family – owners of Lácteos Vado, a cheese making business – have changed their lives profoundly since joining the GANE project in July 2014. Located in Muelle de los Bueyes, in Nicaragua’s South Caribbean Autonomous Region, Lácteos Vado produces several varieties of cheese and sour cream. Initially fearful of making changes to his business, Douglas has fully embraced good agricultural practices for producing cheese and running his enterprise. Between 2014 and 2015, Lácteos Vado increased its revenues from the sale of dairy products by 37 percent or \$57,478. (See graph below.) The growth of the Vado family’s business has also benefitted their community – they now purchase milk from 60 local smallholder farmers, up from 45 before the GANE project.

Behind these numbers, the business itself has undergone a transformation. Before joining GANE, Lácteos Vado lacked quality control, modern production equipment, and safety infrastructure. TechnoServe provided technical assistance and training to help Lácteos Vado improve its quality control and sanitation and to reduce waste from both the milk it collects and the cheese it produces. The project also co-invested with Douglas, providing modern steel production equipment that improved quality, sanitation, and production capacity.

But the biggest change of all was to the production facility itself. With business consulting services from

TechnoServe, Lácteos Vado created a plan to invest in a new processing plant that would support increased production capacity and improved sanitation. TechnoServe assisted Douglas in applying for a \$4,000 loan to complement his \$17,000 in lifetime savings to invest in the new plant.

The new production facility has not only transformed the business but also how the Vado family lives. While saving for many years, the family of five lived in a humble, one-room home. Today they have built a larger, more modern home, located right next to the new processing plant. Reflecting on his success, Douglas still has big dreams for the future. In the coming year, he plans to obtain a national health certification, improve the label on his products, and expand sales to new clients.



MULTIPLE SERVICE COOPERATIVE UNION OF PAIWAS

A Market Access Success Story



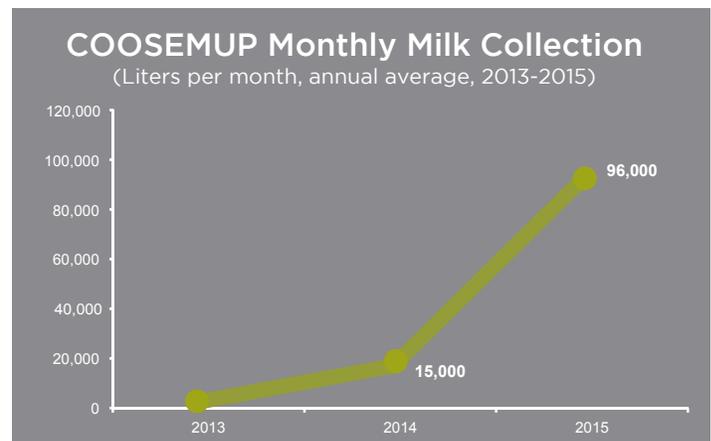
Ten years ago, a group of farmers in Paiwas, in Nicaragua's Southern Caribbean Autonomous Region, formed the Multiple Service Cooperative Union of Paiwas (COOSEMUP), to increase their farming incomes and improve their livelihoods. As Hernán Toledo, president of the cooperative, explains, "forming a cooperative was the only way for us to advance." But several years into their new venture, the cooperative was in dire financial straits and members were frustrated by managers' limited technical capacity.

In 2014, COOSEMUP partnered with GANE, in order to improve its management and to expand services for its members. "Since joining the GANE project, the cooperative has been able to consolidate itself," says Toledo. TechnoServe provided capacity building training for both the cooperative's board of directors and staff, covering topics such as management, administration, and finances.

Additionally, COOSEMUP, TechnoServe, and La Perfecta (a Nicaraguan dairy company) formed a partnership to establish a milk collection center. COOSEMUP raised \$61,324 from its membership to purchase land and to build a structure to house the facility. La Perfecta loaned two milk chilling tanks with a combined capacity of 7,600 liters per day and worth \$25,000. This equipment was loaned on the condition that the cooperative sell a guaranteed volume of milk to La Perfecta. GANE provided

And GANE provided the cooperative with milk testing equipment worth \$8,072 and provided training in how to use these new tools.

Since establishing the collection facility, COOSEMUP has rapidly scaled up its new business. In late 2014 (shortly after the plant opened), 30 cooperative members were collecting 15,000 liters of milk per month. By the end of 2015, 42 cooperative members were collecting 96,000 liters per month – generating annual sales of about \$360,000. (See graph below.) Most importantly, the new collection center provides COOSEMUP's members with more stable prices. They now sell their milk to La Perfecta at \$0.28 per liter, while most members used to sell to local cheese makers for about \$0.22 per liter. COOSEMUP's experience shows that even a young cooperative can establish a serious business that provides substantial benefits for its members.



VII. LIVESTOCK TRACEABILITY

INTERVENTIONS: LIVESTOCK TRACEABILITY

Over the last decade, the Government of Nicaragua has worked to build a national livestock traceability system. In Nicaragua, livestock traceability is defined as the ability to trace an animal from birth to slaughter by recording key information such as date of birth, sex, breed, and movement among farms. The traceability system is composed of three key components – a register of livestock farms, a register of all national cattle, and a register of all cattle movements – which are maintained in a national database. Nicaragua’s traceability system is managed by the Institute for Agricultural and Livestock Protection and Health, a government agency also known by its Spanish acronym “IPSA.”

The Nicaraguan government views the national traceability system as strategically important, because the European Union-Central American Association Agreement allows for tariff free livestock and dairy exports to the European Common Market. However, access to European markets will only become available after Nicaragua implements a livestock traceability system that registers all farms, cattle, and movement (among other requirements). As such, development of a traceability system is a long-term investment to improve Nicaraguan farmers’ future access to export markets for beef.

When the GANE project began, less than 40 percent of Nicaragua’s 5 million cows were registered in the national traceability system. These relatively low numbers were partially due to a complicated system that disincentivized farmers from registering their cattle. Specifically, in order to register a cow, a farmer had to travel to an IPSA office to fill out initial paperwork, then visit a bank to deposit payment for ear tags, return to an IPSA office to pick up the tags, and then engage an IPSA-certified technician to physically register the farm and tag their cattle. Any further cattle movements could only be reported into the national traceability system by visiting a municipal government office in person.

In this context, TechnoServe formed a partnership with IPSA to increase participation by making the system dramatically easier and more accessible to farmers. To do this, TechnoServe and IPSA worked directly with livestock producer organizations to certify “traceability operators.” These operators were typically producer organizations which registered cattle and reported key information into the national traceability system on a fee-for-service basis. For \$0.35 to \$0.70 paid by the farmer (in addition to the \$1 cost of an ear tag), traceability operator staff will travel to a producer’s farm to tag a cow and register it in the system – completely eliminating a trip to the bank and two trips to an IPSA office. By eliminating these indirect costs, the traceability operators’ additional fee more than pays for itself. Additionally, instead of reporting movement information to the local government, a producer can instead report this information directly to the producer organization – which enters the data into IPSA’s national traceability system using a web-based platform. In order to ensure the sustainability of traceability services provided through co-operatives, TechnoServe provided them assistance to develop and execute business plans.



Vidal López (R), farmer, works with Víctor Espinoza (L), traceability operator, to register his cattle.

IPSA was a critical project partner. In addition to leading the certification of traceability operators, IPSA and GANE collaborated to identify 19,050 farms that received traceability services through the project. By partnering closely with a government agency, GANE integrated long-term sustainability into this intervention from the project's inception.

In a related activity designed to support Nicaragua's animal health infrastructure, TechnoServe partnered with veterinary experts at Colorado State University (CSU) and five bovine disease laboratories (operated by the Nicaraguan government and private non-governmental organizations)

to improve the quality and availability of disease diagnostic services for GANE-supported farmers. Proper diagnosis and treatment of bovine illness is critical for increasing livestock reproduction rates. To improve these services, CSU provided capacity building training for lab technicians and worked with TechnoServe to identify and equip labs that lacked diagnostic equipment. Additionally, TechnoServe worked with two privately operated labs to develop business plans to provide diagnostic services to project-supported farmers on a fee-for-service basis. As part of this effort, these labs signed agreements with project-supported cooperatives to provide ongoing diagnostic services.

NICARAGUA'S LIVESTOCK TRACEABILITY SYSTEM

Cattle Registration Process Before and After GANE

Before			After		
Cost per Farmer	Register Cattle	Report Information	Cost per Farmer	Register Cattle	Report Information
\$1 per ear tag	Fill out initial paperwork at IPSA office.	Farmer records movement information	\$1 Per ear tag	Traceability operator visits farm to register cattle	Farmer reports movement info to cooperative
Transportation cost and foregone wages	Deposit payment at bank	Farmer reports info to local government	\$0.35 - \$0.70 for imbedded services		Cooperative reports to IPSA database
	Pick up ear tag at IPSA office	Local gov't. reports to IPSA database			
	IPSA-certified technician tags cow				

RESULTS: LIVESTOCK TRACEABILITY

When TechnoServe sought proposals from producer organizations to develop traceability businesses, there was so much demand that the project decided to certify 29 (instead of 10) new traceability operators. In partnership with these operators, GANE helped register over 417,000 cattle belonging to 19,050 farmers (22 percent of whom were women) in the national traceability system - translating into an increase of approximately 20.8 percent in the number of cows registered in the national traceability database. Because there is so much demand for privately provided traceability services, IPSA is now promoting the model with other producer organizations and development NGOs working in the livestock sector - so the private operator model will continue to expand after the project ends, contributing to an improved national traceability system. Additionally, the project trained 201 field veterinarians and laboratory technicians at five project-supported livestock disease labs that will now provide diagnostic services to project-supported farmers.

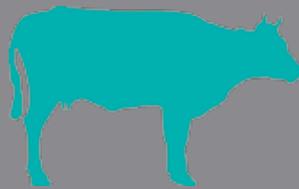
GANE helped register over 417,000 cattle belonging to 19,050 farmers in the national traceability system.



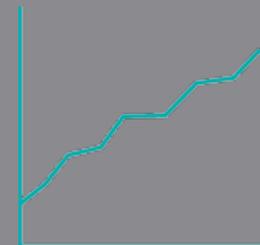
LIVESTOCK TRACEABILITY: BY THE NUMBERS



19,050
farmers
registered



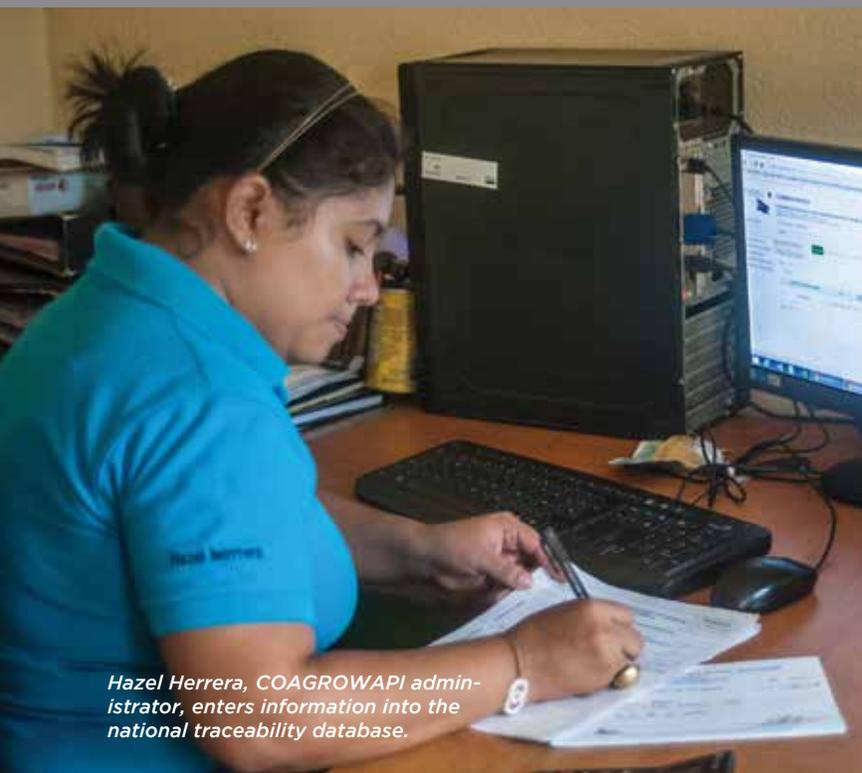
417,278
cows
registered



20.8%
growth in size of
national database

COAGROWAPI: BUILDING A TRACEABILITY BUSINESS

A Traceability Success Story



Hazel Herrera, COAGROWAPI administrator, enters information into the national traceability database.



José Angel Urbina (R), traceability operator staff, applies an ear tag to a cow on the farm of Pedro Cabrana (L).

Located in Rama, 300 kilometers from Managua, COAGROWAPI is a cooperative of livestock producers who strive to improve the marketing and sale of their dairy products. Before partnering with GANE, some cooperative members implemented traceability on their farms, but they found it onerous to register new cattle and to report movement information into the national traceability database.

In July 2015, COAGROWAPI partnered with GANE to establish a new division at the cooperative to provide traceability to its members and other local farmers, using the project's private traceability operator model. The cooperative now provides a complete package of traceability services, including tagging cattle, registering farms, and entering livestock movements into the national database.

The GANE project provided support to help COAGROWAPI establish its new traceability business unit. First, TechnoServe partnered with IPISA to certify 15 private operators to market and provide traceability services to farmers. Next, TechnoServe helped establish a revolving fund by providing the

cooperative with 5,100 ear tags and 1,000 traceability register books. As the ear tags and registers are used up, the cooperative can use service fees collected to replenish its stock, thus guaranteeing available working capital. For its part, the cooperative invested its own funds to install internet access, which is needed to connect to the national traceability database.

Benigno Morales, a member of the board of directors at COAGROWAPI, described the cooperative's success at establishing this new business unit: "it has been a success because 11 months after initiating the process, we have registered 81,844 cattle, breaking our goal of registering 1,000 per month... We have registered 1,230 farms and have hired 19 new employees – 13 men and 6 women." Most importantly, livestock farmers increasingly value traceability's benefits – recognizing that traceability can help improve access to new markets, prevent theft, and manage the health of the national cattle herd.

VIII. INSIGHTS AND LESSONS LEARNED

1. GANE's Model Can Stimulate Adoption of Good Agricultural Practices for Livestock Production

Livestock production in Nicaragua is traditionally low-cost and low-productivity, and many small farmers are risk adverse and unaccustomed to making productivity-enhancing investments on their farms. Nonetheless, GANE's final evaluation showed that an impressive 83 percent of farmers adopted the full package of GAP promoted by the project (an incremental increase of 42 percent above and beyond the project's baseline). As Beatriz Lanuza, a GANE-supported farmer in Nueva Guinea put it, "we used to not pay any attention to our cattle, but now we treat them as though they are important."

How did GANE persuade risk-averse farmers to invest in productivity-enhancing techniques? Several project components supported the adoption rate:

- By providing training using TechnoServe's CREATE adult learning methodology, GANE ensured that farmers actually retained the knowledge needed to implement GAP
- Community-based trainers' deep engagement with farmers reinforced training sessions. Farmers reported that trainers' follow-up on-farm technical assistance helped them adopt and correctly apply project-promoted techniques. GANE promoted financial products designed to stimulate adoption of the promoted GAP. TechnoServe and its partners designed a product with the appropriate loan size, payment terms, and interest rates to meet farmers' needs.
- The training curriculum emphasized farming as a business and built farmers' capacity to assess investments' costs and benefits. This skill helped farmers to understand the high returns associated with productivity-enhancing investments.
- GANE promoted financial products designed to stimulate adoption of the promoted GAP. TechnoServe and its partners designed a product with the appropriate loan size, payment terms, and interest rates to meet farmers' needs. By providing training

using the Cycle of Learning teaching methodology and TechnoServe's CREAR adult learning techniques, GANE ensured that farmers actually retained the knowledge needed to implement GAP.

- TechnoServe worked with highly motivated lead farmers to set up demonstration plots where other GANE-supported producers could observe the benefits of adopting GAP.
- The project ensured sufficient access to the inputs needed to adopt GAP by helping producer organizations to sell inputs directly to their members, by bringing input suppliers directly to farmer training sessions, and by negotiating preferential prices with local input supply companies.

While TechnoServe believes that GANE's approach should be replicated, future dairy sector interventions should also address other challenges that impede adoption. First, some farmers are extremely risk-averse, so they were reluctant to use financing, despite GANE's specially designed loan product. Small changes to the loan product design and additional farmer sensitization can help address this challenge. Second, GANE's community trainers reported that some farmers did not apply GAP consistently. For example, some farmers only used mineral salts occasionally when they had money available to purchase them. Future interventions should pursue all avenues available to minimize inconsistent application of GAP, because these techniques are most effective when they are implemented consistently and as a joint package.

2. Future Livestock Sector Interventions Should Continue to Prioritize Quality

Improved quality is the best way for farmers and producer organizations to increase the sale price of their livestock and milk. For this reason, GANE worked to improve milk quality in order to unlock new markets and higher prices. At the farm level, TechnoServe promoted the rational use of inputs and hygienic milking practices. At producer organizations, the project promoted rigorous milk quality testing at all collection centers. However, improv-

ing milk quality is a long-term process that requires ongoing support, particularly outside of the regions where TechnoServe intervened.

Accordingly, future dairy interventions should continue to prioritize milk quality, with particular attention to the following areas:

- Many of Nicaragua’s small livestock farmers do not have access to agricultural training and thus produce low-quality milk. More capacity building is needed. Marlon Zamora, a cheese maker, noted: “We need more technical assistance and training for our farmers to ensure better quality milk for our cheese production.”
- There is some trade-off between production costs and quality. Thus it is important for development organizations to promote rational investments that generate substantial quality improvements in order to preserve Nicaragua’s cost advantage per liter of milk produced (as compared with other livestock-producing countries in Central America).
- It is critical for producer organizations to control for quality by testing all milk that comes into their collection centers. However, testing milk is technically complex, and many producer organizations that were not supported by GANE need equipment and training.
- Farmers should be adequately compensated according to the quality of their milk. One challenge is that few farmers receive a higher price for better quality milk, although cooperatives will reject poor quality milk. Additionally, milk quality analyses conducted at producer organizations and at industry plants can produce different results, generating mistrust between buyers and sellers. Future interventions should collaborate with industry to establish premiums for higher quality milk and should consider supporting independent milk quality testing to ensure greater transparency.

“We’ve had an awakening, we see the future with greater hope...Our dream is now a reality.”

—Cooproleche Cooperative Leaders

3. It is Most Effective to Work Simultaneously with Livestock Producer Organizations and Their Members

TechnoServe found that GANE’s interventions were most effective when the project simultaneously provided capacity building to a producer organization and agronomic training to farmers that sell milk to the same organization – an approach that TechnoServe typically promotes across its agricultural development projects. Simultaneous intervention is particularly important for improving milk quality, because both farmers and collection centers need to adopt GAP in order to ensure high quality milk.

One of GANE’s challenges was that a majority of project-supported farmers neither belonged to nor sold milk to a project-supported producer organization (and thus did not benefit from the synergies achieved by simultaneously training producer organizations and their farmer members). This was a result of several related factors that limit the number of cooperatives that aggregate, chill, or otherwise add value to milk in GANE’s areas of intervention. First, poor infrastructure, like low electricity coverage and poor road conditions, raises the costs of chilling and transporting milk. Second, some producer organizations struggle to grow and diversify their businesses, which prevents them from buying larger volumes of milk and increasing their member base. And third, there is insufficient demand from the dairy industry for chilled milk from the targeted regions. Greater demand from industry would likely spur more producer organizations to collect more milk from more farmers.

However, this is not to say that GANE should not have assisted unaffiliated dairy farmers. On the contrary, the project worked – with limited success – to encourage these unaffiliated farmers to either join or sell milk to existing producer organizations. Specifically, the project helped producer organizations diversify their product offerings, increase the quality of their processed products, and find new

buyers – with the objective to increase producer organizations’ demand for milk, thus increasing their purchase volume from small farmers. The project also helped 12 producer organizations launch or expand additional service divisions, such as agriculture input supply stores and traceability services, to attract new members. Nonetheless, many GANE farmers remained independent dairy producers and marketers.

In this context, future dairy-sector interventions should consider the following priorities:

- Collaborate with the private sector, national and local governments, and donor agencies to improve road and electricity access in dairy production areas, in order to improve the enabling environment for dairy producer organizations.
- Continue helping producer organizations to diversify product offerings, expand markets, and introduce new or better services – in order to attract new members and suppliers.
- Help independent farmers to integrate into existing or organize new producer organizations, and support these organizations to aggregate and market their milk.
- Continue to provide training and technical assistance to unaffiliated farmers. Even when offered a path to cooperative membership, some farmers may wish to remain unaffiliated for a variety of rational economic and cultural reasons.

4. As Farmers Improve Their Cattle’s Nutrition, They Will Need Access to Improved Bovine Genetics

While program participants generally reviewed GANE’s interventions positively, there is scope to expand the access to inputs component, particularly for those farmers who successfully invest in improved pastures, mineral salts, supplemental feed, water access, and implement sanitary practices. Specifically, interviews with farmers, producer organizations, and local governments revealed that there is an unmet demand for improved bovine genetics and artificial insemination (AI) services. Many

project-supported producers want to improve their herd’s genetics in order to increase their milk yields and the weight of their cows, but they do not have access to AI services.

TechnoServe believes that there is scope to develop private AI service providers to address this unmet demand. Future interventions should prioritize developing AI services and consider the following:

- AI services are relatively expensive (US\$40 to \$60 per cow, depending on the quality of the genetics), so development agencies need to conduct formal market research to assess demand and farmers’ willingness to pay.
- Several existing input supply companies in Nicaragua already offer AI services. For a flat fee, these companies will sell genetic material and visit a producer on his or her farm to perform the insemination. While these services exist, markets are underdeveloped in some livestock-producing regions and some farmers do not understand AI’s benefits. Future projects should consider developing partnerships between input suppliers and producer organizations to market and deliver AI services directly to farmers.
- While access is the primary challenge to addressing unmet demand for improved genetics, it is also important to sensitize farmers to AI’s benefits – higher milk yields, increased weight, and a high return-on-investment.
- It is most appropriate to invest in AI after a farmer has implemented GAP – including mineral salts, water, and sanitary practices – to ensure that cattle have proper nutrition. Without good nutrition, farmers will not reap the full benefits of improved genetics, such as increased beef and milk production.
- Reproductive diagnostic services, which help farmers identify cows that have problems reproducing, are largely unavailable to smallholder farmers because too few people have the training and experience to provide this service. These diagnostics are critical for farmers to make well-informed decisions about investing in their herd’s genetics.

5. Nicaragua's Dairy Industry Needs to Absorb More Farmers into Formal Markets

TechnoServe believes that the formal dairy value chain – which introduces milk into the cold chain for processing by industry – presents the best business opportunity for small farmers to maximize their incomes through higher and more stable prices. However, at present, the formal sector simply does not have sufficient capacity to absorb more than one-quarter of the milk produced in Nicaragua. To address this capacity gap and integrate more farmers into formal markets, development agencies should assist producer organizations to increase milk-chilling capacity, diversify their value-added product offerings (beyond traditional cheeses), and identify local and regional markets for these products. Additionally, future interventions should collaborate with the dairy industry to promote Nicaraguan dairy products abroad – because as the dairy industry grows, farmers will benefit by selling more milk into formal markets.

6. Nicaragua's Livestock Traceability System Should Strengthen Demand by Emphasizing Long-term Benefits

GANE substantially improved Nicaragua's national livestock traceability system by making it easier, less expensive, and less time consuming for farmers to participate. Before the project, registering a cow was relatively complex – a farmer had to first visit an IPSA office to fill out initial paperwork, then visit a bank to pay for ear tags, then return to the IPSA office to show proof of payment and receive the ear tags, and then find a government certified agent to visit and register their farm, tag cattle, and register individual cattle in the system. This was particularly burdensome for farmers living in areas that were far away from an IPSA office. GANE-supported “traceability operators” now provide all of these services directly on-farm for a flat fee that ranges between \$1.40 and \$1.60. This approach, developed in collaboration with IPSA, is substantially cheaper than the old system, where an ear tag cost \$1.00 and a

farmer incurred substantial indirect costs (including transportation and foregone wages) traveling around to banks and government offices.

However, even under the new system, farmers must pay to enroll their cattle in the national traceability system. Accordingly, future interventions should further strengthen demand for this service so that farmers see it as an investment with a defined benefit rather than just another cost of production. Most farmers interviewed for this case study reported that traceability's main benefit is to organize their herds. (A cow's numbered ear tag provides a reference point when recording information such as vaccinations or births.) However, as Jacinto Ruíz, a manager at IPSA explained, “traceability is more than just putting an ear tag on a cow.” But the current system provides little incentive to go beyond the ear tag and actually record and report movement information into the national traceability database. In short, Nicaragua's traceability system needs to better promote its benefits and strengthen demand in order to achieve all of its objectives.

Future interventions should build upon GANE's successful traceability operator model by expanding their number and reach, allowing farmers in remote areas greater access to this service. It is also important to strengthen demand for traceability services and ensure that farmers keep records and report into the national database. Some actors argue that the most effective way to do this is to force demand – for example, by legally obligating the beef and dairy industry to purchase only from traced farms. However, TechnoServe believes that the most effective and pro-farmer solution is to strengthen demand by sensitizing producers to the benefits of investing in traceability. Specifically, future interventions should emphasize that Nicaragua will only be able to export beef and dairy to high-value markets in Europe once it fully establishes a national traceability system – so implementing traceability today is a long-term investment to improve market access in the future.

7. Livestock Sector Interventions Should Incorporate Gender-Based Approaches from Inception

While men often control livestock and dairy transactions, this conceals the industry's true reality. Other household members – particularly women – participate significantly in the production of livestock and dairy products by contributing their time and labor on the family farm. For this reason, it is both challenging and very important for livestock sector interventions to actively engage both women and men throughout the life of the project, especially in training activities. While GANE implemented substantial gender-based approaches to engage both women and men in training, these activities were not conceived until over a year after the project began. These approaches likely would have been more effective if they had been implemented from the project's start. For example, community trainers delivered some farmer training modules before a gender action plan was implemented to make the curriculum more inclusive. TechnoServe's experience shows that gender-based approaches are very important in livestock and dairy sector interventions; however they should always be implemented from the project's inception. sector interventions to actively engage both women and men throughout the life of the project, especially in training activities. While GANE implemented substantial gender-based approaches to engage both women and men in training, these activities were not conceived until over a year after the project began. These approaches likely would have been more effective if they had been implemented from the project's start. For

example, community trainers delivered some farmer training modules before a gender action plan was implemented to make the curriculum more inclusive. TechnoServe's experience shows that gender-based approaches are very important in livestock and dairy sector interventions; however they should always be implemented from the project's inception.

8. Livestock Sector Interventions Should Promote Sustainable Production Practices

Nicaragua has a relatively non-intensive livestock production model – relative to other Central American nations, it has fewer head of cattle per hectare of land. Given this model, Nicaragua has potential to be a hub for sustainable livestock production in the region. To support this objective, GANE promoted integrated land-use management techniques, including the use of shade trees as live barriers and planting forage crops that improve soil quality and dry season productivity.

Looking to the future, TechnoServe believes that sustainable livestock production will become more important in Nicaragua for several reasons. First, livestock farmers report increasingly tangible impacts of climate change, especially more variable and severe dry season weather. And second, much of the country's remaining arable land lies in government-protected areas, so it is important to intensify production as sustainably as possible to prevent livestock farming from spreading to protected lands. In this context, future livestock sector interventions should increase their focus on promoting sustainable production techniques by integrating environmentally-friendly practices throughout all training curricula.



A police officer inspects a truck carrying traced cattle.

IX. NEXT STEPS: THE WAY FORWARD

Building a competitive and inclusive livestock sector for Nicaragua's smallholder farmers is a long-term commitment that cannot be achieved by a four-year-long development project. Rather, it is an iterative process that requires ongoing investment and intervention. To build upon GANE's efforts, TechnoServe recommends the following next steps.

Scale Up GANE's Training Package: Many of Nicaragua's small livestock farmers have never received formal agronomic training. (For context, the GANE project only had the resources to train approximately 10 percent of the farmers in the 14 municipalities where it worked.) To address this knowledge gap, TechnoServe believes that GANE's training curriculum, delivered using the CREATE teaching methodology and farmer demonstration plots, should be scaled up – given the approach's high rate of adoption, substantial productivity improvement, and low costs relative to traditional extension models. Additionally, training should incorporate gender-based approaches and promote sustainable production practices from inception.

Focus on Improved Milk Quality: Future dairy sector interventions should focus on improving the quality of milk entering the value chain – both by promoting best livestock production practices and rational investments on the farm and at cooperative milk collection centers. It is also important for projects to offer farmers a pathway to sell milk to a producer organization, because quality interventions are most effective when implemented simultaneously with livestock cooperatives and their member farmers. Furthermore, interventions should help farmers and producer organizations to sell their milk at a price that reflects its quality, particularly by improving access to formal dairy markets and by promoting independent quality testing.

Continue to Expand Farmers' Access to Inputs: As farmers begin to implement improved livestock production techniques, they need access to agricultural inputs. Future livestock sector interventions should scale up GANE's interventions to facilitate access to inputs, equipment, and financing – partic-

ularly in regions not targeted by the project. Projects should also incorporate activities to increase small farmers' access to artificial insemination services in order to improve their herd's genetics and milk yield and to reproductive diagnostic services to improve productivity.

Integrate Farmers Into Formal Dairy Markets: In order to access formal markets, which often pay higher prices than informal ones, farmers need to sell their milk through producer organizations. To help unaffiliated farmers integrate into formal markets, development agencies should promote producer organizations in several ways. First, interventions should support private-public partnerships to expand electricity and road access to improve the enabling environment for producer organizations. Second, interventions should help producer organizations to grow by diversifying their value-added products, expanding their markets, and improving member services. Third, interventions should support the dairy industry to expand marketing opportunities both within and outside Nicaragua. And, fourth, interventions should help unaffiliated farmers to integrate into existing or new producer organizations.

Continue to Develop the National Traceability System: The development of Nicaragua's national livestock traceability system is a major undertaking and a long-term investment. To date, about 2 million out of the country's 5 million cattle are registered in the system. Future interventions should build upon the successful private traceability operators developed under GANE by replicating and expanding the model. Additionally, it is critical to strengthen demand for traceability services and to improve farmers' reporting into the national database by sensitizing farmers to the importance of traceability as a long-term investment that will win access to lucrative export markets in the future.

"Thanks to the GANE project...we feel liberated, we have achieved economic independence."

—Female livestock producer at final evaluation focus group

X. ACKNOWLEDGEMENTS

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COAGROWAPI Cooperative

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Cooproleche Cooperative

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Autonomous Regions

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Control of Movement, IPSA

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de los Bueyes

Juan Vargas, Founder,
Cooperativa Multisectorial la
Pradera

Julio Alfonso Meléndez Ruíz,
Systems Engineer, IPSA

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Cooproleche Cooperative

María Luz Alvaréz, President
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Mario González Tocha, Manager,
Office of Local Development,
Municipal Government of Muelle
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Mario Rodríguez Reyes,
General Manager, Agropecuaria
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Marlon Jarquín, Board of
Directors, Cooperativa Musún

Marlon Zamora, Owner,
Alpha-Omega Cheeses

Miriam Serrano, Vice Mayor,
Municipal Government of Muelle
de los Bueyes

Noelia Cárdenas Dávila,
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Oscar López Calderón,
Director Ejecutivo, La Cámara
Nicaragüense del Sector
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**Reyna Isabel González Bermu-
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Rodrigo Salomón Valverde Mejía,
Secretary, Board of Directors,
Cooproleche Cooperative

Santiago Valentín Orozco,
Farmer, Wapí

Valeria Guevara Ruíz, Executive
Director, Nicaraguan Federation
of Livestock Associations

Vidal Antonio López Robles,
Board Member, COAGROWAPI
Cooperative

Warren Zeledón, Administrator,
Cooperativa Musún

TECHNOSERVE'S GLOBAL LIVESTOCK WORK

Other Livestock Projects: Interventions and Results



KENYA

Project Dates: 2012 – 2016
Farmers Trained: 91,865
Yield Increase: 38 Percent
Finance Mobilized: \$963,643
Incremental Sales: \$1.67 million
Donor: U.K. Dept. for International Development

Project Summary: TechnoServe's Kenya Market Assistance Program partnered with dairy cooperatives to improve members' access to livestock feed, improved breeding, venterinary services, and markets.

MEXICO

Project Dates: 2010 – 2019
Farmers Trained: 325
Yield Increase: 19 Percent
Finance Mobilized: \$5.09 million
Incremental Sales: \$6.0 million
Donor: Danone Ecosystem Fund

Project Summary: In partnership with Danone, a French dairy company, TechnoServe is training medium-sized farmers to improve their productivity and helping integrate them into Danone's supply chain.

TANZANIA

Project Dates: 2013 – 2018
Hub Members Registered: 7,094
Capital Mobilized by Hubs: \$13,919
Milk Collected: 2.03 million liters
Incremental Milk Sales: \$606,514
Donor: Bill & Melinda Gates Foundation

Project Summary: In partnership with Heifer International, TechnoServe is helping form farmer-owned dairy "hubs" in Tanzania. These businesses collect and chill farmers' milk and then market dairy to buyers.

UGANDA

Project Dates: 2013 – 2018
Hub Members Registered: 16,989
Capital Mobilized by Hubs: \$2.74 million
Milk Collected: 37.28 million liters
Incremental Milk Sales: \$9.04 million
Donor: Bill & Melinda Gates Foundation

Project Summary: In partnership with Heifer International, TechnoServe is helping form farmer-owned dairy "hubs" in Uganda. These businesses collect and chill farmers' milk and then market dairy to buyers.

ABOUT TECHNOSERVE

TechnoServe works with enterprising people in the developing world to build competitive farms, businesses and industries. We are a nonprofit organization that develops business solutions to poverty by linking people to information, capital and markets. Our work is rooted in the idea that given the opportunity, hardworking men and women in even the poorest places can generate income, jobs, and wealth for their families and communities. With nearly five decades of proven results, we believe in the power of private enterprise to transform lives.

HEADQUARTERS

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BUSINESS SOLUTIONS TO POVERTY