Improving the Profitability of la Planta Láctea

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WPI

Improving the Profitability of La Planta Láctea

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Abstract

La Planta Láctea at la Escuela Agrícola San Francisco de Asís in Cerrito, Paraguay struggled to be profitable. The project sought to develop a series of recommendations to generate more income and improve product quality for la Planta Láctea in conjunction with la Fundación Paraguaya. General observations, structured interviews, and formal meetings were used to generate a set of focus areas. Recommendations and deliverables addressed physical upgrades and marketing materials the plant could utilize to improve product quality and sales.

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The team would also like to thank the staff of la Escuela Agrícola San Francisco de Asís, as well as that of la Fundación Paraguaya, particularly the director, Dr. Martín Burt. He along with Luis Caseres, Esmeralda Ramirez, Marysabel Aquino, and Nelva Diaz, provided invaluable feedback and information to enhance the quality of this project.

Executive Summary

La Planta Láctea at la Escuela Agrícola San Francisco de Asís struggled to be profitable. The plant makes dairy products such as Queso Ibérico, dulce de leche, and yogur. The project team worked with the cheesemeister and director of the school as well as la Fundación Paraguaya to help the plant increase its sales. The team used three methods to do this: observations, interviews, and meetings.

First, the team observed the workings of the plant. This included interviewing the cheesemeister and other employees about factory processes and needs. Interviews were also conducted with other teachers and employees at the school and foundation as well as other project groups to develop focus areas. The specific focus areas identified were: a need for physical upgrades and a need for marketing materials and strategies promoting Queso Ibérico, the plant's most profitable product. Based upon these results, recommendations and deliverables were developed.

Within la Planta Láctea, a series of recommendations was made to improve the quality of the products and improve the business. First, a ladder to improve plant cleanliness was suggested to reach all walls and ceilings when cleaning the manufacturing space. Second, it was recommended that a portion of the whey produced be directed to the kitchen. It could serve as a protein-rich water substitute in the bread made for the students, increasing the bread's nutritional content. Third, a direct internet connection for the plant was needed. The cheesemeister conducts business electronically and a slow, unreliable connection made this nearly impossible. Fourth, a curtain to contain steam in the room where dulce de leche is made was proposed. The dulce de leche manufacturing process generates steam and this steam negatively affected machinery and infrastructure of the plant. The fifth recommendation was a refrigerator to store the yogur made

at the plant. Yogur was stored with the cheese as it aged and airborne cross-contamination between the two products as well as an improper storage environment caused the yogur to spoil prematurely.

For marketing, many people were not familiar with the products of la Planta Láctea. A series of recommendations was made to help attract people's attention; give information about the products, the school, and the cheesemeister; and to showcase the products of la Planta Láctea. First, the team recommended the plant host cheese tastings so people could learn about the cheese, try it, and then buy it. To aid in distributing information at these events and in other settings, pamphlets and fliers were made. Second, a system was designed for organizing cheese in the refrigerator in the hotel where it is sold. This placed Queso Ibérico at eye level to draw people's attention. Third, a banner needed to be designed for the school's table at a farmer's market where cheese is sold in order to draw more attention. Fourth, also for this market, a digital picture frame with a slideshow showing students working at the school was recommended to draw attention to the table. Fifth, a series of scripts were made for students to aid in their interactions with customers. The sixth and final recommendation was for a new label for the dulce de leche. These labels should match the labels for the Queso Ibérico so that the product appears more gourmet and therefore sells more.

The goal of these recommendations and deliverables was to increase product quality and marketing for la Planta Láctea. If they are followed, the sales and profits will increase.

Authorship

Abstract	**M.Z.**
Acknowledgements	**M.Z.**
Executive Summary	**S.P.**
Introduction	**ALL**
Background	**ALL**
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Results and Recommendations	**S.P. & M.Z.**
Summary	**R.R.**
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The team worked together to contribute equally to the entire project and paper.

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Introduction

Paraguay is an impoverished landlocked country in South America. Approximately one fifth of Paraguay's GDP is based on agriculture and nearly thirty-five percent of its citizens live in poverty. La Fundación Paraguaya intends to simultaneously combat poverty and embrace agriculture and trade by creating entrepreneurship opportunities for people, especially students.

One way la Fundación Paraguaya does this is by replacing welfare or financial relief with educational relief. To do this, they created educational agriculture and trade schools such as la Escuela Agrícola San Francisco de Asís. The mission of these schools is to target families in the poorest areas of Paraguay and give them the means to understand business, finance, and innovation in the modern world. These schools are self-sustaining and student education is focused on engagement with the products of the school.

La Escuela Agrícola has 15 separate businesses on campus. One of them, la Planta Láctea (Cheese Factory), specializes in cheese, yogur[1] and dulce de leche production. The purpose of this project was to increase profits within la Planta Láctea. The goal was to minimize resources used and decrease costs while increasing sales needed to support the self-sufficiency of the school. The areas of production and sales the project focused on were developed from the concepts of barriers of entry and addressed using the techniques of Six Sigma and Lean Manufacturing. Overall recommendations were given to la Planta Láctea to improve its manufacturing and a marketing strategy was developed to improve its sales.

[1] Yogur is a popular product in Paraguay similar to traditional American yogurt with a consistency closer to liquid than solid.

Background

La Escuela Agrícola strives to educate youth from impoverished families in Paraguay about sustainable agricultural and business practices. One way they do this is to teach students the entire process of making cheese, yogur, and dulce de leche. In order to maximize the profitability of this operation, a strong foundational understanding of the school, the plant, its processes, and the marketing of its products is important.

Paraguay:

Paraguay is a landlocked nation located between the South American countries of Brazil, Bolivia and Argentina. Its seven million people rank it one hundred fifth in the world for net population and a GDP per capita of $8500 ranks it one hundred forty-second. Paraguay's economy is split among three sectors: Industry, at eighteen percent, Agriculture, at nineteen percent, and Services, at sixty-three percent. By comparison, the labor force of Paraguay is split among the three, nineteen percent, twenty-six percent, and fifty-five percent respectively. Paraguay ranks eighty-first in the world for unemployment at seven percent, while roughly thirty-five percent are considered to be living below the poverty line (CIA, 2008). A World Bank analysis of the poverty profile of Paraguay associates several traits with impoverished Paraguayans: low education levels, monolingual Guaraní speakers, a lack of secondary school education, and migration (Worldbank, 1994). As a reaction to such widespread poverty, organizations such as la Fundación Paraguaya work to find a permanent solution to this crisis.

La Fundación Paraguaya and La Escuela Agrícola:

La Fundación Paraguaya was founded in 1985 by Dr. Martín Burt. It is a "self-sustainable, non-governmental organization" based in Paraguay, with a mission of "implement[ing] practical, innovative and sustainable solutions which eliminate poverty and

create decent living conditions for every family" (Fundación Paraguaya, n.d). The foundation works to eradicate poverty in the nation through education, offering courses in finance and entrepreneurship for young people. The main anchor for the success of the foundation is their concept of "Learning by Doing, Selling, and Earning" (Fundación Paraguaya, n.d). This hands-on approach gives students both the means and the opportunities to change their own lives. While this unique method can be found throughout all areas of the foundation, it is arguably most evident in its agricultural education programs.

La Fundación Paraguaya currently operates four self-sustaining agricultural schools, the first being la Escuela Agrícola San Francisco of Cerrito. These schools provide educational relief from poverty with relevant and quality education. The students of la Escuela Agrícola, aged fifteen to nineteen, traditionally come from poor, rural families. They learn the skills needed to face poverty and are able to incorporate this knowledge into their homes. At graduation, students receive two Baccalaureate diplomas: one as an Agricultural Technician and one as a Tourism and Hospitality Technician. Through this education la Fundación Paraguaya provides the youth the ability to obtain jobs, continue their schooling, or build a microenterprise of their own. All, without this opportunity, would not have been possible to achieve. Throughout the world, others are applying this technique. More than 60 self-sustainable schools have been created in twenty-six countries (Fundación Paraguaya, n.d.). This system is proven to succeed.

The school's curriculum includes sustainable farming practices, agriculture, horticulture, arboriculture, animal husbandry, and beekeeping as well as business, marketing, and entrepreneurial skills. Students engage in all aspects of the school by spending half their time in the classroom and half putting the techniques learned into practice. Daily tasks include chores for the upkeep and health of the livestock, as well as administrative and financial duties. Operation

of the school is funded by the hotel, as well as sales of goods produced in la Plánta Láctea and other areas of the school. 2011 marked the fifth consecutive year the school achieved financial self-sufficiency (Fundación Paraguaya, n.d).

La Planta Láctea:

La Planta Láctea is a hub of activity at the school. Students learn how to process milk from the cattle and goats into many dairy products, including multiple types of cheese, yogur, and dulce de leche. These are then sold locally as well as in markets such as restaurants, supermarkets, and Agroshopping, a farmers market in Asunción.

Not only is la Planta Láctea an important educational center at the school but it is also an important source of income. In 2015 the factory reported an annual profit of one hundred forty-eight million guaranies (25,500 USD) and they predict profits of nearly two hundred million guaranies (35,500 USD) in 2016. Revenue in 2015 accounted for more than thirteen percent of the school's income and only eight percent of its total expenses. Projections for 2016 estimate the revenue of the plant will increase to almost fifteen percent of the school's income. This shows the expected growth of the plant and its potential to be a major contributor to the sustainability of the school. In addition, the dairy products help lower operational costs at the school as they are utilized in sectors such as the kitchen and the hotel.

Dairy Industry:

Paraguay's national pride in their culture can be seen vividly through their cuisine. Because of the bilinguality of the nation, dishes are often named in Guarani, as opposed to Spanish, showing the rich tradition of the food and the recipes that have been passed down from generation to generation (South America Travel Guide, 2015). Paraguayans traditionally rely heavily on dairy products in their diet, along with fresh produce, proteins, and corn products

(Almada E. et al, 2005). Dishes like *chipa* and *sopa paraguaya*, both of which are eaten daily as a lunchtime staple across the nation, incorporate farm-fresh milk and hand-crafted cheese, making the dairy industry vital in Paraguayan culture (South America Travel Guide, 2015).

While the dairy industry plays a key role in the culture of the nation, economically, it has not made the same impact. According to a study released in 2009 by Paraguay's Technical Unit for Industrial Studies, the nation ranks sixty-fourth in the world in terms of the amount of dairy products exported per year in crude form (UTEPI, 2009). That same study placed the nation eighty-fifth in terms of exported processed dairy products (UTEPI, 2009). The report then goes on to explain that the industry has been steadily increasing. An example of the country's exports, both crude and processed, to the United States in 2003 was estimated to be $506,000; five years later, in 2008, that number had expanded to just under four million dollars (UTEPI, 2009). While still a relatively small industry, making up only about one and a half percent of Paraguay's national industrial sector according to the Paraguayan National Government in 2011, there is concrete evidence that it is growing (Gobierno Nacional, 2011).

Cheese Production:

According to legend, the first cheese made was an accident. Curd and whey was produced from milk that was stored in a sheep's stomach pouch containing rennet in the lining. The heat from the sun, as a merchant travelled through a desert, caused the change and separation of the milk. The art of cheesemaking crossed from Asia to Europe where it thrived. The demand for cheese has continued to grow and spread causing production to increase rapidly. In the United States, one-third of milk produced is used in the manufacturing of cheese (IDFA, 2013).

Cheese is a milk concentrate containing protein and fat. The various amounts of moisture lead to three main categories of cheese classification: hard (low moisture), semi-hard, and soft

(high moisture). Other characteristics of cheese include structure, flavor, and appearance. These differences result from the type of milk, bacteria, and manufacturing technique chosen. The difference in length of heat treatment and of aging throughout the process also determines the type of cheese (Bylund, 2015).

The art of cheesemaking can be divided into a few main stages. The first step is the collection of milk. Bacteria cultures are then added to the milk, depending on the type of cheese to be produced, and mixed with rennet. Throughout this process, curds and whey form within the mixture due to the activity of enzymes. The cheesemeister stirs and cuts the mixture before draining the whey and molding the leftover curds. The final steps, including treatment, pressing, brining, and storage, determine the cheese characteristics (Bylund, 2015). This process is outlined in Figure 1.

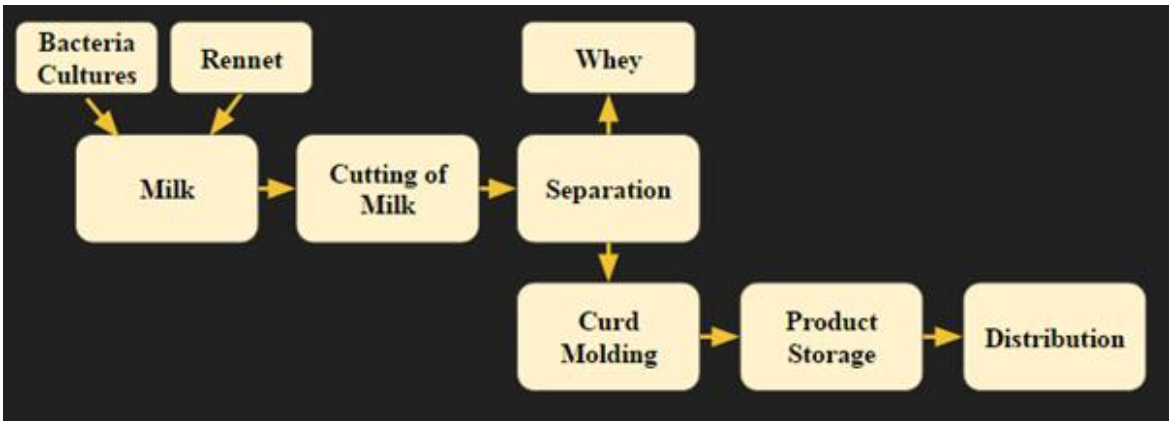

Figure 1: Cheesemaking Process.

Cheese Production in la Planta Láctea:

La Planta Láctea at la Escuela Agrícola San Francisco is a small scale operation that produces artisanal dairy products as a source of income for the school. The cheesemeister, Sr. Ricardo Negrete, a Spaniard with over eighteen years of experience, has worked at the school, teaching and making cheese, for the past two years. Together, along with an assistant and a

rotating group of students from the school, they produce dulce de leche, yogur, and three types of cheese: Queso Paraguay, ricotta, and Queso Ibérico. Queso Paraguay is a cheese native to Paraguay with a relatively bland taste, making it ideal for cooking. Queso Ibérico, on the other hand, is an aged, flavorful, sharp cheese made from cow and goat's milk, based upon the cheesemeister's Spanish recipe. Queso Ibérico is the focal product of the factory.

Queso Ibérico is made at la Planta Láctea in larger quantities than any other product. The plant receives milk from the farm at la Escuela Agrícola and also purchases between two hundred and five hundred liters from outside vendors multiple times per week. This milk is stored in a large chilling machine. Early in the morning on Queso Ibérico production days, the milk needed to make the cheese is transferred into a heating vessel for pasteurization. Once the milk is properly heated, the necessary bacteria cultures are added, and the resultant mixture is thoroughly stirred by machine. The mixture is left to rest until it solidifies and is then cut by the students working at the factory. The mixture is stirred again and the curds are separated from the whey. This whey is then taken to another machine where it is used to make ricotta cheese.

The Queso Ibérico curds are then pressurized in molds of different sizes: small, medium, medium-large, and large. Once the wheels of cheese have taken shape, they are taken out of the molds, and placed in the "secador", a dry refrigerator, where they age at the discretion of the cheesemeister. The cheeses are rotated and cleaned as they cure based on their age. The younger cheeses need care every other day and the older cheeses, once a week.

There are many varieties of Queso Ibérico, based upon their age and the curing process. The standard is Queso Iberico Clásico, aged four to eight months. Other varieties include Queso Iberico Tierno, aged no more than two months and Queso Iberico Extra Madurado, aged for more than nine months. Additionally, the cheesemeister has recently begun to offer Queso

Ibérico in oil or with an herb coating. To create these products, the cheeses are soaked in oil or packed in herbs to impart unique flavors through the aging process. After months of storage, the cheese is vacuumed sealed in plastic bags, and labeled appropriately. The cheese is marketed in many forms, including wedges as well as half and whole wheels.

Workflow of la Planta Láctea:

An essential component to any profitable business is efficient workflow. Investopedia defines workflow as "a series of tasks to produce a desired outcome, usually involving multiple participants and several stages in an organization." (Investopedia, n.d). Workflow in a factory such as la Planta Láctea presents a unique set of opportunities and challenges. Among these challenges are raw material inflows and outflows, labor and material management, and food storage.

Resource inflow is a vital component of the workflow in la Planta Láctea. The factory utilizes materials, such as milk, and must arrange for storage of them before they can be used to produce cheese. The milk is divided for the production of different products. The cheesemeister must consider market demands and resource constraints before determining the product making schedule. Other materials utilized by the factory include bacterial cultures for the various products. These materials must be stored in a temperature controlled, easy access, clean, and organized space prior to use within the cheesemaking process.

Most processes of the plant are linear. A process that exemplifies the unique challenges in labor and material management is Queso Ibérico production. When separating the curds from the whey, care must be taken to lose as little product and time as possible. The curds are transported a few feet to the pressurization machine where they are pressed into molds. The

whey is moved into a separate vat to make ricotta cheese. These, among others, show the fluid processes factory workers perform in making cheese.

Upon completion, all products are transported to the secador to be stored and chilled until market sale. Products such as yogur and dulce de leche do not require aging and are therefore ready to be sold immediately. The Queso Ibérico, however, is managed as was explained in the Cheese Production and la Planta Láctea sections.

The products of the factory are sold to a list of over fifty clients as well as at Agroshopping and in the school hotel. Moreover, after sale the factory utilizes an internet-based program to transport its information to Administration. With such a complex system, there is room to analyze the factory's current techniques and make recommendations for improvement. It is imperative la Planta Láctea identifies barriers of entry and utilizes management techniques like Six Sigma and Lean Manufacturing to grow and optimize their workflow efficiency.

Introducing a product in a new industry:

Companies looking to introduce a new product into an industry face several challenges. Research into this field has seen great strides since Joe S. Bain wrote "Barriers to new Competition" in 1956. Bain's discussion of market entry conditions created one of the first structured discussions of how markets emerge in the modern era (Lynn, 1957). The next largest advancement was Michael E. Porter's Competitive Strategy in 1979. Porter was the first to introduce barriers to entry as obstacles for new businesses (Pehrsson, 2009). As further research has been done into the difficulties of new businesses, the concept of barriers of entry has been developed into a concrete series of challenges.

Barriers of Entry can be organized into six categories: Financial Investment, Cost Advantages, Supply Restrictions, Customer Loyalty, Legal Barriers and Patents, and Threat of

Retaliation (Simster, 2011). At la Planta Láctea's current point in its lifecycle, it has successfully survived some of these barriers. Financial Investment, Cost Advantages, and Customer Loyalty, as outlined below, will expand upon current challenges.

Financial Investments of new entrants

One of the largest barriers of entry into many markets is the financial obligation of a new firm to match the capital of competitors. Areas in consideration in this include: plant, property, and equipment (PPE), building leases, research and development (R&D) and inventory (Simster, 2011). For la Planta Láctea, R&D and Lease Commitments were less important than PPE and Inventory. La Planta Láctea is not a brand new operation, so it already has some areas of PPE such as a functional building, milk chilling machine, milk stirrer and vats to produce its other products. However its PPE limits production as the milk chiller can hold up to five hundred liters of milk and the stirrer, three hundred liters, resulting in a maximum production of thirty kilograms of Queso Ibérico per day. The inventory of la Planta Láctea is also an area of key importance. Queso Ibérico, for example, is standardly sold after it has aged for five months so the Plant must plan on producing today what it intends to sell in five months' time.

Cost Advantages of Current Firms

Another barrier is the cost advantage established firms in the cheese and dairy industry in Paraguay have over la Planta Láctea. Some examples of these are Economies of Scale, The Experience Curve, and Low Cost Input Prices (Simster, 2011).

The concept of Economies of Scale is incredibly important for la Planta Láctea. Larger businesses have a lower cost per unit due to their scale. Also as a result of their larger production, they are able to utilize specialized machines in their production process (Simster, 2011). La Planta Láctea, however, must use the same machine for dulce de leche and ricotta

cheese production and therefore cannot produce dulce de leche on the same day as Queso Ibérico (ricotta being a product of its whey).

The Experience Curve outlines the more experience one has repeating a process, the greater the chance of innovating it. As a process is repeated and innovated, it will become standardized. Standardization in production creates consistent products and therefore gives the opportunity to improve the customer interaction (Simster, 2011).

Low Cost Input Prices is the factor of Cost Advantages that has the largest effect on the production of la Planta Láctea. New and small scale businesses will generally pay more for inputs (Simster, 2011). The plant invests more money per liter of milk than its competitors. La Planta Láctea receives milk from cows at la Escuela Agrícola but must purchase milk from distant suppliers; this inflates milk procurement costs.

Customer Loyalty

Customer Loyalty is one of the largest barriers la Planta Láctea must overcome to establish itself in Paraguay. Artisanal cheese in Paraguay is an underdeveloped industry. People do not traditionally eat cheese by itself but instead use it to make dishes such as Sopa Paraguaya. Paraguayans can be considered loyal to their inherited ways of cheese usage, and the barrier la Planta Láctea must overcome is convincing potential customers to consume products such as Queso Ibérico.

Product differentiation is a key strategy in combating customer loyalty. By targeting product differentiation, the team can work to distinguish the products of la Planta Láctea and their history from traditional cheese in Paraguay (Investopedia, n.d.). In order to promote the Queso Ibérico brand and also improve sales throughout la Planta Láctea, the project team

developed a series of marketing initiatives that will be discussed in the Results and Recommendations section of this paper.

Management Techniques:

There are many different ways to assess efficiency and profitability within the business and manufacturing sectors. The practices of Lean Manufacturing and Six Sigma have been applied with great success in many business and manufacturing companies and have been shown to reduce waste, cut costs, and increase profits.

Lean Manufacturing

Lean Manufacturing focuses on cutting costs wherever possible. Long term thinking and planning is required as initiatives do not immediately lower costs in some cases (Levitt, 2008). The idea of lean manufacturing can be explained with the five M's of efficiency: manpower, material, machines, methods, and money (5ME, n.d.).

Each of these points explores a different aspect of efficiency and provides recommendations to maximize its effectiveness. With manpower, it is important to make sure that everyone has the training required to do their jobs and that everyone is committed to the same goals. Using higher quality raw materials leads to higher quality products but it is also necessary to limit the amount of waste created within the production processes. To ensure the highest quality possible it is essential to use the right machines and those chosen should be chosen for their reliability and durability. The methods used for manufacturing should be evaluated to determine places where efficiency could be improved. They should also be well documented so they are easily repeatable and can more easily be taught to employees. It is also important to note that processes should be evaluated and updated on a regular basis to ensure that

production flows in the best way possible. The money aspect of this paradigm is used to measure profitability and it is necessary to keep track of all assets and cash flows. (5ME, n.d.).

Lean Manufacturing does not have to be fully implemented all at once as there are levels of commitment. The first level looks at changes that lower costs and increase efficiency that can be made easily with little to no investment. The next level involves researching changes that can be made to improve the efficiency of machines and equipment as well as the quality of the products and the amount of waste created. The third and final level requires extensive research into changing the processes in order to make production more efficient and profitable (Levitt, 2008). This project primarily focused on first and second level changes within la Planta Láctea.

Six Sigma

Six Sigma is another approach to looking at efficiency in the manufacturing workplace and is defined as "a business improvement strategy used to improve profitability, to drive out waste, to reduce quality costs and improve the effectiveness and efficiency of all operations or processes that meet or even exceed customers' needs and expectations" (Antony, 2001, p.119). It aims to do this by reducing the number of defective products produced because this will increase the overall product quality, increase profits, and increase overall customer satisfaction (Antony, 2001). Benefits of this paradigm include saving time and money during production, increasing profits, and increasing the overall quality of the product (Kwak, 2006).

Six Sigma looks at the workflow to identify areas that can be improved. It does this by implementing an acronym known as DMAIC: define, measure, analyze, improve, and control. It is in many ways similar to the 5 M's used to define Lean Manufacturing. The process begins with a qualitative assessment to determine focus areas for improvement. Then information must be gathered to identify specific problem areas. Next, this information is analyzed to find sources

of error or variation. Once these areas have been pinpointed, improvements can be made. The final step, control, aims to monitor the status of these improvements and make changes as necessary (Kwak, 2006). In la Planta Láctea, the techniques of Lean Manufacturing and Six Sigma were used as guidelines for a unique plan to target barriers of entry and to propose improvements.

Case Studies:

Traditional Balsamic Vinegar of Modena

Traditional balsamic vinegar of Modena represents the difficulties of an artisanal product overcoming marketing barriers. The purpose of this case study was to examine the ways the uniqueness of the product could be used to overcome barriers (723, Mattia, 2004).

The product, based in Modena, Italy, is unique and has many regulations surrounding its production (724, Mattia, 2004). As a result, the process required to create this product is highly artisanal with a high production cost as the vinegar must age for a minimum of twelve years before it can be sold (726, Mattia, 2004). The market for it is highly selective and is primarily seen in high end restaurants, both in Italy and abroad, in specialty stores, as well as bought directly from producers. The relationship between the producer and the client are very important as there is a trust between the two as the client expects a certain product quality (730, Mattia, 2004). Additionally, the vinegar must be packaged in a specific bottle to promote brand recognition and emphasize its gourmet qualities (729, Mattia, 2004).

There are many challenges with marketing traditional balsamic vinegar of Modena. One of the biggest is known as “informational asymmetry”. There are many similar products and customers do not understand the difference between the authentic product and cheaper alternatives. Unless there is a way to convey the higher product quality that comes along with the

more expensive product, customers who are not familiar with the product will choose the less expensive, less gourmet options (733, Mattia, 2004).

It became necessary for the vinegar producers to focus on their brand image and value and they launched an awareness campaign in order to increase awareness about their products. This campaign relied on marketing the uniqueness of the product and its high-class clientele (736, Mattia, 2004). This was accomplished by means of partnerships between producers and other organizations, particularly events highlighting the culture of this region of Italy, as well as giving the vinegar as gifts to important members of the community and highlighting the product in events with foreign dignitaries. The major goal of this was to give more product information to people and so a series of pamphlets was made to give information not only about the product and its history but also how to use it. Additionally a focus was placed on advertising the events showcasing the vinegar rather than the vinegar itself. Measures such as this do not require a great deal of financial investment but still convey a great deal of information and expose many people to the product and its rich history and bring the marketing of the product in line with its target audience (738, Mattias, 2004).

Traditional balsamic vinegar of Modena is similar to Queso Ibérico in many ways. Many of the marketing strategies and brand building steps employed by the producers of the vinegar can be applied in la Planta Láctea to help improve the marketing of not only this cheese but also the many other gourmet products that they make.

V. M. Auto Parts Pvt. Ltd.

V.M. Auto Parts Pvt. Ltd. is a small manufacturing company located in India. The company employs fewer than fifty people and manufactures many different types of auto parts such as different shafts, axles, flanges, and washers (V.M. Auto Parts Pvt. Ltd., n.d.). This

company was the subject of a case study that looked at the implementation of Lean Manufacturing techniques in small scale companies. Even though the scope of the company is different from la Planta Láctea at la Escuela Agrícola, its scale provides insight into how small-business manufacturing works.

The principles of Lean Manufacturing can be described in many ways; earlier in this section the five M's were used. This case study uses the five S's: sort, set in order, shine, standardize, and sustain. The idea behind these is to sort all tools and equipment and dispose of all non-necessary pieces. Then the workspace is to be set in order and the previously sorted items are given locations based upon what processes use them and how often they are needed. Next the workplace is cleaned up and all equipment undergoes necessary preventative maintenance. The penultimate step is to standardize production and maintenance procedures. Finally, these changes must be sustained and continued in order to see the long range benefits for the business (Agrahari, Dangle, Chandratre, 2015).

V.M. Auto Parts Pvt. Ltd. saw many changes and benefits as a result of the application of Lean Manufacturing techniques to its production floor. Storage of equipment and tools was standardized. Waste was eliminated and the work area and everything in it was cleaned. Statements of procedure were created and processes were homogenized (Agrahari, Dangle, Chandratre, 2015).

The company saw an overall reduction in business expenses and was able to manage its resources more effectively. Production time and maintenance costs were lowered and overall efficiency was increased. Additionally, working and safety conditions were improved. Employee morale increased as workers took more pride in their work and made fewer mistakes as they increased their attention to detail (Agrahari, Dangle, Chandratre, 2015). Overall, the application

of Lean Manufacturing techniques in this setting was highly effective and this case study shows these techniques are not just for use in large scale manufacturing operations but are applicable in many different manufacturing outfits.

Kraft Canada Ingleside Facility

An analysis of Kraft Canada's Ingleside Facility was done by an undergraduate student of the University of Toronto. The study was focused on animal feed in the cheese manufacturing operation of the natural cuts department where cheese is cut and wrapped. Animal feed is the cheese that has fallen in between machinery onto the floor or that is left inside the machinery after the production has run. The objective of this project was to determine the major causes of animal feed generation through the implementation of the DMAIC techniques of Six Sigma. After the causes were identified, recommendations were given to the company to decrease the amount of animal feed generated weekly in order to decrease related costs (Nabi, 2007).

The Define stage consisted of an understanding of the cheese making process. A flow map was generated starting from the transportation of cheese to the knockdown area through the final step of transporting full pallets to either coolers or to shipping vans. Following this map a process description and a detailed problem understanding were given (Nabi, 2007).

In the Measure stage, Kraft provided data from a fifty-one week time period to determine the animal feed generation. Some information was not provided due to software that was unable to collect some data. An understanding of the current system and its capability was the final portion of this phase. Findings indicated the performance levels were very poor and there was enormous room for improvement (Nabi, 2007).

Descriptive statistics, time-series modeling and testing for normality were just a few assessments needed for the Analyze stage. Many graphs and tables were created and

comparisons made. Other tools consisted of a multi-variable study and ANOVA analysis as well as a general linear model (Nabi, 2007).

Following this analysis came the Improve stage. Improvements such as the implementation of a Line Monitoring System as well as an update to the current data software to include line speeds, production and cycle times were recommended by this study. Several short-term recommendations were provided such as physical barriers and supplementary trays to prevent unnecessary loss (Nabi, 2007).

The final stage of Control ensured the sustainability of the changes. After the implementation of the recommendations, monitoring of systems and training of operators was found to be necessary. Control is an important form of observation to verify that changes made are executed as intended to better the system (Nabi, 2007).

The study found the application of Six Sigma to be an excellent choice. "Kraft Cheese Operations was a strong advocate of the Six Sigma methodology, and was very cooperative in the practical application of our knowledge at their facility." (Nabi, 2007, p. 59). This was an important aspect in the implementation and continuation of all recommendations that were made. Areas identified for improvement in the study included increasing the amount of data collected and doing more in depth analysis as well as expanding the amount of time to implement the Control stage (Nabi, 2007). This application of Six Sigma displays a positive past experience in a cheese factory setting.

Methodology

The primary goal of this project was to increase the efficiency and profitability of la Planta Láctea. The Gantt Chart provided in Appendix A gives a layout of the team's seven week project. The first week was spent developing connections with the students and cheesemeister, and a general observation of the factory was performed. The current cheese production methods, the workflow, the equipment, and how the factory functions as a business were considered. Additionally, site assessments were performed at different areas, including the plant and where products were sold, to consider physical upgrades to the plant as well as better marketing strategies. In doing this, a paradigm combining the aspects of Six Sigma and Lean Manufacturing was developed to recommend an approach best suited to the needs of the factory.

Preliminary Observations:

The goal of the first two weeks of the project was to gather information about the factory while building rapport with the cheesemeister, Ricardo Negrete, and those involved in the production of cheese. To do this, the team participated in every aspect of the cheese making process alongside the workers of the factory. This encompassed everything from separating the curds and whey, to packaging the cheese for sale. This gave the team the opportunity to understand the process beyond a verbal explanation as well as to communicate with the cheesemeister and workers about the current state of the factory in both production and marketing. The team also studied the culture of the plant so as to gauge how suggestions might be received. Time was spent getting to know the cheesemeister, his assistant, and students, not only about what the workers did at the factory but also about their personal lives. This allowed for both strong relationships with the factory workers as well as an understanding of their desires for what they hoped to accomplish.

Site Assessments: Factory

The time spent in the factory allowed for an assessment of many areas. This included current cheese production and workflow of the plant as explained in the Background section. From here, an evaluation was completed of the equipment that worked efficiently, that was working but needed maintenance or improvements, and that was not working. The team also learned how the cheesemeister sells directly to clients and to the other businesses at the school. The team decided the cheese production and the workflow of the factory satisfied current production levels; however, the factory needed physical upgrades and effective marketing strategies.

Site Assessments: Points of Sale

Marketing strategies were developed through assessments of points of sale. Key markets included Agroshopping and Hotel Cerrito. At Agroshopping students were the salespeople. They operated a booth that was about ten feet long where the school's produce was displayed. Behind the students there was a ten cubic foot refrigerator that contained the school's dairy products and a banner that announced the school and provided information about its purpose. The arrangement was similar to others except for the presence of the banner and the fridge. Few other vendors offered dairy products and la Escuela Agrícola was one of two that offered premium cheese other than Queso Paraguay. The communication style of the students was passive. They generally responded only when spoken to and only mentioned the uniqueness of the school and the dairy products when prompted.

At Hotel Cerrito, the hotel located at la Escuela Agricola, students were also the primary salespeople. Like Agroshopping, they sold dairy products that were kept in a fridge located in the lobby. Hotel Cerrito needed a plan to encourage its guests to buy Planta Láctea products. The

products were not arranged to promote sales nor did students advertise them when guests checked out. The team estimated that one out of fifteen adults that stayed at the hotel bought dairy products. This showed potential for the hotel to be a much stronger source of income for la Planta Láctea. These site assessments led the team to focus on marketing in these locations.

Implementation of Six Sigma and Lean Manufacturing:

Six Sigma and Lean Manufacturing models, as described in the Background, guided the choice of methods, the analysis of the data, and how to identify areas of improvement. The stages of the models appear in linear fashion, but when used can be applied in any sequence. This makes it hard to describe in exact detail their application from day to day. But it is possible to illustrate the overall approach by looking at each of these stages, how the team pursued information, justified improvements, and ultimately made recommendations. The improvement model used to solve problems at la Planta Láctea is illustrated in Figure 2.

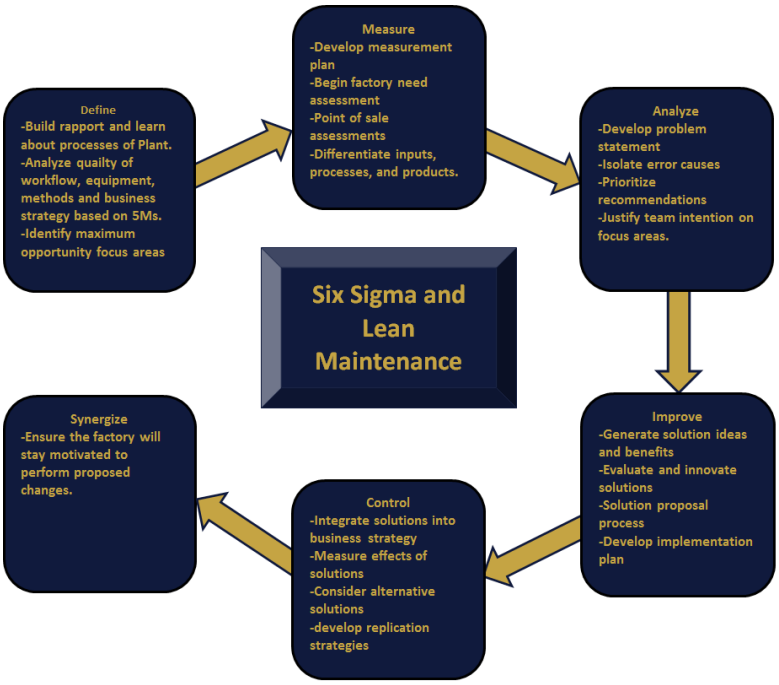

Figure 2: Planta Láctea Six Sigma improvement plan.

To begin, the Define stage of Six Sigma identified and assessed potential improvements to the cheese factory and to marketing. In this define and assessment phase, the 5Ms of Lean Manufacturing: manpower, materials, machines, methods, and money, focused the team's attention on areas where improvements might be made. The Measure stage of Six Sigma led the team to develop a plan to collect data on which to base recommendations for upgrades to the plant and marketing. This plan used interviews and meetings with faculty of the school, primarily the cheesemeister and school director, as well as the project advisors and members of other IQP groups. The Analyze stage directed the team to review the knowledge, data and opinions gained from the observations, interviews and meetings in order to isolate causes and problems that affect plant function and product marketing. The Improve stage helped the team generate solutions and recommendations for the factory and marketing. The benefits of each recommendation were evaluated. These evaluations indicated what changes would best serve the factory and the marketing of its products. The final stages of Control and Synergize required the team to consider how to manage its proposals and make sure they complement other parts of the plant, and the marketing of its products. Of particular concern was that the recommendations harmonized well with the way things are done in Paraguay so the proposals would take root after the team left.

Results and Recommendations

The project goal, as defined by the director of la Fundación Paraguaya, la Escuela Agrícola, and the cheesemeister, was to create a set of recommendations and deliverables to help la Planta Láctea increase the quality of its products and increase its profits. In order to do this, the team implemented the methodology discussed in the previous section and found two main areas for improvement: physical problems within la Planta Láctea and a lack of product marketing strategies.

Physical Upgrades:

The team began their work with a focus on potential physical upgrades to la Planta Láctea. This included the quality of goods produced and the efficiency of the plant as a whole. In response to the principles of the Lean Manufacturing paradigm, the team first identified small changes that could easily be made.

Ladder. A new ladder would aid the cleaning processes. La Planta Láctea has a high ceiling that makes it and the walls difficult to clean. Plant cleanliness is a requirement for a food manufacturing license. This ladder would also allow access to a long term storage loft that is now relatively inaccessible.

Whey. A second small change is a redirected use of the whey. Currently the whey supplements the diet of the animals. Whey can also enrich bread dough and thereby improve nutrition of the students. Specifically, seventy-five of the eight hundred liters per week could be set aside for people while the rest would go to the animals.

Internet Connection. After small changes, the team refocused to four large projects. A direct internet connection for the building came first. The previous connection was unreliable and slow. The new connection allows the cheesemeister to work more efficiently by responding

more quickly to requests for products, selecting supplies and, in general, conducting business. Key beneficiaries of the new connection are the students because the cheesemeister can spend more time teaching them.

Dulce de Leche**.** Second, there was no partition between the room where the dulce de leche is manufactured and the rest of la Planta Láctea. Currently, steam is the problem because dulce de leche produces steam; it dissipates throughout the building, rusts pipes, discolors wall and floor tiling and deteriorates mortar. In addition the elevated temperature and humidity adversely affects the quality of cheese. A simple barrier, such as a thick, plastic curtain, hung in the doorway, could ameliorate this problem.

Refrigerator. Third, a refrigerator should be dedicated to the exclusive storage of yogur. The yogur currently shares storage space with the cheese. Mold spores from cheese can contaminate the yogur because the bottles are not hermetically sealed. Additionally, the temperature at which cheese is stored is above yogur's optimum. A new refrigerator would improve yogur quality and shelf life and thereby increase profits.

Office Space. Fourth, la Planta Láctea needs an office space for the cheesemeister. Currently, the management side of the business is conducted in the manufacturing space. Electronic communication, updating spreadsheets, and making phone calls to clients all take place within feet of the din of electric motors, moving parts, other workers, and the teaching of students. A private workspace, such as one of the current storage rooms, could resolve these problems and ultimately help the cheesemeister manage a business that will surely grow.

Marketing:

The marketing strategy for la Planta Láctea required many changes. The current policy is insufficient for the goals of the business. Many people are unfamiliar with the cheese and other

dairy products from la Escuela Agrícola. Furthermore they know nothing about Queso Ibérico, a cheese meant to be eaten on its own rather than used as an ingredient in traditional Paraguayan dishes. Additionally, there is no evidence of promotional materials and minimal evidence of cheese tastings and of student initiative to discuss the cheese with customers.

To address the insufficient marketing strategy the team sought to: attract people's attention; teach people about the products, the school, and the cheesemeister; and promote Queso Ibérico. The team created deliverables and made recommendations that met one or more of these focal points. These deliverables and recommendations are discussed in the context of three primary points of sale: within la Planta Láctea, in Hotel Cerrito, and at Agroshopping.

Planta Láctea

Cheese Tastings. La Planta Láctea should sponsor monthly cheese tasting events and make samples available in places where high sales volumes can be expected. This recommendation addresses all three marketing focal points. It attracts people's attention, educates them, and promotes the sale of Queso Ibérico.

The recommendation was realized through a cheese tasting, organized by the team on behalf of la Planta Láctea, in Villa Hayes, a city close to la Escuela Agrícola. The team worked closely with el Centro Cultural Melodía de Villa Hayes to plan a tasting in conjunction with a library opening and ribbon cutting ceremony. As a result of this event, many people with a great deal of influence in the local culture were introduced to Queso Ibérico. In addition, a professional connection was made between the cheesemeister and the director of the cultural center. Thus, similar events could be hosted in the future so the cheesemeister can better promote the product of la Planta Láctea.

Pamphlets. La Planta Láctea needed marketing pamphlets. They contain information about the products, especially Queso Ibérico, the school, and the cheesemeister and can be widely distributed, for example in Hotel Cerrito and at Agroshopping. Not only are they informative, but pamphlets keep information in circulation. These pamphlets can be seen in Appendix B.

Labels. La Planta Láctea needed new labels for the dulce de leche containers. The current labels are not eye catching and do not impart an artisanal, gourmet image. An example of this style of label can be seen in Figure 3.

Figure 3: Current Cerrito Dulce de Leche labels.

There is however a model for what the label should look like: the Queso Ibérico label. Its color palette of midnight blue, gold, and gray differentiates it from competitors. This label is shown in Figure 4. If the dulce de leche and Queso Ibérico labels are the same, customers will see they have the same artisanal quality.

Figure 4: Queso Ibérico label.

Hotel Cerrito

Refrigerator Organization. First, the refrigerator in the hotel lobby was not well organized. Queso Ibérico needed to be placed at eye level, because if people see it first, they are more likely to buy it. A layout for product placement within the refrigerator was created and can be seen below in Figure 5.

Figure 5: Layout of Product Placement within the Hotel Refrigerator.

Script. Second, guests learned little or nothing about Queso Ibérico from student workers at the hotel. Communication needed improvement. A short sales presentation, in the form of a script, was prepared for the students to be used when guests check out. Another project team, charged with training student hotel workers, included the script in their efforts. The script, specifically about Queso Ibérico, can be seen in Appendix C.

Cheese Platter. Third, Queso Ibérico was not utilized at the Hotel. Without publicity, especially in the form of a chance to taste the cheese, people do not know about it and so do not buy it. A cheese platter, a well-known food publicity strategy, should be offered to guests highlighting different cheeses of la Planta Láctea. Cheese platters could be offered at times such as at check-in or before meals.

Agroshopping

Scripts. Students were not effectively communicating la Planta Láctea's products to customers. A script was created to promote Queso Ibérico. One of the marketing teachers implemented this script in his classes for first year students. This script can be found in Appendix D.

Banner and Picture Frame. Second, the table did not draw customer's attention. The table can be seen in Figure 6. A banner should replace the white, bare space in the front of the table to highlight Queso Ibérico. The banner would include buzzwords such as gourmet and artisanal. Furthermore, a digital picture frame would increase attention. The picture frame would include a slideshow of photos of the students working, the school, and the various work areas and products.

Figure 6: Table at Agroshopping.

Summary

After consulting la Planta Láctea and its respective points of sale, project work will lead to increases in both product quality and sales. Through interviews and observations, it became apparent that physical upgrades were needed to improve product quality and plant efficiency. Also, the marketing strategies of the factory did not attract attention, teach about the products, and sufficiently promote Queso Ibérico. This insight provided targets for the list of deliverables and recommendations.

1. Direct internet connection to fix data uploading.
2. Partition the dulce de leche room to reduce humidity damage.
3. Purchase a dedicated yogur refrigerator to improve quality and shelf life.
4. New office space in la Planta Láctea to improve business and finance organization.
5. More Cheese tastings would expand exposure and familiarity of the cheese.
6. Pamphlets at the points of sale provide customers with information about products.
7. Product labels need to represent product quality and prices.
8. Improve advertising and organization of products at Points of Sale.
9. Improve communication from student sellers to customers at Points of Sale.

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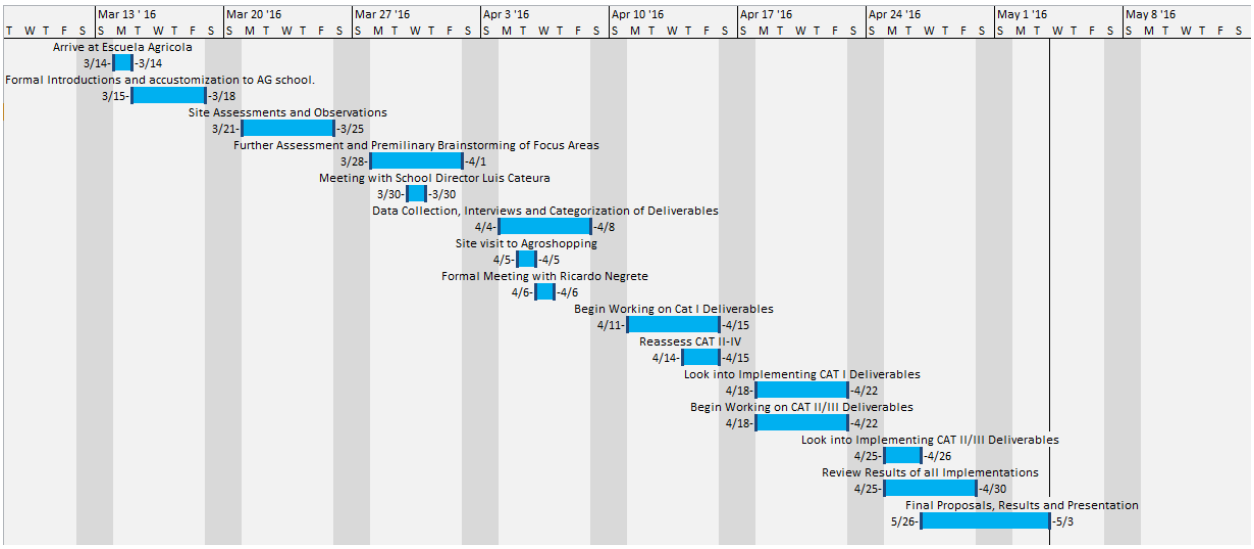
Appendix A: GANTT Chart



Appendix B: Pamphlets

Trifold Pamphlet

¿Qué es Queso Ibérico?

Queso Ibérico Cerrito es el queso ¡más gourmet de todo Paraguay! Es perfecto para comerlo sólo en alguna picada, o acompañado por algunos frutos secos, uvas y vino. Fue creado por Ricardo Negrete, un Maestro Quesero Español con 18 años de experiencia. Éste queso madurado está fabricado con leche de vaca y cabra por los alumnos de la Escuela Agrícola San Francisco.

Para mas informacion:

Visita nuestra escuela y Hotel Cerrito!
Ruta 9 Carlos Antonio Lopez (Transchaco)
KM 46
Telefono: (271) 272223
Contacto Ricardo Negrete
Telefono y WhatsApp: 555-555-5555
E-mail: rnegrete@fundacionparaguaya.org.py

Cerrito

QUESO Gourmet IBÉRICO

Un Manjar de Producción Nacional

Escuela Agrícola San Francisco

Cerrito

fundación paraguaya

El Maestro Quesero

El Sr. Ricardo Negrete es un maestro quesero Español quien ha fabricado queso por 18 años. Los primeros 16 años de producción los empleo desarrollando su receta del queso Manchego que es originario de España. Hace dos años el Señor Negrete trajo este tipo de queso a Paraguay comercializándolo como Queso Ibérico, que es manufacturado en la Escuela Agrícola San Francisco de Asís, donde enseña sus recetas a sus alumnos.

Los Productos de la Planta Láctea

El producto gourmet de la planta Láctea más famoso es el queso Ibérico el que tiene muchas variaciones ricas. El Ibérico clásico es madurado entre 4 y 6 meses, el Extra Maduro por 9 meses o más. Otras opciones especiales incluyen Queso Ibérico

Madurado con Aceite o con Hierbas. Estos quesos tienen un sabor más intenso. El Queso Ibérico Tierna es el más joven y fresco y es perfecto para una picada ligera. Otros productos artesanales que fabrica el Señor Negrete incluye Dulce de Leche, Queso Paraguay y Yogur ¡Todos son perfectos para consumir en cualquier ocasión!

La Escuela Agrícola San Francisco

La Escuela Agrícola San Francisco de Asís es autosuficiente en Cerrito Paraguay. Los alumnos estudian muchas áreas de agricultura y hospitalidad, incluyendo como se fabrica el Queso Ibérico. La venta de estos productos deja utilidades para beneficio de la escuela y la educación de los estudiantes.

Flyer

Queso Ibérico:
Un Manjar de Producción Nacional

Queso Ibérico Cerrito es el queso ¡más gourmet de todo Paraguay! Es perfecto para comerlo sólo en alguna picada, o acompañado por algunos frutos secos, uvas y vino. Fue creado por Ricardo Negrete, un Maestro Quesero Español con 18 años de experiencia. Éste queso madurado está fabricado con leche de vaca y cabra por los alumnos de la Escuela Agrícola San Francisco.

Puede encontrar nuestro queso en el Hotel Cerrito y en Agroshopping cada martes en Asunción en el "Shopping Mariscal". También puede contactar a Ricardo Negrete:

rnegrete@fundacionparaguaya.org.py

Cerrito

Appendix C: Hotel Script

Propósito: Queremos mejorar servicio en el hotel y aumentar la presencia y las ventas de los productos de la Planta Láctea.

Paso 1) Saluda al huésped: *"Hola.* ¿C*ómo fue su experiencia?"* Continúe charlar.

Paso 2) Introducir la Planta Láctea: *"¿Conoce usted la Planta Láctea que tenemos acá?"*
Sí o No?
Respuesta con sí: continúe a paso 4

Paso 3) Respuesta con no- Da información de fondo: *"En campus tenemos una Planta Láctea que manufactura varios productos como Queso Paraguay, Yogur y Dulce de Leche. También tenemos un queso muy especial y único que se hace con una mezcla de leche de vaca y cabra que se llama Queso Ibérico. Todos estos productos fueron* creados *por un maestro quesero Español."*

Paso 4) *"¿Ha probado el queso Ibérico? ¿Le gustaría una probada de lo?"*

Paso 5) *"¿Ha visto el refrigerador con los productos de la Planta Láctea? ¿Quisiera comprarlos antes de salir?"*
Sí or No?
Respuesta con no: continúe a paso 7

Paso 6) Respuesta con sí: Muestre los productos en el refrigerador.

Paso 7) Continúe con el proceso de hora de salida

Appendix D: Agroshopping Script

Propósito: Queremos mejorar las ventas de Agro shopping y aumentar la presencia y las ventas de los productos de la Planta Láctea.

Paso 1) Saluda al huésped: *"Hola.* ¿C*ómo esta?"* Continúe charlar.

Paso 2) Introducir la Planta Láctea: *"¿Conoce usted la Escuela Agrícola San Francisco?"*
Sí o No?

Paso 3) Respuesta con no: Da información de fondo de la escuela y los productos: *"Somos una escuela auto sostenible en Cerrito que está cerca de Benjamin Aceval y Villa Hayes. Trabajamos en varias áreas en campus que incluye: cultivando verduras, cuidando por los animales y trabajando en una Planta Láctea donde producimos Queso Paraguay, Yogur, y Dulce de Leche. También tenemos un queso muy especial y único que se hace con una mezcla de leche de vaca y cabra que se llama Queso Ibérico. Todos estos productos fueron* creados *por un maestro quesero Español."*

Paso 3) Respuesta con sí: "*Conoce usted que además de producimos muchos productos diferentes como verduras y carne, tenemos una Planta Láctea donde producimos Queso Paraguay, Yogur, y Dulce de Leche. También tenemos un queso muy especial y único que se hace con una mezcla de leche de vaca y cabra que se llama Queso Ibérico.*

Paso 4) *"¿Le gustaría una probada del Queso Ibérico?"*

Paso 5) *"¿Ha visto el refrigerador con los productos de la Planta Láctea? ¿Quisiera comprarlos antes de salir?"*