

Amanda Hoefler
Beckman Catholic High School
Dyersville, IA
Brazil, Factor 11

Brazil: The Need to Decrease Malnutrition

Brazil has been a prospering country. It is ranked fifth in the world in population and land area. It also has the seventh largest economy in the world. There are over 193 million people living in Brazil with 83.75% of the population living in urban areas. Malnutrition is one of the bigger problems in Brazil resulting in a 6.9% death rate. Recent economic troubles and inflation have spurred protestors from various economic backgrounds to demonstrate in urban areas. This unrest regarding the economy will add to the problems associated with providing adequate nutrition for all Brazilians.

The majority of people living in the urban areas of Brazil have a low quality of life. The number of people living in poverty actually decreased from 34% of the population in 2004 to 22% in 2009 (Seibt 2013) leading to a larger middle class, increased salaries, and inflation. As a result, Brazil's poor are getting poorer. Jérémie Gignoux, an economist at the Paris School of Economics stated, "Brazil remains one of the countries with the highest level of inequality when it comes to salary and access to social services." People who live in poverty are often referred to as a favela. For a favela in Brazil, life is rough. Favela have less access to infrastructure and they have to take public transportation everywhere. While the average person living in a city's center experienced a 53% increase of income in the 1990's, a favela experienced a 21% decrease.

In general, the literacy rate for adults in Brazil was at 90% in 2010 and in 2008 99% of the urban population was using improved drinking water. Between 1990 and 2010 the estimated population growth was at 1.3%. The percent of children who were underweight and younger than the age of five in Brazil was 2.1% and decreasing (GlobalHealthFacts.org). With these statistics, one can see that Brazil is improving; however, population growth, malnutrition, and economic issues remain causing difficulties for Brazil's poor.

I decided to concentrate on malnutrition by taking a look at the lifestyle of a farmer in Brazil. The average farmer in Brazil is 52 years-old and the majority of the farmers have a low-level of schooling. The size of a Brazilian dairy farm varies depending on its location in Brazil. In the southern part of Brazil the average herd size is 92 whereas in the central section, the average size is 897 head. There are various kinds of dairy operations in Brazil as well. A Brazilian dairy farm may be a small family milking herd using the method of extensive grazing or a larger dairy operation using a full confinement method. In the past 15 years, the production of milk in Brazil has doubled. The growth of the industry is due to the government financing programs that provide assistance to farmers in Brazil. The consumption of dairy products in developing countries is slowly increasing, while the consumption rate in developed countries seems to be remaining steady. Since Brazil is considered to be a developing country, there is an increase in consumption of dairy products, which means a higher demand for them as dairy products provide a protein source for the human diet.

In urban areas, many people are unable to access to fresh food on a regular basis. Part of this issue is that farms are not located close to urban centers. On average, farms are found about 23km from urban areas. The roads are also not built well and the lack of infrastructure causes transportation difficulties. Farmers cannot bring their food to the city easily. There is also the growing population of Brazil, which means a higher demand for food. Brazil currently imports 4.65% of the country's food overall. The amount of milk powder imported alone, increased 111% in March of 2012 equaling a total amount of \$55.79 million

US dollars' worth of imported milk powder. Brazil imports this product mainly from Chile, Uruguay, and Argentina (Brazil - Food Imports.)

Although decreasing, malnutrition is still something that is prevalent in Brazil. A robotic milking system is one way to help provide access to fresh milk protein for those living in urban centers. By using a robotic milking system, cows have the capability to be milked more frequently, since a human does not have to be there to milk them. Cows enter the robotic systems at will and can be milked up to six times in a twenty-four hour period. This results in an overall increase in milk production. Robotic milkers are currently being installed on a farm in Castro, Parana (Claessens, Jerry). This makes sense since this region is big on using technology to increase milk production (Brazil Market Report).

An increase of milk production is good for Brazil as they strive to provide food for a growing population. Milk helps fight malnutrition due to the amount of calcium, vitamin D, protein, and many other nutrients it contains. With this in mind, milk can be contaminated if a cow has mastitis, which can lead to human diseases if the contaminated milk is consumed. Mastitis is a bacterial infection of the cow's mammary gland. Common bacteria related to mastitis are Staph and Strep. Mastitis caused by *E. coli* can also be a concern. The use of robotic milkers in the dairy industry in Brazil can help reduce the risk of consuming contaminated milk. Robotic milkers automatically test the milk to determine if mastitis or other diseases are present. If the robot detects an abnormality in the milk, the milk will automatically be placed in a bucket apart from the non-contaminated milk. Robotic milking systems help decrease the health risks since a robotic milker detects abnormalities in milk more effectively than a human eye. The robots' have sensitive detection systems which test the clarity, conductivity, color, and thickness of the milk produced in each individual quarter of the cow's udder. Not only do robotic milkers better detect mastitis, they decrease the amount of mastitis. By hand milking, using a parlor milking system, or other ways of milking dairy cows compared to using a robotic milking system, there is an increased risk of under/over milking one of the cow's quarters. Under/over milking of a cow can cause mastitis because, "reverse pressure gradients occur only during the milking of empty teats and over milking will therefore increase the possibility of bacteria entering the teat by this method." (Rusmussen, Morten D.) Robotic milkers decrease this risk by milking each quarter individually and by the use of a microphone to listen to the milk flow to detect the amount of milk left in each quarter. This reduction of mastitis also means less waste milk and more consumable milk for people in Brazil. Along with the reduction of mastitis, there is a reduction of the usage of antibiotics. By using fewer antibiotics, there is a decrease in antibiotic resistance. The reduction of antibiotics also helps the farmer, because he/she has to spend less money for the medicine.

The use of a robotic milking system is not only beneficial to Brazilian farmers and consumers, but is better for the cows. The reduction of mastitis improves the overall health of a cow, resulting in better cow comfort. Mastitis cannot only affect a cow's quality of milk, but can affect her overall health by moving into her system and affecting her appetite and cause other problems for her. Some cases of mastitis can also lead to the death of a cow. Robotic milkers can also help cows' overall health by improving their feeding. In a robotic milker, a cow is fed protein according to her individual milk production, which can improve cow health.

Robotic milkers can also help reduce the waste of certain products in Brazil and decrease input costs. One way to do this is to use the by-product resulting from ethanol (biofuel) production from sugar cane to feed cows. This by-product contains high amounts of protein. There is an abundant amount of this product in Brazil since Brazil is the second largest ethanol producer in the world with the United States being the largest. In the United States, the most common way to feed the cow protein in the robot is by feeding a pellet mixed with corn, but in Brazil, the by-product of ethanol production could be used. In fact, some farmers in Brazil currently use this product in their cows' diet. Another way a robotic system reduces waste is by producing more consumable milk with the decrease in the amount of mastitis. Cows' manure

can even be reused as fertilizer for the fields or for the pastures in Brazil. A farmer can easily collect the manure in a robotic system, because any cow waste released while in the robot is collected in a pit below the robot. Poor soil quality in some areas of Brazil would benefit from manure compost mixtures from this waste source. All of the above are ways which may be very helpful in increasing efficiency and utilizing by-products of current industry.

A robotic milking system cannot only be used to improve farms, but can be established closer to the urban areas. Robotic operations do not depend as heavily on grazing and could utilize feed sources found close to urban areas. Transportation areas diminish if dairies are established closer to urban centers. Labor sources would be readily available as well. By having easier access to fresh foods, such as milk, in the cities there would hopefully be a decrease in malnutrition since the people would have better access to healthy, consumable products.

Another impact of the use of robotic milking systems is improvement in the educational opportunities in Brazil. A robotic milker can serve as a learning tool for a Brazilian farmer. The robotic milker is very technologically advanced which is something most farmers are not used to, although some do use computers. A robotic milker can be used to teach farmers how to use technology thus advancing their education and giving them skills. Not only does a robotic system involve a lot of technology but there are also a lot of mechanics involved in the robot. Teaching a farmer about the mechanical part of a robotic milker can also advance their education and they can use their knowledge of the mechanical parts of the robots to help them in other departments of the farm, such as machinery. Farm hands on larger dairy operations would gain skills which could be used in other fields related to technology and maintenance. Along with this, there is a need for a person to educate the farmers of Brazil on how to operate the robotic milkers. People from the robotic milking company would come into Brazil to educate people on how to operate the robotic milking. "Lely (a robotic milking company) would use their FMS program to train farmers," according to Jerry Claessens, Senior Manager for Lely and LSO Latin America. This is also where an educational opportunity comes in for Brazilians. Brazilians could be hired by the robotic milking company to train other Brazilians on how to operate the robotic milkers thus creating jobs. Brazilians could also be hired to specialize in maintenance of the robotic milkers. This means that these people would be the "experts" on how to run the robotic milkers and could help farmers if they have any major problems with the robots. This would require additional training of course which would most likely initially be provided by a foreign person from the robotic milking company. A hired laborer that might lose his/her job to a robotic milking would not necessarily need to go into a career with robotic milking. They could continue to help on the farm if the herd expands or they could find a job elsewhere in the dairy industry, for it is a robust industry in Brazil (Jerry Claessens).

A robotic system can be used on multiple kinds of farms. Most robotic systems exist in a full-confinement system, but they can exist on an extensive grazing farm as well. In a full-confinement system, part of the freestall barn (building housing cows) would be remodeled in order to have a place for the robotic milking system. With the robots inside the freestall barn, the cows are free to eat feed and drink water at all times. Using a robotic milking system is different when using a grazing method, however. In this method, cows are allowed at pasture 24/7 except when milking. This is done by using a "graze way gate." In both methods, cows are allowed to be milked based on their milk production. For example if a cow is producing 80 lbs. of milk per day, she would be allowed to be milked 4 times per day. The maximum amount of milkings per day for a cow is six. If a cow visits the robot and it is not time for her to be milked, she is let back out.

There is also the irrigated intensive rotational grazing method that is used in Brazil, which is a government program that promotes irrigated pasture management and good herd management and accurate record keeping. A robotic milker would therefore be supported by this program because of the computer programs extensive records. The computer program that is part of the robotic system not only

records the cow's milk weight, but also the temperature of the milk, the quality of milk, the weight of the cow, and the cow's rumination. The computer system also has records where the farmer can record events of each cow's life such as calvings, health treatments, injuries and other events.

Robotic milking systems involve monetary investment in technology and equipment. Government assistance could be used to help operations get started. The current costs of importing milk products and dependency on foreign sources for dairy products could be offset in a few years' time with increased production, better cow health, and use of Brazilian resources and labor. Small villages could work together to form cooperatives to benefit from the increased technology and production methods.

In conclusion, Brazil is a prospering country; however, the country has a problem with malnutrition as well as other factors. By establishing a greater number of robotic milking systems, multiple factors could be addressed. The main factor would be the improvement of protein availability to the people of Brazil, reducing the need for imports. Lack of protein is a key ingredient to Brazil's malnutrition issues. Urban centers could benefit greatly with larger dairies being established near centers with large numbers of urban poor.

Malnutrition affects brain development and health. The healthier and more educated the population, the more Brazil will develop into a country which is able to meet the needs of all of its population. An investment in improved food production methods is an investment in Brazil's people and their future. The gap between the favelas and those with good incomes would begin to decrease instead of widening. Other factors affected and improved by the use of a robotic milking system would be demographics, animal health, education, and biofuels. In addition, the robotic milking system could help cut down on current waste in Brazil in multiple ways.

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