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Nicaragua, Factor 11: Malnutrition

Improving Protein Deficiency in Nicaragua

The four basic necessities of life are air, water, shelter and food. If all of these necessities are met, then life will continue. Life may sustain if these items are consistently present in one's life, but where is the quality in a life with only the most basic of needs met? Just because someone has enough to live on does not mean he is not suffering. Only a minimal amount of food is needed to maintain life, but the goal should not be to just stay alive; it should be to live a quality life. How does one classify a quality life? Having a quality life means more than just having air to breathe, but having clean, unpolluted air. More than just a source of water but sanitary water. More than just a roof over head but a secure and durable place to call home. More than simply having enough to eat, but having food that meets one's bodily needs.

Persons suffering from malnutrition may be alive, but they are suffering through those lives. As third world countries develop, their citizens aspire to a more protein-carbohydrate balanced diet (Weaver). Even after calorie needs are met, protein malnutrition may continue. High quality protein access may be restricted due to expense, accessibility issues, or a variety of other possible obstacles. The bottom line is, regardless of the reason an astounding amount of the world's population is going through life malnourished. Insufficient protein consumption can lead to health issues, and living with impaired health is certainly not considered a quality life.

1. Rural Nicaraguan Life

Nicaragua is the second poorest country in South America, behind only Haiti. A horrifying 50 percent of Nicaraguans live below the poverty line (HabibMintz). The rural parts of Nicaragua are where the majority of their population—and also the most poverty stricken—live. A standard family living in rural Nicaragua is made up of six to eight family members. Most of these families live packed together in small hut-like shelters made of wood or brick and typically only live with their immediate family members. A common meal consists of some variation of rice and beans. A large number of rural Nicaragua suffers from hunger or food insecurity, even the families with a consistent food source are often malnourished (Merrill). The rural parts also struggle to access health care. The majority of their country's healthcare budget is used towards the upper class; this makes it difficult for the rest to receive medical attention and nearly impossible for those living in rural areas (Merrill). The vast majority of hospitals in the country are located in the capital city, Managua. Ambulance services are only provided in towns and cities, and most rural families have no transportation outside of bicycles or animals, making it difficult to travel the long distance to the hospitals (Torres). Even if someone did make it to a hospital, those living in the rural areas are often poverty stricken and would likely not be able to afford care. Due to the poverty rate being so high, most families take their children out of school at a young age to work and help support the family. The average child living in rural Nicaragua only receives 2.1 years of schooling (*Compassion Blog*).

Parents struggle to support such large families by farming in a climate considered unstable for many types of agriculture (*Rural Poverty Portal*). The large-scale, high-profit plantations are owned almost exclusively by the small percentage of the population that makes up the upper class and large corporations. The produce grown on these large scale farms is primarily sold as exports. Many living in the rural setting will labor on these plantations for long hours in return for very small pay in hopes of feeding their family (*Tearfund*). The working conditions on most of these plantations are poor and workers are often exposed to harmful pesticides used to treat the produce (Moore). Those lucky enough to own their own small-scale farm typically farm around ten acres. The most common crops grown are

sugarcane, corn, rice, bananas, and coffee; but a variety of other crops can still be found in this region. The major types of livestock found in Nicaragua are hogs, cattle, chickens, and goats. Nicaraguan farmers use many practices such as irrigation, tilling, and fertilization to improve crop production (*Nation's Encyclopedia*).

A major restriction on rural Nicaragua's agricultural production is the climate. Nicaragua has a tropical climate and experiences two main seasons: dry and rainy. Unfortunately, neither is perfect for agriculture. During the dry season, most plants begin to dry up, including crops if not persistently watered. In the rainy season it rains virtually every day; this can cause crops to wash away or soil erosion. In the rainy season there are also more insects, which are responsible for eating and transmitting bacteria to crops (*Vianica*). The main obstacle to earning a living wage is most employers pay minimum wage (Alaniz, Gindling, and Terrell). If only the man of the house is working, minimum wage is not near enough to support the average family size of six to eight members. Without higher education it is difficult to earn adequate wages, but education of any kind is scarce in rural Nicaragua. Without enough money it is difficult to provide enough food for a family, let alone nutritious food. Grocery stores are rare in towns and cities and practically unheard of in rural areas. Some of the rural areas have street vendors that sell produce. But most rural families have to rely on the food they grow or buy from a neighbor. Even those who are not hungry are most likely malnourished (Jacobs).

2. Malnutrition

Nicaragua has a 31 percent malnutrition rate, the highest out of all twenty Latin American countries (HabibMintz). That percentage is significantly lower than in past years. Even though there has been a slight improvement in malnutrition, it is still a substantial issue. Although only a small portion of the population suffers from starvation, the other portion is chronically malnourished. One of the major nutrients Nicaraguans are lacking is protein (Jacobs). Protein deficiency is very serious and can lead to multiple health problems: anemia, marasmus, kwashiorkor, and more. One in three children in Nicaragua suffers from anemia, and the number is greater in the rural setting (*Food and Agricultural Organization*). So one third of the children, not even taking into account the adults, are experiencing the difficult side effects that come along with anemia caused by protein deficiency. These side effects range in severity, depending on how extreme one's anemia is, from simple fatigue to hemorrhaging. The other major disease affecting rural Nicaragua is kwashiorkor. This condition occurs when a person's diet predominantly consists of carbohydrates, such as rice and bananas, and is severely lacking protein. Kwashiorkor can stunt growth in children, cause diarrhea, alter mental health, and due to liquid retention, it causes extreme swelling of the abdomen (Traister). A major factor of rural Nicaragua's severe protein malnutrition is that the agriculture products containing high amounts of protein such as beef or pork can provide greater income if sold. The poverty-stricken farm families need any money they can get to support themselves. It is in turn cheaper for a family to buy grain than it is to buy meat. Improving malnutrition in Nicaragua would drastically improve their quality of life. The main benefit of course being the health benefits; protein gives your body energy and strengthens the immune system along with many other things. Protein has been proven to not only improve physical health, but also to benefit intellectual health. This is because protein provides the amino acids that the brain, along with the rest of the human body, requires to function at its best. Providing the body with proper amounts of amino acids can increase brain activity, alertness, and the brain's ability to function (Appleby).

It is reasonable to assume that Nicaragua's struggle against protein deficiency is going to get worse unless something is done about it. With their rapidly increasing population, unless agricultural productivity is increased, there simply will not be enough to go around. If 31 percent of Nicaragua's roughly 6,256,000 people are already lacking protein, what will happen when their population increases? By 2025, only ten years away, Nicaragua's population is estimated to have reached 7,038,000 people (*Population Pyramid*). That is nearly one hundred thousand more mouths that not only need fed, but properly nourished.

3. Solution

There have already been numerous programs implemented in Nicaragua attempting to improve the food and nutrition, such as the Nicaraguan Feeding Program. Although they have shown some progress, what is being done simply is not enough. Current programs, such as those providing meals or supplements are helping, but they are making Nicaraguans too dependent on outside help. If funding for these programs were to stop, the people from rural areas would be worse off than before, because they have grown to rely on the help of these organizations. The ideal solution for Nicaragua needs to be long-term and allow them to be self-sufficient. Instead of shipping food into the country their current agriculture should be improved. To feed the growing population, fields would have to be bigger, and herd sizes would become overwhelmingly large. That is, unless new farming innovations are used to improve efficiency by producing more food with the same amount of resources. Nicaragua already consumes over forty-four pounds of pork per person annually, so by improving their already notable pork industry, the protein deficiency would drop significantly (*Elanco Animal Health*).

4. Genetic Improvement

The possibilities of genetic improvement in swine are endless, and the technology involved is rapidly improving. To avoid any controversies, it is important to clarify that genetic selection/improvement is entirely separate from genetically modified organisms. Genetic selection is simply breeding with desired genes, and avoiding undesirable traits; so it is essentially speeding up natural selection. By focusing on the issue of protein malnutrition, the focal point of using the genetic technology should be to provide Nicaraguans with higher amounts and higher quality of meat. Through genetic improvement, both of these can be achieved. The technology is not only available, but is being regularly used in the United States. By improving genetics, the litter size of pigs can be increased, meaning more quality protein. The average daily gain of the pig can be increased, allowing pigs to reach market weight sooner; this provides quality protein more quickly and efficiently. Things such as ultimate pH, lean percentage, and tenderness of the meat can be improved, therefore increasing the quality of the pork (Johnson). The amount of meat per pig can also be increased by genetically improving things such as backfat thickness, loin eye area, and carcass length. Genetic improvement can also increase the efficiency of the feed conversion in swine. By improving a pig's feed conversion a pig can produce more muscle on the same amount of feed; this ultimately provides more meat using the same amount of resources. Another benefit of genetically improving swine is that all of these improved traits mentioned are heritable. (*National Swine Improvement Federation*).

5. Proposal

Since sending enough genetically improved boars to Nicaragua in order pass on the quality genes is impractical, the cost effective alternative is artificial insemination. The only supplies needed for this artificial insemination would be catheters or spirettes, some form of lubricant, and the genetically improved semen. The biggest obstacle is the uncertainty of the semen; extreme temperatures, dirty equipment, sunlight, and rough handling can all be harmful to the swine sperm (*The Pig Site*). By pairing up with an agriculture program already in place in Nicaragua, such as the Foreign Agriculture Service, the proper care of the genetically improved sperm could be assured (*Embassy of the United States*). Because the improved genes are heritable, not every gilt or sow would require artificial insemination of the desired genes. After multiple litters are born with the genes, these traits will eventually spread themselves. There would need to be some training for selecting the best animals locally for continued use as breeding stock. Nicaragua will only be reliant on outside help temporarily. Once the pigs born from the litters of the artificially inseminated sow reach breeding maturity, they can begin to pass the genes on through natural breeding. The average sow has two litters a year and pigs reach sexual maturity at six to seven months of age, so the process would be relatively efficient (King).

Similar programs have been implemented around the world and their progress has been very promising. One main program that stands out is BRAC Artificial insemination; although their work involves beef

instead of swine, the concept is essentially the same. They are set up in eleven different locations around the world, and focus on poverty stricken rural areas. BRAC offers artificial insemination services with improved semen designed to increase the yield of milk. They have provided help to millions of the world's poorest people, and they prove that an AI program can be extremely successful in fighting global nutrition issues.

6. Implementation

The poverty stricken Nicaraguans are obviously not going to be able to fund this groundbreaking genetic technology on their own. The genetically improved semen would be the most expensive component to this plan. Large swine genetic companies may be willing to donate the genetically improved semen. Although these companies are highly protective of the intellectual property they have created for their United States lines, they may have germplasm that would be more suitable for conditions in Nicaragua, and not profitable for them (Weaver). The Pig Improvement Company (PIC) is the international leader in providing genetically superior pig breeding stock and technical support for maximizing genetic potential to the global pork chain. Birchwood is another company that specializes in advanced swine genetic solutions. These are just two examples of the countless companies involved in this field. Whether it be one large company donating all of the semen, or a compilation of multiple companies, it would be fitting with their philanthropic efforts to join an effort such as this one. Other agriculture companies, such as Elanco Animal Health, have recently been endorsing programs about food security. There would be numerous organizations like this that would likely be willing to either get involved with or donate to this program idea.

Another issue is finding personnel capable of inseminating the pigs, and willing to travel to Nicaragua. A possible solution is to get college agriculture programs involved. At most colleges, a student majoring in Animal Science learns about artificially inseminating swine within their first year of study. This potential program could be turned into an internship or study abroad opportunity for college students. They could spend a semester or a summer traveling to Nicaragua to get hands on experience in their area of study, as well as an incredible philanthropic opportunity.

The final aspect is the cooperation of the Nicaraguans. The first thing needed would be the permission of the Nicaraguan government to come into their country and implement this potential program. Nicaragua is currently under a constitutional democracy, comparable to that of the United States (*Countries Quest*). In the past, they have been cooperative with relief groups and other programs, so it is feasible to assume it would be the same in this case (*Charity Village*). The cooperation of the farmers would also be necessary; they would be in charge of caring for their livestock like normal, and selecting desired breeding stock once outside help was no longer required. Seeing as this program has nothing but benefits to offer them, it would be appropriate to assume the farmers cooperation would be given. And to help assure that this program would be viewed positively by the Nicaraguans, advertising campaigns and propaganda could be used. This technique was extremely beneficial when used in Uganda recently when use of the orange-fleshed sweetpotato (OFSP) was first introduced. To assure the OFSP's success, the companies involved used a large amount of advertising in Uganda. Things like informative pamphlets, interacting with farmers, and other types of propaganda were used to assure to public's approval (Odongo and Mwanga). A similar advertising approach would likely be successful in Nicaragua.

Genetically improving the swine in Nicaragua to produce larger amounts of high quality meat would make a distinct improvement to the lives of Nicaraguans, especially those living in rural areas. Equalizing access for small-scale farmers to the best genetics will give them the technology to strengthen their production and self reliance. Producing the protein their bodies need will improve the overall health of Nicaragua by stopping diseases such as anemia, marasmus, Kwashiorkor and many other health issues caused by protein deficiency. This is crucial due to how few of their citizens can easily access health care. Another benefit of developing Nicaragua's pork industry is the effect it will have on their economy;

through producing more pork with the same amount of resources, farmers will have a higher capital potential.

Ending protein deficiency in Nicaragua could be the difference for them between struggling through life or leading a high quality life. The majority of Nicaraguans meet the basic necessities of life, but they deserve more than the basics. Nicaraguans are more than entitled to living quality lives, but they lack the resources to initiate this better life. Through genetic improvements and a little boost to get started, Nicaraguans can achieve the higher quality life everyone deserves.

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