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Increasing Dairy Cooperative Opportunities through Education and Technology in Eritrea

INTRODUCTION

In developing countries all over the world, people struggle daily to find adequate food sources to survive. Some developing nation's agricultural shortfalls are so great, significant volumes of food substances need to be imported which could be produced within the country. While this is a worldwide problem, the African continent is more than familiar with difficulties in producing the food they need. Many of the Africa's more established nations have in place the capital along with the necessary education and transportation systems to improve the number of self-sustaining farms and agricultural businesses. Eritrea deserves their turn to have a chance to make similar progress.

Eritrea, in eastern Africa, is one of many countries experiencing the effects of food insecurity. With approximately 80% of the population working in agriculture yet meeting only 60% of the nation's food needs, meaningful changes are necessary to enable significant progress towards self-sufficiency. Eritrea's supply problems are numerous. Primary grains, such as sorghum and barley, are in limited supply, and teff, the staple cereal for many traditional Eritrean meals, is not affordable for the average household. The country is reliant on external aide and dependent on other nations for 87% of its grain and 51% of its vegetable oil. Revenues from exports offset barely 25% of the costs of food imports, leaving Eritrea dependent on outside organizations to cover the remainder of the bill.

The ongoing battle to achieve food security is very difficult in such a harsh environment. Much of the failure to meet the needs of a ballooning population can be attributed to several circumstances. The violent 1998-2000 border conflicts with Ethiopia killed thousands and wreaked havoc upon housing, livestock and infrastructure. Many farms still have not recovered from the violence of ten years ago. In addition, infestations of pests such as Busseola fusca (Fuller) have inflicted staples such as maize and sorghum, further hampering production. Furthermore, drought has prevented any period of abundance. Traditional methods of agriculture are reckless and the damaging approach has caused erosion, chemical buildup, and depletion of soil and its fertility. This decline in agricultural conditions and capabilities has resulted in a need for new agricultural methods and food production mechanisms.

One key to improving food security as well as the general standard of living in Eritrea is through education and access to new technology. Even if rural farmers manage to produce a considerable amount of food, most do not have the means to distribute and market the end product of their toil. The majority lack credit to take out loans, or even the confidence in their own endeavors to be able to pay off such loans. One way to improve both food security and production, as well as provide new educational and technological opportunities, is through participation in agricultural cooperatives. By encouraging such participation, farming turns into a community effort resulting in faster progress and greater yield.

BACKGROUND

Subsistence farmers in Eritrea can be found nationwide, as 75% of the nation depends on agriculture for income and sustenance. Most families have six or seven children and make due with a meager $200 USD per year. The average Eritrean consumes less than 1,500 calories each day, one of the lowest caloric intakes in the world. Grains such as sorghum, maize, barley, and teff are staples to the Eritrean diet, but as prices rise, families are forced to make cutbacks. Less common food sources are chickpeas, fieldpeas and horsebeans, yet they are more easily accessible than most other fruits or

vegetables. The need for adequate daily nutrition is a constant struggle for Eritrean families.

Improving educational opportunities is a second priority in Eritrea. Only 41% of the general population attends school, while the adult illiteracy rate is 75%; and 80% of those individuals are female. Families simply cannot afford to send their children to school. School supplies are an unwelcome expense, and families need additional assistance on the farm. The majority of families do not have the luxury of providing their children with an education. This leaves no room for change, growth, or reform, for family members are unable to make and implement educated decisions.

There is no distinct gender divide in Eritrean agriculture. Women commonly participate in food processing and preparation, but do not often participate in other aspects such as harvesting and maintenance. Some followers of Islam, one of the nation's leading religions, do not approve of female agrarian activity, but there is nothing either formally forbidding such participation, or an especially strong social stigma attached to such activity. In fact, due to the high death rates of men from the border conflicts, 14% of the nation's households are now female-led. Economic and family pressures have given rise to the necessity of female workers. This has empowered women to make an impact on their family's financial situation. These women could greatly benefit from education for a role for which they were not raised.

The majority of subsistence farmers own land plots averaging 1.3 hectares in size. Common crops include sorghum, wheat, barley, maize, finger millet and pearl millet. Legumes are also grown, along with flax and sesame, but with failing success in recent years. Cattle herders have minimal forage provisions, and allow their animals to eat what they can. Such harsh conditions have resulted from a lack of conservation. Pastures have been overgrazed and stripped of nutrients, or contaminated with excess pesticides and artificial fertilizers. Irrigation systems and production facilities are not adequately maintained, due to a lack of resources and knowledge, rendering such systems inefficient and ineffective.

The primary obstacles to improving farm productivity are education and access to resources. If farmers possessed the proper equipment to optimize efficiency and output, it would create a better living standard as well as produce more food for the nation. However, education and research is necessary to properly use and understand such devices or implement new methods. Currently, subsistence farmers do not have access to training, tools or data that could prove useful to their farm practices. Such barriers are preventing improvement in Eritrea's food security situation.

Access to agricultural resources, however, is currently an improving situation. Cooperative pilot projects have displayed great success in providing farmers with access to a greater market and modern equipment, boosting profit as well as reputations. One such cooperative project is the Mendefera milk collection centre in Debab. However, such a facility can only service one region, and is not yet responsible for collecting milk from the farms. Herders living in the outermost parts of the region cannot utilize the facility fully, for they are not capable of transporting their product over such a vast distance.

Agricultural education and research has, on the whole, remained unchanged in this area. With cooperative facilities, the collective milk production and profit has increased, and farmers have learned about pasteurization and shipment and its consequent reduction on costs. However, such education is primarily demonstration as opposed to hands-on teaching, for the farmers do not participate in the bulk of the process. Although various organizations are trying to teach subsistence farmers about alternative methods of livelihood, such as beekeeping, there have been few training opportunities for farmers to learn on how to improve their current practices. Because educational opportunities are limited, progress has only been demonstrated in the large community efforts, such as the Debab cooperative.

In addition to improving educational opportunities, another aspect for improving Eritrean

agriculture that possesses true potential is the livestock sector. Inconsistent rainfall, pests, erosion, and war have all hampered Eritrea's food security. However, the nation's livestock industry shows great promise in securing some degree of food security. Milk, a key part of nutrition, can be distributed nation-wide or turned into other dairy products. Cattle byproducts, such as manure, prove useful to subsistence farmers as well, offering natural alternatives for fuel, energy and fertilizer. Thus, there are many opportunities in the livestock sector just waiting to be tapped into.

If subsistence farmers gained access to training, research and technology, they would be able to optimize their output and current circumstances. By gaining an understanding as to how one factor leads to particular results, farmers could begin to implement change in their agricultural practices. Learning the short term and long term effects of various adjustments would encourage farmers to reform aspects of their farm. It is at this point where resources come into play, for micro financing (through an organization such as Kiva) and donations would enable such change to occur.

RECOMMENDATIONS

The solution to fighting malnutrition and improving food security lies within Eritrea's livestock sector. With variable conditions negatively impacting crop prices, families are searching for a reliable source of nutrition. The core of the nation is set in the south central plateau highlands with over 55% of the population inhabiting the region. The area is mild in comparison to the rest of the nation and is the source of Eritrean herding. Approximately 56% of Eritrea's land is used for forage and browsing, and there is a growing demand for dairy and meat products. Eritrea's most promising industry is most definitely in livestock production, yet opportunities are few and far between.

One success in the livestock industry has been with milk production. The Mendefera milk collection centre in Debab, operational in 2001, is an example of a successful community cooperative. Farmers are given the chance to participate in a large-scale production with advanced equipment and broad market. This creates job opportunities for those who run the facilities, and optimizes the farmers' profit. The Mendefera cooperative, as currently established, has enhanced the quality of life for the 435 dairy farmers that participate in the program, with 90% of those being small-scale farmers (1-5 cows).

However, Eritrea agricultural cooperatives face several limitations. Participants are responsible for transporting their own product to the facilities. Such a trek restricts farmers from carrying their maximum load, as well as creates potential to lose stock along the way. Employees of the cooperative handle the processing and distribution processes without much explanation given to the producers. Although the facility is an invaluable resource to many, it provides no educational programs, nor offers new alternatives to subsistence contributors.

COOPERATIVE IMPROVEMENTS

The creation of another milk cooperative would be beneficial to Eritrea. Using the Medefera facility as a model, a new cooperative could be constructed in another dairy-focused region, such as Maekel. This facility would grant other subsistence farmers with an enhancing opportunity, which would increase milk production and availability as well as improve the farmer's living situation and sustainability. The time frame for planning and construction would be relatively short, for the groundwork of the Debub location could be replicated.

In order to increase the role cooperatives play among subsistence farmers, some revisions would need to be implemented. The key change would be to expand the resources the facility currently provides. To reach out and improve the practices of a regions-worth of herders, providing more opportunities would certainly optimize participation, and in turn, livelihood for both farmers and

cooperative heads. By creating training programs, collection stops, transportation routes, and access to cutting-edge resources, an immediate and positive change would occur on a nation-wide scale.

One important addition to the cooperative services would be the implementation of collection stops. The inability to transport milk product greatly hampers the potential output of the facility. Farmers must currently directly transport their own product to the cooperative on a daily basis because no transportation alternative or milk storage facility exists. Raw milk must be kept at least 40oF constantly. If farmers had the opportunity to drop their milk off at a nearby cooling and storage tank, many could and would transport greater quantities over the shorter distance, or even make multiple trips. These drop-off tanks would be comprised of a chiller and an agitator, to cool and blend the milk before collection. Such devices prevent bacteria growth and keep raw milk at its best. To optimize both convenience and quality would benefit both sides as well as providing additional educational opportunities for the farmer.

A collection service could also be implemented through the facility. The establishment of a pickup route would increase the quantity of milk coming through the centre each day. The Gash Barka region makes up one-third of the nation. While quite sizeable not all farmers will have direct access to a cooperative program. However, more farmers could participate if they only needed to reach one of the cooperatives' chilling tanks. Collection trucks could alternate routes every other day, so tanks will be full by the time of pickup. The cost of such a service would impact the producers' profit, but because subsistence farmers would be contributing a greater quantity and the distribution of costs over participants, the overall outcome would result in greater milk production, increasing dairy availability and net profit.

HERD AND FARM IMPROVEMENT

Another potential opportunity to enhance subsistence farmer's production is by improving the quality of the livestock. The general livestock population is the product of generations of cross breeding, and farmers cannot be selective with pedigrees due to lack of personal cattle. The crossbred cattle of Eritrea are rugged with decent milk yield, yet struggle with infections such as Foot-and Mouth Disease (FMD), Rift-valley fever, and substantial rates of tuberculosis (TB) are numerous. However, alternative breeds, such as the Sudanese Hamerenya, thrive in Eritrean conditions and possess many helpful traits. The creatures are docile and have a high milk yield. In addition, they are also disease resistant and can be milked during pregnancy. One hundred and thirteen Sudanese Hamerenya cows were distributed throughout Adi Quala by an IFAD-funded program and the Post-Crisis Rural Recovery and Development Programme, and the flourishing outcome gives reason to expand such an opportunity.

Herds can be improved through either direct introduction or artificial insemination. Cows can be imported and distributed throughout farms due to donation or consent to macro loans. Another alternative is artificial insemination. To begin an artificial insemination network through a cooperative would result in long-term improvement of dairy production. With greater genetic possibilities, farmers would boost herd immunity and increase milk yield. Individuals could undergo training at the cooperative to perform or assist in such procedures. The creation of new jobs and the increase in herd quality would benefit the community. Gash Barka Livestock and Development is one such program that would perhaps invest in and support such an opportunity.

Artificial insemination is a feasible option with a tremendous shaping effect on the livestock sector. It is safer than natural reproduction and provides farmers with more alternatives. However, one potential issue may be the acceptance of artificial insemination itself. Religion plays a key role in Eritrean culture, and the two primary religious beliefs are Islam and Christianity. The possibility of resistance from the public could prevent the implication of such a program. Currently, artificial insemination is not accepted in any circumstance other than a medical problem between a married couple.

Although people may not take a similar position on cattle, there is still a chance that such a method of improvement will not be accepted.

Finally, the fixation on training at a cooperative could educate families on self-sustaining methods. Families can be taught to venture into other forms of dairy production. By creating yogurt and cheese, the shelf life of the product is increased, giving families a sense of assurance. If successful at home, farmers could even venture into the alternative dairy markets for surplus profit. The manure generated from herding activities opens up a world of possibilities as well. Manure is a clean source of fuel and an invaluable organic fertilizer, which is sustainable resource for all herders. A biogas generator construction project would be of tremendous benefit to household productivity and welfare.

CONCLUSION

By educating family farmers and providing access to and support for implementing methods, increased research will result in increased food production and security. The spread in cooperative developments and their educational influence would greatly increase Eritrea's food security and sustainability. Training programs would provide helpful data thus leading to farm reforms, and even allowing for travel opportunities to neighboring nations. By training large groups and thus forming connections, subsistence farmers would have a support network during difficult times. The reputation established through cooperative work would also provide the participants with a collective voice, giving them relative power in livestock sector decisions.

Thus, the work accomplished through the cooperatives would lead to greater national food security. The improvement in cattle quality would reduce the spread of disease, and money spent on such treatment, as well as milk production and output, would directly impact subsistence farmers and the surrounding communities. Dairy availability and quality results provide affordable access to nutrition on a nationwide scale. Many mechanisms could be easily replicated from the existing cooperative in Debub, yet expanded into more areas of education and training. Access to such knowledge and technology opens up many doors for small-scale farmers, creating opportunities that could be realistically backed by microfinancing and specialized contributions. Therefore, for a nation lacking in many resources, some relatively small changes in transportation, production, and educational opportunities could have a lasting and significant impact. The education of Eritrea's workforce will provide a more secure future for the whole nation.

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