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Ethiopia: Rotational Grazing Solutions for an Arid Climate

A poverty stricken country located in the eastern part of Africa, Ethiopia has a rich environment for livestock production. Ethiopia raises the most immense livestock population in Africa, entailing 65 million cattle, 40 million sheep, 51 million goats, 8 million camels and 49 million chickens (*Ethiopia's livestock systems: Overview and areas of inquiry*). With livestock production being such a big part of Africa's agriculture, you can't help but wonder if there's a solution to their hunger issues from within their country through their own efforts. Livestock can assist producers in many ways, and for various tasks. Livestock can help where manpower is needed, feed families, generate money, and many more tasks. A chore that comes with owning and raising livestock is the feeding of these animals. Growing and maintaining pasture can be difficult with drought, and large quantities of animals on the land. A way that farmers in Ethiopia can maximize use of their livestock and create lower feeding costs is rotational grazing. This would help people in impoverished areas who cannot always afford things needed for raising livestock.

Ethiopia raises a large amount of livestock, so you may wonder how families manage these animals and function normally on a daily basis. It is traditional for wives to move in with their husband's family following marriage. The typical household may hold three generations consisting of the oldest couple, their son's and their wives, daughters who are unmarried, and grandchildren from the sons' families. Although "Sons are often encouraged to find their own land and, in urban areas, they usually aim to move out of their parents' house with their wife. However, resources are still shared between family members even when children move out of the home" (Evason). Common housing structures are built with round roofs made of thatch, walls plastered with mud or woven, and mortarless stacked stone walled homes. The roofs are made of thatch which is made from grass. The average diet varies just like the diverse cultures of Ethiopia. Common foods seen across the country are spiced meats, vegetables, and flatbread. Their diet is mainly vegetarian as a result of religious beliefs. They eat with their hands, as a family. Most families make their living through subsistence farming. What they raise and produce is mainly used to feed their families. Rotational grazing would greatly benefit these rural families by improving soil health and lowering feed costs.

Rotational grazing is a great tool for those who live in areas that can experience drought, or have limited access to grazing land. The practice of rotational grazing is also beneficial to the soil, plant, and animal health. What rotational grazing consists of, is the producer moving their livestock from paddock to paddock to provide rest periods for the pasture. A paddock is a subdivision of the pasture. To create the paddocks you will build fences, but in this case the wire will have electricity flowing through it to keep animals in place. The materials and setup of the fencing can be done at a reasonable price. In fact the fence can be set up with a solar powered battery to keep the electric fence working, and using a renewable resource to power it. When the paddocks are allotted time for rest, the roots of the grasses and forage plants will deepen. That in turn will help keep soil in place during dry periods. Deeper roots also help increase biomass of the soil and fertility by continually casting off to decompose. Practicing rotational grazing can also decrease feed costs because you will have more quality grass and forages available for your livestock. Producers could graze their cattle for longer periods without rain. The grasses will be better quality as well for the livestock to graze from.

To work in tandem with rotational grazing, solar powered watering systems would be a great addition to the pastures. Solar powered water pumps require little maintenance, and will last a long time. In an area

such as Ethiopia with an arid, drier climate solar pumps would work great. This along with ditch irrigation or sprinkler systems can help to water the grass for animal use. You can pump water from streams or lakes over great distances. Price will depend on distance from the water source to where it is being pumped and solar panels needed. The average price for a solar powered water pump is 2,000 U.S.dollars. Solar power is sustainable and will benefit farmers in the long run while rotational grazing. They will need to be able to pump water in a cost efficient way and this is the solution that may work well for them. To purchase systems such as these there could also be a cost share program through their extension service that the government could help in funding. If the government wants their growing population to be more self-sufficient, then funding systems such as these will help their people do just that.

The practice of rotational grazing can be used with cattle, pigs, sheep, goats, or any animal that grazes. In the northern part of Ethiopia their feed sources are as follow: crop residues at 45%, natural grass at 35%, browse at 10%, and crop aftermath at 8% procured from 3.2 million hectares of grazing land, and 3.6 million hectares of cultivated land (*Community Resource Management: The Case of Grazing Lands in Northern Ethiopia*). A sustainable animal that I believe would work best for Ethiopia is goats. Goats can be multi-purpose animals being used for purposes such as dairy products, meat, and weed eaters. Goats tend to eat everything and anything they can get a hold of. Practicing rotational grazing with goats would give the much needed relief to the pastures the herd grazes. Goats are also a very manageable animal to raise, seeing as they are smaller than a cow, which in turn won't need as much to eat. Although it can be implemented across the board to more species. This will improve more pastures across Ethiopia if more producers of all species start using the sustainable practice of rotational grazing.

According to The World Bank in Ethiopia "With about 123 million people (2022), Ethiopia is the second most populous nation in Africa after Nigeria, and one of the fastest-growing economies in the region, with an estimated 6.4% growth in FY2021/22. However, it also remains one of the poorest, with a per capita gross national income of \$1,020." While over 70% of the population works in the agriculture field, that is where Eipthionas must work to help solve their problems through sustainable agriculture. Sustainable agriculture is practicing farming in a way that is protective to the environment and makes the greatest use of nonrenewable resources. Rotational grazing is a sustainable agriculture practice. The way the practice is sustainable is because it helps improve the environment in a cost effective way. Improving the environment will assist the farmers now and for the future generations. They will help set up their children for success in their future as well. When we take a look at the financial benefit to families, they will be able to provide food for their family at the same time as being able to sell the by-products of goat production. They are able to create products such as soaps and lotions from the milk and can sell the extra meat and the milk to others. Implementing these practices now will only be better for the long run, and will add to the quality of life for the families. They may even be able to put extra money away to send their children to college to gain degrees that lead to better jobs and security for the family.

A benefit of rotational grazing you see in the United States is the programs that the Natural Resource Conservation Service, also known as the NRCS, offers. You can receive money for practicing different sustainable agricultural methods. These programs support various practices that help producers advance their conservation efforts in their operations. They have certain criteria that you meet to earn your incentive. A few examples of the various incentive programs available are funds for drilling new water sources, temporary watering systems, internal cross fencing, summer annual seedings, and perennial forages. Those are all areas of expense producers will have to consider when implementing rotational grazing. Through programs that the NRCS offers, you can implement the practice in a more cost efficient way. You must have certain upkeep to your operation, and they monitor and assist you with your program. These programs are used by many producers, and help many Americans with sustainable farming, and better conservation methods. Ethiopia, through assistance, could implement an incentive program into their government similar to one of these that the NRCS offers in America. A barrier that could cause issues in regards to the government adding these programs, is the money to do so. Another issue within the government providing this type of aid would be corruption in the government. Some politicians may be there for their own agenda and not for the betterment of the nation. A way that any citizen of the county could assist in encouraging the government is to talk to their governmental representatives. Their goal as a Federal Republic is to unify with the public's opinions. Citizens need to let these politicians know their ideas so they use their power within the government to in turn help the farmers with their initiatives. If the government could provide help, this would assist impoverished farmers to use better, more cost effective practices, to help with food insecurity.

My solution for Ethiopia is to help farmers start practicing rotational grazing with goats. The way that impoverished farmers would get the funds to set up a rotational grazing system is through government programs. Farmers would be saving money on feed costs through the grazing system. The reason goats would be used is because they can be marketed several ways to maximize the profit from the animals. The farmers could milk the goats and sell the dairy to small businesses to be used in dairy products, soaps, lotions, and even candles. They can also be butchered and sold as another point of income or eaten by the producers. One other benefit of goats is the way they are natural weeders. Goats are used to clean up weeds from time to time because they will eat everything. They will assist in weed control, and with fertilization of the pastures they graze. Farmers are not the only ones who will benefit, small businesses will be helped when they purchase dairy and meat to use in their products they sell. The economy will benefit from goat production. Being a leader in livestock production in Africa, Ethiopia can encourage rotational grazing across the board in livestock production. This will help improve the soil quality in the country. This will encourage grass to grow better in a country that is most commonly known as dry and arid. All in all, impoverished Ethipoians will greatly benefit from practicing rotational grazing.

Although impoverished, Ethiopia is rich in agriculture production. The majority of families farm to keep their family afloat. They farm to feed themselves, and sell the little they have left. Rotational grazing will provide benefits for this poverty stricken country. They can also help conserve their land and enhance soil health to help improve row crop farming. It will help families who may wonder when and where their next meal may come from, find stability. Rotational grazing will help improve their income to assist with expenses so that they may grow their operations. Introducing the help of government funded programs will help these rural families who suffer from poverty. It would make using better, environmentally friendly practices, easier to implement. This would help the future generations in the long run. With assistance the most dominant population of Ethiopia, agricultural producers, can help eradicate Eipothias food insecurity.

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