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Ethiopia, Factor 4

Ethiopia: Preservation of Livestock with Improved Vaccination and Application of Medications

Ethiopia, the second most populous nation (82 million people) in Africa, is a landlocked country of 435,071 square miles. The country is in close proximity to the equator, lying between latitudes of 3° and 15° north and mostly having a tropical monsoon climate. From its lowest point at 413 feet below sea level in the Dalol Depression to its highest mountain Ras Dejen at 15,157 feet, Ethiopia is a country of dynamic elevation differences, and with this large range of elevation there is an equally diverse ecology (Mengistu). This includes deserts on the eastern border that run into lowlands, steppes, and eventually tropical forests in the south. The Highlands of Ethiopia, the largest continuous area of elevation on the continent, cover most of the country, and are separated into northwestern and southeastern portions by the Great Rift Valley (Topographical). The Blue Nile finds its beginnings in Lake Tana in the northwestern portion of the highlands, and is believed by some to be the River Gihon that flowed from the Garden of Eden. The Blue Nile flows out of Ethiopia into Sudan to join with the other tributaries of the Nile (Actual). The country is a federal parliamentary republic; however, according to *The Economist* in its 2010 Democracy Index, Ethiopia is classified as an authoritarian regime and ranks 118th in its democratic practices, resting only three spots more democratic than Cuba (*Democracy*). There are over 16 million students enrolled in grades 1 through 12 and 15 million of which attend government schools (Statistical). The health care of Ethiopia is among the world's worst with only 149 hospitals in the country and 2.6 physicians per 100,000 people (*The World*). Ethiopia is the 10th largest producer of livestock in the world and with this large amount of animals there is an alarming level of animal disease that affects the livelihood of an overwhelming portion of the country's livestock population.

An Agricultural Family in Ethiopia

As a major producer of livestock, Ethiopia has over 49 million cattle which are raised mostly in the highlands of the country. Oromia, one of the nine ethnic divisions of Ethiopia (similar to a state), is home to over 22 million of these cattle (about 45%). Despite this large cattle population, 74% of the cattle holdings have fewer than ten heads of cattle. Many of these smallholders use their animals for draught purposes, such as plowing and threshing, thus the cattle become vital to the farming process as well to insure food security for these people (*Agricultural*). Farming families in Ethiopia are medium sized with two parents and about four to six children and often include older generations of the family as well. The two main elements of Ethiopian diet are grains and pulses, which consequently are the main two subsistence crops of the country (USA). The major cash crop of Ethiopia is coffee which is grown primarily by smallholders (Ethiopian). The agricultural practices of Ethiopia are out dated and have little to no provisions for environmental preservation.

In a country that is largely dependent on agriculture, droughts can bring serious problems to the smallholders. In previous years severe droughts have maliciously plagued Ethiopia and its neighboring countries. These droughts bring a loss of food not only to the people of the country but also to the livestock (Tekle). With hardly enough water for the farmers, the livestock often feel the wrath of the

water shortage more severely. Under these conditions, many cattle are afflicted by numerous diseases for which treatment is often not an option. The combination of harsh droughts and prevalent diseases lead to an ever growing problem for Ethiopians raising cattle.

The Disease Problem

When most of the cattle holdings are below ten heads of cattle, a disease inflicting one or more of the animals is potentially disastrous as it can lead to the elimination of a family's entire herd. Of the 49 million cattle, approximately 6.4 million of them died from disease and other causes in the course of one year. These diseases include Foot and Mouth, Tuberculosis, Anthrax, Blackleg, Pleuropneumonia commonly known as Lung Plague, Rinderpest, Worms, Sleeping Sickness (Trypanosomiasis), and other parasites (About 9.3 million of Ethiopia's cattle were afflicted with a disease in 2008/2009, and less than half of them received any form of treatment.) Without treatment, almost all of these diseases lead to death, and even if the cow does not die, it will suffer from weight loss, slowed growth, poor fertility, and decrease in physical power. Most of these diseases can easily be prevented through vaccination; however preventive methods are not always available to the smallholders of Ethiopia. Only 12.7 million (roughly 25%) of the country's cattle received any kind of vaccination, but just because they were vaccinated does not mean they are protected from all the communicable diseases out there. Most of the cattle are vaccinated for Anthrax and Blackleg but are still susceptible to the other various diseases (*Agriculture*). When the cattle are affected by these diseases, they often cannot be used for farming, and even their milk can become tainted due to the nature of some of the diseases. This prevents the families from working as efficiently as necessary to sustain their livelihood. Consequently, the death of a cow can lead to an extreme economic hardship for the family. Also, it can be expensive treating diseased cows and many cannot afford the added cost. For the families that solely raise cattle and do not farm, disease is even more of a threat to their stability since it affects their only source of income.

However, there is a gleam of hope on the horizon, Rinderpest, otherwise known as cattle plague was recently eradicated, joining small pox as the only two diseases to be wiped out by humans. This was made possible by the development of a vaccination that did not have to be refrigerated, which allowed the transport of vaccine to rural areas where it was previously unavailable (McNeil). The eradication of this disease shows the improving condition of this problem as research in this field is making progress in protecting the livestock of the world. The smallholders of Ethiopia will directly benefit from increased research focused on eliminating the communicable diseases that affect their cattle, as they will no longer have to be concerned with protecting their animals if there is no longer a threat of contracting a disease. Unfortunately not all of these diseases can be effectively prevented with a vaccine. Trypanosomiasis for example is caused by a protozoan carried by Tsetse flies. In order to control the disease the flies must also be controlled. This makes the possibility of eradication highly unlikely, and the only hope for the animals affected is expensive and complicated treatment. Consequently, most animals affected with Trypanosomiasis die. Many times the only way to prevent the other members of a herd from contracting Trypanosomiasis after it appears in one of the cattle is to slaughter the affected cow to eliminate any further infections (Rashid).

Other Factors Affecting Cattle

A major factor that affects the mortality of cattle in Ethiopia is drought. Droughts are common in this area of Africa and sometimes cities have to go without potable water for months on end. With no water to spare for farming or irrigation for pastures, the food source of cattle is greatly diminished and animals become weaker and in turn are more likely to fall ill. Also, with the increased animal deaths during a drought, it becomes harder to properly dispose of the animal carcasses. With decaying carcasses lying on the ground even the slightest amount of rain can wash contamination into water sources and lead to disease in humans and other livestock (Westerhoff).

Globalization is another factor that indirectly affects the cattle of Ethiopia. The appeal of higher paying jobs and better living conditions in other countries causes many professionals, such as veterinarians, to leave the country to practice elsewhere. This leaves Ethiopia with a deficit of trained personnel able to assist in the treatment and prevention of diseases in cattle. Subsequently, a vast number of cattle that contract a disease ultimately die because they do not receive the proper care. If veterinarians continue to leave Ethiopia in search of better places to work, less and less cattle will receive treatment for their diseases and many more will die from easily preventable diseases.

Solutions to the Disease Problem

The first step to battle diseases in the cattle of Ethiopia is to implement simple disease prevention methods across the entire country. By developing methods to get clean water for the country, such as building water treatment facilities or distributing tablets to sanitize the water, not only do the people benefit from not drinking parasites, but the cattle farmers can prevent their livestock from contracting waterborne diseases. Although sometimes expensive, clean water is one of the simplest ways to improve the health conditions of cattle (Lardy). Another method is isolating diseased cattle immediately after they show symptoms. By doing this, transmission of diseases from animal to animal is reduced dramatically, and it becomes easier to observe the afflicted animal to make sure the disease does not progress. In times of drought, a simple solution to stop the spread of disease due to contaminated water is to quickly remove the carcasses of those animals that die due to the drought and properly dispose of them. This will ensure that any rain that does fall will not become tainted so that those affected by the drought can use every drop of water that they get. Keeping the cattle well fed and exercised will improve their chances of survival when combating diseases and recovering after treatment. Also healthy cattle lead to better productivity, so the farmers not only prevent a loss of cattle, but they allow for improvements in their production.

The next step to battling these diseases is widespread vaccination of the animals in order to prevent the contraction of these diseases. Many of the diseases that affect the cattle of Ethiopia are easily prevented with the proper vaccination. Foot and mouth disease can easily be prevented with a yearly vaccine, but the vaccine is currently too expensive for many smallholders to afford. Research needs to be done in order to develop a more cost effective vaccine that lasts longer so that it can be administered to more animals. Anthrax and blackleg are two bacterial diseases that are much easier to prevent than to treat due to their relatively low cost vaccine, and are currently the two diseases that the most cattle are vaccinated for. However, whenever the non-vaccinated animals contract these diseases they need immediate treatment that is often very expensive (Larson). Also, anthrax spores from the carcasses of infected animals that are transferred to the soil are viable for re-infection for 20 years (Rashid). By increasing the number of cattle

vaccinated for anthrax and blackleg, cattle raisers prevent costly treatments further down the line. Unfortunately there are no effective vaccines for diseases carried by parasites; and protozoan and vector control methods such as trapping flies and spraying animals with pesticides, are not practical, so alternative prevention methods must be sought out.

Trypanosomiasis, known as African sleeping sickness in humans, is a huge problem in Ethiopia. Not only is it almost impossible to prevent, but the treatment is very expensive, and even when available it must be closely monitored and adjusted often as the disease causing trypanosome can alter its protein coating to build resistance to a drug. A possible genetically-based prevention method for Trypanosomiasis is currently being researched by a team lead by Steve Kemp. The researchers have found that a hump-less West African N'Dama breed of cattle seems to be resistant to this disease, while the humped cattle of much of Africa are easily afflicted by the disease. Trypanosomiasis in cattle is estimated to have an economic impact of 4 to 5 billion US dollars. While this approach seems to have a promising beginning it is mainly invested in the long term effects and will take over a decade to become useful after the crossbreeding commences. This study is just in the beginning stages as all the biological data from the genetics of the resistant and non-resistant breeds are coming together, and more research is being done in regards to which specific parts of the genes in the resistant breed play roles in the protection from the disease. Once the genetic research is complete, the researchers can carefully cross-breed the different breeds to gain the resistance but maintain the productivity of the eastern breeds, as the N'Dama is considerably less productive. This approach has the potential to prevent Trypanosomiasis in many breeds in Africa, which will greatly reduce the potential for smallholders to lose their animals to disease (Mutai).

Another method to improve the application of medication to animals is to improve higher education in Ethiopia in order to increase the number of veterinarians in the country. Ethiopia has already been working to improve education by increasing the public investment in education and increasing the share of the education budget devoted to higher education from 14.9% to 23%. Until the last decade the number of new veterinarians each year was only 25, and the average veterinarian to animal ratio was 1 to 500,000. With the recent focus on improving education, the Ethiopian government has opened nine more veterinarian colleges and five more institutions training animal health assistants. There are now about 600 new veterinarians graduating each year, but despite the rapid increase in veterinarians the quality of care given to the animals has decreased. This decline in quality can be attributed to a decrease in spending per student, less qualified academic staff, and rapid enrollment bringing in less qualified students. In order to insure that the quality of veterinarians improves, Ethiopia must implement a method of accrediting schools and requiring veterinarians to obtain certification before they begin practicing. This will greatly improve the care available to the animals of the country, and will lead to better treatment of diseases and proper application of prevention methods (Tefera).

Conclusion

All of the above mentioned solutions work towards achieving the millennial goals of ending hunger and poverty, and environmental sustainability. By fighting the spread of diseases within the livestock of Ethiopia, farmers will be more able to use their animals to aid in the growing of crops, for milk production, and for meat. By cleaning up the water and properly disposing of dead carcasses, the condition of Ethiopia's environment will improve substantially, leading to better conditions for all.

The responsibility of implementing these solutions does not lie with one group of people or one organization or even the Ethiopian government. It is rather shared by all that directly and indirectly depend on and benefit from the livelihood of the livestock of the country. The government plays a key role in regulating the quality of care given to the animals by veterinarians and can also help prevent disease by requiring all cattle to get vaccinated for Anthrax, Blackleg, and Pleuropneumonia. These vaccinations are relatively inexpensive when compared to the potential damage caused by a herd becoming infected and a family losing a major asset (Larson). Universities have to maintain a high quality of education for veterinarians so that everyone treating an animal will be properly trained. Communities need to encourage each other to implement the simple solutions including methods of isolating diseased animals and preventing water pollution to stop the spread of diseases. It is mainly the responsibility of international research agencies to find new vaccines and alternative prevention methods since Ethiopia currently does not have the means to do this for itself. But unless all of these members work in unison to prevent and treat diseases in the livestock, all of their efforts will be in vain. It is only when they come together that they will effectively improve the conditions of Ethiopia's livestock.

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