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### **Philippines: Porcine Epidemic Diarrhea Virus**

In the modern world today technology is all around. Everyone from lawyers to farmers use technology for just about everything that they do. But in a country that wasn't urbanized with limited technologies, things would be more difficult. Take a second and think about how far technology has advanced in the United States. Farmers in the United States use technology to help them plant crops, monitor them with drones, and develop new herbicides. Farmers began planting and harvesting crops with the help of animals, and today with the click of a few buttons they can plant and harvest a whole field. The technology for them keeps expanding everyday. But in the Philippines, farmers don't have access to these types of technologies to help them with the health of their animals. With the use of technology there is a greater chance that a deadly disease could be eradicated from a country. The Porcine Epidemic Diarrhea (PED) virus has killed millions of pigs around the world. In the Philippines alone the virus has killed more than 60,000 pigs since the year 2006, and the number continues to grow (National Hog Farmer, 2006). The growing number of pigs that have died from the virus is causing problems for pig farmers in the Philippines. The impact of the virus has been negative for farmers of all sizes in the country. The price of pork has been low because of the virus, and the economy has been low due to little to no exporting to other countries. Officials in the country have put in place some biosecurity measures to stop the spread of the disease, but the use of biosecurity alone won't eradicate the virus. The best solution to eliminate the disease is to put electrolytes in the water for the pigs to drink to stop their diarrhea from occurring. Medicines and vaccines are available, but are not cost efficient for Filipino farmers (Porcine Epidemic Diarrhea (PED), 2013).

The average Filipino family contains about five people who live in rural towns or farms. The average size of a Filipino farm is about two acres (Pesticides Action Network Asia & the Pacific, ND). On the farms the families grow most of the foods the family consumes, and the crops that they sell to make a living. The major crops that are grown are rice, corn, coconut, sugarcane, banana, cassava, pineapple, and other vegetables. Filipinos usually use traditional forms of farming (Philippine Consulate General, 2015). The typical Filipino diet is rich in sodium and fat. Rice is usually served with all meals, and is the staple ingredient of Filipino dishes. The practice of growing rice came from the Chinese and was passed through the area to other countries (Pesticides Action Network Asia & the Pacific, ND). Adequate nutrition and food markets are hindered by the lack of variety of food that is grown on the islands. The types of foods that the people of the Philippines need for proper nutrition have to be imported from other countries. That is why if something is imported it's in a small quantity. It is really expensive to have products and produce imported into the country. Filipinos do more exporting than importing to make more money (National Statistics Office, 2009). The average living wage per day is \$1, unless one works for the government and then one earns \$2 per day. About 100 Pesos equal \$2.28 in US dollars (White, 2014). Because of the lower amount of income that came from the products the farmers were raising, Filipinos had to make meals stretch and weren't getting the proper nutrition they needed. The fruits and vegetables they would raise they could sell at local markets to make a profit and also feed their families. Some families can't produce enough meat, because they cannot keep their pigs alive that have been exposed to the deadly PED virus, or what they do have alive they have to sell to get money for cheaper foods to feed their families.

In the Philippines most people learn from the ancestors and trades are passed down through the generations. Thirty-three percent of all women between the ages of fifteen and forty-nine have completed college. More than ninety percent of people have completed elementary school. About the same amount of people that have completed elementary school are insured under PhilHealth (about two of every five

people). PhilHealth is the most common and cheapest form of health insurance offered in the Philippines (Pesticides Action Network Asia & the Pacific, ND).

Some of the major barriers to improving agricultural productivity are traditional farming practices and the cost of more modern practices. Most of the Filipinos will choose the most cost efficient choice to earn a higher profit. Employment and earnings are a barrier to modernization, because most of the families can't afford to pay employees a fair wage for the labor they do on the farm. Filipinos that rely on pork to be the product they raise, sell, and export aren't making as much money these days because of the PED virus. There is a vaccine that is available, but it is so expensive that if a family buys it they won't have enough money for the food or supplies they need to support a family. With little to no money they can't buy food or make meals with proper nutrition for the elderly or children (Kroll, 2014). Even though the vaccines are available they aren't popular in the Philippines because of the cost, and the fact that it isn't a form of traditional farming. Traditional farming would be to keep the animal in isolation and try to cure them with natural remedies (Sanchez, 2014). Biosecurity measures are in place to slow or stop the rapid spread of the disease (Ackerman, 2013).

The virus can be deadly to swine and has caused the swine industry to have low prices. Farmers are having a tough time trying to sell their pigs to local farmers or other countries because of the scare of the virus spreading. There has been less pork available to the local Filipinos because of the number of pigs that were dying from PED (Price and Food Security Update, 2011). PED is still present in the Philippines, and is affecting small and large farms with severe acute outbreaks (Sanchez, 2014). The virus has the ability to be present in the environment and can live in feed at room temperature for fourteen days (Pork Checkoff, 2013). There are biosecurity measures that the Philippines are practicing now for example: farmers only wearing clothes, boots, gloves, or anything else that comes in contact with fecal matter at that facility. Some facilities use shower in and shower out methods to help stop the virus spreading. The facilities in the Philippines are not fully enclosed, so the virus can spread by a bird or bug that comes in contact with fecal matter and travels to a different pig facility. This classifies the virus as an airborne virus (Sanchez, 2014). The trends for PED are slowly improving. The virus is known to return about every six months until it is eradicated from that area (McOrist, 2013). The trends of the virus are being measured by the testing of major and minor farms at random times to ensure that the virus is gone. Researchers do this to see where the virus has stopped infecting pigs and where the virus is still present in the air, feed or in the pig's systems (Porcine Epidemic Diarrhea (PED), 2013). The data that has been collected so far show that the biosecurity measures that were taken have helped to slow the virus from spreading to new facilities. The more rural farms are where the virus is mostly still present. The small farmers do business together, and don't have fully enclosed buildings like some of the major swine production facilities do. Because they aren't enclosed the birds and insects can still fly in and come in contact with fecal matter and spread it to another barn (McOrist, 2013). Also, because the status is improving, so are the pork prices and the amount of export out of the country. Families and farmers are also making a higher profit and more nutritional meals (Ackerman, 2013). If the country urbanizes even more then the economy has a better chance of improving (Steele, 2014).

If the economy improves then there is a more likely chance that the technology will improve along the way. As the technology transforms more research will be conducted to further knowledge about the PED virus in the Philippines. In each country the virus has mutated to make it adapted to each specific country. If the whole country urbanizes then researchers can have some of the newest technologies to conduct further studies of the major conflicts in the Philippines. If there is a change in the economy it might make prices of the medication or vaccines become more affordable for the farmers. Also, if the economy improves the farmers could get a higher revenue for the things that they sell (Price and Food Security Update, 2011). With more money they can buy food and supplies that they need to support their family. They can buy healthier foods to feed their families with revenue they make (Steele, 2014).

To improve food security for the citizens of the Philippines the biosecurity standards need to be fully implemented. When they are fully implemented there is a lower chance of the virus being transported to other pig farms. The University of Philippines has a local project to help with the improvement and management of PED in the country. The University's project can help in many ways, because they have done extensive research and figured out that the feedback method of treatment will make the piglets immune to the PED virus. The feedback method is a form of treatment where the sows are infected with the PED virus. The best way for the sows to come in contact and be infected with the virus is by fecal matter or chopped intestines from piglets that are infected with the virus. When they are infected with the virus certain antibodies (sIgA) are produced that can be transported to the piglets via colostrum. The antibodies enter the piglet when they nurse. The antibodies react like a flu virus shot that we get, piglets get a small amount of the virus, and their immune system fights off the virus. Then the piglet immune to the virus. This type of treatment is more cost efficient compared to the electrolytes that can be used in the watering systems (Kroll, 2014). This type of treatment also is more effective if the animals haven't had electrolytes in their watering systems, because they only stop the diarrhea from occurring, where the feedback method immunizes the piglet to the virus. It is also more effective, because the sows will reproduce more than once, so more piglets are immune to the virus (Kroll, 2014). If this type of method was used throughout the whole country on the pig farms, the disease could be eradicated very quickly. Some organizations are helping with the immunizations of the sows but a cheaper, more traditional farming method to use would be the feedback method (Sanchez, 2014). Using a combination of methods that the farmers are okay with will help with the push back farmers may give the government because they do not agree or see the benefit. Being educated as well as knowing about others success stories using these methods will greatly improve the overall chances that the government implementation of these methods will go over well.

The International Pig Welfare Conference is being hosted in Denmark on April 29 & 30, 2015. The conference will showcase how global leaders can change swine production and what types of disease are influencing the means of production. The types of discussion that can be presented are broad. If PED was discussed it would be a great benefit to examine what the future holds for the virus. The swine producers from the Philippines are looking for answers for their businesses and how the conditions are going to improve for them (Ministry of Food, Agriculture, and Fisheries, 2015). The Philippines need help with the finances to get types of treatments to the producers in the Philippines. With the finances available for the producers the virus could disappear sooner than waiting for the electrolytes to work and make the virus to disappear and then return in a matter of months. The most cost efficient way to eradicate the virus would be use the feedback method and have organizations share the minimum cost associated with it (Kroll, 2014). At the conference some information might be shared that worked for another country that could work in the Philippines. The rural farms could be a huge help eradication of the virus by using biosecurity standards and feedback method. They could also share labor to help each other with infecting the sows with the virus, and make sure that the sows are the only ones that come in contact with the contaminated fecal or intestinal material. As the pigs' health improves the economy and revenue for the producers will increase. Producers will see that they have the ability to export to other countries because the pigs are immune to the disease, and are able to ship to other countries without transporting the virus (Ministry of Food, Agriculture, and Fisheries, 2015).

The government, can also help with spread of the disease by helping implement the biosecurity measures that have been approved by the country. The government affiliated agency, Bureau of Animal Industry (BAI) is in charge of creating and implementing the standards for most of the means of animals in the Philippines (Cuevas, 2005). The BAI is also head of controlling and eradicating animal diseases in the country. They would help to ensure that the biosecurity measures were being utilized effectively and properly (Cuevas, 2005). Field Epidemiology Training Programme for Veterinarians is an organization

that has helped in the Philippines with controlling and eradicating animal diseases. The organization also trains veterinarians to work in a variety of countries (Harris, 2009). Through support from the government with these two initiatives, PED outbreaks will continue to go down. One of the key ways of combating hunger is through education (EAHMI, 2010). If the farmers and veterinarian are not being educated and kept up to date on procedures and methods that are effective, PED and other animal diseases will continue to spread. With pork being the top produced meat besides poultry, the government needs to assist in playing a role in fighting this epidemic to help the economic standing of the country (EAHMI, 2010).

Imagine what it would be like if the countries that don't have access to technologies, did. If the technology in the Philippines was modernized it would be less difficult for the Filipinos daily lives. Farmers to take care of their animals, and there could be better education for the youth. They would have the ability to diagnose and treat an animal for a disease they're infected with, or create new vaccines and medication. The number of pigs that die from the PED virus would decrease, and the farmers would receive higher revenue. This increase would help with their vet bills and food for their family. Their pork prices and economy would increase with the use of modern technology. Technology would make life a lot simpler than it is today for them. The Philippines would become more efficient and independent, because they can provide for themselves and their families. The officials in the country have tried hard to eradicate the disease without making much of a cost with the biosecurity. But that alone won't eradicate the disease. With the technology they could eradicate PED from their country and expand their economy. The wages in the country would increase and there's a potential for new jobs. The imports and exports from the country would increase and they could import more food with better nutrition. The best thing for the country would be to keep the biosecurity and have cost efficient vaccines imported into the country or to infect the sows with the disease to make the piglets immunized to the virus.

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