

Carly Levinsohn
Carmel High School
Carmel, IN
Ukraine, Animal Health

Ukraine: Containing the Spread of African Swine Fever

The Ukraine, an Eastern European country, is in the midst of a major turning point. The once thriving Bread Basket of Europe is now shriveling away into a food insecure state that is experiencing major economic decline. What has caused this decline? The outbreak of African Swine Fever has caused a significant deficit to the government, markets, and farmers everywhere. It began with just one contraction of the virus, a seemingly small and minor occurrence... but it only takes one infection to change everything. The first outbreak led to an epidemic that no one could have ever imagined.

The Ukraine, a developed country, has a population of 44,009,214. There are many ethnic groups, consisting of Ukrainians, Russians, and other minorities. The percent urban population composes 69.7% of the state and 30.3% rural. In Ukraine, 71.2% of the land is used for agriculture, made up of 56.1% arable land, 1.5% of permanent crops, and 13.6% as permanent pasture. The major crops and exports are potatoes, buckwheat, cornmeal, cabbage, beets, mushrooms, cucumbers, carrots, apples, pears, strawberries, cherries and stone fruits with cheeses (“A to Z World Culture: Ukraine”). In 2013, the average privately owned farm size in Ukraine was approximately 343 hectares (“Country Report: Ukraine”). That is about the size of Central Park in New York City. The climate in Ukraine varies throughout the state. In the south, it is a subtropical Mediterranean climate. In the north, it is temperate continental, meaning cold winters and warmer summers. The government type in the Ukraine is a semi-presidential republic. There are three branches: Executive, Judicial and Legislative. The Executive branch includes a Chief of State, a Prime Minister, and a Cabinet. In the Legislative Branch, there is the Unicameral Supreme Council with 450 seats. The Judicial branch includes a Supreme Court (SCU) with 95 judges and a Constitutional Court with 18 justices (“A to Z World Culture: Ukraine”). Although a fairly developed country, the Ukraine has some underlying food security issues hidden within.

A typical family in Ukraine has two parents and one or two children. The living space is limited due to poverty, causing many Ukrainians to live in apartment blocs or small houses. Houses have two rooms, the Velyka Khata (large room) and the Mala Khata (small room). Cooking, sleeping, work, and meal times are held in the Mala Khata, while the Velyka Khata is used for special occasions (Ledohowski and Butterfield). Their diet consists of warm, filling, and rich foods. It is heavy in potatoes, bread, and meat. The meat usually consumed includes pork, beef, chicken, fish, and sausage. Ukrainians have a greater range of choices for jobs due to a free market economy. The turnover rate for employment is high and so is unemployment. Citizens often struggle with finding sustainable jobs. Such jobs include working in offices, businesses, etc. The majority of women are unemployed. The few women who are employed are teachers, nurses, and secretaries. Few reach high level management. There are large differences between male and female wages. The average wage is \$200 (“A to Z World Culture: Ukraine”). Families have access to education; 99.7% of those 15 and older are educated. Although seemingly great by the numbers, the health care system in Ukraine is underfunded, corrupt, and inaccessible (Mendel). Ukrainians have problems earning a living due to their lack of dependable employment and low wages. Getting access to nutritious food is difficult because the cost of living continues to increase, and they do not worry about whether their food choices are healthy. A typical bread basket for a family increased 42% in price from 2014 to 2015 (Nguyen). Food security has not been stable in Ukraine, and it is continuing to get worse with the cost of living on a steady incline.

Currently, the main problem affecting food security in Ukraine is related to pigs and African Swine Fever. African Swine Fever is a highly contagious virus found in domesticated pigs, wild boars, warthogs and

other swine (“Fast Facts African Swine Fever”). The disease is spread from the animals eating or coming into contact with infected meat, carcasses, feed, vehicles, clothing, shoes, tissue and secretions in another swine (FAO). Some symptoms include high fever, reduced appetite, miscarriages, blackened lesions, coughing, difficulty breathing, etc. If it is a newly exposed herd, death could happen unexpectedly without any symptoms. Death usually occurs 7 to 10 days after contraction of the illness (“Fast Facts African Swine Fever”). Historically, the African Swine Fever was first detected in Kenya in the 1920s. It was described as an “acute haemorrhagic fever” (Costard, de Glanville, and Wieland). The virus is believed to have been around in Kenya among wild swine for quite a while. The strong contagion spread through almost the entirety of the African subcontinent before ever travelling to another continent. This was until 1957 when airline trash was fed to a group of hogs in Lisbon, causing the first outbreak in Europe. It was soon eradicated but followed a couple years later with another outbreak reported in Poland. It remained endemic until the discovery of a new tick in Spain that was a carrier of the disease. The idea of a carrier also being able to transmit the disease was a new revelation in the veterinary world, and this made the disease much more complex to stop and contain (Costard, de Glanville, and Wieland). The virus has continued to spread throughout Europe until it reached the Ukraine.

Today, it is known as a transboundary disease because of its rapid spread not stopped by national borders (“Transboundary Animal Diseases”). The African Swine Fever has a mortality rate of 99%. This is such a large problem today in the Ukraine because pork is a heavy part of the Ukrainian diet. It makes up 36% of all meat consumption in the country (FAO). In 2012, about 700,000 tons of pork were eaten in the Ukraine (Prihodko). Some pigs, even those afflicted by African Swine Fever, are slaughtered and still sent to market. This is unsanitary for the other pigs because if a pig comes into contact with the corpse, machinery, or a number of other places, it too could get the disease (FAO). This disease is in a continuous vicious cycle that will take a thoughtful and considerable effort to stop. Socioeconomically, this disease also has a large impact upon the farmers. According to a study done in 2015, a Ukrainian farmer that has a 1000 hog farm that experiences an outbreak could have losses equivalent to \$161,000 US dollars (FAO). A farmer having to pay a deficit that large could very easily put them at difficulty to continue their livelihood, making them unable to pay for food and other expenses. With the more time that passes, trends are continuing to worsen. More pigs continue to pass on the disease, making it even easier to spread the contagion of the virus. The African Swine Fever affects rural populations the most. Approximately half of the country’s pig population is found in the backyards of homes in rural areas (“Team Efforts to protect Ukraine rural economy from pig disease”). This is important because these families are directly impacted by the outbreaks of the disease because it could be their pig. These households earn about 69 million USD annually (“Team Efforts to protect Ukraine rural economy from pig disease”). These outbreaks take the money directly out of the rural family’s income that could be used for food, to put back into their other pigs, etc. The disease also can affect the urban population as well. If the suppliers of pork for urban grocery stores have all of their pork infected with the Fever, it can limit or even remove the quantities of pork available in stores. Even though some farmers may still send in the infected meat to sell, the quality and possibly quantity has lessened in good meat to eat. With this, consumers may not be getting necessary nutrients. Plus, with less meat available, the price will continue to go up, as it has since 2012. With high unemployment rates and low wages, some may not be able to buy this meat anymore, resulting in food insecurity from an economic and nutritional standpoint.

The African Swine Fever affects women differently than men because their wages are lower, and their unemployment is higher. About 75% of those unemployed are women (“A to Z World Culture: Ukraine”). With this, women will have even less access to the meat than men will because of their lack of income. The Ukrainian elderly and children rely upon the husband and wife of the household, resulting in similar ramifications. Marginalized populations are also greatly impacted because of the increase in price. As a result, these groups do not have access to the pork sold in markets.

The disposal of infected meat and carcasses can have an effect on the environment. If done inadequately,

this action can perpetuate the spread of African Swine Fever by exposing more swine to the virus. Also, the decomposing of a swine's body in the ecosystem can also have adverse effects on the ecosystem (Dr. Loeffen).

In order to address this widespread problem, the Food and Agricultural Organization of the United Nations has begun to devise a solution. This includes the shipment of machines to Ukrainian veterinary laboratories to conduct testing for African Swine Fever on the pigs ("African Swine Fever Being Tackled in the Ukraine"). This allows for more accurate diagnoses and early detection of the virus. All of these machines, however, are all located in the nation's capital in Kiev. Access is an issue that can be accomplished by spreading out these machines around the country.

There are many more steps that need to be taken to eradicate this disease. In order to fully solve this problem, a 5-year implementation plan has been created in attempt to contain the African Swine Fever. It is comprised of goals for one year, three years, and five years in order to keep Ukraine on track, encompassing what can be done in the short and long term.

In the first year, the main objectives will be to heighten awareness of African Swine Fever and its damaging effects. In order to do this, a farmer certification test will be created for all farmers to take each year. On this test, the farmer will be asked to list all of the animals they plan to raise. Then, they will be asked a series of questions about the measures to be taken if the animals are infected with a particular virus; this includes preventative, sterilization, and other actions to be taken. In order for farmers to be fully prepared for this test each year, the government and Food and Agricultural Organization of the United Nations can send out informational flyers about the various diseases their livestock could be stricken with. The farmer, if they own swine, may also take a course offered by ASForce, an organization in place with the intent of having a course to educate Ukrainians about the dangers and information regarding the African Swine Fever. This program will begin with pigs mainly and eventually become comprehensive of all livestock over the course of a few years. The test dates will be given based on the region where the farmer lives. They will be administered in the nation's capital of Kiev. If a farmer cannot make the test date, they can request a test to be mailed to their home and can mail it back to the capital of Kiev. With the current lack of Internet access to specific areas, the test will eventually be available online; however, this will not be until Internet is widely available. This test will be extremely beneficial to the people in Ukraine because the literacy rate is quite high with 99.7% of people over 15 years old being literate ("A to Z World Culture: Ukraine"). Also, in this first year, the machines Ukraine is importing will need to be spread out into all of the regions in the state in order for the diagnostic technology to be available to more of the population. This can be arranged by the government.

This type of plan is not incredibly rare for a virus such as the African Swine Fever. Another common virus threatening animal health, called Avian Bird Flu, has been handled in quite a similar manner. This disease is spread through many of the same vectors as the African Swine Fever, and the contagion is just as strong as that of the African Swine Fever. The first step in addressing this problem was through the World Health Organization taking initiative to educate poultry owners about the dangers of this life-threatening poultry influenza. Similarly, my plan also collaborates with the World Health Organization due to the organization's immense exposure to this type of animal health threat.

These actions taken in the first year can be managed and funded by the Ukrainian government, the Food and Agricultural Organization of the United Nations, and the World Health Organization. This is feasible planning because the Food and Agricultural Organization of the United Nations has already budgeted some money out for the containment of African Swine Fever. Some of this money can be channeled into this particular plan. In addition, the expertise that the World Health Organization has in combating disease could be quite effective. The Ukrainian government can help with making sure all of the farmer's names are included in the summoning for a particular test and overseeing that the plan is being executed well

throughout the whole nation and its provinces.

For the three year plan, research will be conducted to determine the most effective ways to sterilize an area that has been exposed to the African Swine Fever. This will most likely be funded by the Ukrainian government and a partnership with Ukrainian Laboratories to develop this sanitation product. Ukrainian Laboratories include chemists and biologists who will work together to invent the new sterilizer. With this new innovation, more information will be added to the government flyers sent out about the new sterilization product. This will also be on the test. With the new discoveries, more questions will be added to the test.

The sterilization techniques for African Swine Fever are critical in its prevention. This is one of the main strategies employed in stopping any contagious virus. This approach (of sanitation and isolation) was also one used to stop Avian Bird Flu. If done properly, this strategy could have an incredible impact on farmers and livestock not just in Ukraine, but everywhere.

This next phase of the solution will be funded entirely by the Ukrainian government, the World Health Organization, and the Ukrainian Laboratories. This is realistic planning because the Ukrainian Laboratories encompass all of the labs in the country. With all of the scientists in the nation working together to solve this widespread issue, a product could be developed quickly and efficiently. The Ukrainian government can fund this problem as well because although they may not be the richest country, they still are able to invest to stop the spread of African Swine Fever.

The last phase of the solution is the 5-year plan and beyond. This 5 year plan will work on creating vaccines for piglets and other swine to build immunity to the terrible virus. The vaccine will be funded by the Food and Agricultural Organization of the United Nations, the Ukrainian government, and the World Health Organization. The other research plan that will be carried out is for gene testing to help predict a pig's susceptibility to the virus. Having this kind of preemptive knowledge about the risk a farmer's animal could have may make the prevention a priority. It can also help the farmer prepare effectively to not allow an outbreak of the African Swine Fever on their farm. This last part of the long-term plan will be split between the Food and Agricultural Organization of the United Nations and the World Health Organization. The partnership will be a strong pairing with both parties being well-funded organizations.

Amidst all of the knowledge already accumulated about the African Swine Fever, there is a particular gene that can affect the replication of the disease. As shown by a study done by the National Institute of Health and veterinarians, DNA vaccines and RNA antiviral drugs could have an effect on the replication of the virus in the swine's genome (Hübner et al). One particular enzyme responsible for unwinding and winding DNA, called topoisomerase II, has stopped the African Swine Fever virus' gene expression. This testing would continue to find genetic patterns amongst the genome and create an effective vaccine to inhibit the virus' expression.

While carrying out this solution plan, one should keep in mind what the value of the pig is to the Ukrainian culture. Many folk tunes and other symbols are centered around the pig. The pig is an iconic symbol of the Ukrainian culture and its success. By carrying out this plan, the pig will no longer resemble the country's decline. The pig will represent Ukraine's perseverance in the face of adversity. By solving this critical food security problem, Ukraine will, once again, be a renowned emblem of independence, freedom, and determination.

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