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Belarus, Factor 1: Plant Science

### **Belarus: Improving Crop Production**

Since we humans began to roam this planet, we have scavenged and produced food. Yield has been an important factor going along with our toil. Yield is the amount of product received from a piece of land. Yield, here in the United States, is high and is prosperous because of our exceptional soil quality and technology. Yield depends on soil quality, applications, moisture, heat, crop genetics, and more. Belarus is a struggling country whose yields are low and their need for large-scale farming is high.

The country of Belarus is young, being that it was part of the former Soviet Union. Founded in 1990, this country has struggled to feed its people. As in the past with other countries, after war and distress and becoming a new nation, it is difficult to reconstruct the country and lay a solid foundation to make the country successful and productive. One factor that has slowed this process is crop yields and the small number of large-scale farms. Within the Communist rule of the USSR, it was not possible for a family to rise up through the farm market and earn enough to become a large-scale farm. In the Soviet Union, farming was a government ran operation and was not run by individual families. When Belarus was founded, the government run farms were given back to the people and since then, has not been able to catch up with the demand for product that exists. This problem requires a complex solution and will take many years to complete. The process of getting people on board and bringing in new technology and improved conservation to increase crop yields is a multi-faceted problem requiring many resources.

The average rural Belarusian family size is four people. Due to the lack of variety within the country, the diet of these people is primarily red meat and potatoes. The education provided to children in Belarus is primary and secondary school along with access and the ability to attend college. The typical rural child will not however attend college and will return to their family farm and farm along with their parents. This action is not mostly desire to farm, but the parents need the help from their children because most of the farm work is done by hand and cannot be easily done by one or two people. Agriculture is not a commonly taught subject. Many people gain knowledge of how to farm by living and working on one, although they do not learn the science behind what happens but only how to care for their crops. Very few people are taught agriculture in a school setting. This does not allow for Belarusians to take charge of their crop production needs because they simply are not educated about them. One thing that tremendously helped the United States was the introduction of land grant, agriculture based universities such as the University of Minnesota that Norman Borlaug attended. This allowed many people to pursue an education in agriculture and continue to advance the world of agriculture through education. The Health Care system is more involved in the population of people that were affected by the Chernobyl Accident that caused many people to have health issues. The radioactivity from the accident traveled about 300 miles from the Chernobyl site. The radiation is causing a high incidence cancer. Some of these cancers have become hereditary and pass through generations. Because the Soviet government has accepted responsibility for the Chernobyl accident, the government provides health care. The care given to the rest of the population is decent and affordable. It is similar to American health care with insurance and coverage and the doctors and physicians are well educated.

The Chernobyl accident is one of the most significant nuclear accidents in history. This accident happened on the 26<sup>th</sup> of April 1986. The radiation cloud was detected around the world. The most affected area is the border of the Ukraine, Russia, and Belarus. Belarus is the most affected country where almost ¼ of country is affected in some way. Farmers living in the area will still try to raise crops in this area, but

are unable to produce enough to be sustainable. The land that has been contaminated and is unsuitable for prominent plant growth and much of the crops harvested from this area are not predictable and usually mutate and do not produce a large amount of useable product. Due to the fact that the effects of the accident will last thousands of years, this portion of Belarus will be unfit for successful crop production for a very long time.

The typical farm size in Belarus is 3-5 acres, mostly tended to by hand or small machine. The crops grown in Belarus are barley, rye, oats, wheat, potatoes, flax, canola and sugar beets. Although most are small farms, there are large-scale factory farms, similar to farms in the United States. These large farms make up about 14% of all crop production in Belarus. These farms have modern technology and large equipment and machines that allow for large yields that feed the majority of the country. They also use crops that are engineered to perform. These crops are not at the level that American GMO's are, but they do increase yields and withstand the weather and extremes that hit Belarus. The rest of the country however is limited to small farm equipment such as small tractors and grain carts. It is as if the remaining 86% of the country is stuck with the American farm technology that was used in the 1930s. Many farms only have one or two tractors with small plows, planters, etc. The harvesting of their crops is done by hand or with old machines.

There are clear barriers holding back the production of this country. The first barrier is crop yield. The production in Belarus is low. The GDP is at such a low [71.71 billion USD] that the government and private businesses cannot afford to pay workers a reasonable wage. They are paid about \$55 a week to \$250 a month, less than the standard of living. The primary reason for low production is the soil quality and also soil maintenance. The conservation practices in Belarus are poor. There is a great amount of erosion. Much of the rich soil is washed or blown away. Most of these farmers are not educated or supplied with resources to improve conservation. The land is plowed and plowed without leaving organic matter to build up quality of the soil. Another factor that disrupts plant production is a wild climate. The sowing of crops is usually late because of the risk of a late frost. These frosts often occur in May and kill off planted crops. The winters could also start sooner than expected, often as early as September and will not allow for harvest to take place. Drought could decrease the yields as well. The average temperature is lower than 66° F and average rainfall is around 20 inches a year.

The technology that is affordable for the common farm family is another barrier. Not just machines and other advancements, but the plant technology. The machines used do not have yield monitoring, variable rate, and other functions. They are simple and small machines that do not do the job as well. On the plant side, most of the seed planted is last year's harvest. There is minimal genetic modification. Therefore, the actual production of these low line practices does not make for a high producing agricultural country.

According to *Agriculture in Belarus*, "There are significant opportunities to take advantage of warmer temperatures and a longer growing season to expand northwards crops currently only viable in the south of the country. The major threat to agricultural production will be the increase in frequency of drought and heat-waves, however improved soil conservation measures, water management and more drought-resistant plants should allow agricultural production to benefit on the whole from changed conditions. Additionally, there is at present a gap between the potential yield of many crops in Belarus and their actual production, and measures to reduce this gap could more than counter-act any negative effects on yield due to climate change."

One of the solutions to this problem is an increase in plant scientists to create seed that will resist drought, grow faster, and have higher producing plants, etc. These improvements will set Belarus on a straight course of high agricultural production. The only thing holding back is the fact that family farms cannot afford these high end products. One way that the income of family farms in Belarus could be increased is

by improving soil conservation. Without soil loss there will be a larger amount of quality soil for plants to use and will increase yields and in turn increase income of family farms. Additionally farmers will purchase better equipment and the farming economy will turn towards high efficiency. In the northern part of the country, growing time is short and the soil is rougher than the south. A potato plant that could grow quickly and is able to grow in poor soil will best suit the north. The average temperature throughout the summer is 63 degrees. Average rainfall for the summer is less than 7 inches. The month of May is one that is unpredictable in Belarus. Frosts are common in mid May, which will kill off all planted crop seed. September is a month that historically could be the start of winter. Snows will fall and prevent farmers from getting into the fields. There is little technology for engineering plants. Improved plant genetics would help the country, but the seed costs for these new plants would be too expensive for small farms. Once the country is successfully on track to higher production, these new seeds would prove to be effective once small farms are able to afford them. Once we have seen a higher production and common wealth between family farms we would be able to bring in the plant scientists to engineer these new seeds.

In my US History class we have learned about the Great Depression and Dust Bowl. The Dust Bowl was a time where the topsoil was blown around the United States because of poor soil practices. This caused production to plummet and the country to sink lower into the depression. Towards the end of the Dust Bowl, farmers began to understand soil conservation and began implementing ideas and practices to improve the conditions given by the Dust Bowl. In Belarus they practice similarly to the United States before the Dust Bowl. There is not much soil conservation to be seen. There is little prevention of the rich topsoil from being blown or washed away leaving little nutrient for the plants to grow. The farmers of Belarus are stuck in the same mindset and despair that farmers in the US experienced during the Dust Bowl, although there is not the extreme weather that happened in the US. Long-term poor soil practices drastically reduce crop yields. In the southern plains of the United States in 1935, the US government sent specialists to sort out new soil practices. These soil scientists were able to find new ways to farm. These new practices were to plow with the contours of the soil, to plow deep rows and not just pulverize the soil, and to use no-till farming. These new ways of farming helped to pull the southern plains out of the dust bowl, along with rain. In Belarus the problem is not a drought, or an increased amount of wind, but poor soil practices. They just plow up the ground and do not consider erosion or lack of nutrients available to their crops. They would need soil scientists that could go to the countryside and teach farmers new tactics and show them the benefits. Just like agronomists in the United States assist farmers in making decisions and teach farmers how to improve their operation, we would need jobs like that in Belarus. Having people who are experts in agronomy and plant soil science who's sole responsibility was helping farmers learn more about how to improve what they are doing and assist in making decisions. To accomplish this though, you would need to bring experts in who spoke Belarusian and could communicate with the farmers, or you would need to begin agricultural education within the country and create native experts who have a larger understanding of their own country.

Technology is a large part of our everyday lives. From new clothes to new phones, technology is being forever improved upon. Devices are being linked across the globe and out into space. Agricultural technology is one area that only continues to improve and be more precise with every year. From variable rate planters to automatic shut off sprayers, new technology could be introduced to Belarus and would improve crop yields drastically. It is amazing the things that engineers and have been able to create that have changed the way farming is done in the United States and has continued to make the US one of the largest producers in the world. The use of poor tools and minimal technology does not make for great yields. Once Belarusian farmers are able to successfully conserve soil and take advantage of what they are taught and yields improve, they will be able to afford new technology. It will be a slow climb to reach the advancement in technology as used by the US farmer, but they would get there. Because the implements used by Belarusian farmers are so un advanced, it is difficult for them to fully get what they can out of their ground. If they had access of the amazing planters and sprayers and everything else available not

only in the US but also other parts of Europe, they would soon catch up with the rest of their continent. This technology however is very expensive and there are many American farmers who cannot afford what is available. Belarusian farmers are so far behind that some may say it is a lost cause to try to help these people because there is little future for them. The Belarusian government would need to head this whole solution due to the fact there is not much wealth within the agricultural community in Belarus and it would be impossible for them to go about this alone. There would need to be some government spending where farmers need money to put in buffer strips, terraces, or water tile as these projects would be unaffordable right out of the farmers pocket.

The urban population would greatly improve with higher production of the farming community. There would be an abundance of food and more wealth to be spread around. Companies, agriculture based or not, would become wealthier. Family farms would be spending money on tractors and combines, who affect not only the machinery sales industry but also the steel, computing and fuel industries as well. You can look at the United States for example. It is because of high agricultural production and the vast amount of raw product at its disposal that the country prospers. People do not need to spend large amounts of money for quality food and the average farmer is producing more than enough for the rest of country. One could look at countries that have low agriculture production and see that the country is not prosperous. There are many poor and hungry people in countries such as Belarus.

To lie out an order of events that would need to be done to turn Belarus around, first would be the introduction of agriculture teaching in secondary classrooms to open up the idea to young minds. Ag teachers who spoke Belarusian would have to be brought in from other places first. Second would be the establishment of one or more land grant, agriculture-based universities to focus on agronomy to have native Belarusians spearhead the turnaround of the nation. Establishing ag businesses or adding agronomists and consultants to the ones that already exist to go out to farmers and assist them in making good decisions and getting all they can from their farms. Once farmers are farming in the right way, yields will slowly go up and farmers would be earning more and eventually be able to buy more high tech implements. As farmers gain more advanced technology, they will be able to buy better seed and apply chemicals to produce high yielding crops. With time, most of the country could become like the already existing 14% of large-scale farms.

In conclusion, there is one key factor that is holding back Belarus' agricultural production. Their yield is lacking and the small farmer in Belarus is not producing enough to feed many people. There are solutions to this problem that lie within proper soil conservation, taking advantage of growing seasons, genetically modified crops, and technology. These all would go in a sequence starting with small farms improving soil conservation, then planting at the proper time which then will provide them with higher yields to purchase seed that has been genetically modified which will improve yields and production to buy newer, advanced technology to be one of the leaders in agriculture on the continent of Europe.

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