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Sweden, Factor # 6: Sustainable Agriculture

The Global Guinea Pig: Sweden

The world is in a constant state of discord. Today, we are living with fear that there is no tomorrow for our species. Sweden is a country that is trying to lead the path to create a more sustainable future. The world knows that in a very short amount of time, we will need to produce much more food for a much larger population. Our world cannot go forward with the same agricultural practices that helped create climate change and instead must come up with new agricultural solutions to combat this crisis. In our world, there is no country battling climate change perfectly, but Sweden has been doing a good job. This, in some ways, makes them the guinea pig society. If they are able to continue having a strong economy and combat climate change, then so should the other countries of the world. Yet, there are still many ways our global guinea pig can decrease its environmental impact from agricultural practices.

The country of Sweden is in northern Europe and has about 10.2 million people with 85 percent being urban and 15 percent being rural (Trading Economics, 2019). Their yearly temperatures range from -33 degrees Celsius in the winter to 17 degrees Celsius in the summer (WeatherOnline, 2019). Sweden's leadership is a parliamentary democracy; they have a prime minister and a royal family. Some of their major exports include oats, wheat, barley, rye, sugar beet, iron, steel, wood pulp, and paper products. Sweden's total land area is 410,335 km^2 and total water surface area is 39,960 km^2. In Sweden, 6.8 percent of the land has temporary or permanent crops with cultivated land (World Atlas, 2017). Globally, Sweden, with 1.99 people per household, has the lowest average household size (Organization for Economic Co-operation and Development (OECD), 2011). Overall, Sweden is a highly developed country with no civil unrest and a high quality of life. Everyone who lives in Sweden, both rural and urban, has access to electricity (Trading Economics, 2019). The education system is government-funded; some children can start going to preschool as early as age one. (Sweden, 2018)

The Swedish government excels at long-term policy planning for the future of its citizens. "The overall goal of Swedish environmental policy is to hand over to the next generation a society in which the major environmental problems in Sweden have been solved, without increasing environmental and health problems outside of Sweden's borders." (Annemay Ek., 2018) Sweden is already a leader in sustainability. "Sweden is well-advanced in terms of agri-environmental programmes, as compared to other European Union member states and has a higher share of payments for improving sustainability through better ecosystem management than other European Union states." (OCED, 2018) Sweden is currently modifying its government policies related to sustainable production methods; this will further its efforts towards sustainability (OECD, 2018).

A key way to address climate change is by reducing consumption of fossil fuels, particularly in the agricultural industry. The way that Sweden is addressing this issue is by having an energy and carbon tax, where the same rules apply to farmers as the rest of the Swedish population. Sweden's agricultural diesel tax is one of the highest, compared to the rest of the European Union (OECD, 2018). This policy will help to shift agricultural producers away from reliance on this fossil fuel. Sweden's

greenhouse gas emissions have been reduced by 25 percent between 1995-2015, providing further evidence of the positive impacts of their sustainable climate policies. (United Nations, 2019) In the world today, government policies help regulate environmental standards and guide their society along the path to greater sustainability. According to the OECD, Sweden has very strict environmental policies. Sweden ranks amongst the highest in the OECD's environmental policy stringency indicator. (OECD, 2018)

Although Sweden is a leader in sustainable development policies, there is always room for improvement. In Sweden there are 6,894,100 acres of land that are farmed and intensively tilled; that is about 6.8% of Sweden's land mass. (National Encyclopedia, 2019) Conventional (intensive) tillage occurs when a farmer uses tilling equipment like a disc or plow to turn over the field's soil. The soil is left without living roots in it, which leads to erosion by wind or water, as there is nothing holding the soil in its place. When using conventional tillage on hilly terrain, erosion will remove nutrients from the tops of the hills by bringing the valuable topsoil to the bottom. (All About Food, 2014) Conservation tillage occurs when you disrupt the soil as little as possible - for example, only tilling once a year rather than twice. (All About Food, 2014) The third and final type of tillage is no-till; this is when there is no turn over of the soil. (All About Food, 2014) Sustainability related to tillage practices increases as farmers shift from conventional to conservation to no-till methods. In a 2018 survey, researchers found that crop rotations, education, size of farm, presence of clay-dominated soil types, and whether the farmer spent more than 50 percent of their working time on crop production, were the major influences on whether farmers used conservation tillage or not. (Hydbom, Olsson, & Olsson, 2018) This study also suggests that farm enlargements, more farmer-to-farmer meetings, efforts to educate advisors, and more solutions for more small farms that are cost-effective could increase the use of conservation tillage in Sweden. (Hydbom et al, 2018) This information can be used to develop policies that encourage greater use of conservation tillage and no-till practices. The potential drawbacks to minimum tillage could potentially include more pesticide use; the environmental impacts of this would need to be offset.

The agricultural crop of kernza has the potential to do extremely well in Sweden. Kernza is a perennial crop that thrives in colder climates. The benefit of kernza crop production is that, once established, it requires no tillage. It would be a replacement for the annual wheat crops that are currently being grown. As a perennial, it grows back every year from its permanent root system, even after it has been harvested (The Land Institute, 2019). There is research currently being conducted by the Swedish University of Agricultural Sciences, to determine how and where kernza crops can be grown in Sweden (Swedish University of Agricultural Sciences [SLU], 2018). The potential drawback of kernza is that it is a very new crop and therefore it has not yet been determined what the best crop management techniques are to maximize long term yields. With continued research to test a variety of crop management techniques then this drawback will be eliminated. The next step that should be taken to promote the growth of kernza in Sweden is to raise awareness about the product, and its benefits for farmers. A benefit for the farmer growing kernza is that it is not reseeded every year. This would mean less fuel used, and a reduced need to own a seeder. Also, the time previously spent seeding could now be spent elsewhere. Another benefit is that with kernza there is no need to till the soil so farmers would not lose their valuable topsoil and would save on the fuel costs of tilling.

In the United States, kernza is becoming established firstly by businesses that have developed a product around kernza usage or by current businesses switching over to use kernza in their product. For example, General Mills has begun using kernza in a cereal, not only for the environmental benefits, but also because it is a sweet grain. General Mills has switched over to promote the growth

of this grain and open up a new market for kernza. This can happen in Sweden also; multiple companies can make the switch and create a new market for the grain, which leads farmers into beginning to grow the kernza crop.

As kernza becomes established as a crop, the Swedish government could further promote its growth through subsidizing crop tours in order to spread awareness and interest. The government could also provide low interest start up loans for anyone who is planning on making a kernza related product. This would make the business more attractive for anyone looking to get into the market. These businesses may include breweries; several successful kernza breweries are already established in the U.S, such as Patagonia Provisions, Blue Sky Brewery and Hopworks Urban Brewery. In addition to beer, several successful products have already been marketed in the United States; these include pasta, pizza, and bread. (The Land Institute, 2019) Several successful restaurants currently use kernza in their recipes, such as the Birchwood Cafe, Avalanche Pizza, and The Perennial.

Animal agriculture is a major emitter of greenhouse gases and a large contributor to deforestation, air pollution, water pollution, and biodiversity loss. (Climatenexus, 2019) The best way to reduce animal agriculture is to make the market for animal products smaller. This can be done by increasing veganism in the population. Only 2% of the Swedish population identify as vegan, and 7% identify as vegetarian, according to a study done in 2018. (Statista, 2019) The amount of people identifying as vegan is actually decreasing in Sweden as they went from 4 percent in 2015, down to 2 percent in 2018. (Statista, 2019) Sweden can help promote veganism by making sustainable lifestyles a core element of their education system. It is very difficult to learn how to prepare well-balanced vegan meals when being brought up in an omnivore environment. If there was a vegan cooking class all throughout a child's education, the child would have a much better understanding of how to cook vegan meals, as well as a better understanding of how their food consumption affects the environment. Meat consumption can be sustainable, but if more and more people continue to become meat eaters, we will run out of land to sustainably grow meat. It is unreasonable to think that everyone will become vegan, but the more people that do means that the meat that others want will be grown sustainably. To further sustainable awareness in education, Sweden could also make environmental sustainability a mandatory curriculum subject. Elements of an environmental sustainability program could include learning about the effects of fossil fuels, biodiversity, ecosystem management, waste control and sustainable farming. Currently in Sweden environmental sustainability is not a mandatory subject, nor is it integrated into the current core subjects. (Skloverket, 2019) Imagine if math classes had sustainability integrated into word problems. For example, a particular food item could be selected for calculating how much water consumption was needed to produce the item. It would make students more aware of the implications of their eating and other behaviors on the environment, as they grow. Those children could then use their knowledge to influence others within their country, as well as globally, causing a positive ripple effect. But they can do more than just integration, they can create a whole-school approach to sustainability. The sustainable methods can be applied to the construction and upgrades of school buildings. Sweden's teachers should be trained how to integrate sustainability into their classroom teachings. There should be more project-based learning on sustainable development. The curriculum should focus on active learning, future thinking, inquiry and problem solving.

Sweden has done a wonderful job creating their country's food guide. Their food guide document opens with a "Sustainable Big Picture". The subheading on their food guide document is "Food habits, health and environment". The document talks about a wide range of environmental concerns including climate change, the use of pesticides, and eutrophication. The document also discusses

several ways to decrease your own environmental footprint by walking and biking. The guide also promotes purchasing eco-labeled products to ensure they are sustainable. Also discussed, is how cereals have smaller greenhouse gas emissions than other crops, such as rice or potatoes. The unnecessary environmental impact of sweets is discussed, as a bag of jelly beans can have as much of an environmental impact as a portion of pork. (Food and Agriculture Organization [FAO], 2019) To further these efforts, Sweden will need to do more to integrate their food guide into every Swedish home, so the people can further realize how what they eat affects the environment. Public education will be the key for Sweden to continue to reduce its emissions in this regard. In their education system, to integrate the food guide, they can use it as part of the curriculum. Sustainable practices can become a mandatory class and the food guide will be a unit included. To integrate it into homes they can include recipes in their guide, so people can use it more practically.

In conclusion, Sweden has been doing very well in regards to sustainability, making them the perfect guinea pig for the other nations of the world to follow. To make further improvements, Sweden can promote the use of better tillage practices and the growth of kernza crops. Also, Sweden needs to make changes to their public education system so that every child can learn about sustainable practices in a more comprehensive manner. As the world watches Sweden succeeding in all the pillars of sustainable development, socially, economically and environmentally, it will encourage other countries to make similar and necessary changes.

Our planet Earth is in danger, and has been for a long time. What we need now is not more new ideas, but to take action today before it’s too late.

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