**Introduction**

Narrowed topic: In what ways do livestock impact climate change?

According to the United Nations (2019) in 2050 the world’s population is expected to increase by 2 billion persons from the current 7.7 billion to 9.7 billion. Due to the increasing population, the demand of livestock will rise simultaneously. Climate change is the rising sea levels that increase the risk of flooding, to the fluctuating weather conditions that threaten food production (Climate Change). Livestock are animals raised in an agricultural surrounding to produce supplies such as food and labour (Definitions for livestock). Livestock farming is one of the most significant sectors in agriculture and as the world population increases the demand for livestock products is growing (Reynolds et al., 2010). This demand for livestock will have crippling effects on climate change resulting in anthropogenic emissions, deforestation and water pollution. Greenhouse gases are mainly produced by enteric fermentation where ruminant livestock which are animals with four-part stomachs digest and decompose food-producing methane as a by-product and manure storage allows for the preservation of nutrients present in manure, and can be used for application on to the soil (Grossi et al.,2018). Reducing emissions from the livestock sector will be one of our greatest challenges due to the increasing population and the demand for livestock.  **Agriculture will continue to have major implications on global warming if mitigation strategies are not employed to reduce greenhouse gas emissions from the livestock sector. The rearing of livestock contributes to climate change as a result of greenhouse gas emissions, land use, and water pollution.**

**The rearing of livestock and the emission of greenhouse gases**

Climate change is directly affected by the livestock sector through greenhouse gas emissions. This occurs through enteric fermentation and by improper manure storage. Firstly, for the process of enteric fermentation, the two main greenhouse gases emitted by the livestock sector are methane and nitrous oxide. These are the two most detrimental greenhouse gases as they are more potent to the environment than carbon dioxide (Grossi et al., 2018). Therefore, with the emission of these greenhouse gases, the environment is at risk as they contribute to a major part of the increase in temperatures worldwide. It can also be determined from the findings that because of these emissions, the changes in temperatures around the world are significant as there are more warmer days than colder days. This results in the melting of ice caps which causes the sea levels to rise. This poses a threat to several people around the world.

The livestock sector promotes a significant effect to climate change by the emissions of greenhouse gases through improper manure storage. Secondly, In the rearing of these animals, the storage of manure is very important as proper storage limits the amount of greenhouse gases emitted. The main gases emitted from manure are methane and nitrous oxide. The storage of liquid manure in lagoons creates breathing environments for anaerobic bacteria and this increases methane production. On the other hand, nitrous oxide is generated by both aerobic and anaerobic conditions. The use of manure on fields influences the release of nitrous oxide from the soil (Giampiero Grossi et al., 2018). It can be deduced that without proper ways of storage, the manure from the livestock sector will continue to increase in the emissions of methane and nitrous oxide in the atmosphere. High concentrations of these gases are very dangerous as they cause rapid increases in temperatures which further enhances the effects of climate change.

**The effects of livestock rearing on climate change through land-use change**

The production of livestock has a significant contribution to global warming because of its impact on land-use change. Land-use change has been the propulsion of human alteration of terrestrial ecosystems, with 80% of agricultural land allocated for livestock production. The growing requirements for food have expanded this sector as well as the volume of carbon emissions from land-use change (Weindl et al., 2017). Land-use change refers to the conversion of land to carry out a different purpose. Livestock occupies most agricultural lands; therefore, not only is there a large volume of emissions from the ruminant livestock themselves through enteric fermentation and manure, but also through the deforestations of land to provide grazing and production space.

Roughly 30% of the global land area is used to rear livestock. Between 1980 and 2000, livestock was the main contributor to the deforestation of 83% of the agricultural land expansion in the tropics. Carbon dioxide emissions from land-use change represent 33% of total emissions from livestock production (Havlik et al., 2014). Land-use change for livestock production severely impacts climate change due to the emission of carbon dioxide. Approximately 2.7% of the world’s land is used toward housing and development, this implies that livestock production is the main reason for deforestation and occupies es nearly 10 times more land space than humans.

**The impacts of livestock rearing on water pollution**

The rearing of livestock has a large contribution to global warming because of its impacts on water pollution. The worldwide livestock sector accumulates a greater amount of toxins and sewage which is discharged into the water systems and one of the main contributors of water pollution. (Climate Nexus, 2016). As a result this build up of toxins from animal waste and feed production is detrimental to both humans and animals as it generates harmful substances into the environment. The improper management of livestock waste can cause leaching into groundwater and further leads to eutrophication which can then give rise to unfavorable substance in the atmosphere. Again it is presented where livestock continues to pollute water sources from animal waste, and other substances used during the production.

The increase in consumption of livestock products continues to encourage harm to ecosystems. Mostly in developing countries the demand for livestock products poses the greatest harm to water sources by the animal excreta, rainfall-runoff from the pasture, and other harmful substances. (Dopelt et al., 2019). Thus during the production, the need for high quality livestock product causes the increase in the use of chemicals that when left unused by the livestock will pollute the water ways. The need for regular pasture will pose threats as it causes degradation of the soil and increases the risk of runoff through pathogens from the waste and sediment transport into surface waters. Hence, this form of pollution will generate toxic greenhouse gases into the environment thus causing global warming.

**Conclusion**

In conclusion, it has been proven that livestock does have adverse effects on climate change. The effects range from the emission of greenhouse gases through the land use change and to water and air pollutions. These factors are proving to be detrimental to the environment as they are threatening the lives of both humans and animals. With the growing population, the demands for livestock product are increasing thus further worsening the effects of climate change. Mitigation strategies are needed in order to limit the effects of the livestock sector in order to reduce the impacts on climate change.

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