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Climate Change and Poultry Production - A review

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ABSTRACT
Climate changes are one of the most significant aspects, which cause a threat to all human beings living on the planet Earth. Climate shifts may result from enduring human modifications, from internal natural processes to external pressures. People's diets are significantly influenced by chickens because many of them substitute poultry for red meat. Additionally, eggs are a highly nutrient-dense food item that is widely consumed globally. Despite the fact that the poultry industry is one of the most developed in the world, there is a misconception that it has little effect on global potential warming because, in contrast to ruminants, their digestive processes do not produce methane. Global warming and climate change have been demonstrated to have a significant impact on the chicken production subsector, despite the industry's little Greenhouse gas emission. One of the most significant environmental factors affecting poultry production globally is heat. Heat stress causes laying hens and broilers to suffer from decreased growth and egg production as well as diminished poultry and egg quality and safety. There is need to campaign to poultry farmers on how to reduce the effects of seasonal fluctuations on poultry production. Extension managers and other development organizations need to educate the poultry farmers more about the effects posed by seasonal fluctuations on poultry production. One way is to put energy-efficient systems, like solar power and energy-saving technologies, into place. Water management strategies that reduce the effects of water scarcity include rainwater collection and effective irrigation.

Keywords: Climate Change, Environment, Gases, Poultry farm

INTRODUCTION
Climate change is a multifaceted, intergovernmental issue that affects many aspects of the biological, environmental, sociopolitical, and socioeconomic fields on a worldwide scale (Leal Filho et al. 2021; Feliciano et al. 2022). Higher temperatures are a result of climate change in several countries. (Schuurmans 2021; Yadav et al. 2015). The earth's climatic issue became much more pressing with the start of the industrial revolution (Leppänen et al. 2014). Animal production and climate change have always had detrimental effects on one another. Because of the effects of rising air temperatures, a shortage of feed grains, and an increase in the prevalence of diseases, climate change may have an influence on animal productivity (Adams et al., 1990; Bowes and Crosson, 1993). However, according to FAO (2006), livestock production is also one of the main contributors to the world's most serious environmental issues.

In the future, there will likely be a greater demand for livestock products (meat, milk, and eggs) due to population growth, increased urbanization, and improvements in human social status. The FAO projects that by 2050, these needs will have at least doubled. Specifically, it anticipates a 70% increase in meat demand and a 50% increase in milk demand (UN, 2019; FAO, 2012). The livestock industry will therefore need more natural resources to meet these demands, which will increase the industry's environmental footprint.

Many species that are monogastric have the capacity to grow quickly, which makes them more useful in industrial farming systems that practice all-in/all-out farming. One species like this is the chicken, whose quick growth has led to consumers favoring its products because of their socioeconomic standing, ethical concerns, religious convictions, customs, and/or food scandals (Font et al., 2014). People's diets are significantly influenced by chickens because many of them substitute poultry for red meat. Additionally, eggs are a highly nutrient-dense food item that is widely consumed globally. Despite the fact that the poultry industry is one of the most developed in the world, there is a misconception that it has little effect on global potential warming (CO_2-eq) because, in contrast to ruminants, their digestive processes do not produce methane. According to Gerber et al (2013), the poultry sector represents 9% (0.6 Gg CO_2-eq/year) of the livestock sector's emissions.

Effect of Seasonal fluctuations on Poultry Production System

Birds that are exposed to high temperatures in the environment experience physiological, immunological, and behavioral reactions that negatively impact their productivity and performance even more. Because of their stunted growth, chickens raised in hot climates can perform poorly and incur significant financial losses from their production (Ahaotu et al., 2017).

Egg Quality

The productivity of laying hens is limited by seasonal variations, which are reflected in both egg production and egg quality. This is because the birds use the energy from feed to maintain a constant body temperature, which lowers egg production and, in particular, lowers egg quality (Okonkwo and Ahaotu, 2019).

Meat Quality

Seasonal variations may have a direct impact on the metabolism of muscles and organs during heat exposure, which may continue long after slaughter. For example, seasonal fluctuations can increase the risks of pale-soft-exudative meat in turkeys, heat shortening in broilers and dehydration in most species. Additionally, modifications to poultry management techniques in response to risks arising from seasonal variations may indirectly result in modifications to the quality of meat. (Uzoma et al., 2019).

Reproductive Performance

Reductions in eggshell thickness and an increase in egg breakage were brought on by seasonal variations in production performance (Ebeid et al., 2012). Research has also demonstrated that seasonal variations lead to a notable decrease in egg weight (3.24%), egg shell thickness (1.2%), eggshell weight (9.93%), and eggshell percent (0.66%). (Uzoma et al., 2019). All stages of breeder cocks' semen production are impacted by seasonal variations (Ahaotu et al., 2017).

Immunity

Recent years have seen a number of studies look into how seasonal variations in poultry affect the immune system. Overall, every study demonstrated that seasonal variations have an immunosuppressive effect on laying hens and broilers. Reduced weights of the thymus and spleen relative to other organs have been observed in laying hens exposed to seasonal fluctuations. Additionally, decreased weights of lymphoid organs and liver have been reported in broilers exposed to seasonal fluctuations (Ghazi et al., 2012).

Disease Incidence

According to Uzoma et al (2019), seasonal variations will change the distribution of diseases worldwide. The occurrence of zoonotic diseases is significantly impacted by high temperatures as well. Variations in the seasons may also result in an increase in insect vectors, a prolongation of transmission cycles, an increase in vector imports, and an increase in animal reservoirs.

Feed quality

Droughts, floods, and extreme heat can all lower crop yields, lower nutritional value, and raise the possibility of weed, pest, and disease outbreaks. More than so-called C4 plants like corn or sorghum, plants with a C3 photosynthetic pathway like wheat, rice or soybeans can gain from higher temperatures (Cui, 2021). According to NASA estimates, maize crop yields will decrease by 24% over the next 30 years (Grey, 2021).

CONCLUSION AND FUTURE OUTLOOKS

The demand for chicken products resulting from population growth is driving the rapid expansion of the global poultry industry. Even though chickens produce some of the lowest emissions of any livestock, this implies that as the human population grows, so too will the poultry industry's contribution to greenhouse gas emissions and climate change.

The increased agricultural output brought about by climate change will benefit certain regions while decreasing others. Data related to logistics and transportation can boost productivity and lessen environmental effect. To find opportunities for optimization, start monitoring your fuel usage, carbon emissions, shipping expenses, and other pertinent data. In many significant markets, including the US and Europe, ESG (Environmental, Social, and Governance) guidelines will become the norm. Pay close attention to international laws, particularly those that apply to your target markets.

For instance, according to Dunkley (2011), the use of propane which is used to raise young birds during the colder months of the year accounted for roughly 65% of greenhouse gas emissions from farms that raised pullets and broilers, but just 0.3% of emissions from farms that raised breeders.

One way to lower electricity consumption and related expenses is to put energy-efficient systems, like solar power and energy-saving technologies, into place. Water management strategies that reduce the effects of water scarcity include rainwater collection and effective irrigation.

Additional difficulties will arise from pathogen proliferation in warm environments. The problem will only get worse as a result of attempts to control antibiotic resistance. To match availability, cost, and nutritional value, producers will need to reformulate frequently.

When faced with stressors such as heat stress, humid environments, pen density, and pathogen pressure, poultry can benefit from the use of phytogenic feed additives as they can enhance their immune response and support gut health. They can also help to naturally support or stimulate a healthy response to problems, with the added benefit of lowering reliance on antibiotics and other medications.

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