



THE SCIENTIFIC CONSENSUS ON CLIMATE CHANGE ON DOMESTIC ANIMALS

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ABSTRACT

There is a strong scientific consensus that the earth is warming and that this warming is mainly caused by human activities. Climate change affecting all the living organisms on the earth including the domestic animals. The productivity and the health of the animals are greatly affected by these altered climatic conditions. Indirectly this is affecting the economy of the farmers or producers and also affecting all the human being as they are largely dependent on the animals for several reasons. Necessary steps should be taken to keep the animals safe from environmental stress. Lastly, trees should also be planted and pollution should be reduced to prevent the climatic change and offer a better future to the next generations.

KEYWORDS: Animal, Climate Change, Global Warming, Consensus, Heat Stress

There is a strong scientific consensus that the earth is warming and that this warming is mainly caused by human activities. This consensus is supported by various studies of scientific opinions and position statements of scientific organizations, many of which explicitly agree with the Intergovernmental Panel on Climate Change (IPCC) synthesis reports.

Nearly all activity publishing climate scientists say humans are causing climate change. (Myers *et al.*, 2021) and (John Cook *et al.*, 2016) Surveys of the scientific literature are another way to measure scientific consensus. A 2019 review of scientific papers found the consensus on the causes of climate change to be at 100%. (Powell *et al.*, 2019) and a 2021 study concluded the over 99% of scientific paper supports on the human cause of climate change. (Lynas *et al.*, 2021) The small percentage of papers that not support with the consensus either cannot be replicated or contain errors. (Benestad *et al.*, 2016)

Presently the animals are also being greatly affected by the altered climatic conditions especially global warming. The major reasons behind this climate change are both natural and anthropogenic activities. But the major changes occurring in the earth especially in the climatic conditions are due to the later one. For the last few centuries, humans have exploited nature brutally. There are already several pieces of evidence that animals, birds and plants are being severely affected by global warming, the latest contribution of the human being to nature. Unless and until the reduction of greenhouse gas emission will be done, the temperature of the earth will continue rising. These altered climatic conditions are

affecting all the living organisms including the domestic animals. (Oreskes, 2004) the health and productivity capability of the animals are being greatly affected. This has a clear negative impact on the economic conditions of farmers and producers. In this paper, we will discuss how the climatic changes are affecting animals and what steps should be taken for its prevention.

EFFECT ON ANIMAL HEALTH

Several studies have been carried out to assess the effect of climate change on animals especially domestic animals. (McMichael *et al.*, 2007) Climate change particularly global warming has affected the health of all the domestic animals and also the human being. The rise in the temperature causes several temperature-related illnesses and also death. In one hand it causes a decrease in production, on the other hand, it causes deterioration of animal health. With the increase in temperature several vector-borne diseases, infectious diseases and foodborne diseases increase rapidly. The high rise in temperature also causes a shortage of animal food in different seasons. The scarcity of food for the animals results in malnutrition. The eventually makes the animals more prone to diseases.

Several researchers have shown that heat-stressed animals has a low level of glucose and non-esterified fatty acids. The animal actually tries to reduce metabolism in its body to reduce the heat production and this reduction of metabolism results in negative energy balance and decreased milk yield under hot conditions. The function of the liver and other endocrine glands are also impaired. The level of cholesterol and albumin are

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disturbed. The metabolic activities in the body are affected greatly by heat stress. The secretion of the saliva is also reduced in the heat-stressed animal due to a reduction in feed intake. So there is always a change of increased acute ruminal acidosis. (Seo and Menldelsohn, 2008)

Heat stress also affects the mortality of the newborn calves. It has been reported by several researchers that higher mortality rate has been observed in summer calves. A possible explanation of this may be reduced colostral immunoglobulin coming from the mother to the calf.

In hot weather, the incidence of mastitis is also increased though the mechanism behind it has not been explained well. A possible explanation may be that high temperature facilitates the survival and multiplication of several pathogens or they are vectors.

Several types of research have been carried out to find the relationship between heat stress and immunity. Some have reported an immune impairment during heat stress whereas some have reported no effect. It has been found that cell-mediated immunity decreases during the stress full conditions. (Ogden and Lindsay, 2016).

Another mechanism that causes impairment of animal health is myco-toxicosis. The warm temperature and high moisture content result in high production of fungus. These fungi produce mycotoxins that can cause different diseases in the animals. The toxins can affect different tissues of the animal like liver kidney gastric mucosa brain reproductive tract etc. The growth rate of the animals is also decreased and the animals become more susceptible to other infections.

EFFECT ON ANIMAL PRODUCTION

Climate change particular global warming has a major impact on the productive performances on the farm animals and affect livestock production globally. (Nardone *et al.*, 2010) at the time of the heat stress, the animals try to reduce heat production from their own metabolism. For this reason, they reduce feed intake to reduce heat stress. This results into decreased weight gain of the growing animals.

The major loss occurs at the time of heat stress is the loss of milk production in the dairy cow. As already discussed above, there is reduced feed intake in dairy animals at the time of the summer which results in a sharp decrease in milk yield. There is a threshold temperature depending upon breed and area above which the milk production of the animal starts decreasing. It has also been observed that high producing animals are more affected than the low producing animals. Besides the

quantity of milk, the quality is also affected. This temperature-dependent decrease in milk production is observed in all the domestic animals including cattle buffalo, sheep and goat.

A reduction in the body size in cattle, buffalo, sheep and goat have been reported by several researchers. The heat stress also affects the growth of the embryo in pregnant animals. The warm climates or hot season also affects the quality characteristics of meat compared to cold seasons. As the animals do not take sufficient feed, the growth is reduced and the animals are often susceptible to different diseases that result in higher mortality. In the case of poultry also higher temperature results in decreased body weight gain and high mortality. Heat stress also reduces the reproductive performance of the laying hens and results in decreased egg production. Different egg quality parameters like egg weight and shell thickness are also compromised.

Water should also be supplied in adequate quantity. Cold water can also be provided to the animals but it should not be chilled. Earthen pots can be used for storage of water and it makes the water cold by natural processes.

The third step we can take is to select the animal which is more resistant to heat stress. It has been noticed that indigenous cattle breeds have more capacity to tolerate the heat. Their body is easily adapted to this type of conditions and the effect of heat stress on the production is also very low. On the other hand, exotic animals are easily affected by the stress and their production is greatly hampered. So, the use of indigenous breeds or crossbred animals should be encouraged.

PREVENTION OF CLIMATE CHANGE

The most important thing we can do to solve the problem is to prevent climate change. It is well known and established fact that the major reason behind the change in the climatic conditions globally is nothing but the anthropogenic activities. In the way towards modernization and civilization the human have contributed largely towards environmental pollution. So we should reduce the exposure of the pollutants to the environment in the best possible ways. Especially we should focus on reducing the emission of greenhouse gases from vehicles, industries and other places.

On the other hand, we should plant trees at a large-scale scale if we want to fight the battle against climate change. Several reports published by several organizations shows that the number of trees per head is very less in India compared to other countries and it is also decreasing at a very rapid rate. We should take steps

as soon as possible to increase the number of trees and decrease the environmental pollution.

CONCLUSION

It is very much clear that climate change is going to be the major problem in the future unless and until we take some steps. Already it has started affecting the productivity of the domestic animals and has hampered lives of other animals species. As the human being is largely dependent upon the animals for several reasons they are also being affected due to these conditions. The demand for animal products is increasing day by day where the productivity is diminishing due to the altered climatic condition. It is affecting the production and the health of the domestic animals and results in a great economic loss to the farmers or producers. We should take steps to save the animals from the detrimental effect of heat stress. Feeding management, housing management and selection of proper breed are the way to fight these conditions. And last but not only animals but also human beings from the harmful effects of climate change in the future.

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REFERENCES

- Benestad R.E., Nuccitelli, Dana, Lewondowky S., Hayhoc K., Hygen, H.O. and Cook John, 2016. Learning from mistakes in climate research. Theoretical and applied Climatology, **126(3)**: 699-703.
- John Cook, Kotcher, John E. and Meyers K., 2016. Consensus on consensus a synthesis of consensus estimates on human-caused global warming. Environmental Research Letter, **11(4)**: 048002.
- Lynas M., Houlton, Benjamin Z. and Perry, 2021. Greater than 99% consensus on human caused climate change in the peer-reviewed scientific literature. Environmental Research Letters, **16(11)**: 114005.
- McMichael A.J., Powles J.W., Butler C.D. and Uauy R., 2007. Food livestock production, energy, climate change and health. The lancet, **370(9594)**: 1253-1263.
- Myers, Krista F., Durean, Peter J., Cook J., Kotcher, John E., Myers and Teresa A., 2021. Consensus revisited: quantifying scientific agreement on climate change and climate expertise among earth scientists 10 years later. Environmental Research Letters, **16(10)**: 104030.
- Nardone A., Ronchi B., Lacetera N., Ranieri M.S. and Bernabucci U., 2010. Effect of climate changes on animal production and sustainability of livestock systems. Livestock Science, **130(1-3)**: 57-69.
- Ogden N.H. and Lindsay L.R., 2016. Effect of climate and climate change on vectors and vector-borne diseases: ticks are different. Trends in parasitology, **32(8)**: 646-656.
- Oreskes N., 2004. The scientific consensus on climate change, Science, **306(5702)**: 1686-1686.
- Powell and Lawrence J., 2019. Scientists reach 100%, consensus on Anthropogenic Global Warming. Bulletin of Science, Technology and Society, **37(4)**: 183-184.
- Seo S.N. and Mendelsohn R., 2008. Animal husbandry in Africa: climate change impacts and adaptations. African Journal of Agricultural and Resource economics, **2(311-2016-5520)**: 65-82.