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EVALUATION OF CLIMATE CHANGE AND LIVESTOCK INDUSTRY IN THE VIEW OF AGRICULTURAL ECONOMICS

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ABSTRACT

The purpose of the research - Climate change is one of the most serious problems for the human beings face and is among the main agenda items in the international arena. This study aims to evaluate the problems that arise with climate change concerning the livestock sector.

The methodology of the research - Various methods examine the relationship between climate change and animal husbandry using different variables.

The practical importance of the research - Examining the relationship between climate change and agriculture sector shows that animal production is responsible for 18% of greenhouse gas emissions measured in CO_2 equivalents. The most important effects of animal production can be listed as a decrease in the quantity and quality of production, an increase in sensitivity to diseases and pests, changes in the reproductive cycle, losses at birth and a decrease in feed efficiency.

The results of the research - Climate fluctuations also decrease animal availability, fertility, and the availability and quality of forage crops and water, and adverse effects on animal production.

The scientific novelty of research - Climate change will have multidimensional negative consequences for animal production in some regions of the world, especially for their nutrition and the continuation of their lives. The results suggest that climatic fluctuations will adversely affect animal production in terms of quality and quantity and will cause economic losses**.**

Keywords- Ecosystem, climate change, livestock breeding, animal welfare, grazing and pasture systems, reproduction in animals

Introduction.

Climate change is one of the biggest environmental problems of our time, mainly due to human activities (Gurbuz and Yildiz, 2019). Greenhouse gas emissions such as CO_2, CH_4, N_2O increase in the atmosphere and as a result of this increase, the artificial rise of the near-earth layers and Earth's temperature is referred to as “global warming”. The change in climatic conditions resulting in global warming such as precipitation rates, humidity, air movements, drought etc. is expressed as ‘global climate change’. Climate change is seen as an important threat to the sustainability of many species, ecosystems and livestock production systems in many parts of the word (Acıköse and Gürbüz, 2018). Some of the impacts of climate change are that regions will be drier, sudden and heavy precipitation events will increase in rainy regions, precipitation regime will change in all regions, and the number and severity of extraordinary events based on seasons will increase.

Animal husbandry activities lead to global warming and are also adversely affected by global warming. Agricultural activities are responsible for about 20% of the world's growing greenhouse gases (Pathak and Wassmann, 2007). Global climate change has caused agricultural production to decline by around 1-5% every decade in the last 30 years. Limited information is available on the effects of animal production as opposed to vegetable production. In general, it is estimated that feed consumption, reproduction and yield levels will decrease depending on the increasing temperature in different animal species. Climate change will increase the susceptibility of animals to diseases while causing mutations in disease and parasitic factors, increased zoonotic diseases and the emergence of several new diseases. Therefore, there is a need for integration in the development of genotypes with

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good adaptability and the ability to overcome environmental stress and improvement of soil and water management in reducing the possible effects of the climatic changes that will occur (Thorne, 2007; Gurbuz and Ozkan, 2020)

Effects of Climate Change on Animal Production Systems.

Extreme weather events and seasonal fluctuations affect animal welfare while causing a decline in yield and reproductive performance**.** Estimates from various climate models suggest that by 2100 the average global temperature could be 1.1-6.4 ℃ warmer than in 2010. The harsh weather conditions (intense heatwaves, floods, and droughts) that animals are exposed to may result in animal deaths in extreme (Gaughan and Cawsell-Smith, 2015)

Animals can adapt to warmer climates, but the response mechanisms that aid survival can have adverse effects on their yield performance. Farm animals perform their best performance between 10-30 ℃. It is stated that there is an average 3-5% decrease in feed consumption of cattle, sheep, goats and chickens with every 1℃ increase above 30℃ in ambient temperature. Pasture-based livestock systems are expected to be more affected by global warming than livestock systems. Because of the solar radiation caused by global warming, high temperature, low rainfall and drought will directly affect pastures and crops. Pasture-based animal husbandry is the preferred system in developing countries and a 25% loss in animal production is projected in these countries (Gurbuz et al., 2019).

Increasing per capita consumption in line with population growth in the coming years will lead to a rise in demand for animal products (Delgado, 2003). By 2050, the world's population is estimated to reach 9.3 billion and more than 60% of this population will live in cities (Bonnal et al., 2022). At this point, to balance between animal production and animal consumption, both the number of animals and the productivity per animal must be increased. To ensure the sustainability of animal husbandry, water use efficiency should be increased against the expectation of decreasing water quantity and quality. For this purpose, water-saving systems should be used in animal and plant production.

The effects of drought are commonly expressed directly and indirectly (Gürbüz and Kadağan, 2019). Direct effects will occur in product harvesting, yield losses in rangelands and forest areas, increased fire hazard, decrease in water reserves, increased mortality in natural habitats, and deterioration in fish, plant and animal habitat (Gurbuz and Macabangin, 2019). Indirect effects will begin to appear as consequences of these direct effects. For example, losses in production, decreased productivity in pasture and forest areas, decrease in agricultural income, rising food and forest product prices, unemployment, migration, breeders ' bank debts, decline in tax revenues and disaster relief programs are some of those effects.

The Relationship between Livestock Production Systems and Ecosystem.

The increase in the world population has also increased the demand for animal products such as meat, milk and eggs. Besides, globalization has facilitated and accelerated the entry of international food chains into local markets, leading to the rapid growth of the animal-based industry. The livestock sector is undergoing a complex process of technical and geographical change. The greenhouse gas emissions from agriculture are 2 times higher than traditional mixed production systems and 6 times higher than pasture-based production systems. 70% of cultivated agricultural areas and 30% of world terrestrial areas are directly related to animal production (FAO, 2006). Approximately one-third of the entire arable land is needed for the production of forage crops, while grazing covers 26% of the world terrestrial area. FAO (2009) states that animal production is one of the most important causes of the world's most important environmental problems such as global warming, degradation

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of land, air and water pollution and loss of biodiversity (FAO, 2009). By 2050, livestock production will grow twice as fast in the developing world as other sub-sectors of agriculture. These problems will continue to increase unless the enterprises convert from the intensive enterprises to the extensive enterprises (Gurbuz and
Tipi 2015)

Effects of Global Warming on Livestock Breeding.

Extreme temperatures adversely affect the animal's production performance (growth, meat, milk, egg yield, etc.), reproductive physiology, metabolism and immune system. The desertification process caused by global warming also decreases the carrying capacity of forage-based cultivated areas and the buffering capacities of agricultural systems. Non-pasture-based livestock systems may face many risks due to high cost based on feeding and low adaptation capabilities of animal genotypes.

High temperature has negative effects on milk quality and quantity in dairy animals and some studies confirmed that higher temperatures shorten lactation period. Also the milk yield and live weight gain of beef cattle in the summer decrease, pregnancy rates of dairy cattle during the summer season decrease by 38% (Nardone et al., 2010). Due to global warming, the animals started their hibernation and spawning period five days early, and the migration period was also reported to be 2-3 days late.

Effects of Climate Change on Animal Health.

As with humans, climate change affects farm animals, both directly and indirectly. Direct effects are temperature-related diseases and deaths. Indirect effects appear as thermal environmental effects on animals, vector-borne diseases, reduced resistance to infectious pathogens, feed/water shortages, and nutrition-borne diseases. Some diseases addressed pose a significant threat to livestock activities due to treatment costs, yield losses and damage to the immune system (Nardone et al., 2010). The amount of saliva produced in animals' decreases and the decrease in saliva HCO_3 (Bicarbonate) content decreases the amount of saliva that enters the rumen, and this leads to a decrease in animal feed intake. In this case, their sensitivity to lower clinical and acute rumen acidosis increases in animals due to heat stress.

Wittmann et al. (2001) found that in research models created after a 2°C increase in air temperature values, Culicoides imicola, which represents the main vector of the bluetongue virus, increased the probability of spreading at a significant rate (Wittmann et al., 2001). On the other hand, it is estimated that the life span of vector ticks and their resistance will increase; therefore, animal diseases will increase. Although it was determined that the risk of getting mastitis is higher in periods when the air temperature is high, the mechanisms that cause an increase in mammary gland infections in the summer months are still not clarified.

The hypothesis proposed to explain this phenomenon is that the increase in temperature caused the survival and proliferation of pathogenic microorganisms. However, it is thought that vectors may facilitate this or that heat stress may negatively affect defence mechanisms (Nardone et al., 2010). An increase in epidemic diseases is also expected due to climate change. It is of vital importance to focus on breeding efforts to develop breeds that are more resistant to the aforementioned problems.

Indirect effects of climate change can occur in the form of feed and water scarcity, nutritional diseases, resistance of infectious hosts, and the spread of vector-borne diseases, which adversely affect the adaptation of animals to changing climatic conditions. High temperatures support the development of pathogens or parasites, while changes in winds can

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lead to the spread of some pathogens and disease carriers over a larger area. Climate change can cause changes in the spread of diseases, some severe diseases can also occur in flocks that are not seen before (Petrovica et al., 2015).

Effects of Climate Change on Reproduction in Animals.

High environmental temperatures adversely affect the reproductive performance of farm animals in both sexes. Approximately 50% of the world's beef is in the tropics. Besides, temperature stress is estimated to cause economic losses in approximately 60% of dairy cattle farms in the world. Temperature stress affects the ovule development of animals by altering LH, FSH and progesterone release during the oestrous cycle.

Exposure of poultry, rabbits and horses to high temperatures causes decreased fertility in these animals.

Generally, emerging points in studies on reproduction can be summarised as; fall in the yield of progeny, the lengthening of the first insemination period, since the estrus could not be detected completely and fall in the pregnancy rate. At the same time, due to high atmospheric temperature and increased body temperature, the amount of blood coming into the uterus decreases. As a result, the intrauterine temperature increases, the rate of fertilization decreases, the embryonic development slows and the increase in early embryonic deaths occurs.

Effects of Climate Change on Grazing and Pasture Systems.

Increasing climate variability and decreasing seasonal differences have a significant effect on pasture-based systems (Nardone et al., 2010). Increased weather temperature will contribute positively to the development of animal husbandry in terms of the expansion of meadows and pasture areas and increase the time of feeding the animals outdoors in regions with previously colder climates. In areas where air temperatures are already high, the production of fodder crops will decrease due to the drought. Besides, the heat stress will lead to the decrease of feed intake in animals and thus the loss of animal yield (Tipi and Gurbuz, 2015).

Effects of Climate Change on Animal Welfare.

Animal health and welfare are an integral part of environmental sustainability in animal production. When the collection, storage and disposal of solid and liquid fertilizer that occurs during animal breeding is not done correctly, they infect the air, over and underground waters therefore negatively affect the environment. For example, approximately half of the methane emission from livestock manure in the world is caused by pork manure (Koyuncu, 2018).

Having animals in hot, stuffy, and poorly cleaned barns and unsanitary conditions will also adversely affect animal welfare. Furthermore, the transport of animals to the far distances for slaughter increases the emission of the transport sector while also negatively affecting the welfare of animals (Gurbuz and Özkan, 2019). Indigenous races are more reliable and more durable than culture breeds raised in industrial enterprises. Therefore, improving the welfare of animals will provide an advantage in overcoming the problems caused by climate change.

Result and Conclusions.

Various methods examine the relationship between climate change and animal husbandry using different variables. However, the general conclusions from these studies are that climatic fluctuations will negatively affect animal production in quality and quantity

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and cause economic losses (Seo and Mendelsohn, 2008; Mauger et al., 2015) These problems that animal production is expected to face in the future could lead to revenue losses for micro-level producers and food insecurity for both producers and consumers.

In parallel, it will have significant effects on the country's economy at the macro level and will result in loss of prosperity (Gurbuz, 2019). Adaptation of animal production to climate change needs to be ensured to minimize all these negative impacts.

Slowing greenhouse gas growth in animal production should be a priority to reduce greenhouse gas emissions from agriculture. There are many different methods of this; using better quality feed and improving animal nutrition according to changes in temperature, developing new breeds of animals resistant to stress, effective manure handling and stocking management, grazing management and pasture improvement are some of these.

These work will both eliminate the low yield from climate change in animal production and reduce the effects of animal production on climate change. Adequate financing and necessary information should be provided for the producers to take the necessary measures. Livestock should be an essential policy focus while tackling many issues such as climate change, land degradation, water pollution and biodiversity loss. Measures to be taken in this context should be planned in their environmental, social and economic dimensions and measures should be taken both at a national level and with international cooperation.

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İQLİM DƏYİŞİKLİKLƏRİNİN VƏ HEYVANDARLIĞIN KƏND TƏSƏRRÜFATI İQTİSADİYYATI NÖQÜMÜNDƏN QİYMƏTLƏNDİRİLMƏSİ

Gülay Özkan

XÜLASƏ

Tədqiqatın məqsədi - İqlim dəyişikliyi bəşəriyyətin ən ciddi problemlərindən biridir və beynəlxalq aləmdə əsas gündəm məsələlərindən biridir. Bu tədqiqat heyvandarlıq istehsalında iqlim dəyişikliyinin yaratdığı problemləri qiymətləndirmək məqsədi daşıyır.

Tədqiqatın metodologiyası - Müxtəlif üsullar müxtəlif dəyişənlərdən istifadə edərək iqlim dəyişikliyi və heyvandarlıq istehsalı arasındakı əlaqəni öyrənir.

Tədqiqatın praktik əhəmiyyəti - İqlim dəyişikliyi və kənd təsərrüfatı arasındakı əlaqənin tədqiqi göstərir ki, CO2 ekvivalentində ölçülən istixana qazı emissiyalarının 18%-i heyvandarlığın payına düşür. Heyvandarlıq istehsalının ən mühüm təsirlərinə məhsulun kəmiyyət və keyfiyyətinin azalması, xəstəliklərə və zərərvericilərə qarşı həssaslığın artması, reproduktiv dövrlərin dəyişməsi, doğum itkiləri və yem səmərəliliyinin azalması daxildir. **Tədqiqatın nəticələri -** İqlim dəyişkənliyi həmçinin heyvanların mövcudluğunu, məhsuldarlığını, yem bitkilərinin və suyun mövcudluğunu və keyfiyyətini azaldır və heyvandarlıq istehsalına mənfi təsir göstərir.

Tədqiqatın elmi yeniliyi - İqlim dəyişikliyi dünyanın bəzi regionlarında heyvan istehsalı, xüsusən də onların qidalanması və həyatlarının davamı üçün çoxölçülü mənfi nəticələrə səbəb olacaq. Nəticələr göstərir ki, iqlim dəyişkənliyi heyvan istehsalına keyfiyyət və kəmiyyət baxımından mənfi təsir göstərəcək və iqtisadi itkilərə səbəb olacaqdır.

Açar sözlər- Ekosistem, iqlim dəyişikliyi, heyvandarlıq, heyvanların rifahı, otlaq və otlaq sistemləri, heyvanlarda çoxalma

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ОЦЕНКА ИЗМЕНЕНИЯ КЛИМАТА И ЖИВОТНОВОДСТВА С ТОЧКИ ЗРЕНИЯ ЭКОНОМИКИ СЕЛЬСКОГО ХОЗЯЙСТВА

РЕЗЮМЕ

Цель исследования - изменение климата представляет собой одну из наиболее серьезных для человечества проблем и входит в число основных пунктов повестки дня на международной арене. Данное исследование направлено на оценку проблем, возникающих в связи с изменением климата, касающихся животноводческого сектора.
Методология исследования - используя различные методы, изучается взаимосвязь между изменением климата и животноводством с применением различных вариаций.
Практическая значимость исследования - рассмотрение взаимосвязи между изменением климата и сельскохозяйственным сектором показывает, что на долю животноводства приходится 18% выбросов парниковых газов, измеряемых в эквивалентах CO2. В качестве наиболее важных последствий животноводства можно перечислить снижение количества и качества продукции, повышение чувствительности к болезням и вредителям, изменения в репродуктивном цикле, потери при рождении и снижение эффективности использования кормов.
Результаты исследования - климатические колебания приводят также к снижению доступности для животных, плодородия, доступности и качества кормовых культур и воды, что отрицательно влияет на животноводство.
Научная новизна исследования - климатические изменения приведут к многоплановым негативным последствиям для животноводства в некоторых регионах мира, в частности, для их питания и дальнейшей жизни. Согласно полученным результатам, климатические колебания оказывают негативное влияние на производство животноводческой продукции в качественном и количественном отношении и приведут к экономическим потерям.
Ключевые слова - экосистема, изменение климата, животноводство, благополучие животных, выпас и пастбищные системы, воспроизводство животных