DOES CATTLE PRODUCTION AFFECT GLOBAL WARMING?

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Vesna Gantner[2], Boro Krstić[3], Ranko Gantner[4], Zvonimir Steiner[5], Vera Popović[6]

Abstract

In all developed countries, an efficient livestock and cattle production sector is required to ensure a consistent supply of high-quality food. According to recent publications, the global livestock business accounts for 14.5% of total anthropogenic emissions, with the cattle sector contributing to 65%. Although it contributes to total emissions, the livestock sector has the potential to mitigate climate change by 14% to 41%. It is important to emphasize that the animal production sector is critical to food production, which is essential to human survival. However, the reliability of these estimations is frequently called into question. There is currently a particularly active campaign against the livestock and cattle production sectors, and it is critical to identify the interest groups behind it and their reasons. The issue must be asked: would there be a drive for artificial or vegan "meat" if there was no intense campaign against livestock farming as the claimed cause of climate change?

Key words: *cattle production, greenhouse gas emissions, artificial meat, veganism.*

Introduction

Animal production is a crucial component of the agriculture industry, but it has an important impact on the environment. Historically, animal production systems were designed to turn waste materials and other resources with limit-

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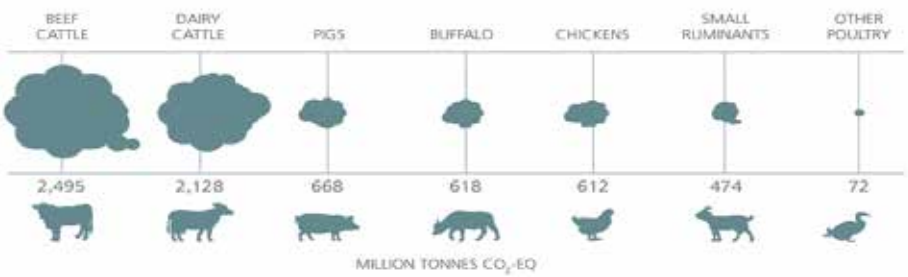
ed alternative uses into edible items and other goods and services. During that period, the relatively small size of animal production systems had a negligible impact on the environment. However, as demand for animal-sourced food grows, the sector has become more intense. As a result, the industry has grown more demand-driven and rapidly growing, eventually leading to the current situation in which it competes with other industries for natural resources. This increase in demand has also resulted in higher environmental repercussions, with the cattle sector frequently cited as being notably resource-hungry.

Given the continuing expansion of the sector to ensure food security for the growing world population, there is an urgent need to reduce its emissions and environmental impact. According to estimates, total greenhouse gas (GHG) emissions from animal production supply chains were approximately 7.1 Giga tonnes of CO2-eq/year in 2005, accounting for 14.5% of all anthropogenic emissions (49 Giga tonnes CO2-eq in 2004). The animal production supply chains produce 2 Giga tonnes CO2-eq of CO2/year or 5% of anthropogenic CO2 emissions, 3.1 Giga tonnes CO2-eq of CH4/year or 44% of anthropogenic CH4 emissions, and 2 Giga tonnes CO2-eq of N2O/year or 53% of anthropogenic N2O emissions, according to IPCC reports (IPCC, 2007).

In terms of species, cattle account for the majority of animal production sector emissions, accounting for approximately 4.6 Giga tons CO2-eq, or 65% of total sector emissions. At the same time, pigs, poultry, buffaloes, and small ruminants have far lower amounts of emissions, ranging from 7% to 10% of sector emissions (FAO, 2013; Figure 1).

Figure 1. GHG emissions related to animal species



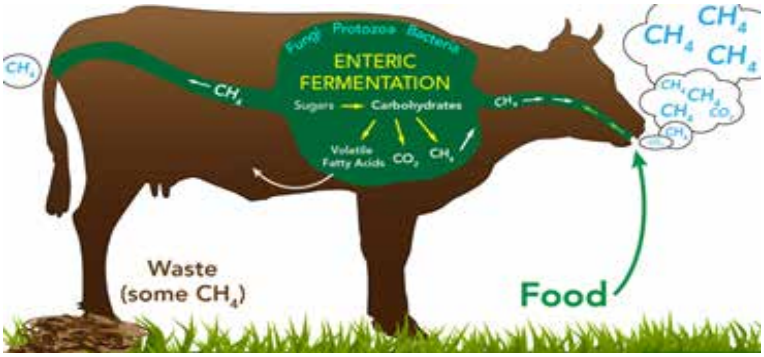
Source: FAO, 2013

When it comes to commodities, beef contributes 2.9 Giga tonnes of CO2-eq or 41%, while cattle milk contributes 1.4 Giga tonnes of CO2-eq or 20% of total sector emissions. These commodities are followed by pig meat, with 0.7

Giga tonnes of CO2-eq (9%), buffalo milk and meat (8%), chicken meat and eggs (8%), and small ruminant milk and meat (6%) products (FAO, 2013).

The main source of greenhouse gas emissions in ruminant production systems is feed fermentation in the rumen (Figure 2) and feed production. Furthermore, pasture-based production systems produce more greenhouse gases compared to farm-based production systems.

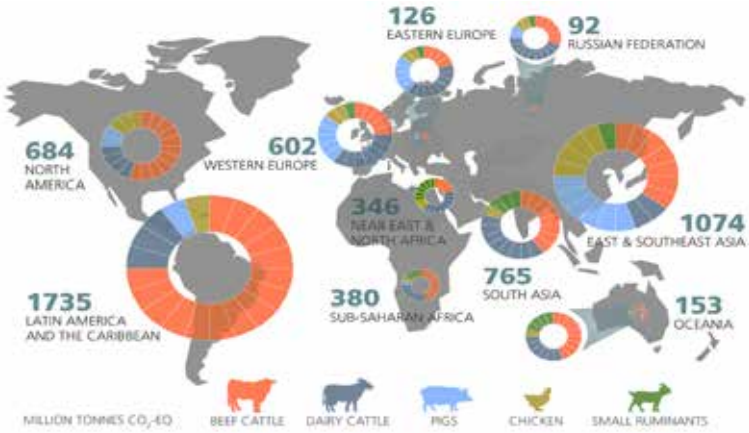
Figure 2. Presentation of gas production in cattle



Source: LTS, 2020

Regional emissions and production profiles fluctuate greatly, and the variances can be attributable to the variable shares of ruminants or non-ruminants in total animal production, as well as alterations in production (and emission) intensities between regions.

Figure 3. Regional GHG emissions related to animal species



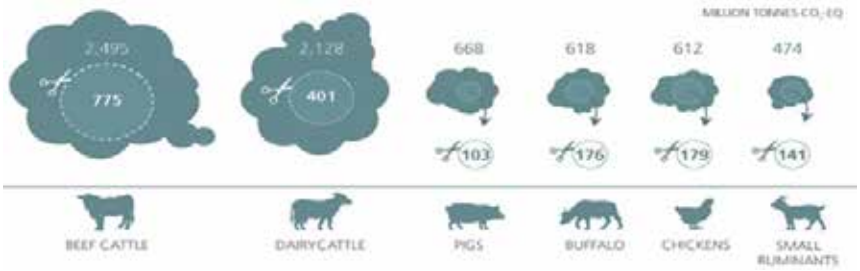
Source: FAO, 2013

The highest level of emissions, with 1.7 Giga tonnes CO2-eq, is caused by the specialized production of beef in the Latin American and Caribbean regions. The lowest emission levels were estimated in Eastern Europe, Oceania, and the Russian Federation, with emissions totalling around 0.1 Giga tonnes CO2-eq. (FAO, 2013, Figure 3).

The intensities of greenhouse gas (GHG) emissions in animal production systems vary significantly between farmers, particularly for ruminant products, as well as pork and chicken meat and eggs. This variation results from a variety of agroecological factors, methods of farming, and supply chain management. According to the FAO (2013), such variation occurs both inside and between agricultural systems. Interestingly, the differences between producers with the highest and those with the lowest emission intensity provide an opportunity to find an adequate mitigation option.

It is generally observed that the lower the productivity, the higher the GHG emission per kilogram of product (Gerber et al., 2011.). For instance, in ruminant production systems, productivity has a strong negative connection with emission intensity. Moreover, higher GHG emissions are mostly caused by reduced feed digestibility, which results in increased enteric and manure emissions, poorer farming practices, and lower slaughter masses. Furthermore, slower growth rates result in more emissions per kilogram of meat produced, but higher age at slaughter leads in a longer life and higher emissions. The global animal production sector contributes to anthropogenic GHG emissions. However, it can also deliver a significant share of the necessary mitigation effort, according to the FAO (2011). Mitigation potential estimates are based on the wide gap in emission intensities that exist globally, regionally, within production systems, and in agroecological regions, as reported by the FAO (2013). The mitigation potential ranges from 14 to 41%, depending on the chosen species, system of production, and geographical location.

Figure 4. Mitigation potential regarding the animal species



Source: FAO, 2013

Does total livestock and cattle production really affect global warming?

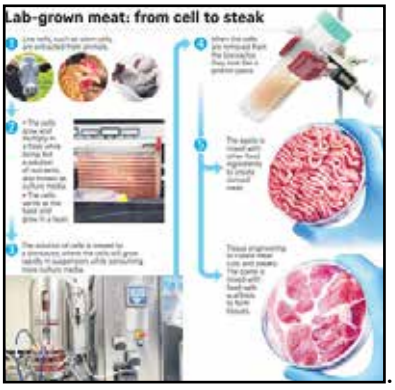
The livestock industry in Europe is a major contributor to greenhouse gas emissions, producing more emissions than all cars and vans in the region combined (Greenpeace, 2020). The same report also stated that the rise in the dairy and meat production over the past ten years has made livestock production sector an important contributor of overall emissions.

Similarly, Ecopeanut (2021), highlighted the negative impact of the livestock industry on the environment, such as emissions, water consumption, deforestation and land clearing, and land occupation. The organization suggested that if people switched to vegetarianism or hunting, 14.5% of all human-related emissions could be offset. However, this solution raises other questions, such as whether there are enough resources to produce plant-based food for the growing human population.

Advocating for the complete extinction of domestic animals, as some lobbies do, would have disastrous long-term effects for the quality and structure of arable land, which cannot be regained by any known substitute to manure. This would directly and automatically threaten existing plant productivity while increasing the number of impoverished people worldwide. In some areas, traditional livestock breeding with acclimatized plant crops is the only viable choice because wheat and corn do not grow. The elimination of domestic animals would also result in significant population migrations, famine, and regional destruction.

Picture 1. Climate crime – the main suspect; the 'solution' to the problem – artificial meat

How and why did we go from producing the most fundamental requirements of all living things, food, to being labelled as those who are destroying the planet?



Artificial meat

'Cultured meat, produced in bioreactors without the slaughter of an animal, has been approved for sale by a regulatory authority for the first time. The development has been hailed as a landmark moment across the meat industry' (Guardian, 2020).

Artificial meat, also known as lab-grown meat, in vitro meat, or synthetic meat, is a product made by cultivating muscle cells in a nutritional serum and helping them to form muscle-like fibers. By applying tissue engineering technologies to the synthesis of muscle for consumption as food, cellular agriculture has set up a new path for manufacturing items normally derived from animals. There are two types of cellular agriculture: tissue engineering-based and fermentation-based. *Tissue engineering-based* cellular agriculture uses cultured meat and leather systems, in which cells or cell lines are extracted from living animals and tissue-engineered generate consumable tissue. The starting material, or cells, can be taken from an animal utilizing a biopsy process or a genetically engineered cell line. *Fermentation*-based cellular agriculture does not include the utilization of living animal tissues. Instead, products are manufactured through fermentation of bacteria, algae, or yeast that have been genetically engineered with recombinant DNA to make organic compounds. These molecules can subsequently be used to create common animal products like gelatine, casein (used in milk), and collagen (used in leather). While cultured meat is an early-stage technology with potential benefits and challenges, there are concerns about its environmental impact. ***The emission, water consumption, and footprint of artificial meat production are still unknown***, and there are no scientific estimates of the extent to which meat production will contribute to the reduction of GHG emissions. Therefore, the claim that artificial meat will save the globe from greenhouse gas emissions is not supported by scientific research. However, it is estimated that the financial turnover on the artificial meat business would reach 140 billion euros within the next several years.

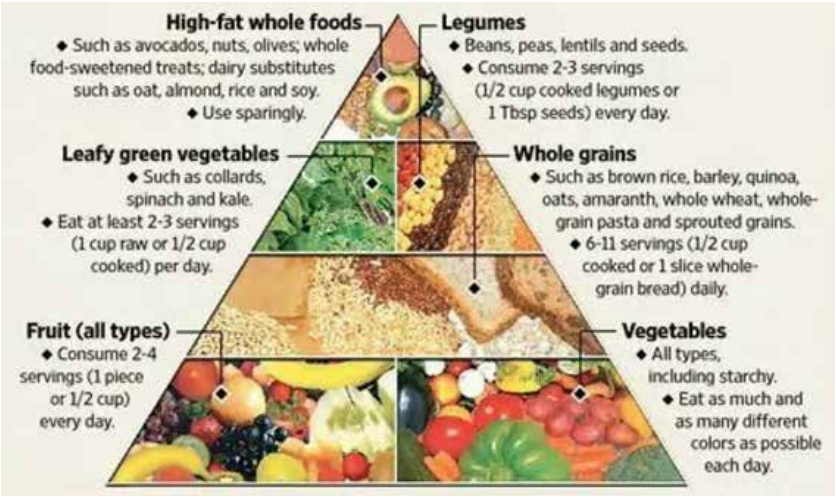
Picture 2. Artificial meat

WOULD YOU CONSUME ARTIFICIAL 'MEAT' IF THERE WAS NO AGGRESSIVE CAMPAIGN AGAINST LIVESTOCK PRODUCTION AS THE CAUSE OF CLIMATE CHANGE?

Plant based diet

As people become more conscious about their health and the environment, plant-based diets have gained popularity in recent years. A plant-based diet is predominantly composed of plant-derived foods such as whole grains, legumes, nuts, seeds, and fruits and vegetables, with little or no animal products (BDA, 2023). While there are several various types of vegetarians, they all prefer to eat plant-based cuisine for a variety of reasons.

Picture 3. A plant-based diet – a food pyramid



Source: Plant-Based, 2023

Many people choose to eat a plant-based diet for a variety of reasons, including personal preference, health concerns, ethical considerations (such as not wishing animals to be harmed), concerns about the environment (based on the belief that animal production has a significant environmental affect), and beliefs related to religion. However, other research suggest that consuming insufficient amounts of animal-based meals may have negative implications. Studies conducted in Guatemala on mothers and new-borns (Casterline et al., 1997) and school-age children (Rogers et al., 2003) demonstrated that little or no consumption of animal-source foods can result in a high vitamin B12 deficiency, resulting in insufficient dietary intake. Severe folate (vitamin B9) and cobalamin (vitamin B12) deficits can have a major negative influence on brain development in infancy and raise the risk of depression in adulthood (Black, 2008). It is also crucial to note that adequate folate intake during pregnancy can minimize the risk of neural tube abnormalities (NTDs) in babies, but severe cobalamin deficiency can impair adolescent behavioural and psychoeducational performance (Black, 2008). Deficits in folate and cobalamin are primarily associated with malabsorption or a vegetarian diet. Black (2008) stated that vitamin B12 insufficiency can have negative consequences on newborn growth, cognition, integration into society, and appearance of depression.

Adopting a plant-based diet is frequently regarded as a more sustainable dietary option due to its possible good environmental effects. Plant production takes fewer resources than animal production, including land, water, and energy which results in a lower carbon footprint and reduced greenhouse gas emissions. In addition, fewer resources are required for plant production, which leads to the conservation of natural resources, ecosystems, and biodiversity.

However, it is vital to highlight that plant-based diets rely mainly on soya derivatives like tofu and tempeh, which are primarily produced in Brazil and India. Unfortunately, this has resulted in significant deforestation and loss of habitats in these regions. According to a new study by Jordan et al. (2022), over 400 square miles (1,000 square kilometers) of Amazon rainforest have been removed during the last ten years in order to expand soya-growing plantations in the Brazilian state of Mato Grosso. Similarly, palm oil, a key component of a plant-based diet, is primarily manufactured and imported from Indonesia, Malaysia, Thailand, and Nigeria, where regional ecosystems have been devastated by destruction of forests and biodiversity loss.

Millions of hectares of forest are cleared for palm oil cultivation, destroying habitat for numerous species. Furthermore, the palm oil business has faced several charges of human rights breaches, including underage labor, widespread sexual abuse and rape, and contamination with hazardous pesticides (Trauger, 2022).

Picture 4. Deforestation in Borneo

Source: Future Environment Defenders, 2023

Picture 5. Plant-based meat

WOULD YOU CONSUME PLANT-BASED 'MEAT' IF THERE WAS NO AGGRESSIVE CAMPAIGN AGAINST LIVESTOCK PRODUCTION AS THE CAUSE OF CLIMATE CHANGE?

Conclusion

According to current studies, the global livestock sector produces 14.5% of total anthropogenic greenhouse gas emissions, with the cattle sector contributing with 65%. Furthermore, the livestock sector has a great potential for mitigating climate change having a mitigation potential of 14–41%, depending on the specific species, system of production, and farming area. We are currently witnessing a very aggressive campaign against the agricultural production sector, especially livestock production, but we have to ask ourselves which lobbies are behind the campaign and for what reason.

The answer is not difficult to find, let's ask ourselves if we would ever think of consuming artificial or vegan "meat" if there was not an aggressive campaign against livestock production, and especially cattle production as the cause of climate change?

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