



INTERNATIONAL
HELLENIC
UNIVERSITY

CAFOs: Climate change and Animal welfare

Maria Emmanouilidou

**UNIVERSITY CENTER OF INTERNATIONAL PROGRAMMES OF STUDIES
SCHOOL OF HUMANITIES, SOCIAL SCIENCES AND ECONOMICS**

A thesis submitted for the degree of
***Master of Science (MSc) in Master of Science (MSc) in Energy Law,
Business, Regulation and Policy***

January 2022
Thessaloniki – Greece

Student Name: Maria Emmanouilidou
SID: 1108200002
Supervisor: Prof. Eftichios Sartzetakis

I hereby declare that the work submitted is mine and that where I have made use of another's work, I have attributed the source(s) according to the Regulations set in the Student's Handbook.

January 2022
Thessaloniki - Greece

Abstract

This dissertation was written as part of the MSc in Energy Law, Business, Regulation and Policy at the International Hellenic University, focusing on environmental issues and mostly on climate change and agricultural sector.

The objective of this dissertation is to provide essential information about the harmful consequences of the current food production system, especially livestock sector and its contribution to climate change. The analysis will focus on the detrimental effects of massive livestock production and mistreatment of the animals on the environment and the overall future results if a positive change, towards cruelty-free policies, is adopted, based on recent data and reports provided by the scientific community. The main contribution of this dissertation is to examine the prospect of an agricultural policy with substantial reduction of animal use in the agricultural sector, in order to achieve both, the humane treatment of animals and the increase of alternative plant-based crops in the overall food production. At the end of this dissertation, we can deduce if this approach could result in the ultimate goal to save the environment and tackle climate change.

To conclude, I want to thank International Hellenic University for giving me the opportunity to participate in the specific Master's program and also all of my professors, who provided me with very useful information about the energy sector and the environmental issues. I am also grateful to Professor Eftichios Sartzetakis, my supervisor, who guided me and helped me throughout the research and writing of this dissertation.

Key words: CAFOs, climate change, animal welfare, sustainability, plant-based diet.

Maria Emmanouilidou

30/01/2022

Contents

ABSTRACT.....	III
CONTENTS	V
I. INTRODUCTION	7
II. IMPACTS OF INDUSTRIAL AGRICULTURE AND GLOBAL CLIMATE CHANGE.....	10
1. LIVESTOCK HAVE HIGH CARBON FOOTPRINT	10
2. LIVESTOCK CREATES NITROGEN EMISSIONS	13
3. LIVESTOCK PRODUCTION IS HARMFUL FOR THE NATURAL ECOSYSTEMS	14
CONCLUSION.....	15
III. ANIMAL WELFARE LEGISLATION AND VIOLATIONS IN INDUSTRIAL FARMING.....	17
1. LEGISLATIVE TOOLS FOR ANIMAL WELFARE IN EUROPEAN UNION	17
2. EUROPEAN COMMISSION'S EFFORTS TO IMPROVE ANIMAL WELFARE	20
3. ANIMAL WELFARE VIOLATIONS IN EUROPEAN UNION.....	22
4. SYSTEMIC AND EGREGIOUS CRUELTY IN INDUSTRIAL AGRICULTURE WORLDWIDE.....	23
IV. CURRENT EUROPEAN UNION AND GENERAL POLICY FRAMEWORK 25	
EUROPEAN UNION'S COMMON AGRICULTURAL POLICY (CAP) - A USEFUL TOOL TO COMBAT CLIMATE CHANGE	25
GENERAL POLICY FRAMEWORK IN AGRICULTURAL SECTOR TO TACKLE CLIMATE CHANGE	29
1. MARKET-BASED POLICIES	29
2. BEHAVIOURAL CHANGE POLICIES	30
3. CHANGE OF PARADIGM.....	34
V. CONCLUSION	37
I. BIBLIOGRAPHY.....	39

I. Introduction

One interesting phrase that might seem extreme but it is ascertained by the scientific data is the following: “a vegan driving a Hummer does more to combat climate change than an environmentalist in a Prius.” It means that an average family emits much more greenhouse gas emissions¹ by eating animal-based products than by driving around. This family could, actually, reduce its GHG emissions if it consumed less meat and drove more, using more fuel. (Cassuto, 2010)

According to recent data agriculture accounts for 18.4% of GHG emissions (Ritchie, 2019) The reason agriculture plays a big role in emitting GHG and polluting the planet is because people moved away from the traditional animal husbandry to achieve efficiency, productivity and profit, with the assistance of the technological development. The farmers, with the assistance of technology and innovations have managed to decrease the cost of production, which is translated into bigger profits on less capital. The current agricultural system motivates the farmers to increase their farm size to achieve lower costs per unit of production and greater profit. (Hribar, 2010) Thus, the Concentrated Animal Feeding Operations (CAFOs) were created. A CAFO is an industrial agricultural facility that confines a very large number of animals, for the production of animal-based products. To be characterized as a CAFO, a farm must first be categorized as an animal feeding operation (AFO). “An AFO is a lot or facility where animals are kept confined and fed or maintained for 45 or more days per year, and crops, vegetation, or forage growth are not sustained over a normal growing period.”² (EPA, 2021) In terms of numbers, in a CAFO can be found over 125,000 chickens, over 10,000 pigs, over 1,000 cows, or similar quantities of animals. (Overcash, 2011) Such practices and numbers of animals justify the term “Factory Farming”.

As the population on the planet grows at a rapid pace, so does the need to feed these people. The global population is currently (in 2019) around 7.7 billion people and according to the United Nation’s projections, will reach 10.9 billion by the end of the

¹ Hereinafter “GHG emissions”

² Definition by EPA US- Environmental Protection Agency

century (Roser, 2019). Unfortunately, humankind's food production is unsustainable. This issue has come up for several years now, but the need for change has never been so pressing. The current food production system is not only contributing to climate change but is also hurting the animals, humans and the natural ecosystem in general.

Livestock emissions accompanied with other current food production practices are damaging the environment compromising humanity's own existence. If the targets of Kyoto Protocol and Paris Agreement are to be achieved, action must be taken now by all the polluting sectors. The target is not only to reduce the GHG emissions but to reach the most optimistic goal, which is to be carbon neutral till 2050. This cannot be done unless drastic changes occur in the agricultural sector too.

Nowadays, according to the statements of EU, plant-based foods are very important for EU's sustainability targets. Their contribution is substantial to reach the environmental goals of the EU Green Deal and the agri-food reform mentioned in the Farm to Fork Strategy. (EAPF, 2020) The European Commission understands the negative consequences of increased animal-based product intake on the environment and the climate, nevertheless, in the proposed 'Farm to Fork' food policy did not recommend any substantial measure to decrease it. (Unit, 2020)

Unfortunately, all the measures taken attempting to address this issue are insufficient. Instead, only by reducing the consumption of animal products, we will be able to see fast results and achieve the goals that have been set in order to tackle climate change. If humankind did not have any other survival dietary option this research would have a completely different context, but it does. According to recent scientific data, livestock sector provides only 18% of calories but covers 83% of farmland (Damian Carrington, 2018). Therefore, the human diet already consists of 82% plant-based alternatives. As a result, humans will continue to survive and surely thrive after reducing (with an effort to eliminate) their animal product consumption.

Animal welfare has also started to receive more attention at European and International level. The industrial farming view animals as insentient beings, destined for human consumption or as parts of the ecosystems, which must be preserved at a minimum level in order to protect the biodiversity on the planet. On the contrary, though, animals are not inanimate objects like for example plants, trees or stones. The animals are like us, humans, they have a brain and a nervous system, thus they can

feel misery, pain, terror, grief, anxiety, joy and happiness. They are also entitled to welfare and protection. Fortunately, many people argue that animal welfare should be taken always into consideration in decision and policy making procedures. (Alexis Carlier, 2020)

Moreover, the huge number of animals in industrial agriculture is directly linked with systemic and egregious cruelty in the sector and thus animal abuse is directly related with climate change. Overgrazing, massive land use to grow feed for the animals, use of tremendous amounts of water for the irrigation of the croplands and soil erosion, are only some of the impacts that the industrialization of food and livestock production has caused to the environment. Also, the expansion of land for agriculture is the leading driver of deforestation and biodiversity loss. The carbon footprint of the above activities is directly linked with GHG emissions, mostly methane, the leading cause of climate change.

The EU has made progress in trying to protect the animals kept for farming purposes. EU has established some fundamental freedoms for them and regulated their humane treatment through legal frontiers. However, in my point of view EU has failed to give the right meaning to the term “protection” because it has failed to provide an effective protection mechanism in order to achieve the enforceability of the respective provisions.

It is vital to change the way we treat the animals, not only from an ethical perspective, but also to protect the environment, avoid catastrophic climate change, and eventually save human lives.

II. Impacts of industrial agriculture and global climate change

In the 21st century, there are a lot of evidence that the production and consumption of farm animals is unsustainable. (Development, 2006) (Johan Rockström, 2009) The global population is expected to increase and the annual income will grow in developing countries. This income growth will have as a result higher animal-based product consumption which will certainly deteriorate the current situation, which is already out of balance and extremely difficult to reverse. (RISE, 2018) In the paragraphs below are presented the most important negative effects of livestock production on the environment. These negative effects also constitute the reasons why more plant-based products must be on our tables from now on.

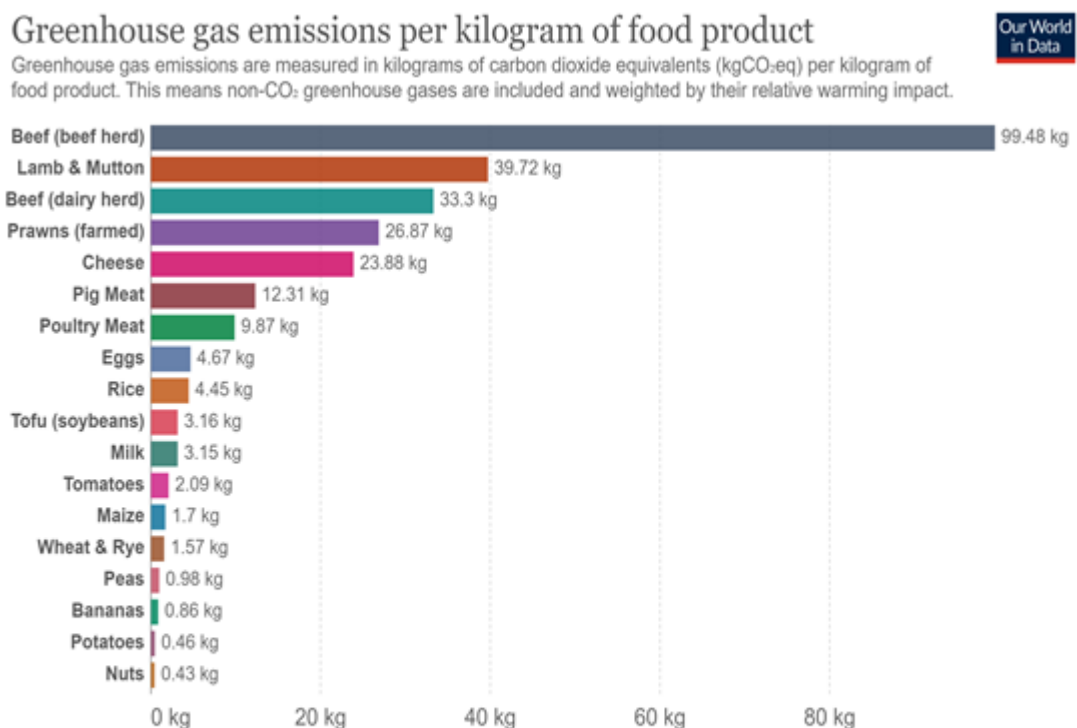
1. Livestock have high carbon footprint

The first negative impact of current agricultural production is the large GHG footprint causing climate change. The main greenhouse gases are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). The CO₂-carbon dioxide is emitted during the production and international transportation of agricultural products. (Vilma Sandström, 2018). The CH₄-methane derives mainly from the enteric fermentation of animals and N₂O-nitrous oxide derives mostly from animal's manure, and from the production of their feed by the use of fertilizers. (RISE, 2018) Liquid manure management cause an increase in methane emissions, while dry manure management (waste stored in fields), is associated with less methane emissions. (Jih-Shyang Shih, 2006) But, we have to note at this point that even dry manure management causes serious problems. The manure stored in land emits ammonia which will eventually transform into ammonia ions and enter into the ground and groundwaters, polluting them both. (Shi-Ling Hsu 2015) Given the above observations, it becomes clear that the production of meat pollutes heavily the environment. Therefore, we could start eating foods that don not harm our planet. For instance, instead of feeding plants to livestock we could eat the plants directly ourselves. In terms of nutrients, vitamins and minerals the animals are just the middleman. If we consumed the plants directly, we would receive all of the nutrients in our diet without the negative effects, like diseases, and health risks which accompany the animal flesh consumption. Consequently, the

quality of our food would be much better and we would not damage the environment at the rate we do now. The animals can eat grass, unlike humans, but they need a large acreage of land for grazing. On the contrary, the land required to grow plant-based foods is significantly less. (RISE, 2018)

Beef and lamb production have the highest GHG emissions, while in the second place comes the pork and poultry. Instead, pulses such as beans and lentils emit around 24 times less GHG emissions. Industrial farming produces only 18% of global calories and 37% of protein, but emits more than half of total food’s GHGs. In general, even meat with the lowest GHG emissions still emits much more than the highest emitting plant-based foods which are high in protein. (COP, 2021)

As demonstrated at the figure 1 below animal-based products such as beef, lamb, prawns, cheese, pig meat, poultry meat and eggs produce the highest GHG emissions (measured in kilograms of carbon dioxide equivalents) per kilogram of food product. On the contrary, the contribution of the plant-based products is substantially less. These data indicate the problematic nature of the current food production system.



Source: Poore, J., & Nemecek, T. (2018). Reducing food’s environmental impacts through producers and consumers.
 Note: Data represents the global average greenhouse gas emissions from food products based on a large meta-analysis of food production covering 38,700 commercially viable farms in 119 countries.
 OurWorldInData.org/environmental-impacts-of-food • CC BY

Figure 1. Source: Poore, J., & Nemecek, T. (2018). Reducing food’s environmental impacts through producers and consumers. *Science*, 360(6392), 987-992. - Our World in Data. <https://ourworldindata.org/environmental-impacts-of-food?country=>

According to the figure below, the meat production worldwide in the period from 1961 to 2018 increased from 55 million tonnes to more than 300 million tonnes. Also, the meat supply per person used to be 23kg and now is 43kg and the human population has grown from 3 billion to 7 billion people. (COP, 2021) The mass meat production in industrial agriculture has rapidly increased the number of animals raised for human consumption. For example, in the United States, only, 9.5 billion animals are killed for food each year. (Cassuto, 2010). The number of animals slaughtered, globally, in 2018, has drastically increased. More analytically: around 69 billion chickens, 1.5 billion pigs, 656 million turkeys, 574 million sheep, 479 million goats, and 302 million cattle were slaughtered for meat production. (Roser, 2019)

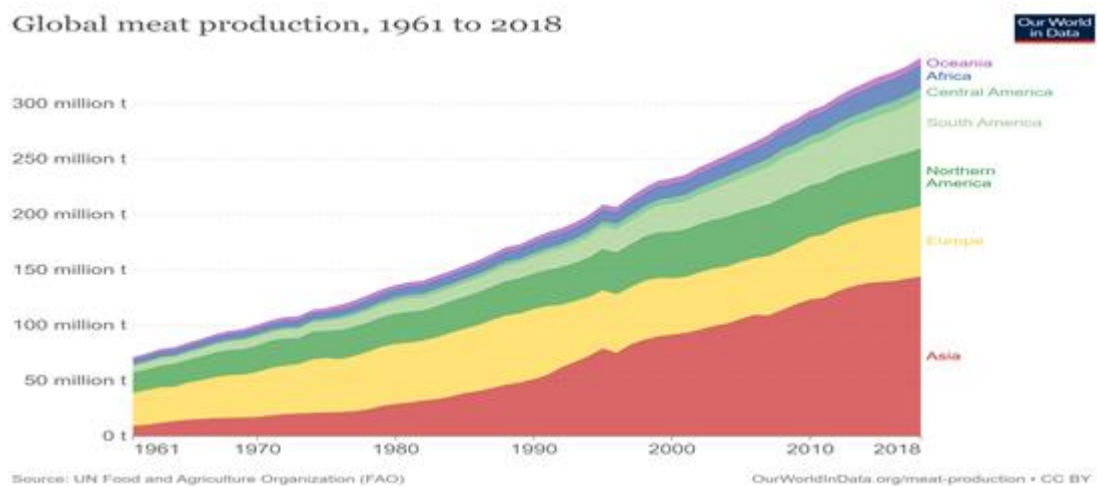


Figure 2. Source: Food and Agriculture Organization of the United Nations (FAO) (2020)-Our World in Data <https://ourworldindata.org/meat-production>.

2. Livestock creates nitrogen emissions

The second negative impact of current agricultural production is the accumulation of nutrients like nitrogen, phosphorus and their compounds, which cause eutrophication and also pollute heavily the water we drink and the air we breathe. (RISE, 2018) For example, the manure from pigs contains more pathogens and antibiotics than human waste, but in industrial farming the manure instead of going to sewage treatment facilities most of the times ends up directly into the ground and eventually into the groundwater, rivers, and lakes. This whole cycle pollutes also the air we breathe, causing for example respiratory problems and antibiotic resistance. For example, 5,000 pigs produce the same amount of raw waste as 20,000 people. These data make industrial farming problematic for the environment and its regulatory supervision is of utmost importance. (Cassuto, 2010)

One of the main reasons industrial farming's GHG emissions are so high is that it requires a large number of petroleum-based fertilizers and other chemicals. These fertilizers are used to grow faster the animal feed. The analogy of energy input to output for factory animal products can be 35:1, which means that it requires 35 units of energy to produce only one unit of energy from meat. (Commision, 2008)

A drop in livestock production can result in a considerable reduction in the nitrogen leakage. A reduction of less than 50% in all animal-based product consumption, will decrease the use of fertilizer from 11.3 to 8.0 million tonnes, while emissions of nitrates to waterbodies and ammonia (NH₃) to air will drop by 40%. Changing our dietary patterns not only can reduce nitrogen emissions but can also lead to many positive results. (James N. Galloway, 2008) In the territories where the livestock production is increased the reduction in nitrate and ammonia accumulation will be also significant more. Less nitrogen emissions will improve the water quality and decrease the risk of eutrophication. For instance, the total nitrogen load to waterbodies in EU in 2005 was around 4.6 million tonnes, half of which derived from agriculture. (Bruna Grizzetti, 2011) Beside the efforts for improvement the recent years, the limits for nitrate in fresh water and marine systems are generally surpassed. In terms of numbers, the World Health Organization nitrate acceptable limit for drinking water is 50 mg per litre. Unfortunately, the nitrate accumulation in the

shallow groundwater is generally higher than this acceptable threshold. (H. J. M. van Grinsven, 2012) (Henk Westhoek, 2014)

3. Livestock production is harmful for the natural ecosystems

Third, livestock production is harmful for the natural ecosystem in general. It reduces the biodiversity on the planet by not leaving enough land to the non-farm animals, which is essential for their survival. (RISE, 2018) Farmland covers 50% of Earth's habitable land, and the vast majority of that farmland is used for livestock and their feed. Industrial farming threatens the wildlife by causing natural habitat loss. Moreover, It causes degradation of soils by production of livestock and cultivation of feed for the farm animals. One other harmful effect is that industrial farming is the main cause of deforestation. Livestock, and especially beef production endangers the survival of tropical forests. Consuming more meat means that more natural habitat needs to be deforested in order to become soy or corn crops. Contrariwise, reducing animal product consumption could free up land which could return to its previous form as natural land or forest to save the wildlife and store carbon. (COP, 2021)

At least half of the worlds rare species of plants and animals can be found in forests. Such ecosystems not only should be left untouched but should also be protected from human intervention. They play the most significant role in the global carbon cycle and thus in preserving the global climate. They also constitute our major weapon against the climate crises and more than three-quarters of the world's accessible freshwater comes from such forests. (Jonathan A. Foley, 2007). For example the production of soybeans, used as feed for the farm animals, in the forest region of the Amazon raised by 15% per year from 1999 to 2004. The agroindustrial expansion in Brazil is going to continue, wich threatens to preserve the Amazon deforestation. This expansion resulted in the increase of animal production which simultaneously reduced the price of Brazilian agricultural products and increased the demand for Brazilian beef and soybean. (Philip K. Thornton, 2010)

Conclusion

The magnitude of the above negative impacts are closely related to the development of industrial agriculture and rapid growth of population, therefore, growing demand for animal products. Around the world, the animal-based product demand is increasing and it is expected to reach a 70% growth by 2050. This growth of demand will increase the production and the GHG emissions from the agricultural sector. Moreover, soil erosion and degradation, deforestation, animal waste and air pollution, water depletion and pollution are also some of the most serious problems of CAFOs. (Cassuto, 2010)

The climate crises has started, at last, to take the place it deserves in policy making procedures. However, one food system policy idea has not received sufficient attention: the direct funding of farm transitions from CAFOs to plant-based operations. Livestock-to-plants farm transitions follow the model of successful sustainable energy policy (Manny Rutinel, 2021). In policy discussions, the world is focusing on the energy sector, which is rational because it is responsible for the largest percentage of GHG emissions. Surprisingly, the next sector receiving more attention is the transportation sector, overlooking the fact that GHG emissions from agriculture surpass those from transportation. (Cassuto, 2010) Instead, the agricultural sector remains almost unregulated or “virtually” regulated.

The meaning of the term “regulate” has to be clear. In order to effectively reduce GHG emissions from the agricultural sector we must reduce the animal products, that is, both consumption and production, and therefore ultimately reduce the number of animals worldwide. It is vital that the effort will be at a global level because climate change is not a regional threat. If the states start to apply animal welfare standards and close monitoring in the industrial agriculture and CAFOs, the livestock numbers will drop, effortlessly. In addition, we will achieve reduction in GHG emissions, improvements in health and welfare for animals and humans and less land use. Moreover, we combat deforestation and expand the natural carbon sink in our battle to tackle climate change.

A clear example for an unregulated agricultural sector is the USA in which the animal welfare laws do not apply in the agricultural sector and factory farming. When referring to “virtually” regulated a good example is European Union. EU is considered

to be pioneer in the agricultural sector regarding the legislation and the measures that have been set. Indeed, there are numerous regulations and directives attempting to establish minimum animal welfare standards for the farm animals. It is unquestionable that some progress has been made but not at a rate capable of substantially reducing GHG emissions. Most of these minimum standards are not followed by the industry, because regardless of EU's good intentions it has not established an adequate monitoring mechanism and has failed to provide the right motives and incentives for that. This whole attempt is also not in line with the common agricultural policy (CAP) because of the direct payment measures and coupled agricultural subsidies-voluntary coupled support (VCS) which will be examined at the next chapter. Now lets focus on the animal welfare legislation and its violations.

III. Animal welfare legislation and violations in industrial farming

So far, we have established that the industrial agriculture and the CAFOs have tremendous negative effects in the environment and contribute substantially in the climate change. We also made a proposition that the most effective way to achieve drastic changes in the agricultural sector and reduce GHG emissions is by decreasing the animal-base products consumption and production. To address the production side in the industrial agriculture, one proposition is to establish fundamental rules for animal wellbeing, to further improve the existing animal welfare legislation, and most importantly to start actually enforcing it, with adequate and effective monitoring and severe sanctions, as an answer to violations. Let's, now, examine the European Union's animal welfare legislation where the agricultural sector is heavily regulated.

1. Legislative tools for animal welfare in European Union

Many years ago, some people understood that animals are sentient beings and they are not treated accordingly, mostly in the farming industry. This is the reason they established some fundamental freedoms in order to provide them a safer environment, otherwise, a path to their welfare. Most of these freedoms, unfortunately, exist only in theory and not in practice. Animals in general must receive enough water and quality food and be protected from thermal and physical discomfort. People must abstain from any kind of "unnecessary" animal cruelty. Moreover, animals are entitled to behave normally under any circumstances and avoid feeling fear and anxiety. (Deborah Temple, 2020) The main EUs legislative tools attempting to include some of these freedoms for the farm animals are presented below.

Article 13 of the Treaty on the Functioning of the European Union (TFEU) recognizes animals as animate beings and demands that animal welfare be respected when forming and applying some EU policies. This article is not a legal binding provision for protecting animals, however, introduces the responsibility of the Member States and the European Union, to make sure that the animal welfare is taken into consideration

in some EU policies, such as agriculture, the internal market and research³. The main body of EU legislation on animal welfare applies to farm animals and has been enforced in the Member States through numerous Directives and Regulations (Document, 2021).

In 1974 we have the first EU Directive providing the minimum protection of animals at slaughterhouse⁴, which currently is no longer in force because of the implementation of the Council Regulation (EC) No 1099/2009 on the protection of animals at the time of killing. Next, in chronological order, is the European Convention for the Protection of Animals kept for Farming Purposes, signed in 1976. (Document, 2021)

Moreover we have the Directive 98/58/EC for the protection of animals kept for production or other farming purposes⁵. Specific Directives also provide guidance for farming activities. These Directives have banned certain cruel methods of animal's confinement in the industrial farming, for example individual pens for calves or bare cages for laying hens. They also designate the minimum required space for each animal and generally set out measures regarding animal management. Numerous Directives also enforce minimum standards for the protection of pigs⁶, calves⁷, laying hens⁸ and

³ Article 13 of the Treaty on the Functioning of the EU states that "In formulating and implementing the Union's agriculture, fisheries, transport, internal market, research and technological development and space policies, the Union and the Member States shall, since animals are sentient beings, pay full regard to the welfare requirements of animals, while respecting the legislative or administrative provisions and customs of the Member States relating in particular to religious rites, cultural traditions and regional heritage."

⁴ Council Directive 74/577/EEC of 18 November 1974 on stunning of animals before slaughter.

⁵ "The Farm Animals Directive".

⁶ Directive 2008/120/EC, "the Pigs Directive".

⁷ Directive 2008/119/EC, "the Calves Directive".

⁸ Directive 1999/74/EC, "the Laying Hens Directive".

chickens for meat production⁹. Moreover, a Regulation is dealing specifically with the transportation of animals¹⁰, while a Directive addresses the issue of animal killing¹¹, providing specific acceptable killing practices, in order to protect animals from suffering. Some other examples of EU legislation where animal welfare is considered are: Regulation (EC) No 73/20099 (on cross compliance under the CAP)¹², Regulation (EC) 1254/199910 (on export subsidies for live cattle)¹³ and Regulation (EC) No 1698/200511 (on support for rural development)¹⁴. (Commission, 2010)

However, the differences between farming systems, weather and geographical areas in Member States of EU which have not been taken into account when forming the EU legislation have caused the uneven enforcement of the provisions regarding animal welfare. Also, if we add to this the existing gaps in the legislation, EU has failed to ensure the minimum protection standards for the farm animals, throughout its whole territory. In some countries the rules and measures are followed and the monitoring is stricter, but in other Member States the farmers do not apply the animal welfare standards and thus the protection of animals is uneven. The fact that there is not correct and even enforcement of the legislation creates disadvantages in competition between the EU farmers. (Document, 2021)

⁹ Directive 2007/43/EC, “the Broilers Directive”.

¹⁰ Regulation (EC) No 1/2005 protection of animals during transport, “the Transport Regulation”.

¹¹ Directive 93/119/EC, “the Slaughter Directive”.

¹² Which replaced Regulation (EC) No 1782/2003 on common rules for direct support schemes and establishing the cross-compliance system whereby CAP payments are reduced or in the most severe cases even completely withdrawn if beneficiaries do not respect EU legislation.

¹³ Whereby payment of the refund for exporters of live bovine animals is subject to compliance with EU legislation concerning animal welfare.

¹⁴ Support for rural development, which contains a specific measure to compensate farmers for applying measures in the framework of national rural development programs that go further than the minimum requirements.

2. European Commission's efforts to improve animal welfare

Nowadays with climate change being the centre of attention, achieving the targets of Paris Agreement¹⁵ is crucial and most countries in the world have committed to this goal. Specifically, EU launched its new policy in order to be in line with the latest developments. In order to achieve the temperature target of Paris Agreement the GHG emissions must reach their maximum level by 2020 and then start to reduce, reaching their zero level by the end of the century. (Patricia Espinosa) This is why European Union's new policy framework- the so-called Green Deal-has the optimistic goal of making Europe climate neutral till 2050. The goal is to review each existing law on its climate implications and enforce new legislation focusing on green technology and innovations and proceed with environmentally friendly reforms in every polluting sector with the ultimate goal to tackle climate change. Among the initiatives of the Green Deal are the new CAP and the Farm to Fork policy, both of which indicate the link between agricultural sector and food production with climate change. Generally, among other measures taken under these policies the European Commission would like to form and implement a simpler legislative framework, focusing on actual animal welfare results. In order to do so, education is the key. All member states should be well-informed and include professional guidance and help in order to achieve the desired animal welfare standards in all of the parts of the livestock production chain.

The EU' goal is to address effectively the lack or the uneven implementation of the animal welfare standards, make the livestock industry understand that respecting the welfare of animals is of high economic importance and also very beneficial for them and the EU, as a whole, and that improving animal welfare, in the industrial farming, is the only solution for a sustainable future. The Commission's methods to ensure the compliance of Member States include the increase of the inspections and monitoring, and the creation of an informative network, where the Member States can exchange information, scientific guidelines, practices and techniques in order to apply the animal welfare standards. Moreover, as we mentioned above, education plays a big role in this

¹⁵ The Paris Agreement goal is to limit global warming to well below 2°C with efforts to limit it to 1.5°C. (European Commission, Climate Action- Paris Agreement - ec.europa-official website of EU)

transition and the existence of trained personnel is crucial. So, each one of the interesting parties of livestock production chain should receive adequate education on how to protect the animals and their wellbeing. Moreover, EU promotes and reinforces international cooperation by emphasizing the importance of animal welfare and makes continuous efforts to include it in international treaties and conventions. In addition, EU acknowledges the fact that consumers have the power to guide the market towards the right direction, thus tries to provide consumers and the public with appropriate education and information, paying also a lot of attention to the younger generations. Children and teenagers should learn to protect, respect and care for the animals in order not only to reform the food system in the future but to change humanity's perception of animal utility in a holistic approach. In addition, tries to make EU laws on farm animals more approachable to the public to make sure that they are not misled by false animal welfare reassurances. Accurate food-labelling and certificates are also contributing towards this goal. (Auditors, 2018)

The European Commission's Audit is the body of EU responsible for examining the implementation of the legislation in force and reporting whether there are gaps, violations or unlawful practices. These tasks are realized through inspections, monitoring and complaint reports. At the end, it makes recommendations regarding the legislation, highlighting the weaknesses and proposing necessary changes. A specific audit examined the animal welfare and the overall implementation of the latest EU strategy. According to the report: "progress has been slow and there are still a number of weaknesses regarding the application of the minimum standards of animal welfare required by the legislation, even where the legislation has been in force for up to 18 years." (Auditors, 2018)

Although the above measures are helpful to improve animal welfare, they are not able to achieve the required drastic changes. It is clear that European Union is unwilling to interfere directly with the production chain and reduce the meat consumption through more aggressive policies. For instance, EU could set a maximum threshold in the number of animals kept for farming purposes or tax uniformly, in all Member States, the animal based products in order to incorporate into the prices all externalities created, such as their carbon footprint and contribution to climate change.

3. Animal welfare violations in European Union

The truth is that, although EU follows the right direction, farm animal abuses are widespread including many forms of cruel techniques. Factory farms are particularly problematic, as the report (EU action on animal welfare: close the gap between ambitious goals and implementation on the ground-2018) by the European Court of Auditors (ECA) reveals, with economic interests often prevailing over welfare rules. (ECA, 2018) Janusz Wojciechowski, member of ECA committee responsible for the report, quoted in an interview: “It’s difficult to introduce improvements on intensive farms and enforce laws. In intensive farming systems the risk for animal welfare is increased. When there are 100,000 pigs it is very difficult to control. Small farms are easier places to achieve high animal welfare standards. Unnaturally high number of animals living together leads to aberrant behaviour in laying hens such as feather pecking and cannibalism, aggression and tail biting in pigs and aggression in calves. To address that behaviour it is common practice to perform painful physical alterations in particular beak trimming, tail docking, castration and teeth clipping.”¹⁶ (Kevany, 2018)

In various farms of some EU countries e.g. Germany, Romania, UK and Italy the EU inspectors found many examples of pig tail docking, a common painful practice in industrial farming. The EU has banned this cruel practice since 2001, but, as we can deduce by the results of the inspections, it remains a mainstream and common practice for the factory farming. Something worth mentioning, is that one Romanian farm continued to apply the tail docking technique and at the same time was receiving EU funding to improve animal welfare.

The procedures and practices followed in slaughterhouses are also raising a lot of concern. For example when the ECA team visited one slaughterhouse in France the operators and the workers were not using the acceptable killing practices, like the “front of head stunning” which leaves the animal unconscious immediately and without causing any pain or suffering, instead, they were using a controversial

¹⁶ Janusz Wojciechowski, ECA member responsible for the report (EU action on animal welfare: close the gap between ambitious goals and implementation on the ground-2018) commented in an interview with Sophie Kevany (The Guardian Wed 14 Nov 2018).

technique on calves at the back of the neck which is called “occipital stunning”. The inspectors also found some other killing techniques that are not acceptable as they constitute non-stun killing methods, like “waterbath poultry stunning” where the hens are killed through electrocution. Following such methods and techniques slaughterhouses can increase productivity by making the killing process faster but painful for the animals. They kill more animals at a specific time and they decrease their expenditures by not following the stunning process. The non-stunning process is indeed a serious problem in European Union, inspite the fact that it is illegal in the most Member States. (Kevany, 2018)

To conclude, the above mentioned examples are only some of the many animal welfare violations in European Union and increasing the insepections is not alone enough for addressing the problem. Wojciechowski, in this interview, gave the solution to the problem, he said “ We need a long term vision. Not for seven years, but for 30. If that vision is of intensive farming, the risks animals will be badly treated is higher.” So, the root of the problem is the industrial farming and we have to make the inevitable drastic change to abolish it. As a reminder, he mentioned Mahatma Gandhi’s words “The greatness of a nation can be judged by the way its animals are treated.” (Kevany, 2018)

4. Systemic and egregious cruelty in industrial agriculture worldwide

Needless to say, the violations occurring in European Union are common policy for the rest of the world too. CAFOs do not seem to care about the misery and suffering of farm animals. Their false perception of animals’ ownership and their denial regarding animal’s sentience make them view farm animals only as agricultural commodities and nothing more (Law, 2008) The examples of animal cruelty are countless. Many organizations¹⁷ throughout the world are participating in operations to expose any form of animal cruelty. It is necessary to distinguish between two different types of cruelty— systemic cruelty and egregious cruelty in agricultural sector.

¹⁷ E.g., PETA (People for Ethical Treatment of Animals)-
<https://www.peta.org/investigations/>.

1. *Systemic cruelty* is the legally acceptable cruelty that animals endure, as a routine, every day in factory farming. The specific nature of industrial agriculture makes the suffering of animals to seem necessary for the animal food production. The conditions in which animals are kept confined are unexemptable. In most cases they do not have enough space to move around, not even lay down. They are forced to stay on their feet for extreme periods of time. Their feed is destined to make them fat and big in a short period of time. Moreover, adding sugar to their feed to make them eat more, is a common practice in factory farming. This fattening process is also achieved through injections with a number of steroid hormone drugs. The killing process is also something unspeakable and as we mentioned above, although theoretically the cruel killing methods have been banned in EU, this is not the case for many countries around the world. In CAFOs worldwide, the workers continue to slaughter the animals using the most horrific ways while they are still conscious. All of these practices are justified by the huge number of animals, confined in such facilities, in order to satisfy the growing demand for animal-based products. The animal welfare standards are directly associated with increased costs and less efficiency in industrial farming. (Mary Maerz, 2020)

2. *Egregious cruelty*, on the contrary, is referring to episodic and individual acts of employees in factory farming. These are hideous, unjustified, pure acts of cruelty against farm animals such as beating, kicking, bludgeoning with objects or dismembering. These acts might be the result of boredom, amusement, worker's need to inflict pain, to feel dominant and exercise power. A growing number of workers in the industry tend to behave like this and the most reasonable explanation, is their constant presence in a cruel environment where the animals suffer and get killed anyway. Animal protection organizations have exposed countless incidents of specific, egregious animal cruelty. This mistreatment of animals is unsurprising in a system where efficiency is the top priority. (Mary Maerz, 2020)

IV. Current European Union and general policy framework

In this chapter we are going to examine the current EU policy framework focusing on the Common Agricultural Policy (CAP) which is the basic funding mechanism of agricultural sector. We will discuss some problematic areas and provide potential solutions to reform the CAP in order to better serve its purpose, to combat climate change. Following, we will recommend some other general beneficial policy measures to reduce GHG emissions from agricultural sector.

European Union's common agricultural policy (CAP) - a useful tool to combat climate change

The Common Agricultural Policy regulates and covers the agricultural sector in European Union with the overarching aim to ensure food security, environmental sustainability and the development of rural areas. The CAP has some funding mechanisms to achieve its targets, the most important are the direct payment scheme, which provides income support for farmers and is linked with specific requirements and the voluntary coupled support (or subsidies) (VCS). (Commision, 2017)

The CAP is very important for animal welfare, when it is used as requirement for receiving the EU funds. The EU in 2016 spend around €46 billion as direct-CAP payments to achieve environmental protection, animal welfare, and public health. Unfortunately, the direct payments in many cases do not ensure the animal welfare. For example, the CAP protects calves, pigs and sets general requirements for all farm animals but it does not include most of the poultry farms and some pig farms in certain Member States. As a result, many farmers that do not receive the relevant CAP payments, do not suffer any sanction when using not acceptable practices. (Auditors, 2021).

The paradox is that, although, CAP tries to promote sustainable agriculture, apply environmentally friendly practices, improve animal welfare and reduce GHG emissions, at the same time adopts measures that have the totally opposite effect, to maintain or increase greenhouse gas emissions driven by livestock. The direct payments and the VCS are linked with increased production of livestock. All Member States use around 7

% and 15 % of their direct payments in the form of VCS, which supports livestock farming. VCS gives motives to the farmers to keep the livestock numbers and the production at the same level and thus ensuring that EU's animal-based products are competitive at the international markets. VCS accounts for 10 % of direct payments, €4.2 billion per year. (Special Report-CAP, 2021)

The EU's goal for the 2014-2020 CAP was to lower the GHG emissions from agriculture and spend €100 billion of CAP funds for this purpose, but the goal has not been achieved. The CAP does not give motives to reduce the livestock numbers because this is not its goal. However, reducing the livestock production would lower emissions from feed digestion, manure storage, but also from fertilisers used in feed production. It would, also, reduce the arable land which is used only to grow feed for the animals. Instead, the CAP measures include promotion of animal products. (Special Report-CAP, 2021)

Nowadays, the European Green Deal and even more the Farm to Fork Strategy, which are the EU's new policies in order to be in line with the targets of Paris Agreement, require changes and adjustments to the CAP, because agricultural policies, should be in close cooperation with other related policies in order to effectively combat climate change. The Farm to Fork strategy is focusing on the changes that must be done to support the most sustainable, low carbon-footprint methods of livestock production. It also promotes a dietary shift to plant-based foods. (Special Report-CAP, 2021)

The new CAP should address the issue of VSC and link the direct payments with more aggressive changes in the agricultural sector. According to recent research VSC must be removed but it is vital for keeping EU's production competitive to the production outside of the EU. According to the economy principles, if VCS in EU is removed, which is a production funding, the domestic meat production will decline. This drop in production, while the demand is kept intact, will cause an increasing import dependency from the countries outside of the EU. At the same time EU will use its decreased production to cover its own needs, thus the EU exports of animal products will drop as well. The overall reduced production worldwide will cause a rise in prices in international markets and this will incentivize other countries outside of the EU to increase their production to cover the demand. This phenomenon is called emission

leakage. Although EU will not produce as much GHG emissions, the amounts of GHG emissions worldwide will remain the same, if not increase, and will just be reallocated outside of the EU. (Markusen, 1975) (Zhong Xiang Zhang, 2012). So, the positive effect of removing VCS and reduce the meat production and GHG emissions in EU will be offset by the increased total GHG emissions outside of the EU. (Torbjörn Jansson, 2020) (Special Report-CAP, 2021) This is why similar measures must be taken collectively by the States throughout the world and support each other in such efforts instead of competing to gain more profit. But if the States left the market unregulated when applying such measures, the market will react accordingly to balance it out. The authority's intervention is crucial for achieving the positive results they aimed for in the first place. For example, if EU removes the VSC, must simultaneously set limits on the animal-based products imports in order to avoid the carbon leakage phenomenon. Indeed, the meat price will increase but this is also a good strategy to reduce meat consumption and production.

The above reduction will hurt farmer's profits and compromise their survival. This is why we need full reform of the CAP, that will improve their incomes and at the same time will genuinely recompensate them for protecting the environment, reducing GHG emissions, and storing carbon. (Lukas Visek, 2021) Decarbonizing agricultural sector will bring balance to our climate and also make the planet more healthy and sustainable. (Peter H. Lehner 2018)

General policy framework in agricultural sector to tackle climate change

In the previous chapter we mentioned some fundamental problems regarding the previous CAP which constitute some of the main reasons why this policy has not yet delivered the promising results to reduce GHG emissions. We also recommended some modifications in order to combat efficiently the climate change. Moreover, now, we will examine some other potential measures in agricultural sector and identify whether they can contribute to save the planet, animals and eventually human lives. We will examine three categories of policies: market-based policies, mainly taxes and subsidies, behavioural change policies such as information campaigns and complete change of paradigm.

1. Market-based policies

Meat is significantly under-priced, consequently, one helpful measure would be to re-evaluate the animal-based products prices, incorporating the externalities, as they are called in economic theory, the production of such products causes to the society. The tax, by “internalizing the externality,” improves efficiency as it induces the elimination of those units of production that possess lower social benefits than the social costs incurred in their creation. (Jim Leitzel, 2021) Animal cruelty causes negative externalities. Many consumers feel sad and angry about animal cruelty in food production. (Matheny, 2007) Consequently, the producers who abuse animals and the consumers who buy their products could be penalised in the form of taxes equal to the negative externality they cause, in order to compensate the society. On the other hand, producers and consumers that choose animal welfare could be subsidized, again at an equal rate. This approach is in line with the “polluter pays principal”, a fundamental principal in the environmental law. (Matheny, 2007)

Animal-based food taxation can also internalize many environmental externalities, as well. Taxing meat and animal-based products would not be necessary if their harmful environmental effects were reflected in their prices. Nevertheless, when such policies are not in place, the option of taxing the animal-based products that cause environmental pollution is an excellent way to achieve the goal of reducing their consumption and increase the consumption of the cheaper and environmentally

friendly plant-based options. (Joseph Poore, 2018) (Franziska Funke 2021) (N. William Hines, 2020) (Zach Raff 2021) If we apply the taxation method on the high-polluting foods, the plant-based product prices will remain the same, or increase slightly. Grazing from livestock can be beneficial through carbon sequestration but its negative externalities, at this specific high rate, surpass the positive impacts. (Tara Garnett, 2017) (H Charles J Godfray, 2018) (Moran, 2021) The increased revenues from meat taxation can be invested in Research & Development subsidies, in order to further expand the development of meat alternatives and reduce their production cost, to make them more approachable to the consumers. The unprocessed plant-based protein sources which improve human health are already in abundance in the markets and produced in an environmentally friendly way. (Franziska Funke, 2021) Before the COP26 Climate Conference starts in Glasgow, many countries, announced that they will start taxing animal-based products. Some of them already do so or consider to do it, which is a very optimistic and positive development. (Coalition, 2021)

2. Behavioural change policies

Moreover, we contribute individually in climate change mitigation at a significant rate just by changing our diet, by choosing more environmentally friendly foods. (Lingxi Chenyang, 2019) Our current food production system has many areas of concern that require immediate change, in order to combat effectively the climate crises. The shift towards more plant-based foods is indeed very helpful but we also need a nexus of similar changes to achieve the optimal results. We have to reduce drastically the food waste and improve our agricultural techniques, to avoid damaging the environment even more. Even when somebody, individually, chooses to shift to a plant-based diet, decreases the environmental pressure, but unfortunately this is not enough. Instead, this dietary shift must be done at a collective level, because the damage we have done to the environment is almost irreversible (EAT-Report). There should be a collective approach worldwide towards this goal in combination with appropriate governmental interventions in the production of animal-based products in order to avoid adverse effects such as carbon leakage, if market is left unregulated.

Eating more fruit and vegetables and reducing our red and processed meat intake will make us healthier, with certainty. Becoming vegetarian can dramatically reduce

humanity's GHG emissions, when multiplying such changes by 7 billion people, and taking into consideration also a growing population. Moreover shifting to a plant-based diet will not only reduce drastically our carbon-footprint but will also make people live longer and healthier lives. The World Health Organisation estimated that the benefits of this lifestyle-change are incredible, we could save around 5-8 million people every year by 2050, in terms of percentage we achieve a 6-10% reduction in global mortality. Such dietary shift will be very beneficial for the society and the economy, as well. Let's analyze the dietary shift step by step. If we follow the global guidelines for a healthier diet (which include some animal-based food intake) we achieve a 29% reduction in our carbon footprint but unfortunately this is not enough to reach the Paris Agreement targets even if we accompany this shift with more environmentally friendly agricultural practices. In the next step, if the world chose a vegetarian diet our carbon footprint would be reduced by 63% and if everyone chose a vegan diet, we would achieve the amazing result of 70% cut in food-related GHG emissions. Consequently, to effectively combat climate change we are in need of more plant-based diets. (Marco Springmann, 2016)

There are some recent data, indicating that people have started to change their dietary preferences, cutting back on meat, but worldwide the meat intake is increasing. (Fresco, 2009). For example, estimations have shown a 72% increase in meat intake between 2000 and 2030 (Fiala, 2008). Globally, the growth of human population, the increased incomes in developing countries and urbanisation will double the animal-based food production between 2000 and 2050. In 2007, an average European Union citizen ate 91 kg of meat per year. However, at the recent years a great number of people have started to become more ethically and environmentally concerned about their eating behaviour and meat intake, which is expected to be a contributing factor for changing consumers preferences. (Forsman-Hugg, 2012)

This is of high importance because consumers themselves can drastically change their consumption patterns -demand side- and thus affect the production of animal based products, leaving the market to react accordingly. To achieve a change in demand of meat and dairy products information and education is the key. People need to understand why their food choices are so important for the preservation of the

natural ecosystem. One really sad realisation is that most people, indeed, are unaware of the magnitude of damage they cause, therefore, it is imperative to break this cycle of inertia and misinformation.

Chatham House and Glasgow University Media Group in cooperation with Ipsos MORI conducted a multinational research to collect information about people's dietary patterns, their perception about climate change and its contributing factors and their attitudes toward animal-based products. This survey took place in 2014 and 12 countries participated, the overall result was that people are able to do the necessary changes if they understand their contribution to the problem and the immediate need to take action to solve it. But this was not the case for everyone, some people even when they know that their behaviour is damaging the environment, they don't seem eager to act, individually, for something that is considered to be a collective problem. Moreover, a very interesting fact deriving from this research was that the knowledge of people about the climate change factors was incomplete and therefore they did not understand what changes must be done in order to avoid it. As a result, people were surprised when they heard about livestock and agricultural sector and their major contribution to climate change. They had not realized, so far, that their food preferences affect the environment so much.

On the other hand, we should not put all the blame to them, the governmental authorities and the media, in general, do not mention the significant contribution of livestock production in climate change. There is a general and rational expectation that the authorities and the media, when there is a drastic need for change will inform the public in an effective and persistent way. Moreover, the governmental authorities through school education, campaigns and other awareness-raising techniques can educate and inform people of issues of high importance. (Laura Wellesley, 2015)

All of the survey participants received the information about livestock sector and climate change with surprise and shock. They could not process immediately the magnitude of its contribution. Most of them believed that there is no connection between the two. Some others, on the contrary, were more informed and knew about this correlation but they were very surprised when they heard about livestock being the second major factor of climate change, even higher than the transport sector. Generally, for the groups from China receiving this information was absolutely

shocking. They appear to have the lower rate of awareness of what drive climate change and in what percentage. Although, they understood very well the connection between transportation and climate change, this new information was just inconceivable. This realization is justified because someone can actually see the smoke and emissions coming out of the cars and public transportation, they can understand that the petroleum they use to fuel their cars derive from fossil fuels, which are commonly known to contribute to the pollution of the air and environment. Instead, people are not able to see and apprehend the GHG emissions and pollution deriving from agricultural sector and farm animals. The level of understanding and awareness was low because of the incomplete information and education they receive. (Laura Wellesley, 2015)

The results of another study indicated that people who have more knowledge about climate change and its contributing factors are more eager to start changing their behaviour. Instead, people with less knowledge are more difficult to admit their personal responsibility and take immediate action to change their lifestyles. One positive finding though, is that, even these people who are reluctant, if they are repeatedly exposed in such information and motivation can eventually change their future behaviour. (Andrew J. Jalil, 2019)

The mass movement to save our climate and our planet, have driven many organizations to start awareness-raising campaigns in order to highlight the importance of plant-based diets. Instead, the political strategy and the media is focusing on other sectors, leaving our unsustainable food production system intact and expanding the cycle of inertia and misinformation. The public, in general, is almost unaware of the contribution of factory farming in climate change. People tend to make lifestyle choices based on their own wellbeing and happiness. If they had the necessary information about animal-based diets and how they compromise their own existence, they could slowly but determinedly make the dietary shift to save the environment, themselves and their families. To conclude, there are policies that target behavioural change and are very effective like, product labelling, information campaigns, nutrition education. All of them inform and motivate the public to make better, healthier and environmentally friendly choices. (Laura Wellesley, 2015)

3. Change of paradigm

Unlike farms that allow livestock to graze or be integrated into crop production, CAFOs are focused on one task: maximizing the production of animal-based products. (Rosenberg, 2017) People have learned to consume cheap and abundant industrially produced animal-based products. The production of such products causes water depletion, change of land use for the cultivation of animal feed, animal cruelty, forest loss, environmental damage, GHG emissions and climate change. This system is not efficient by any metric, and the environmental and ethical consequences are catastrophic. (Sarah Saville, 2012)

On the contrary, a different model, supported by the economic and environmental analysis, is *the contemporary return to the old type of agriculture and the abolishment of current industrial farming practices and CAFOs*. In practice, such model is characterized by less farm animals, which can graze and move around freely in the fields and have full access to natural food and water. Moreover, there is no use of antibiotics and other drugs, no cages and other forms of cruel confinement and inhumane agricultural practices. Instead, there is normal animal growth, sun exposure and humane conditions of housing, respect for animal needs and care for their welfare.

Let's analyze now, one by one the positive effects of a shift to such agricultural model. The abolishment of industrial farming is the only way to let the land and earth return to its natural previous form, to regenerate the soil physically, on its own. At the same time we clear the land from the huge soy and corn crops, intended for animal feed, and instead we let the farm animals graze freely. We reduce the use of pesticides and petroleum-based fertilizers while we use incredibly less water and fuel. The forests will start to regrow and the natural habitat will start to regenerate, creating a bigger and more effective carbon sink, helping us combat climate change.

Moreover, we will preserve the biodiversity and the wildlife will not face extinction any more. We will reduce livestock's carbon footprint, by raising fewer animals. This is translated into less methane emissions from feed digestion, less nitrous oxide from animal manure and fertilizers, while simultaneously we absorb more carbon of the atmosphere. We will save water and increase its quality, avoiding diseases and

promoting human health. In addition, If we free agriculture from CAFOS and reduce the crops used for massive animal feeding we free up a large amount of land, which can be used to organically grow plant-based foods. These types of products require less land and cause less pollution that can be outweighed by the carbon sink phenomenon. Moreover, the plant-based alternatives such as legumes, whole grains, nuts, seeds fruits and vegetables are all key elements of a healthy sustainable diet and already constitute a big part of human diets. Their nutritional value is much higher than animal-based products and their health benefits are innumerable. In conclusion they are superior, in every way, and humanity not only can survive but surely thrive in a plant-based diet.

This is how a sustainable food production system looks like. The previous model by killing elements of the natural ecosystem and endangering the survival of others had nothing to do with the meaning of sustainability. CAFOs and factory farming do not have a long term future and the idea that they lead directly to social prosperity, economic development and wealth could not be more wrong and misleading. (Ignacy S. Fiut, 2016)

V. Conclusion

In CAFOs, the major goal is quantity over quality. Unfortunately, this hunger for quantity has tremendous effects on animal welfare, human health and the overall planet. Throughout human history animals were crucial for our survival. We used them as means of transport and agricultural tools, they were our food source and were contributing to soil enrichment with their manure. Animals and natural ecosystems are closely related to each other, damaging the one we hurt the other, and reversely. Even our earliest relationship with animals before the industrial times were problematic. Humans always had a sense of superiority over them, this relationship used to be anthropocentric and one-sided. Nowadays, the situation is far worse, with industrial farming being the main problem. We evolved economically, socially and mentally but we still continue to behave horrifically to animals, having the false perception that their purpose in life, is to serve the humankind. We could not be more wrong. We view animals as units of production and not as animate beings entitled to live their own lives, peacefully and happily. Industrial farming's focus on efficiency and profits, make people care only for rapid livestock production rate, compromising animal welfare. (Foodprint, 2018) This approach in conjunction with the population growth and the increasing meat demand and consumption has made the current food production system unsustainable and a key factor for climate change due to its high carbon footprint. Consequently, if humankind does not want to extinct, must reconsider its relationship with animals and start viewing them as what they really are, a fundamental and important part of the ecosystem.

The governmental authorities, the society and people should act now to reverse the imminent unsustainable future. For governments trying to change the dietary preferences of people there is a wide range of policies that can implement. First of all, people should have complete information and education about nutrition, health, carbon footprint of different foods, climate change, industrial farming conditions and cruelty. This is how they can understand the close relation between animal welfare and climate change. Next on the agenda could be more aggressive policies, like taxing the high-carbon footprint animal-based products or implementing drastic measures

through legislation. The best solution though is to abolish the CAFO's and industrial farming and return to the previous natural form of agriculture with free-range animals and healthy ecosystems. Meanwhile, the governments can incentivize farmers to increase the availability of plant-based foods, whilst decreasing the associated cost of production, targeting reduced meat and dairy consumption among the population. (Laura Wellesley, 2015) It is evident that all these policies will require significant changes in the law in order to abandon the business-as-usual scenario and move towards a more sustainable food and agriculture system. (Ristino, 2019) The recent years a growing number of scientists, experts, organizations, farmers and society members trying to alert people and ask for a radical reform of the current food system in order to become environmentally and animal friendly. Nowadays, with the effects of climate change becoming more apparent, even more people start to realize that our time is up. The climate crisis is already in our doorstep and now is the time to create a just and sustainable food system which will respect the animals and protect our planet. (Carmen Gonzalez, 2011)

I. Bibliography

1. Agency, EPA US-Environmental Protection. *Animal Feeding Operations (AFOs)*. 2021.

<https://www.epa.gov/npdes/animal-feeding-operations-afos>

2. Alexis Carlier, Nicolas Treich. *Directly Valuing Animal Welfare in (Environmental) Economics*. International Review of Environmental and Resource Economics, 2020.

<https://www.tse-fr.eu/sites/default/files/medias/doc/by/treich/valuing.pdf>

3. Allan Backwell Emeritus Professor, Doctor Elisabet Nadeu. "What is the safe operating space for EU livestock." *The Rural Investment Support for Europe (RISE) Foundation*, 2018.

https://risefoundation.eu/wp-content/uploads/2020/07/2018_RISE_Livestock_Exec_Summ.pdf

4. Andrew J. Jalil, Joshua Tasoff, Arturo Vargas Bustamante. "Eating To Save The Planet: Evidence from a Randomized Controlled Trial using Individual-Level Food Purchase Data." 2019.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3444642

5. Auditors, ECA- European Court of. "The new CAP creating new horizons." *ECA Journal*, 2021.

https://www.eca.europa.eu/Lists/ECADocuments/JOURNAL21_02/JOURNAL21_02.pdf

- Auditors, ECA- European Court of. "Special Report N.16/2021--Common Agricultural Policy and climate: Half of EU climate spending but farm emissions are not decreasing." 2021.

https://www.eca.europa.eu/Lists/ECADocuments/SR21_16/SR_CAP-and-Climate_EN.pdf

- Auditors-, European Court of. "Special Report N. 31: Animal Welfare in European Union: Closing the gap between ambitious goals and practical implementation." 2018.

https://www.eca.europa.eu/Lists/ECADocuments/SR18_31/SR_ANIMAL_WELFARE_EN.pdf

- Bruna Grizzetti, Fayçal Bouraoui, Alberto Aloe. "Changes of nitrogen and phosphorus loads to European seas." *Global Change Biology*, 2011.

<https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1365-2486.2011.02576.x>

- Cambridge, Emma Garnett- Sustainability Research Fellow- University of. "Meat eating is a big climate issue – but isn't getting the attention it deserves." Glasgow: COP Conference for climate change, 2021.

<https://theconversation.com/meat-eating-is-a-big-climate-issue-but-isnt-getting-the-attention-it-deserves-170855>

- Carmen Gonzalez, Professor of Law. *CLIMATE CHANGE, FOOD SECURITY, AND AGROBIODIVERSITY: TOWARD A JUST, RESILIENT, AND SUSTAINABLE FOOD SYSTEM*. Seattle University School of Law Legal Paper Series-Published in Fordham Environmental Law Review,, 2011.

<https://digitalcommons.law.seattleu.edu/cgi/viewcontent.cgi?article=1059&context=faculty>

11. Cassuto, David N. "THE CAFO HOTHOUSE: CLIMATE CHANGE, INDUSTRIAL AGRICULTURE AND THE LAW." *Animals and Society Institute-Policy Paper- How US policies and practices regarding intensive animal agriculture are contributing to a worldwide environmental crisis*, 2010.

<https://www.animalsandsociety.org/research/digital-archive/>

12. Coalition, True Animal Protein Price. "Increasing number of countries start taxing meat and dairy." 2021.

<https://www.tappcoalition.eu/nieuws/16831/increasing-number-of-countries-start-taxing-meat-and-dairy->

13. Commission, European. *CAP EXPLAINED DIRECT PAYMENTS FOR FARMERS 2015-2020*. European Commission- Agriculture and rural development, 2017.

<https://op.europa.eu/en/publication-detail/-/publication/541f0184-759e-11e7-b2f2-01aa75ed71a1>

14. Climate Action- Paris Agreement - ec.europa- official website of EU.

https://ec.europa.eu/clima/eu-action/international-action-climate-change/climate-negotiations/paris-agreement_en.

15. Commission, Pew. "Putting Meat on the Table-Industrial Farm Animal Production Report." 2008.

https://www.pewtrusts.org/-/media/legacy/uploadedfiles/phg/content_level_pages/reports/pcfifapfinalpdf.pdf

16. Commission, Directorate General for Health and Consumers (DG SANCO) of the European. "Final Report: Evaluation of the EU Policy on Animal Welfare and Possible Policy Options for the Future." 2010.

<https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.592.8762&rep=rep1&type=pdf>

17. Commission, Summary Report of the EAT-Lancet. "Healthy Diets From Sustainable Food Systems-Food Planet Health."

https://eatforum.org/content/uploads/2019/07/EAT-Lancet_Commission_Summary_Report.pdf

18. Damian Carrington, Environment editor. "Livestock provide just 18% of calories but take up 83% of farmland: avoiding meat and dairy is 'single biggest way' to reduce your impact on Earth." *The Guardian*, 2018.

<https://www.theguardian.com/environment/2018/may/31/avoiding-meat-and-dairy-is-single-biggest-way-to-reduce-your-impact-on-earth>

19. Deborah Temple, Xavier Manteca. "Animal Welfare in Extensive Production Systems Is Still an Area of Concern." *Frontiers in Sustainable Food Systems*, 2020.

https://www.researchgate.net/publication/344773159_Animal_Welfare_in_Extensive_Production_Systems_Is_Still_an_Area_of_Concern

20. Development, LEAD-Livestock Environment And. *LIVESTOCK'S LONG SHADOW-environmental issues and options*. FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, 2006.

<https://www.fao.org/3/a0701e/a0701e.pdf>

21. Document, European Commission Staff Working. "Evaluation of the European Union Strategy for the Protection and Welfare of Animals 2012-2015." Brussels, 2021.

https://ec.europa.eu/food/system/files/2021-04/aw_eu_strategy_exec_summ_04042021_en.pdf

22. EAPF - European Alliance for Plant-based Foods, Euractiv- press release. *NEW ALLIANCE CALLS FOR PLANT-BASED FOODS AT THE CENTRE OF EU FOOD POLICY*. 2020.

<https://pr.euractiv.com/pr/new-alliance-calls-plant-based-foods-centre-eu-food-policy-207882>.

23. Fiala, Nathan. "Meeting the demand: An estimation of potential future greenhouse gas emissions from meat production." *Ecological Economics*, 2008.

<https://www.sciencedirect.com/science/article/pii/S0921800907006180>

24. Foodprint. "Farm Animal Welfare." 2018.

<https://foodprint.org/issues/farm-animal-welfare/>.

25. Forsman-Hugg, Terhi Latvala Mari Niva Johanna Mäkelä Eija Pouta Jaakko Heikkilä Jaana Kotro Sari. "Diversifying meat consumption patterns: Consumers' self-reported past behaviour and intentions for change." *Meat Science- journal*, 2012.

<https://faanalytics.org/wp-content/uploads/2015/05/DiversifyingMeatConsumptionPatterns.pdf>

26. Franziska Funke, Linus Mattauch, Inge van den Bijgaart, Charles Godfray, Cameron Hepburn. *Is Meat Too Cheap? Towards Optimal Meat Taxation*. Institute for New Economic Thinking (at the Oxford Martin School), 2021.
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3801702
27. Fresco, Louise O. "Challenges for food system adaptation today and tomorrow." *Environmental Science & Policy*, 2009.
<https://www.sciencedirect.com/science/article/pii/S1462901108001251>
28. H Charles J Godfray, Paul Aveyard, Tara Garnett, Jim W Hall, Timothy J Key, Jamie Lorimer, Ray T Pierrehumbert, Peter Scarborough, Marco Springmann, Susan A Jebb. "Meat consumption, health, and the environment." *Science*, 2018.
https://www.researchgate.net/publication/326496818_Meat_consumption_health_and_the_environment
29. H. J. M. van Grinsven, H. F. M. ten Berge, T. Dalgaard, B. Fraters, P. Durand, A. Hart, G. Hofman, B. H. Jacobsen, S. T. J. Lalor, J. P. Lesschen, B. Osterburg, K. G. Richards, A.-K. Techen, F. Vertès, J. Webb, W. J. Willems. "Management, regulation and environmental impacts of nitrogen fertilization in northwestern Europe under the Nitrates Directive, a benchmark study." *Biogeosciences*, 9, 2012.
https://www.researchgate.net/publication/234703379_Management_regulation_and_environmental_impacts_of_nitrogen_fertilization_in_Northwestern_Europe_under_the_Nitrate_Directive_a_benchmark_study

30. Henk Westhoek, Jan Peter Lesschen , Trudy Rood, Susanne Wagner, Alessandra De Marco , Donal Murphy-Bokern, Adrian Leip, Hans van Grinsven, Mark A. Sutton, Oene Oenema. "Food choices, health and environment: Effects of cutting Europe's meat and dairy intake." *Global Environmental Change*, 2014.

https://www.researchgate.net/publication/261102547_Food_choices_health_and_environment_Effects_of_cutting_Europe's_meat_and_dairy_intake

31. Hribar, Carrie. "Understanding Concentrated Animal Feeding Operations and Their Impact on Communities." *National Association of Local Boards of Health (NALBOH)*, 2010.

https://www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf

32. Ignacy S. Fiut, Marcin Urbaniak. *Factory Farming Versus Environment and Society : The Analysis of Selected Problems*. PROBLEMS OF SUSTAINABLE DEVELOPMENT, 2016.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2856363

33. International Livestock Research Institute- Philip K. Thornton, Mario Herrero. "The Inter-linkages between Rapid Growth in Livestock Production, Climate Change, and the Impacts on Water Resources, Land Use, and Deforestation." *Policy Research Working Paper-The World Bank Development Economics Office of the Senior Vice President and Chief Economist*, 2010.

https://openknowledge.worldbank.org/bitstream/handle/10986/9223/WDR2010_0002.pdf?sequence=1&isAllowed=y

34. James N. Galloway, Alan R. Townsend, Jan Willem Erisman, Mateete Bekunda, Zucong Cai, John R. Freney, Luiz A. Martinelli, Sybil P. Seitzinger, Mark A. Sutton. "Transformation of the Nitrogen Cycle: Recent Trends, Questions, and Potential Solutions." *Science*, 2008.

https://www.researchgate.net/publication/5363687_Transformation_of_the_Nitrogen_Cycle_Recent_Trends_Questions_and_Potential_Solutions

35. Jhih-Shyang Shih, Dallas Burtraw, Karen Palmer, Juha Siikamäki. "Air Emissions of Ammonia and Methane from Livestock Operations: Valuation and Policy Options." *Journal of Air & Waste Management Association*, 2006.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=900912

36. Jim Leitzel, Sabina Shaikh. *The Economic Standing of Animals*. University of Chicago, 2021.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3891184

37. Johan Rockström, Will Steffen, Kevin Noone, Åsa Persson, F. Stuart III Chapin, Eric Lambin, Timothy M. Lenton, Marten Scheffer, Carl Folke, Hans Joachim Schellnhuber, Björn Nykvist, Cynthia A. de Wit, Terry Hughes. "Planetary Boundaries: Exploring the Safe Operating Space for Humanity." *Ecology and Society*, 2009.

<https://www.ecologyandsociety.org/vol14/iss2/art32/>

38. Jonathan A. Foley, Marcos Heil Costa, Michael T. Coe, Ruth S. Defries, Holly Gibbs, Erica A. Howard, Sarah H Olson, Jonathan Patz, Navin Ramankutty, Peter Snyder, Gregory P. Asner. "Amazonia revealed: Forest degradation and loss of ecosystem goods and services in the Amazon Basin." *Frontiers in Ecology and the Environment* 5, 2007.

<https://esajournals.onlinelibrary.wiley.com/doi/10.1890/1540-9295%282007%295%5B25%3AARFDAL%5D2.0.CO%3B2>

39. Joseph Poore, Thomas Nemecek. "Reducing food's environmental impacts through producers and consumers." *Science*, 2018.

https://www.researchgate.net/publication/325532198_Reducing_food's_environmental_impacts_through_producers_and_consumers

40. Kevany, Sophie. "Abuse of animals rife on farms across Europe, auditors warn." *The guardian journal*, 2018.

<https://www.theguardian.com/environment/2018/nov/14/farm-animal-abuses-widespread-across-europe-warn-auditors>

41. Laura Wellesley, Catherine Happer and Antony Froggatt. *Changing Climate, Changing Diets Pathways to Lower Meat Consumption*. Chatham House Report – The Royal Institute of international affairs, 2015.

https://www.chathamhouse.org/sites/default/files/publications/research/CHHJ3820%20Diet%20and%20climate%20change%2018.11.15_WEB_NEW.pdf

42. Law, Joseph Vining- Michigan. *Animal Cruelty Laws and Factory Farming*. PUBLIC LAW AND LEGAL THEORY WORKING PAPER SERIES, 2008.

https://repository.law.umich.edu/mlr_fi/vol106/iss1/6/

43. Lingxi Chenyang, Indiana University Maurer School of Law, and College of Literature, Science & the Arts, Department of Philosophy, Yale University - Law School University of Michigan at Ann Arbor. "Is Meat the New Tobacco? Regulating Food Demand in the Age of Climate Change." *Environmental Law Reporter*, Vol. 49, No. 4, 2019.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3329397

44. Lukas Visek, cabinet of Executive Vice-President Frans Timmermans at the European Commission. "Towards a greener and fairer CAP." *ECA-European Court of Auditors Journal* , 2021.

<https://medium.com/ecajournal/towards-a-greener-and-fairer-cap-cf6927dc42a6>

45. Manny Rutinel, Sebastian Quaade. *Animal Agriculture and Emission Reductions: The Viability of a Farm Transition Offset Protocol*. Yale Law School, Yale University, 2021.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3832304

46. Marco Springmann, Researcher at University of Oxford. "Going veggie would cut global food emissions by two thirds and save millions of lives." *The conversation journal*, 2016 .

<https://theconversation.com/going-veggie-would-cut-global-food-emissions-by-two-thirds-and-save-millions-of-lives-new-study-56655>

47. Markusen, James. "International externalities and optimal tax structures." *Journal of International Economics*,, 1975.

https://www.researchgate.net/publication/4957636_International_Externalities_and_Optimal_Tax_Structures

48. Mary Maerz University of Virginia School of Law, J.D. Candidate. "Corporate Cruelty: Holding Factory Farms Accountable for Animal Cruelty Crimes to Encourage Systemic Reform ." 2020.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3367234

49. Matheny, Jennifer Fearing and Gaverick. "The State of the Animals ." *The role of economics in achieving welfare gains for animals* , 2007.

https://www.humanesociety.org/sites/default/files/archive/assets/pdfs/hsp/soaiv_07_ch9.pdf

50. Moran, Lily. *Pretextual Preemption: The Modern Weaponization of the Preemption Doctrine and the Regulation of Concentrated Animal Farming Operations*. University of Pennsylvania Law Review, Vol. 170, No. 6, 2021.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3950445

51. N. William Hines, University of Iowa, College of Law. *CAFOs and U.S. Law*. University of Iowa, Legal Studies Research Paper, 2020.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3611214

52. Overcash, Elizabeth A. *Overview of CAFOs and Animal Welfare Measures*. Michigan State University College of Law-Animal Legal & Historical Center, 2011.

<https://www.animallaw.info/article/overview-cafos-and-animal-welfare-measures>

53. Patricia Espinosa-Executive Secretary, United Nations Framework Convention on Climate Change. "The Paris Agreement, a Strategy for the Longer Term." *THE BIG PICTURE*.

<https://files.wri.org/expert-perspective-espinosa.pdf>

54. Peter H. Lehner, Nathan A. Rosenberg. "A Farm Bill to Help Farmers Weather Climate Change." *Journal of Food Law & Policy*, 2018.
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3219464
55. POLICY, EAPF - European Alliance for Plant-based Foods-NEW ALLIANCE CALLS FOR PLANT-BASED FOODS AT THE CENTRE OF EU FOOD. "Euractiv-press release."
<https://pr.euractiv.com/pr/new-alliance-calls-plant-based-foods-centre-eu-food-policy-207882> (accessed 2020).
56. Ritchie, Hannah. "Our World in Data." 2019.
<https://ourworldindata.org/food-ghg-emissions>.
57. Rosenberg, Peter Lehner and Nathan A. "Legal Pathways to Carbon-Neutral Agriculture." *Environmental Law Institute- Washington, DC*, 2017.
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3040919
58. Roser, Hannah Ritchie and Max. *Our World in Data-Number of animals slaughtered*. 2019.
<https://ourworldindata.org/meat-production#number-of-animals-slaughtered>.
59. Roser, Max. "Our World in Data-Future Population Growth." 2019.
<https://ourworldindata.org/future-population-growth>.

60. Sarah Saville, David N. Cassuto. "HOT, CROWDED, AND LEGAL: A LOOK AT INDUSTRIAL AGRICULTURE IN THE UNITED STATES AND BRAZIL ." *SYMPOSIUM ARTICLES*, 2012.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2104294

61. Shi-Ling Hsu, Florida State University - College of Law. *Scale Economies, Scale Externalities: Hog Farming and the Changing American Agricultural Industry*. FSU College of Law, Public Law Research Paper No. 745, 2015.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2584224

62. Tara Garnett, Cécile Godde, Adrian Muller, Elin Röö, Pete Smith, Imke de Boer, Erasmus zu Ermgassen, Mario Herrero, Corina van Middelaar, Christian Schader, Hannah van Zanten. "Grazed and confused? Ruminating on cattle, grazing systems, methane, nitrous oxide, the soil carbon sequestration question – and what it all means for greenhouse gas emissions ." *FCRN-Food Climate Research Network*, 2017.

https://www.oxfordmartin.ox.ac.uk/downloads/reports/fcrn_gnc_report.pdf

63. Terhi Latvalaa, Mari Niva, Johanna Mäkelä, Eija Pouta, Jaakko Heikkilä, Jaana Kotro, Sari Forsman-Hugg. "Diversifying meat consumption patterns: Consumers' self-reported past behaviour and intentions for change ." *Meat Science*, 2012.

<https://www.sciencedirect.com/science/article/pii/S0309174012001271?via%3Dihub>

64. Torbjörn Jansson, Ida Nordin, Fredrik Wilhelmsson, Peter Witzke, Gordana Manevska-Tasevska, Franz Weiss, Alexander Gocht. "Coupled Agricultural Subsidies in the EU undermine climate efforts." *Applied Economics Perspectives and Policy*, 2020.

<https://onlinelibrary.wiley.com/doi/epdf/10.1002/aepp.13092>

65. Unit, Greenpeace European. "EU Commission says meat harms climate and nature, but does nothing." 2020.

<https://www.greenpeace.org/eu-unit/issues/nature-food/3903/eu-commission-says-meat-harms-climate-and-nature-but-does-nothing/>.

66. University, LAURIE RISTINO-The Johns Hopkins. "GREEN HAM AND EGGS: WHAT'S THE POLICY RECIPE FOR FEEDING A GROWING POPULATION ON A WARMING PLANET?" *JOURNAL OF LAND USE*, 2019.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3474571

67. Vilma Sandström, Hugo Valin, Tamás Krisztin, Petr Havlík, Mario Herrero, Thomas Kastner. "The role of trade in the greenhousegas footprints of EU diets." *Global Food Security Journal*, 2018.

<https://www.sciencedirect.com/science/article/pii/S2211912418300361>

68. Zach Raff, Andrew Meyer. "CAFOs and surface water quality: Evidence from Wisconsin." 2021.

https://www.researchgate.net/publication/333128758_CAFOs_and_Surface_Water_Quality_Evidence_from_the_Proliferation_of_Large_Farms_in_Wisconsin

69. Zhong Xiang Zhang, Tianjin University - Ma Yinchu School of Economics.
Competitiveness and Leakage Concerns and Border Carbon Adjustments. FEEM
Working Paper No. 80.2012, 2012.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2187207

