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**Climate Change and the Livestock Sector's Mitigation
Potential:
A Seized Opportunity for the International Climate
Regime?**

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Abstract

Climate change is destined to remain a central topic of the international political agenda for the decades to come. Several climate negotiations have been conducted over the last three decades, and a diversified range of climate policies has been adopted at the planetary level over this timeframe. Nevertheless, it appears to exist a particular economic sector having a great impact in terms of greenhouse gas emissions, as well as a terrific potential in terms of climate change mitigation, which has regularly been ignored by national and supranational regulation authorities: the livestock sector. Interestingly, while there is a plethora of scientific studies focusing on the necessity to mitigate livestock sector's emissions through a reduction of animal-food consumption and production, the number of legal and political experts focusing on this issue is particularly meagre. The aim of this article is to try to fill this research gap, by looking for the instruments put at disposal by the International Climate Regime in order to induce the mitigation of livestock emissions Worldwide.

Key-words

Climate Change, Livestock Sector, International Climate Regime.



1. Introduction

Having been defined as a ‘threat multiplier’,^I the ‘greatest challenge of the 21st Century’,^{II} and as an ‘existential threat to humanity’,^{III} climate change is destined to remain a central topic of the international political agenda for the decades to come. Several climate negotiations have been conducted over the last three decades,^{IV} and a diversified range of climate policies has been adopted at the planetary level over this timeframe.^V

Nevertheless, it appears to exist a particular economic sector having a great impact in terms of greenhouse gas (GHG) emissions, as well as a terrific potential in terms of climate change mitigation, which has regularly been ignored by national and supranational regulation authorities: the livestock sector.^{VI} The livestock sector alone is responsible for at least 14.5% of total anthropogenic GHG emissions (*i.e.*, more emissions than the entire transport sector).^{VII} Nonetheless, while public authorities have ‘implemented policies and launched communication campaigns to reduce energy demand among motorists, households and industry as part of climate policy-making, [...] efforts to moderate meat and dairy consumption are absent from mitigation strategies’.^{VIII} This is also evident when we look at the Nationally Determined Contributions (NDCs) that have been produced in the years 2020-2021: only one third of the country Parties have included livestock mitigation measures in their NDCs,^{IX} and among these countries, only one (*i.e.*, Ethiopia) ‘included a mitigation commitment related to animal-based diets’.^X In fact, the few livestock mitigation plans mainly focused on manure management (present in 18% of the total NDCs) and feed management (16%)^{XI} (*i.e.*, measures that are less effective than dietary changes in mitigating livestock-related GHG emissions).^{XII}

Interestingly, while there is a plethora of scientific studies focusing on the necessity to mitigate livestock sector’s emissions through a reduction of animal-food consumption and production,^{XIII} the number of legal and political experts focusing on this issue is particularly meagre.

One of the first outstanding legal studies focusing on this topic was conducted by **Donahue**, who defined the livestock sector as an ‘elephant in the room’ of climate change,^{XIV} and who suggested the US government to take measures to reduce meat production and



consumption, already as soon as in 2008. Six years later, in their multi-country study for **Chatham House**, Bailey, Froggatt and Wellesley underlined that, compared ‘to other sectors, the awareness gap for livestock is particularly large’,^{xv} and this is due to the ‘remarkable lack of policies, initiatives or campaigns’ aiming at reducing meat and dairy production and consumption.^{xvi} The authors also identified a research gap concerning the lack of space provided to the livestock sector in climate policies, and they wished for further studies to be elaborated on this topic.^{xvii} The three authors’ hopes were at least partially met, as few mono-country legal researches have followed in the succeeding years. Indeed, while **Johnson** pointed out that Australian government regulation on food consumption patterns does not focus enough on the positive synergies existing between plant-based diets, health, and environment,^{xviii} a further study from **Donahue** asserts that the US Farm Bill is at odds with US environmental regulation, and it concludes that public-land livestock grazing in the US should be put to an end as soon as possible.^{xix} Finally, **Karimi** observes that although the existence of measures as the California's Senate Bill 1383 has some positive effects in terms of climate change mitigation, the only sustainable and effective way of dealing with livestock sector’s emissions pass through the elimination of support for livestock producers and through a sensibilization of consumers aimed at reducing the demand for meat and dairy products.^{xx}

What emerges from the analysis of the state of the art is not only the frequent accent put on the necessity of intervening on the demand-side in order to close the consumers’ awareness gap, but also the absence of any study analysing the role and the efforts of the International Climate Regime in mitigating livestock sector’s GHG emissions. Provided that climate change is the quintessence of the global phenomenon (that hence requires a global level of governance),^{xxi} and provided the lack of studies focusing on the International Climate Regime’s efforts in reducing livestock-related GHG emissions, this article will try to answer the following research question: to what extent is the International Climate Regime establishing a legal framework inducing the mitigation of livestock-related GHG emissions?

In order to provide a satisfactory answer to the research question, this article will be structured as follows. Section-2 will shortly introduce the scientific evidence related to the livestock sector’s impact on the environment, it will focus on livestock sector-related GHG



emissions, and it will finish by remarking the climate-health cobenefits of reducing animal-food consumption and production patterns. Section-3 will pass through the three main international climate treaties in order to understand whether they include any provision that can be linked to the mitigation of livestock sector's emissions. Section-4 will move to the non-binding documents produced under the UNFCCC regime and, in particular, it will analyse the content of the workstream produced under the Koronivia Joint Work on Agriculture. Lastly, in Section-5, my final considerations will be reported, and the conclusions of the article will be drawn.

2. The scientific base

Before focusing on the climate change impact of the livestock sector, it might be important to remind that the environmental consequences of animal-food production are not limited to GHG emissions. Firstly, animal-food production is terribly water consuming. Indeed, you need 57 litres of water to obtain a gram of proteins from pig meat, 63 litres to obtain the same amount of proteins from sheep meat, and 112 litres of water to obtain one gram of proteins from beef.^{xxii} By comparison, you just need 26 litres of water to produce a gram of proteins from vegetables, 21 litres to obtain a gram of proteins from cereals, and 19 litres to obtain a gram of proteins from pulses.^{xxiii} On this regard, it is also striking to observe that the sole production of a kilogram of beef requires the consumption of 15,400 litres of water.^{xxiv} Furthermore, the livestock sector is also a major source of biodiversity loss, water contamination, and air pollution. Indeed, while this was already clear in 2010, when Reid at al. asserted that 'livestock are having widespread direct and indirect impacts on the foundation of all life',^{xxv} in 2015 that Leip at al. conducted a study on agriculture in Europe, and they found out that livestock alone contributes to 73% of water pollution, 78% of terrestrial biodiversity loss, and 80% of soil acidification and air pollution related to the agricultural sector at the EU level.^{xxvi} A final environmental consideration, before moving to climate change, concerns land use. Indeed, it should be reminded that '26% of the Planet's ice-free land is used for livestock grazing, and 33% of croplands are used for livestock feed



production?^{xxvii} These last findings, beyond having an evident impact in terms of nature conservation and food security implications, also have strong climate change implications. As a matter of facts, the terrific amount of space that is used for livestock grazing could be destined to forests and wildlife areas (for biomass recovery) which could play, *inter alia*, a great role as carbon sinks: eliminating the consumption of a kg of beef is equivalent to emission reductions of 184 kg of CO₂ solely related to biomass recovery.^{xxviii}

Accordingly, the climate change impact of the livestock sector is to be reconducted to three main processes: production, processing and transport of feed (it includes the amount of land subtracted to biomass recovery), enteric fermentation, and manure storage and processing.^{xxix} As it has already been stated, on the aggregate level, the livestock sector is deemed responsible for 14.5% of anthropogenic GHG emissions;^{xxx} however, this data is quite outdated, and according to Eisen and Brown it underestimates the current livestock sector's emissions.^{xxxi} In fact, in order to provide an even clearer picture of the livestock sector's impact on climate change, the two scientists have calculated that a 'rapid global phaseout of animal agriculture [taking place over a period of 15 years] has the potential to stabilize greenhouse gas levels for 30 years and offset 68 percent of CO₂ emissions this century'.^{xxxii}

Due attention should also be paid to the different amount of CO₂-equivalent emitted per kg of animal product: 6 kg of CO₂-equivalent are emitted per kg of chicken, 7 kg of CO₂-equivalent per kg of pork, and 60 kg of CO₂-equivalent are emitted per kg of beef.^{xxxiii} By comparison, 1.4 kg of CO₂-equivalent is emitted per kg of wheat, 1.0 kg of CO₂-equivalent is emitted per kg of maize, and 0.9 kg of CO₂-equivalent per kg of peas.^{xxxiv} Furthermore, it is also worth to observe the nature of GHGs that are linked to animal agriculture: the livestock sector is indeed responsible for the 5% of global anthropogenic CO₂ emissions, 44% of anthropogenic CH₄ emissions, and 53% of anthropogenic N₂O emissions.^{xxxv} Importantly, being CH₄ and N₂O short-lived climate pollutants (*i.e.* GHGs with a more powerful climate-altering power than CO₂, but remaining in the atmosphere for a much shorter period of time), to phase-down their emission is crucial in order to rapidly curb climate change.^{xxxvi}



Provided that the current production and consumption of meat and dairy product is already having such a great environmental and climate impact, and considering that according to the FAO we will need to feed 9.7 billion people by 2050,^{xxxvii} the necessity to reduce the terribly inefficient production and consumption of animal food seems self-evident. As a matter of facts, ‘the total global food demand is expected to increase by 35% to 56% between 2010 and 2050’,^{xxxviii} so that the only palpable way to conciliate climate change mitigation and food security, is to drastically reduce animal-food consumption.^{xxxix} For instance, in order to maintain the global temperature within 1.5°C above the pre-industrial level while protecting food security, the EU would need to decrease its ruminant meat consumption by 57.5%, and its non-ruminant meat consumption by 56.7%.^{xl} Therefore, ‘all potential solutions to the climate crisis likely require some form of large scale dietary change’.^{xli} On the bright side, halving EU’s animal-food consumption would not only allow the EU to meet the Paris Agreement’s target,^{xlii} but it would also have outstanding consequences on Europeans’ state of health.^{xliii} As a matter of facts, halving meat and dairy consumption would reduce the spread of cardiovascular diseases (thanks to the ‘lower intake of saturated fats’), colorectal cancer, and it would provide further health benefits through the ‘lower use of antibiotics, [...] improved water quality, [...] and improved air quality’ associated with a reduction of livestock.^{xliv}

3. The international climate treaties

This section will pass through the three international climate treaties, in order to understand if there is any provision (at least indirectly) incentivizing states to phase-down animal agriculture activities.

Unsurprisingly, none of the three international climate treaties explicitly mentions the livestock sector. However, it can be valuable to highlight treaties’ references to agriculture, carbon sinks, LULUCF,^{xlv} REDD+,^{xlvi} and AFOLU,^{xlvii} as they are indirectly related to livestock sector. In fact, any significant large-scale afforestation or reforestation will be impossible without phasing-down animal-food production and consumption.^{xlviii}



3.1. The UNFCCC

As a ‘mother convention’,^{XLIX} the United Nations Framework Convention on Climate Change (UNFCCC) of 1992 does not introduce any clear obligation of result, being its objective the ‘stabilization of greenhouse gas concentrations in the atmosphere at a [non-precisely defined] level that would prevent dangerous anthropogenic interference with the climate system’.^L However, it establishes some commitments for country Parties which, in line with the principle of ‘common but differentiated responsibilities and respective capabilities’,^{LI} impose different obligations for Annex-II, Annex-I, and non-Annex-I Parties.

The most important UNFCCC’s provisions that can indirectly be reconducted to the livestock sector are enshrined in Article 4(1) and 4(2) of the Convention. As a matter of facts, Article 4(1) assigns a central role to ‘carbon sinks’, which all Parties will have to take into account, both in the process of creation of national inventories,^{LII} and when formulating climate policies.^{LIII} Article 4(1) goes even beyond, as it requires Parties to ‘promote [...] the development [...] of technologies [to] reduce or prevent anthropogenic emissions of GHGs [from, *inter alia*] agriculture, [and] forestry’,^{LIV} and to ‘promote sustainable management and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all GHGs [...] including [...] forests’.^{LV} Moreover, these information shall also be communicated to the Conference of the Parties, through the UNFCCC Secretariat.^{LVI}

Afterwards, Article 4(2) devices similar obligations for Annex-I Parties (also in terms of centrality of carbon sinks), with the main differences from Article 4(1) being the obligation for Annex-I Parties to adopt national policies ‘limiting’ their GHG emissions,^{LVII} and the obligation to communicate ‘information on [their] policies, [including] removals by sinks’ within six months.^{LVIII}

Provided that, at this point, the relationship between carbon sinks and the livestock sector should be clear, as well as its connection with agriculture, it can be stated that, by giving a central role to carbon sinks (and to a lesser extent to agriculture) when it comes to all Parties’ obligations in terms of carbon accounting, climate policies, and cooperation, the UNFCCC



establishes a system that provides country Parties with the potential of complying with their legal obligation by acting on the livestock sector.

When it comes to the Convention's shortcomings, both the absence of GHG mitigation obligations for non-Annex-I Parties, and the lack of any reduction target for Annex-I Parties remain major limits of the UNFCCC. However, the major weakness of the UNFCCC, when it comes to livestock sector's emissions mitigation, stands in the establishment of a carbon accounting method based on capturing territorial production instead of consumption.^{LIX} Indeed, the decision to adopt this less effective and equitable way of calculating GHG emissions has not only generated a situation of 'second degree path dependence' (*i.e.*, it has conditioned the approach adopted by the following climate treaties),^{LX} but it has also led Annex-I Parties to dislocate carbon-intensive food production and deforestation in non-Annex-I Parties' territories.^{LXI}

3.2. The Kyoto Protocol

The Kyoto Protocol of 1997 supplements the UNFCCC by identifying binding obligations of results for Annex-I Parties, and by establishing market mechanisms helping Parties to achieve their mitigation objectives in a cost-effective manner.^{LXII} Particularly important, given the aim of this article, are especially Article 2 and 3 of the Protocol, as well as the content of Annex-A.

More precisely, Article 2(1)(a)(iii) requires Annex-I Parties to implement measures as the promotion of 'sustainable forms of agriculture',^{LXIII} while Article 3(3) provides a role for LULUCF in Annex-I Parties' carbon accounting system.^{LXIV} Although the Protocol defers the definition of complete accounting rules to subsequent Conferences of the Parties,^{LXV} so that a clear identification of all the elements constituting LULUCF will only be provided in the Marrakesh Accords of 2001,^{LXVI} it is important to underscore that the Protocol has reiterated the centrality of carbon sinks, both in climate policies and in carbon accounting, through the very identification of the LULUCF sector. Furthermore, the explicit mentioning of the agricultural sector in Article 2 is particularly important, especially if it is read together with the content of Annex-A. As a matter of facts, after listing all the relevant GHGs (including CH₄



and N₂O) taken into account by the Protocol, Annex-A refers to the relevant sectors and sources of GHGs. Interestingly, the first two sources listed under the category ‘agriculture’ really are ‘enteric fermentation’ and ‘manure management’,^{LXVII} and this shows the Protocol’s recognition of the role that the livestock sector has to play in climate law and policies.

Overall, the Kyoto Protocol reinforces the role that the livestock sector can play in the international climate regime, and it does so by both assigning a role to the LULUCF sector (that Annex-I states will have to duly consider in order to meet their binding emission-limitation commitments), and by making explicit reference to the need of mitigating agriculture-related emissions, also acknowledging the role of enteric fermentation and manure management as agricultural sources of GHGs.

However, the main pitfalls of the Kyoto Protocol stand not merely in the absence of obligations for non-Annex-I Parties, or in the US deciding not to ratify the Protocol. Indeed, as far as the mitigation of livestock emissions is concerned, the Protocol’s main shortcoming is the lack of sector-specific reduction targets, which has resulted in agriculture hardly being included in Annex-I Parties’ mitigation policies.^{LXVIII} Furthermore, the very modest GHG-limitation commitment of the first period, and the incapacity to timely ratify emission-reduction commitments for further periods, did not put Annex-I Parties in the position of having to choose between livestock sector’s mitigations and LULUCF’s carbon uptakes. In fact, the emission-reduction targets identified for the first commitment period were so meagre that it has been possible for Annex-I Parties to achieve their target objectives without having to stretch LULUCF to the point of requiring a decrease in livestock production.^{LXIX}

3.3. The Paris Agreement

The timid GHG emission limitations identified under the Kyoto Protocol’s first commitment period were ‘seen as the first step in the development of a process by which obligations could be ratcheted up’.^{LXX} However, country Parties’ incapacity to find an Agreement in Copenhagen (COP-15), and the belated adoption of the Doha Amendment to the Kyoto Protocol (which officially entered in to force only in December 2020, *i.e.*, at the very end of the second commitment period), led states to look for the establishment of a brand-



new climate treaty adopting a different governance approach. As a result, the Paris Agreement of 2015 identifies global obligations of result,^{LXXI} it relies on a bottom-up approach,^{LXXII} and it gets rid of the rigid distinction between Annex and non-Annex Parties to the UNFCCC.

Importantly, the Agreement makes no reference to agriculture, it only refers once to food-production (but just as a limitation to climate adaptation and mitigation policies),^{LXXIII} and it never mentions the LULUCF sector (though it refers to ‘reducing emissions from deforestation and forest degradation’ *i.e.*, REDD+)^{LXXIV}. Notwithstanding this, carbon removals do not only play a role in the ‘enhanced transparency framework’,^{LXXV} but they also continue constituting a central element in the process of carbon accounting, in accordance with Article 4(13) of the Agreement. Furthermore, most of the references to carbon sinks and forestry provided by the Paris Agreement are enshrined in Article 5 which encourages (though in a non-binding fashion) all Parties to take action to enhance the reduction of ‘emissions from deforestation and forest degradation, and [to consider] the role of conservation, sustainable management of forests and enhancement of forest carbon stocks’.^{LXXVI}

If the sensibility of the Agreement to carbon removals is considered in conjunction with the ambitious global obligation set forth in Article 2(1)(a) (‘holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels’), it becomes clear that carbon sinks have the potential to play an essential role in the achievement of the global temperature target. Nevertheless, the most important article enhancing the role of carbon sinks within the Paris Agreement is probably Article 4(1), as it fixes a global obligation of result (*i.e.*, ‘to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century’)^{LXXVII} in which the central role of carbon sinks is just self-evident.

Hence, in line with the Kyoto Protocol, the Paris Agreement continues relying on an accounting method which assigns a role to removals by carbon sinks. Furthermore, the Agreement identifies two global obligations of result which will, *de facto*, require all Parties to intervene on the AFOLU sector in order to respect their legally binding duties. Provided that, according to the best available scientific data, it will be impossible to respect these obligations



of result by acting on the AFOLU sector without drastically decreasing livestock sector production,^{LXXVIII} the potential relevance of these provisions on animal agriculture seems quite apparent.

Still, major limits of the Paris Agreement, as far as the subject of this article is considered, concern both the absence of references to sustainable forms of food-production, and the lack of ‘indication on the accounting rules to be applied in the [AFOLU] sector’.^{LXXIX} Moreover, provided that the Agreement fixes a long-term global objective of result, it allows heads of state to procrastinate the implementation of necessary, but generally unpopular, political decisions as those affecting livestock sector regulations and dietary changes. Undoubtedly, the global stocktake of 2023 will assess the (in)effectiveness of State Parties’ NDCs, and it will have the potential of shedding light on the necessity to act on the livestock sector in order to stay on track. However, being the Paris Agreement’s compliance mechanism arranged as a non-adversarial and non-punitive system,^{LXXX} its ability to successfully modify country Parties’ behaviour will be anything but obvious.

4. The UNFCCC soft law documents and the Koronivia Joint Work on Agriculture

Despite having given birth to “just” three international climate treaties, the UNFCCC framework has also produced a huge number of non-binding documents including COPs’ statements, subsidiary bodies’ ordinary reports, and subsidiary bodies’ workshop reports. Interestingly, State Parties meeting in Durban at COP-17 requested for the first time ‘the Subsidiary Body for Scientific and Technological Advice [SBSTA] to consider issues related to agriculture’.^{LXXXI} This decision led the SBSTA to arrange five workshops between 2014 and 2016 that, despite mainly focusing on agricultural adaptation to climate change, also contain some mitigation elements. Indeed, during the fourth workshop there were, for the first time, ‘many Parties’ asking for the SBSTA to better address the synergies that exist between agriculture adaptation and mitigation.^{LXXXII} Moreover, during the fifth workshop, the necessity to mitigate agriculture-related GHG emissions in order ‘to fulfil the goal of the Paris Agreement’ was made explicit for the first time.^{LXXXIII} Still, it was during COP-23, held in



Bonn, that the Conference of the Parties requested the ‘the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation [SBI] to jointly address issues related to agriculture, including through workshops and expert meetings’ within the process that has been named Koronivia Joint Work on Agriculture (KJWA).^{LXXXIV}

The KJWA has produced a total of six in-session and two intersessional workshop reports between 2019 and 2021, and despite the original mandate required ‘the subsidiary bodies to report to the Conference of the Parties on the progress and outcomes of the work [...] at its twenty-sixth session’,^{LXXXV} no conclusive decision on agriculture has been adopted at COP-26, so that subsidiary bodies ‘have agreed to continue consideration of this matter [...] with a view to reporting on it to and recommending a draft decision for consideration and adoption by the Conference of the Parties at its twenty-seventh session’.^{LXXXVI}

Still, the FAO has defined the establishment of the KJWA as a landmark decision.^{LXXXVII} Accordingly, it could be useful to look at the reports produced under this workstream, as they provide a picture of high-level dialogues on the relationship between climate change and agriculture conducted at the global level, within the UNFCCC framework, by a wide range of experts and stakeholders.

While the first four workshop reports did not introduce particularly relevant positions, with partial exceptions being report-2, in which an NGO representative stated that ‘adaptation in the agriculture sector [must] be addressed jointly with climate change mitigation’,^{LXXXVIII} and report-4 in which ‘many participants’ highlighted the ‘urgent need to increase mitigation efforts’,^{LXXXIX} it is possible to identify some outstanding elements from the fifth report onwards. In report-5, not only participants underlined that ‘improving livestock management systems can be an important part of the solution for mitigation’^{XC}; indeed, in this report ‘several participants suggested that making dietary changes, particularly in developed countries [...] is a quick and effective way of reducing emissions from livestock’,^{XCI} and a representative of the ‘Women and Gender Constituency’ asserted that ‘Parties should be assisted in integrating food-related and agricultural objectives into their NDCs, such as [...] promoting plant-based diets’.^{XCII} Evidently, the fifth report represents a turning point, as it is the first case in which the necessity to reduce both livestock production and (more importantly)



consumption in order to mitigate climate change is explicitly mentioned under a UNFCCC process.

The importance of acting both on the supply and on the demand side is reiterated in the sixth report, in which an IPCC expert highlighted that ‘agriculture, food production and deforestation [are] major drivers of climate change’, so that ‘supply-side practices can be adopted that help to mitigate climate change by reducing emissions from [...] livestock agriculture’, but also reminding that ‘the widespread adoption of a balanced diet presents opportunities for reducing emissions from food systems’.^{XCIII} Moreover, in this occasion, an IPES expert^{XCIV} ‘indicated that twentieth-century conventional agriculture is unsustainable. [...] However, incremental improvements to the existing agricultural system will not be enough to enable achievement of the Paris Agreement goals or the SDGs. [In fact,] necessary change is being prevented by several structural lock-ins, including the concentration of power in the agri-food business and the inadequacy of indicators of success in agriculture’.^{XCIV} Outstandingly, the level of criticism on the present agri-food system reaches an unprecedented level in report-6, as Parties to the workshop have openly criticized the stunning unsustainability of both the system and the underpinning agricultural indexes, while also underlining the negative impact of short-sighted, self-interested actions of some agri-food businesses, and the importance of adopting dietary changes.

Report-7 has mainly focused on the challenges identified by the agri-food sector in relation ‘to the implementation of sustainable land and water management in agricultural practices’.^{XCVI} Nevertheless, also in this occasion, a UNCCD expert has reminded that ‘to achieve land degradation neutrality, a long-term strategy is needed from both the demand and supply sides’.^{XCVII} Afterwards, report-8 focused on ‘modalities for scaling-up implementation [...] of sustainable climate-resilient agricultural solutions’.^{XCVIII} On the one hand, during this workshop, an expert from ‘Project Drawdown’ explained that ‘climate solutions with the highest potential for reducing greenhouse gas emissions relate to [...] shifting to plant-based diets’.^{XCIX} Moreover, the representative of an environmental NGO underlined that ‘an equitable reduction of agricultural emissions and transition to diverse plant-rich diets and agricultural systems is essential to meeting that goal’, and that best practices include ‘less and



better livestock production'.^C On the other hand, the importance of acting on the livestock sector was also highlighted by country Parties as Mexico,^{CI} and by a representative of business and industry NGOs.^{CI} However, in these latter cases the focus was put on improving livestock management and not on reducing livestock production, *inter alia*, by intervening on the demand side.

Overall, the content of KJWA's workshop reports defines an increasing recognition, at the global level, of the major role that the mitigation of livestock-related GHG emissions must play in climate policy. Intriguingly, the most innovative and advanced proposals have always been generated by environmental NGOs and scientific or technical experts. Conversely, country Parties' and agri-food business' proposals for mitigating livestock-related GHG emission have been much rarer, and solely focused on improving livestock management, without ever acting on the demand-side. However, as, *inter alia*, the European Court of Auditors observes, there is 'no effective and approved practice that can significantly reduce livestock emissions from feed digestion without reducing production. [Indeed,] practices concerned with animal breeding, feeding, health and fertility management [actually] encourage production expansion, and may thus increase net emissions'.^{CI}

5. Final Considerations and Conclusions

The three international climate treaties constitute a legal framework that is not completely blind to the livestock sector mitigation potential. As a matter of facts, all treaties support a carbon accounting system which assigns a considerable role to carbon removals by sinks (which can substantially be enhanced through a reduction of livestock production); moreover, Article 2 of the Paris Agreement establishes a binding objective of result which can only be achieved if a considerable phase-down of animal agriculture takes place.

Nevertheless, the international climate regime is still very far from adequately inducing a reduction of livestock emissions. Beyond the original sin constituted by the UNFCCC's carbon accounting system focusing on production (instead of consumption) patterns, and allowing for 'livestock-leakage', main pitfalls of the Paris Agreement, that could ideally be addressed through the creation of amendments or annexes to the Agreement,^{CI} need to be underlined.^{CV}



As a matter of facts, even by sticking to the Paris Agreement's bottom-up approach, more can be done in order to address livestock emissions' mitigations. As a base, it would be useful to integrate the Agreement with references to agriculture, or even better to sustainable and carbon-efficient agriculture. For instance, these references could complement the content of Article 9, on climate finance, and Article 10, on technology development and transfer, in order to incentivise investments on sustainable alternatives to meat and dairy products (e.g. meat analogues and cultivated meat).^{CVI} Even more ambitious would be the proposal of introducing an annex to the Agreement establishing the basis of carbon farming initiatives in the agricultural sector. In order to establish such a system, relevant lessons could be learnt from Australia.^{CVII} Finally, as this article has repeatedly underlined, trying to increase consumers' awareness should also be a priority of the Climate Regime. Accordingly, a major enhancement of Article 12 of the Paris Agreement could introduce an obligation for country Parties to work on closing the awareness gap on the terrific environmental and climate impact of the livestock sector, as well as on the health-environmental co-benefits of reducing animal products consumption. This obligation could be implemented in multiple ways, ranging from school and education reforms to the introduction of carbon emission labels on food products.

Thought-provoking results have emerged from the analysis of the KJWA's workshop reports. As a matter of facts, it appears that Parties have increasingly underlined the need of mitigating agriculture-related GHG emissions, they have progressively made more central the theme of livestock sector's emissions, and they have also repeatedly underscored the necessity of phasing-down animal food consumption by inducing dietary changes. Still, as it has been noted, the most outstanding statements and proposals have come from environmental NGOs representatives and scientific and technical experts. Indeed, differently from country Parties, these categories of actors can easily prioritize the undertaking of strong, scientifically-sound positions, over short-sighted economic and political interests. Considering the vital importance of addressing climate change, as well as its complexity and highly technical nature, its regulation should (at least partially) prescind the logic of self-interested, myopic political interests of country Parties' leaders. Accordingly, the findings emerging from the analysis of the KJWA can be valuable food for thought, and they should stimulate the establishment of



further research on the role that different categories of non-state actors could play in the international climate regime, *inter alia*, through a formal institutionalization of their role.

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^I Lukas Rüttinger et al., 'A New Climate for Peace: Tackling action on Climate and Fragility Risks' (2015) 5.

^{II} World Health Organization, 'Health and Climate Change' (2018) 1.

^{III} Council of the European Union, 'Council conclusions on Climate and Energy Diplomacy - Delivering on the external dimension of the European Green Deal' (2021) 2.

^{IV} See UNFCCC Platform Website (<https://unfccc.int/documents>) link accessed on 26th of February 2022.

^V Angel Hsu & Ross Rauber, 'Diverse climate actors show limited coordination in a large-scale text analysis of strategy documents' (2021) *Communications Earth & Environment*.

^{VI} See FAO, 'Livestock's Long Shadow' (2006); FAO, 'Tackling Climate Change Through Livestock' (2013); Henk Westhoek et al., 'Food choices, health and environment: Effects of cutting Europe's meat and dairy intake' (2014) *Global Environmental Change*; Marco Springmann et al., 'Analysis and valuation of the health and climate change cobenefits of dietary change' (2016) *PNAS*; Heera Lee et al., 'Implementing land-based mitigation to achieve the Paris Agreement in Europe requires food system transformation' (2019) *Environmental Research Letters*; Michael B. Eisen & Patrick O. Brown 'Rapid global phaseout of animal agriculture has the potential to stabilize greenhouse gas levels for 30 years and offset 68 percent of CO₂ emissions this century' (2022) *Plos Climate*.

^{VII} FAO, 'Tackling Climate Change Through Livestock' (2013) 14.

^{VIII} Rob Bailey et al., 'Livestock – Climate Change's Forgotten Sector' (2014) Chatham House, 14-15.

^{IX} Sabrina Rose et al., 'Livestock management ambition in the new and updated nationally determined contributions: 2020-2021' (2021) 1 *CGIAR Research Program on Climate Change, Agriculture & Food Security*.

^X *Ibid.* 3

^{XI} *Ibid.* 1

^{XII} See IPCC, 'Summary for Policymakers' in *Special Report: Special Report On Climate Change And Land* (2019) 26.

^{XIII} *Supra* note 6.

^{XIV} Debra L. Donahue, 'Elephant in the Room: Livestock's Role in Climate and Environmental Change' (2008) *Michigan State University College of Law Journal of International Law*, 104.

^{XV} Robert Bailey (n 8) 22.

^{XVI} *Ibid.* 22.

^{XVII} *Ibid.* 23.

^{XVIII} Hope Johnson, 'Eating for Health and the Environment: Australian Regulatory Responses for Dietary Change' (2015) *QUT Law Review*.

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^{XXVIII} Michael B. Eisen & Patrick O. Brown, 'Rapid global phaseout of animal agriculture has the potential to stabilize greenhouse gas levels for 30 years and offset 68 percent of CO₂ emissions this century' (2022) 8 *PLOS Climate*.

^{XXIX} FAO (n 7) 17.



- xxx Ibid. 14.
xxxI Eisen & Brown (n 28) 2.
xxxII Ibid. 1.
xxxIII Joseph Poore & Thomas Nemecek, 'Reducing food's environmental impacts through producers and consumers' (2018) 2 Science. It is important to remark that these estimates do not consider the additional value of biomass recovery, and therefore identify a carbon footprint per unit of food product that is smaller than the one identified in Eisen and Brown (n 28).
xxxIV Ibid. 2.
xxxV FAO (n 7) 15.
xxxVI UNEP, 'Keeping warming to 1.5°C impossible without reducing Short-lived Climate Pollutants' (2018) (<https://www.unep.org/news-and-stories/press-release/keeping-warming-15c-impossible-without-reducing-short-lived-climate>) Link accessed on 27th of February 2022.
xxxVII FAO, 'The Future of Food and Agriculture: Alternative Pathways to 2050' (2018) 8.
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xxxIX Heera Lee et al., 'Implementing land-based mitigation to achieve the Paris Agreement in Europe requires food system transformation' (2019) 4 Environmental Research Letters.
xl Ibid. 4.
xli Eisen & Brown (n 28) 13.
xlii See Paris Agreement (2015) Art.2(1)(a).
xliiii Henk Westhoek et al., 'Food choices, health and environment: Effects of cutting Europe's meat and dairy intake' (2014) Global Environmental Change.
xliv Ibid. 199.
xlv Stands for 'Land Use, Land Use Change, And Forestry'.
xlvi Stands for 'Reducing Emissions from Deforestation and Forest Degradation'; it also includes conservation and sustainable management of forests.
xlvii Stands for 'Agriculture, Forestry, and Other Land Use', it is a more comprehensive category including both agriculture and LULUCF.
xlviii Heera Lee et al. (n 39).
xlx Arro Van Asselt, 'From UN-ity to Diversity? The UNFCCC, the Asia-Pacific Partnership, and the Future of International Law on Climate Change' (2007) 17 Carbon & Climate Law Review.
l UNFCC (1992) Art.2.
li Ibid. Art.3(1).
lii Ibid. Art.4(1)(a).
liii Ibid. Art.4(1)(b).
liv Ibid. Art.4(1)(c).
lv Ibid. Art.4(1)(d).
lvi Ibid. Art.12(1).
lvii Ibid. Art.4(2)(a).
lviii Ibid. Art.4(2)(b).
lix Navraj Singh Ghaleigh, 'Economics and International Climate Change Law' in Kevin R. Gray, Richard Tarasofsky, Cinnamon Carlarne (eds.) *The Oxford Handbook of International Climate Change Law* (2016).
lx Ibid. 15. Second Degree Path Dependence is defined by Ghaleigh as follows: a situation 'which occurs when the inferiority of a chosen path is unknowable at the time a choice is made, but we later recognize that some alternative path would have yielded greater wealth; dependence on past conditions leads to outcomes that are regrettable and costly to change'.
lxi Heera Lee et al. (n 39) 2.
lxii Harro van Asselt, 'The Design and Implementation of Greenhouse Gas Emissions Trading' in Kevin R. Gray, Richard Tarasofsky, and Cinnamon Carlarne (eds.) *The Oxford Handbook of International Climate Change Law* (2016).
lxiii Kyoto Protocol (1997) Art.2(1)(a)(iii).
lxiv Ibid. Art.3(3).
lxv Ibid. Art.3(4).
lxvi The Marrakesh Accords & The Marrakesh Declaration (2001) 122.
lxvii Kyoto Protocol (n 63) Annex A.
lxviii Mariagrazia Alabrese, 'Politiche climatiche, politiche agricole e il bisogno di coordinamento' (2021) Rivista di Diritto Agrario.
lxix See Eurostat, 'Agricultural production - livestock and meat' (2021) (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agricultural_production_-_livestock_and_meat&oldid=549389). Despite the EU had the most ambitious (but still too low) reduction targets commitments among Annex-I Parties to the Kyoto Protocol, it could achieve its



target objectives without reducing its animal agriculture production between 2008 and 2012 (*i.e.*, during the first commitment period).

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LXXI Paris Agreement (2015) Art.2(1)(a) and 4(1).

LXXII *Ibid.* Art.3.

LXXIII *Ibid.* Art.2(1)(b).

LXXIV *Ibid.* Art.5(2).

LXXV *Ibid.* Art.13(7)(a).

LXXVI *Ibid.* Art.5(2).

LXXVII *Ibid.* Art.4(1).

LXXVIII Heera Lee et al. (n 39); Michael B. Eisen & Patrick O. Brown (n 28).

LXXIX Annalisa Savaresi and Lucia Perugini, 'Article 5: Sinks, Reservoirs of GHG and Forests', *Journal for European Environmental and Planning Law*, in G. van Calster and L. Reins (eds.), *The Paris Agreement on Climate Change - A Commentary* (2021).

LXXX See Paris Agreement (2015) Art.15(2).

LXXXI UNFCCC, 'Report of the Conference of the Parties on its seventeenth session, held in Durban from 28 November to 11 December 2011 - Addendum' (2012) paragraph 75.

LXXXII FCCC/SBSTA/2016/INF.5 (2016) paragraph 47.

LXXXIII FCCC/SBSTA/2016/INF.6 (2016) paragraph 28.

LXXXIV UNFCCC, 'Decision 4/CP.23' (2018) paragraph 1.

LXXXV *Ibid.* paragraph 4.

LXXXVI FCCC/SB/2021/L.1 (2021) paragraph 12.

LXXXVII FAO, 'Understanding The Future Of Koronivia Joint Work On Agriculture' (2021) 17.

LXXXVIII FCCC/SB/2019/1 (2019) paragraph 59.

LXXXIX FCCC/SB/2020/1 (2020) paragraph 67.

XC FCCC/SB/2021/1 (2021) paragraph 52.

XCI *Ibid.* paragraph 47.

XCII *Ibid.* paragraph 29.

XCIII FCCC/SB/2021/2 (2021) paragraph 14.

XCIV Stands for 'International Panel of Experts on Sustainable Food Systems'.

XCV FCCC (n 93) paragraph 15.

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XCIX *Ibid.* paragraph 11.

C *Ibid.* paragraph 30.

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CIII European Court of Auditors, 'Common Agricultural Policy and climate - Half of EU climate spending but farm emissions are not decreasing' (2021) paragraph 30.

CIV See Paris Agreement (2015) art.22 and 23.

CV It is not the case of focusing on the Kyoto Protocol anymore. Indeed, being the second commitment period expired, and given the absence of a third commitment period, the Protocol does no longer produce relevant legal effects.

CVI See Hannah Ritchie, David S. Reay, Peter Higgins, 'Meat substitute products have a large potential for reducing GHG emissions and improving nutritional outcomes' (2018) *Sustainable Food Systems*.

CVII Jonhatan Verschuuren, 'Towards a Regulatory Design for Reducing Emissions from Agriculture: Lessons from Australia's Carbon Farming Initiative' (2017) *Climate Law*.



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