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Technical aspects of Nationally Appropriate Mitigation Actions (NAMAs) for livestock systems in Latin America and Caribbean Region

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Introduction

Livestock farming plays an important role in global climate change, representing 14.5 % of anthropogenic greenhouse gas (GHG) emissions. With 1.9 $GtCO_2e$ emitted annually, the Latin American and Caribbean region (LAC) presents the highest level of emissions from the livestock sector worldwide. Most of these emissions come from the cattle and dairy industry, due-to land-use change, associated with deforestation and grasslands expansion (Gerber *et al.* 2013).

This situation is exacerbated by the rise in the world's population and the consumption patterns of meat and milk, which are expected to increase progressively over the next few decades. According to Alexandratos & Bruinsma (2012), in 2050 milk and meat demands will grow by 73 % and 58 %, respectively, compared to 2010 levels. At the same time, the livestock sector faces challenges posed by climate change, including rising temperatures, increase in drought frequency and severity, tropical storms, and other extreme events.

The global initiatives that aimed at reducing emissions in this sector include the Nationally Appropriate Mitigation Actions (NAMA). Livestock NAMAs are voluntary production development strategies, adopted by the sector (cattle, mainly), focused on reducing emissions. These are based on transformational and progressive changes, achieved by promoting the implementation of appropriate measures, supporting and training relevant stakeholders to facilitate their adoption.

This document provides important information about the main technical aspects of livestock NAMAs, as well as the challenges they face and some recommendations that will help them to improve. It is focused in nine countries of the LAC region(Mexico, the Dominican Republic, Guatemala, Honduras, Costa Rica, Colombia, Argentina, Uruguay and Paraguay); but more specifically in five of them, where climate actions in the cattle sector are best documented (Costa Rica, Colombia, Guatemala, Honduras and Uruguay). Based on the key aspects of organization, logic and mitigation goals, the most relevant technical aspects of the NAMA proposals were reviewed to suggest guidelines and orientation for the technical design, and for the implementation of those initiatives. The study was developed between November 2018 and February 2019, by reviewing and analyzing secondary information and consulting (remotely) with key informants from each country evaluated.

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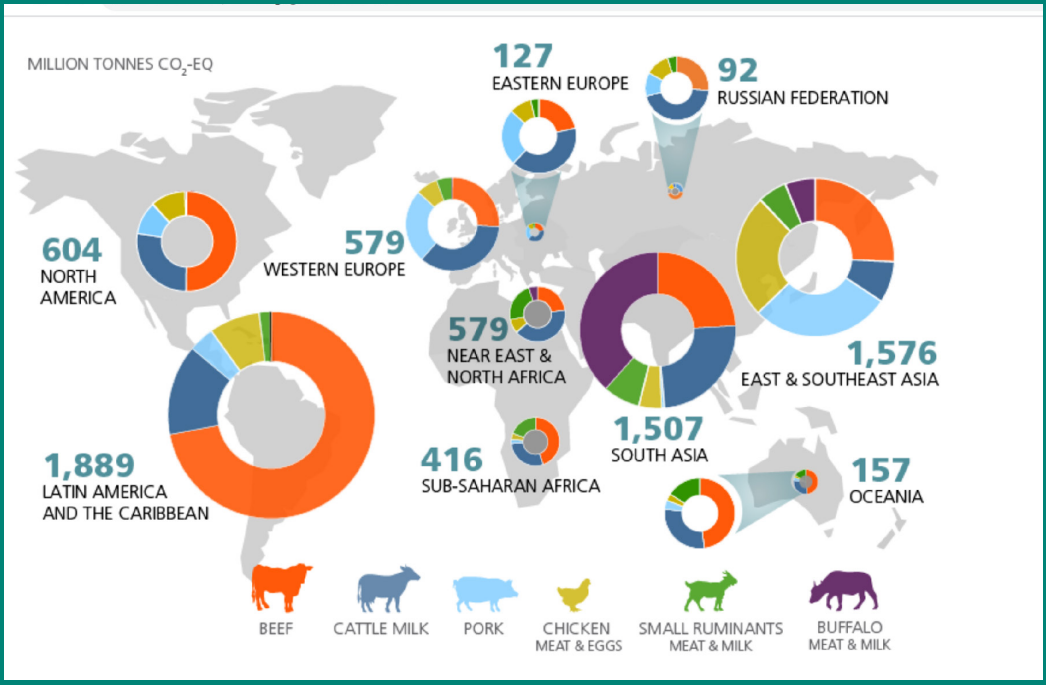

Figure 1. Livestock regional total emissions and their profile by commodity (results do not include emissions allocated to non-edible products and other services). Source: Global Livestock Environmental Assessment Model (GLEAM), FAO (2018).

Context and Challenges

Undoubtedly, the livestock sector is a significant contributor of GHG emissions in most LAC countries. From the countries analyzed, the total sector emissions represent between 9.3 % and 37.4 % of the national GHG emissions, which shows why national efforts to reduce these emissions must take the livestock sector into account (Table 1). However, out of the nine countries initially considered for this analysis, only five have some type of livestock-associated climate initiative. Likewise, the level of progress in existing initiatives is quite varied. In most cases, proposals remain at the conceptual stage.

Table 1. Relative weight of livestock sector emissions (enteric fermentation only) out of total GHG, per country.

Country	Relative value of livestock GHG emissions (%)
Honduras	**14.5**
Colombia	**9.3**
Guatemala	**9.3**
Costa Rica	**9.6**
Uruguay	**37.4**

Source: Nationally Determined Contributions and biannual update reports to the UNFCCC.

From the cases analyzed, the NAMA livestock initiative in Costa Rica presents the most significant progress. There, the initiative is developed through a public-private partnership, with investment from the State, industry organizations and international cooperation. This NAMA has been extremely helpful, by creating a precedent, for the Low-Carbon Livestock Strategy. This strategy is promoted by the Livestock and Agricultural Ministry, and its main objectives are promoting eco friendly and eco efficient changes in the livestock sector; for example, increased efficiency on the business and land management, changes in the animals base diet, genetic improvements through new technologies, attitude improvements towards new mechanisms from the business owners, and more (MAG, 2015). The efforts of this strategy have been important for a better implementation of governance and financing mechanisms, pilot actions for their escalation in later phases, and a proposal to develop a Monitoring, Reporting and Verification (MRV) system. From a technical point of view, the country has launched pilot projects (two pilot phases, four-year duration each one, oriented to the production of meat and dual purpose in 93 farms in five regions, and specialized dairy in 41 farms in four regions) that have generated information related to the impact of key technologies that could be implemented by the project, producing inputs for the two final phases (a five-

year duration phase of scaling-up to 1800 farms in three regions, and a ten-year duration final phase of scaling-up to 10140 farms in all regions nationwide).

The Colombian livestock NAMA was preceded by pilot projects developed by the Colombian Federation of Livestock Farmers (FEDEGAN) along with research institutions (CIAT, CIPAV and Agrosavia). It has a reference in the Colombian Sustainable Livestock Strategy, which defines the governance framework for NAMA design and implementation. This NAMA has made significant progress in identifying target regions and the technologies to be transferred to producers in them. Regarding technical aspects, the initiative focuses on actions aimed at a sustainable intensification of livestock production with intensive, non-intensive silvopastoral systems; at managing land cover and land use (conservation and / or restoration of natural ecosystems within cattle farms), and at addressing other links in the value chain (manure management and the use of methane gas generated in slaughterhouses).

Honduras and Guatemala have made significant progress in creating national strategies for sustainable livestock, as well as specific efforts to obtain resources for NAMA Support Projects. Their livestock NAMA initiatives are still at the concept level, waiting for resources to convey further momentum. The Honduran NAMA has a national scope, and its contribution to Nationally Determined Contributions (NDC) goals is considered significant. The Guatemalan NAMA is regional, with a smaller contribution to NDCs, and its goal is to have a livestock sector that is resilient to climate change.

Uruguay does not have a livestock NAMA as such. However, given the large contribution of the livestock sector to national GHG emissions, the country has been making efforts to meet its conditional emission reduction goals for this sector (including its NDC). The intention is, in order to maximize efficiency, to reduce the impact of livestock on the country's emissions. They are also considering improving forage quality through management and technology.

Policy Recommendations

As a result of the review of LAC livestock NAMAs, some recommendations are presented below, in order to improve key technical aspects that may enhance the livestock NAMAs design and implementation, following efficiency, effectiveness and sustainability criteria.

Scope and potential impacts of the NAMA

Countries should make an effort to be more consistent in defining the scope of climate action through characterization (typology) of farms and prioritization of areas for intervention based on their technical, economic, and environmental performance. It is important to consider NAMA cost-effectiveness, given the limited resources available and the timeframes needed to meet country commitments.

Likewise, it is advisable to make a larger effort to evaluate the impact and efficiency of the technologies to be included in NAMAs (through pilots or modeling), prior to presenting them to stakeholders. In addition to being effective in reducing GHG emissions, the selected technologies must be cost-effective for producers, and increase the adaptive capacity of livestock activities.

By improving the characterization and prioritization, in addition to selecting appropriate technologies, it will become easier to determine the scope and potential impact of NAMAs in each country. This will help by prioritizing segments and technologies with the greatest mitigation potential, based on national effort and investment.

Organization for implementation

NAMA implementation planning should be improved. A structure organized into stages or phases, as most of the analyzed initiatives have, should include clear end-goals and a solid and robust intermediate goal progression logic, establishing the necessary investment, logistics and financial feasibility elements at each phase.

Baseline estimates and mitigation scenarios

In most of the cases analyzed, the methodologies used to calculate the baseline and the scenarios are quite aggregate in terms of emission factors used. More detailed information, regarding technical aspects and farm diets in different types and agro-ecological conditions, allows the establishment of more emission factors per animal category and for different land uses and their changes, just as in the cases of Costa Rican and Colombian NAMAs. This enables the use of more sophisticated modeling tools, resulting in better predictions for baselines and technology impacts, both in relation to enteric emissions and land use as well as bio-economic performance impacts of farms, through herd dynamics models, land use change models, and bio-financial models.

Standardization of mitigation units

It is recommended that countries standardize the manner in which they report mitigations (concerning absolute GHG emissions, for example) in order to facilitate comparisons between countries, promote transparency, and enable the evaluation of the intervention efficiency in meeting its emission reduction goals.

Documentation and transfer of knowledge and skills

It is recommended that countries improve the documentation and information management processes used and

generated during NAMA development (methodologies and access to models and spreadsheets, among others). It is also very important to create mechanisms that ensure internal capacity building for the use and integration of knowledge and skills created during the NAMA design process.

Conclusions

Most countries have made limited progress in their livestock NAMAs (most are still in the conceptual phase and looking for resources). For this reason, they have not yet developed the technical and methodological aspects necessary for a detailed analysis. However, a review of the main technical aspects has been carried out, using available documentary information, and complemented with interviews with key stakeholders. The main technical aspects of livestock NAMAs are described below and summarized in Table 2.

- Methodological approaches to determine baselines and mitigation scenarios present important differences in relation to the level of complexity and detail used. The NAMAs of Honduras and Guatemala employ very simple and aggregate methods (the IPCC methodology at the country level), whereas Costa Rica and Colombia use methodologies and instruments from more complex and detailed models.
- As for the technologies to be implemented in the NAMAs, all the reviewed cases were very similar, with silvopastoral systems as the preferred group of sustainable livestock production practices. The role of national and regional research institutions such as CATIE, CIPAV and CIAT has been key.
- In all cases, the NAMA technical approach addresses two complementary aspects: a) mitigating animal emissions by improving their diet, and b) promoting changes in soil use to both enhance zootechnical animal conditions and to improve soil and biomass (plant cover) carbon capture and retention. Some countries extend the reach of NAMAs beyond farm and landscape to include reductions at higher levels of the production chain. As a result of these interventions, reductions in GHG emission intensities are estimated per unit of product (meat and milk) for all scenarios in the countries analyzed.
- MRV systems are a technical element lacking in almost all NAMAs. Only Costa Rica and Guatemala have given these systems formal consideration. In general, none of the studied cases had a clear proposal for information system implementation and integration, where not only data maps are defined, but other key aspects as well, such as: a) strategies for data collection, sampling, measuring, and storage, as well as calculation of algorithms; b)data storage and processing infrastructure and software; c) integration between transactional information systems at the farm level, with a periodic information collection system; and d) data quality control, among others. In general terms, this fundamental component of NAMAs has been underdeveloped and there is little effort being made to reconcile NAMA goals with MRV processes to verify the progress made over time.

Table 2. Summary of the main technical aspects of livestock NAMAs, by country.

Technical aspect	Costa Rica	Colombia	Guatemala	Honduras	Uruguay
1. *Scope of GHG emission reduction*	Cattle and land use changes.	Cattle, land use changes, and slaughterhouses (manure and methane).	Cattle and land use changes.	Land use changes, fertilizer management.	Cattle and land use changes.
2. *Spatial scale*	National, for all types of livestock (without differentiation). Farm level scope.	Prioritization by regions. Farm level scope.	Regions prioritized by production and socioeconomic aspects.	National, without prioritization by regions.	National, without prioritizing regions or production system types.
3. *Mitigation units*	– Absolute tCO_2e values. – C intensity per unit of product (kg CO_2e/kg of product).			– Absolute values of tCO_2e.	Emission intensity per kg (live animals).
4. *Form of implementation*	3 phases (1 pilot and 2 escalations).	Undetermined	3 phases	Undetermined	
5. *NAMA MRV system*	Established.	Not established.		Establishes on-farm monitoring (but not reporting and verification).	Not established.
6. *NAMA's relationship with the NDC*	The NDC does not specify livestock contributions. NAMA would increase absolute emissions by 4 %.	NAMA would contribute 6 % of NDC goals (including avoided deforestation, which reaches 114 %).	The NDC does not specify livestock contributions. NAMA would contribute 3-6 % of NDC goals.	NAMA contributed between 88 and 97 % of NDC mitigation commitments.	Climate action is not a NAMA as such, but it is part of the NDC.

tCO_2e: Ton of equivalent CO_2

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The views expressed in this document cannot be taken to reflect the official opinions of these organisations.

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