3.7 Adopting nature-positive livestock production systems

a. Background

The livestock production system is often under the spotlight for being responsible for environmental losses (*e.g.* greenhouse gas emissions, deforestation, water utilization), however, we think that we also have to consider its potential in soils regeneration[1], fertility, carbon sequestration[2], biosystem integration and the high nutrition value of animal-sourced foods; and animal by-products good for the soils such as manure and urine. Moreover, there is a need for increasing animal-based protein supply for a more balanced dietary system in most developing areas of the world. In this respect, both women and men farmers are ready to commit to the achievement of a more sustainable livestock sector, based on practices towards sustainable intensification of production with concrete actions and metrics along the value chain of animal source products. Globally, livestock contribute about 40% of agricultural gross domestic product (GDP) and provide livelihoods and incomes for at least 1.3 billion people.[3] It is the livestock economy that we find more women and vulnerable groups owning livestock assets compared to other agricultural sectors.

By applying an authentic farmers-driven approach we will move in the direction of global sustainable agricultural sector, including the livestock sector. Sustainable livestock farming is based on the three principles: 1. improving resource efficiency, 2. strengthening resilience and 3. securing social equity and responsibility of livestock production systems, according to the World Farmers Organization (WFO) policy paper on Sustainable Food Systems[4]. Our sustainable livestock solution is supported by the WFO Scientific Council evaluation framework of "SAFER Foods for a Sustainable World", which was adopted by the WFO Board as a preparation for the UNFSS, and which enabled contributors from the WFO network to evaluate projects and ideas in terms several dimensions of sustainability, including also economic and ethical sustainability of farming[5]. For this purpose, we have selected exemplary projects that represent some of the best livestock practices with the aim to support and amplify their positive actions not only for the environment but also for farmers' associations (men and women).

b. What, in brief, is the solution?

Innovation is key to unlock the potential of sustainable development in agriculture, including livestock farming. Fostering innovative methods, however, requires strong collaboration between both male and female farmers, science, politics and business sectors. Innovation is key to unlock the potential of the livestock sector as the heart of the functioning and transformation of food systems: innovation is a system that consists of a wide range of public and private actors and includes the rules and instruments by which these different stakeholders interact and relate with one another in social, political, economic and institutional settings. Innovation can include products, processes, markets, institutions; it can be technological, social, and organizational. This means that innovation processes in sustainable livestock will be directed not only to what happens at the production level but involve all the stages of the food value chain and all the components of food systems.

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[1] Teutscherova, N., Vazquez, E., Sotelo, M., Villegas D., Velásquez N., Baquero D., Pulleman, M., Arango, J. 2021. Intensive short-duration rotational grazing is associated with improved soil quality within one year after establishment in Colombia. Applied Soil Ecology. 159. doi.org/10.1016/j.apsoil.2020.103835.

[2] Aynekulu, E.; Suber, M.; van Noordwijk, M.; Arango, J.; Roshetko, J.M.; Rosenstock, T.S. 2020. Carbon Storage Potential of Silvopastoral Systems of Colombia. Land., 9, 309.

[3] https://www.ilri.org/

[4] Adopted in June 2020, https://www.wfo-oma.org/wp-content/uploads/2020/07/WFO-Policy-Paper-on-Sustainable-Food-Systems_approved-by-the-WFO-2020-GA_EN.pdf

[5] Available here: https://www.wfo-oma.org/wp-content/uploads/2021/02/WFO_SAFER-Foods-for-a-Sustainable-World.pdf

Sustainable livestock innovation will be driven by all categories of farmers, but only through public/private partnerships can the results be really effective and aligned to the three dimensions of sustainability. A sustainable use of innovative technologies in breeding, feeding, vaccinations, IOT, communications and more, when appropriately packaged in business models, and adapted to socioeconomic conditions of the target communities, have the demonstrated potential to move the needle on resources productivity in livestock, even while contributing positively to biodiversity habitats. Political and cultural dimensions will be respected in the deployment of innovative technologies for sustainable livestock. Moreover, extension services and training directly to women[6] and young farmers[7] have proven to have positive impact on the development of sustainable livestock food systems worldwide, especially in developing countries.

c. What was/were the source(s) from which this solution emerged?

Experience background of ACAI members network as well as the open-source contribution channel including numerous validated technologies of sustainable livestock practices.

d. What problem is it trying to address within food systems?

The livestock sector is often accused to be responsible for biodiversity degradation, excessive water use, desertification and greenhouse gases emissions. However, it holds a great potential in fostering soils health[8], soil fertility, an increased carbon sequestration and biodiversity services, which make the sector actually nature positive. Applying sustainable innovative methods in livestock means addressing climate change both on the mitigation[9] and adaptation side.

Natural resources, especially water and soil, are essential for the functioning and structure of agricultural production systems and for overall social and environmental sustainability. A smart management of resources (soil, water, energy, inputs) is essential for gender-categorised livestock farmers to ensure they can meet the global goal of food security while improving the profitability of their activity. Innovative livestock smart-farming solutions that are climate-friendly and environmentally sustainable exist and need further support. While Precision Agriculture tools have the potential to shape the sustainability of the agricultural sector in an effective way, their deployment in the livestock sector is scarce, probably due to affordability and utilization of those technologies by all types of men, women and young farmers and the support needed to ensure that this happens. We acknowledge the importance of understanding if livestock producers are ready to adopt these technologies and what they need to do it.

Moreover, sustainable livestock contributes to the adoption of a one health approach. In fact, the reduction of diseases of animal origin and the fight against antimicrobial resistance can be achieved through the dissemination of good practices of livestock management. The first and fundamental principle, to our understanding, is that a given solution is suitable for the farmers only if it is also economically viable as is sustainable livestock[10]. Critically, this includes respecting and paying the local cost of capital.

e. Why is addressing that problem important for achieving the goal of your ACAI?

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[6] Gumucio T. Mora Benard M. A. Clavijo M. Hernández M. C. Tafur M. Twyman J. 2015 Silvopastoral Systems in Latin America: Mitigation Opportunities for Men and Women Livestock Producers. CCAFS Policy Brief. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), Copenhagen. 8 p.

[7] Triana-Angel N, Ariza Aya M, Burkart S. 2020. Youth in livestock and the transformative power of rural education: the case of Heirs of Tradition, 2012–2020. CCAFS Info Note. Cali, Colombia: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

[8] Horrocks, C., Arango, J., Arevalo, A., Nunez, J., Cardoso, J. & Dungait, J. 2019. Smart forage selection could significantly improve soil health in the tropics. Science of the total environment, 688. 609-621. DOI: 10.1016/j.scitotenv.2019.06.152

[9] Arango, J., Ruden, A., Martinez-Baron, D., Loboguerrero, A. M., Berndt, A., Chacón, M., Torres, C. F., Oyhantcabal, W., Gomez, C. A., Ricci, P., Ku-Vera, J., Burkart, S., Moorby, J. and Chirinda, N. 2020. Ambition meets reality: achieving GHG emission reduction targets in the livestock sector of Latin America. Frontiers in sustainable food systems. 4:65. DOI: 10.3389/fsufs.2020.00065

[10] Burkart, S. 2020. Making money with sustainable intensification: Opportunities for the beef and dairy sector in developing countries. Poster prepared for the Virtual Livestock CRP Planning Meeting, 8-17 June 2020. Cali, Colombia: Alliance of Bioversity International CIAT.

Considering that the estimated total number of livestock units worldwide surpasses 17 billion units, that about two-thirds of the world's total agricultural area is dedicated to livestock production and that the value of livestock as a global asset reaches more than a trillion USD globally[11], sustainable livestock is central to our ACAI. Furthermore, due to the enormous mitigation and soil regenerative potential of the livestock sector complemented with the production on nutritious food for marginalized communities, both WFO and CGIAR cannot imagine a sustainable food system that provide for humankind while respecting our planet without accounting for sustainable livestock. It is worth highlighting how the spread of sustainable livestock farming contributes to the protection and conservation of biodiversity. Thanks to them, it is possible to reverse the trend of converting land used for grazing into fields for cultivation, altering its conformation and reducing the biodiversity of that area. In temperate regions, grass is capable of restoring degraded soil and storing carbon from the atmosphere: sustainable livestock contributes greatly to preserving soil and grass health. Long-stabilized grasslands store more carbon and are also very important to pollinating insects, providing food in late summer from grasses, meadow flowers, flowering clover and other legumes. In the recent years, both CGIAR research programs on Livestock and Climate Change, Agriculture and Food Security (CCAFS) have intensified efforts on research for development approaches so together with WFO we call for further support to sustainable livestock cases as detailed in section 2.5.

f. How can this solution address that problem?

We showcase some examples of "moving-the needle" technology applications:

- **Ethiochicken** is a company in Ethiopia which in a combination of a robust dual-purpose poultry breed with advanced feed-, vaccination-, and farm management methods has tripled the per person egg supply in Ethiopia between 2015 and 2020. The company enabled the creation of 6000+ small enterprises and strengthened the socioeconomic livelihood of around 2 million rural small-scale farmers in the country in a short time-span. Most beneficiaries of these improvements are the livelihoods of women and children as the usual livestock keepers in these households.
- **IOT and sensing technologies** make it possible to monitor the health of individual animals even in large scale herds and provide them automatedly with individualized feeding rations, such as in pig-pens, salmon cages, dairy operations or cattle feedlots. These systems significantly reduce mortality of animals, increase their health and welfare and increase feed conversion ratios.
- **High density and ultra-HD grazing methods** in combination with regenerative practices, can multiply livestock yields from a given patch of grazing land, while at the same time increasing rates of carbon sequestration, soil health and soil biodiversity. There are thousands of well-documented examples of this on all continents by now, demonstrating the multiple win potential for increased resource productivity, natural enhancement and economic sustainability for farmers.
- **Feed additives to reduce enteric methane** ruminant livestock sector, both from natural [12,13] and chemical sources[14]. This will nearly reduce 40% of the IPCC declared amount of GHG emissions of global agriculture, amounting to the single largest leverage technology among all GHG reduction measures across all commodities from agriculture.

11.Rao, I., Ishitani, M., Miles, J., Peters, M., Tohme, J., Arango […], & Cadisch. G. 2014. Climate-smart crop-livestock systems for smallholders in the tropics: Integration of new forage hybrids to intensify agriculture and to mitigate climate change through regulation of nitrification in soil. Tropical Grasslands – Forrajes Tropicales 2: 130–132. DOI: 10.17138/TGFT(2)130-132

12 Ku-Vera J., Jiménez-Ocampo R., Valencia-Salazar S., Montoya-Flores D, Molina-Botero I, Arango J, Gómez-Bravo C, Aguilar-Pérez C & Solorio-Sánchez F. 2020 Role of Secondary Plant Metabolites on Enteric Methane Mitigation in Ruminants. Front. Vet. Sci. 7:584. doi: 10.3389/fvets.2020.00584

13 Vijn S, Compart DP, Dutta N, Foukis A, Hess M, Hristov AN, Kalscheur KF, Kebreab E, Nuzhdin SV, Price NN, Sun Y, Tricarico JM, Turzillo A, Weisbjerg MR, Yarish C and Kurt TD. 2020. Key Considerations for the Use of Seaweed to Reduce Enteric Methane Emissions From Cattle. Front. Vet. Sci. 7:597430. doi: 10.3389/fvets.2020.597430

14 Meale, S.J., Popova, M., Saro, C. et al. Early life dietary intervention in dairy calves results in a long-term reduction in methane emissions. Sci Rep 11, 3003 (2021). https://doi.org/10.1038/s41598-021-82084-9

- **GANSO (Sustainable Livestock) initiative**[15] in Colombia is committed, through technical and financial assistance, to the professionalization of livestock activity, to make it more sustainable through solutions tailored to each farm and making these solutions transparent throughout the food chain, all the way to the retailers and consumers.
- **The Dairy Sustainability Framework** is a pre-competitive and collaborative model that drives and reports on continuous improvement in the dairy value chain in all locations. The framework caters for the diversity of world milk production allowing local solutions to be identified and implemented in the social, economic and environmental aspects of milk. Currently the Framework covers 30% of global milk production. www.dairysustainabilityframework.org

g. Why does this solution align to the definition and criteria for a 'game changing solution' developed by the Summit?

The examples mentioned in 2.5 have a proven track record of change rates of productivity increases in a time-scale of just a few years, and in the process creating system-wide impact on human and natural capital. That demonstrates their scalability, their immediate impact potential and clearly their actionability.

h. What is the existing evidence supporting the argument that this solution will work, or at least that it will achieve the initial outcomes described above?

Company records, public announcements, case study documents and various scientific analyses.

i. What is the current and/or likely political support for this idea?

Political support for sustainable livestock farming development and innovation**:** catalyzing States capacity to drive transformation is crucial. Not only financial and investment support are required, but also a policy framework that recognizes the role of livestock sector as a driver for sustainability of rural growth and social transformation in rural areas. This predisposition by governments is key to unleash the potential of agriculture as a multifunctional sector.

Political inclusiveness**:** women and young farmers are still lacking possibilities to be involved in the decision making as they experience the biggest challenges in having access to resources. Livestock sector policies should be repurposed to ensure that women and youngsters are involved in policy processes at all levels and have access to leadership positions to give voice and advocate for their own specificities while being representatives of the wider livestock farmers' community.

j. Are there certain contexts for which this solution is particularly well suited, or, conversely, contexts for which it is not well-suited at all?

In general, almost all animal farming contexts can profit from these technological and organizational breakthroughs that have manifested in recent years.

k. Who are the key stakeholders to be further involved in the process of developing and refining the solution idea?

Since the development of a lasting and effective solution needs a broad and systemic approach, it is possible to consider the involvement of different types of stakeholders who can participate collaboratively: of course, considering gender differentiated farmers and the organisations that protect their interests as the core of this new process, stakeholders from the feed industry could be involved, [...]. Moreover, since the sustainable transformation of economic sectors is a fast-growing global trend that also has inevitable impacts on financial institutions, it would be possible to involve different types

[15] Ruden A, Castro JP, Gutiérrez JF, Koenig S, Arango J. 2020. GANSO: New business model and technical assistance for the professionalization of sustainable livestock farming in the Colombian Orinoquia region. CCAFS Info Note. Cali, Colombia: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

of stakeholders from this sector in the process: banks, insurance companies and funds could benefit greatly from financing solutions related to sustainable livestocks also because of its long-term profitability. Stakeholders from the research and academic sector could also naturally contribute, by carrying out targeted research that supports the concrete effectiveness and credibility of the development of new solutions vis-à-vis all other stakeholders, directly or indirectly involved in the process.