Background

The global livestock sector finds itself at a crossroads due to a series of interconnected challenges. As the population grows, dietary habits evolve, and purchasing power increases, the demand for livestock products continues to rise worldwide. However, this expansion of livestock faces significant challenges across different regions. While efforts to reduce environmental footprint and address animal welfare concerns are prominent in regions like the Americas and Europe, in developing regions such as Asia and Africa, livestock is often driven by socio-economic factors and the need for ensuring food security.

These challenges are propelled by a diverse set of factors. Geopolitical aspects, such as trade agreements and international war tensions, influence market distribution and access. Ongoing socio-economic changes, like the rise of the middle class in many parts of the world, impact consumption patterns and demand for livestock products. Environmental issues such as deforestation, water scarcity, and greenhouse gas emissions raise crucial questions about the long-term sustainability of livestock. By taking steps to prevent and control diseases, we can help to ensure that livestock are healthy, productive, and safe for humans and the environment.

In this context, livestock systems must be viewed in their entirety and complexity. System resilience is understood as the capacity to prepare, adapt to changing conditions, and recover rapidly from disruptions.

The Global Agenda for Sustainable Livestock (GASL) plays an essential role by providing technical insights and knowledge to inform policy direction. GASL stands as a pioneering model of a multi-stakeholder partnership approach, bringing together governments, non-governmental organizations, the private sector, social movements, international bodies, donors, and academia. Through its collaborative framework, GASL adeptly addresses the intricate challenges that pervade the global livestock sector. Moreover, GASL's efforts are strategically underpinned by the four foundational sustainability domains, which comprehensively encompass environmental, social, economic, and health considerations, thus illuminating the broad spectrum of impact that the livestock sector.
GASL’s distinctive approach emphasizes the importance of collaboration across diverse stakeholders, fostering a unified commitment to navigate the multifaceted challenges confronting livestock production. This inclusive coalition embodies a shared responsibility to ensure the well-being of people, animals, and ecosystems. The four sustainability domains that underscore GASL’s work – environmental, social, economic, and health – serve as a compass guiding actions that uphold ecological integrity, social equity, economic viability, and human and animal health. This strategic alignment between GASL’s multi-stakeholder approach and its steadfast adherence to the four sustainability domains positions it as an exemplary archetype in the quest for a sustainable and resilient future for global livestock systems.

Bringing together governments, NGOs, private sector, social movements, international organizations, donors and academia, GASL addresses the complex challenges of global livestock production. Through their expertise and collaboration, GASL helps develop balanced and sustainable approaches to livestock production.

On this occasion, GASL is organizing at least three webinars in collaboration with CATIE, offering a space to reflect on the driver challenging livestock and envisioning promising solutions. The aim is to strengthen discussion spaces on environmental drivers, technological innovation, health and diseases, and the geopolitical and socio-economic factors of change in the sector. Additionally, exploring how stakeholders in the livestock sector can collectively devise solutions to further enhance the sustainability and resilience of livestock systems.

These webinars bring together experts, stakeholders, and the general public to discuss geopolitics in the food supply chain, the socio-economic impacts of livestock, and innovative technological solutions. By providing up-to-date information and multidisciplinary perspectives, these webinars contribute to a deeper understanding of key drivers and foster collaborative strategies that enable livestock to progress sustainably in an ever-changing world.

**Specific goals of the webinars:**

1. Demonstrate and understand the primary drivers of change affecting livestock systems and their implications for sustainability and resilience at regional and global level (what change drivers are and how they affect livestock systems).
2. Generate actionable proposals under the GASL four sustainability domains to tackle the identified challenges ensuring sustainable and resilient livestock systems.
3. Formulate an evidence-based technical-scientific stance that can serve as a guiding framework during the GASL MSP Meeting and to provide inputs for this year’s GASL regional consultations and other events such as COP 28.

**Methodological guidelines:**

The webinars will follow a participatory format, and each session will last around 3.5 hours, with an expected attendance of 100 people virtually. Attendance of the webinars will be by invitation, following a guest list provided by the FAO.
The Zoom platform will be used as the communication tool for attendees, and the incorporation of mediation resources through Slido applications is planned.

Regarding its structure, each webinar will consist of three structured parts according to the following outline:

**The current situation** will be presented by a keynote speaker who will deliver their speech. During the same, it will be possible to ask questions and receive brief feedback from the audience through the Slido Platform. The keynote speaker will receive a PowerPoint presentation template with the event’s graphic design and a set of guidelines to be considered in their presentation. The presenter should address specific goal number 1.

Next, we will move on to a panel. During this session, the panelists will make brief interventions as comments on the Keynote speaker’s presentation, allowing us to explore solutions to enhance sustainability and resilience in livestock systems for the addressed drivers of change in the webinar. During the panel discussion, participants also could propose alternative solutions for the addressed drivers through the Slido platform or verbally. These ideas will be picked up by the webinar facilitators as well as the panelists. The panelists should address specific goal number 2.

Subsequently, the Slido Platform will be used again to identify Contributions that GASL could make to address the challenges of environmental and technological innovation drivers.

Finally, 20 minutes will be allocated for the workshop facilitator to recap the agreements reached and express gratitude to the audience for their participation.

**Webinar 1 - Environmental and technological innovation drivers**

**Date: Tuesday, September 5th, 2023**

**Livestock Challenges Due to Environmental and Technological Innovation Drivers**

Environmental and technological innovation drivers are instigating a profound transformation within the livestock sector, reshaping its dynamics and perspectives. Technological innovation is, in turn, redefining
the landscape of livestock practices. Recent advancements are giving rise to novel products with the potential to either supplant or complement traditional animal-derived goods, such as plant-based meats, precision fermentation, and synthetic meat. While the shift towards plant-based alternatives may entail a long-term trajectory, precision fermentation and lab-grown meat could introduce more disruptive alterations. The establishment of regulatory frameworks for these products in various countries is paving the way for significant market reconfiguration, arousing the interest of specific segments of the population.

Land-use alteration emerges as a prominent factor influencing biodiversity preservation and ecosystem service provision (Tobar-López et al., 2019; Tscharntke et al., 2005). Livestock is identified as a prominent contributor to biodiversity decline, with instances of deforestation being attributed to this activity, even up to 90%. Nevertheless, it’s essential to acknowledge that well-managed livestock, including Salvo pastoral systems, presents a substantial avenue for biodiversity restoration and conservation, thereby contributing to the mitigation of climate change. Various countries are championing decarbonization strategies and elevating the livestock sector’s priority to fulfill nationally determined commitments (NDCs) in alignment with policy directives.

The looming threat of climate change has surpassed the objectives outlined in the Paris Agreement aimed at capping global temperature escalation at 1.5 degrees Celsius. Prolonged temperature increases and extreme weather events are impacting grazing systems and intensified concentrate-based production. The variability in climate and escalated production expenses inject uncertainty into supply chains and undermine food security. Regions vulnerable to these disruptions, along with impoverished communities, encounter amplified threats to their food security.

Hence, it is evident that the driver of climate change exerts its influence on the accessibility and quality of vital resources like land, water, and livestock feed. Additionally, climate change plays a role in shaping the prevalence and dissemination of livestock ailments and pests. Broadly, climate change has the potential to deliver both advantageous and adverse outcomes for livestock productivity and adaptation (FAO, 2017). Similarly, the technological innovation driver introduces fresh solutions and tools aimed at enhancing the efficiency, quality, and sustainability of livestock production. Nevertheless, these strides can also usher in novel challenges and trade-offs for livestock producers and consumers, encompassing ethical, social, and environmental considerations.

One of the pivotal technological drivers for livestock production centers on the utilization of precision agriculture and data-driven technologies. These innovations empower farmers and livestock producers to optimize diverse facets of their operations, leading to heightened efficiency, sustainability, and overall productivity. Among the plethora of options, we present three with an environmental focus:

- **Vertical Integration and Controlled Environment Agriculture**: Certain livestock production systems are transitioning towards vertical integration, wherein distinct production stages (breeding, raising and processing) are overseen by a single entity.

- **Controlled environment agriculture**, encompassing indoor farming or aquaculture, offers tailored conditions for livestock, reducing environmental impact and guaranteeing consistent output.
- Waste Management and Environmental Sustainability: Technologies aimed at managing livestock waste, including methane capture from manure, are gaining traction to mitigate the environmental repercussions of livestock production.

- Remote Monitoring and Management: Livestock producers can remotely oversee and manage their operations through smartphones, tablets, and other interconnected devices. This facilitates real-time decision-making and diminishes the need for constant physical presence on the farm.

**Impact of the Situation in the Regions of the World**

The combination of environmental and technological drivers affects regions across the globe in varying ways, primarily impacting countries with high livestock production, such as the United States, Brazil, Australia, and certain areas in Europe. The consequences of climate change are altering production conditions and supply chains worldwide, impacting both developed and developing economies. Technological advancements are sparking discussions on sustainability and food security at all levels of the value chain. The adoption of emerging technologies can also have economic and social implications for communities reliant on livestock.

**Importance of Visualizing Solutions and Future Action Proposals**

The interplay between environmental and technological drivers presents both challenges and opportunities within livestock production. Visualizing solutions and proposing future actions is pivotal in managing these changes and making the most of innovations. Webinars provide a platform for discussing how the livestock sector can respond to the challenges posed by climate change and technology. By bringing together experts in environmental science, technology, and livestock production, the aim is to foster collaboration and co-creation of strategies that lead to more resilient and sustainable livestock systems.

**Webinar Objective**

The objective of this webinar is to comprehensively analyze how environmental and technological innovation drivers are reshaping the livestock sector and how effective solutions and strategies can be developed to address the challenges posed by these drivers under the GASL four sustainability domains. Through multidisciplinary and multi-stakeholder dialogue and exploration of case studies, the aim is to provide a holistic view of the impacts and opportunities of these changes, promoting an informed and collaborative approach to addressing ever-evolving challenges in livestock production.

**Webinar 2 – Health and disease drivers**

**Date: Thursday, September 7th, 2023**

**Livestock Challenges Due to Health and Disease Drivers**

Livestock production has long been associated with potential threats to human health, encompassing zoonotic diseases, foodborne illnesses caused by infectious agents, and the emergence of antibiotic resistance in humans due to the excessive use of antibiotics in livestock.
Intensive systems pose risks to human health, primarily linked to occupational hazards like respiratory issues arising from inadequate air quality within animal housing facilities. These systems also contribute to antimicrobial resistance in human pathogens due to the widespread use of antibiotics for production enhancement and disease treatment in livestock.

Extensive livestock practices face increasing marginalization, leading to distinct human health risks. These include the transmission of diseases between animals, wildlife, and humans due to close interactions, as well as limited access to animal and human health services, hindering disease control efforts for conditions like brucellosis and echinococcosis. Land and water resource pressures compel extensively managed livestock to interact more frequently, weakening traditional disease control measures based on movement and separation. Notable examples of diseases affected by these dynamics are rabies, anthrax, brucellosis, and salmonellosis. The Covid-19 pandemic, which caused widespread disruption between 2020 and 2022, albeit impacting livestock systems less than other sectors, altered food consumption patterns and triggered disruptions within global supply chains.

Several drivers contribute to health and disease challenges within the livestock sector. These can be categorized as biological, environmental, and management factors. Biological drivers encompass pathogens, genetics, and nutrition, while environmental aspects involve climate, water quality, and sanitation. Management-related issues include overcrowding, inadequate vaccination, poor hygiene, and the misuse of antimicrobials. Climate change may perpetuate instability in environmental drivers, potentially influencing pathogen behavior (a biological driver).

The integration of robotics is manifesting in diverse applications globally to enhance animal health and disease prevention in livestock. Examples range from robotic milking machines, feeders, and scanners to drones and virtual assistants.

In essence, robotics holds the potential to revolutionize livestock health and disease management practices. By leveraging robotic technology, we can bolster efficiency, diminish disease transmission risks, enhance animal well-being, and enable early disease detection. These advancements can contribute to healthier animals, more productive farms, and a safer food supply.

These challenges present a formidable threat to the well-being of livestock, humans, and the environment. Navigating these challenges necessitates proactive measures, including bolstering biosecurity protocols, embracing vaccination and other preventive strategies, and innovating new treatments for livestock diseases.

Impact of the Situation in the Regions of the World

Recent health events have left an indelible mark, showcasing varied impacts across global regions. The inherent interconnectedness of animal, human, and environmental health has come into sharp focus, with livestock farming occupying a pivotal role in shaping the well-being of these three essential pillars. This dynamic has, in some measure, engendered shifts in dietary preferences and supply chain disturbances that have reverberated through the global landscape, affecting livestock producers and consumers alike.
The onset of African Swine Fever (ASF) in China during August 2018 marked a watershed moment. Its rapid spread to over 20 provinces and the infection of more than 100 million pigs underscored its formidable impact. The repercussions on China's pork industry, the largest globally, have been nothing short of calamitous. The fiscal toll of ASF on China's economy in 2020 alone was staggering, estimated at exceeding $50 billion. This outbreak cast a long shadow, triggering pork shortages and driving prices skyward. It also inflicted severe repercussions on various fronts: massive pig culling, job losses, environmental degradation encompassing water and soil, and an elevated risk of concurrent diseases. The proliferation of ASF has exhibited astonishing speed, now ensnaring over 50 countries. Notable diseases further exacerbating the international arena include avian influenza (AI), notorious for its contagion among birds and transmission to humans, giving rise to respiratory ailments, diminished egg production, and even fatalities. Swine flu (H1N1), which ignited a global pandemic after its 2009 identification in Mexico, has now receded from pandemic status. Nonetheless, remaining vigilant and adopting protective measures against its transmission remains paramount.

In essence, these events serve as stark reminders of the intricate interplay between health, agriculture, and economies on a global scale. As we grapple with the far-reaching implications, it is imperative to continue fostering strategies that bolster resilience, enhance biosecurity, and reinforce collaborative global efforts in mitigating the potential fallout from such health challenges.

**Importance of Visualizing Solutions and Future Action Proposals**

The intricate interplay among animal, human, and environmental health underscores the urgency of embracing a comprehensive approach to the multifaceted challenges posed by livestock production. The imperative of envisioning viable solutions and formulating prospective action plans becomes even more pronounced in the face of these intricate conundrums. Webinars serve as a pivotal platform for delving into the intricacies of how health and disease drivers can effectively shape and steer strategies, offering a compass to navigate the reverberations of global health phenomena on livestock production and their intricate entanglements with human health and ecosystems.

By convening a consortium of distinguished minds encompassing human health, livestock production, and public policy, these webinars pave the way for identifying opportunities that augur well for elevating the resilience and sustainability of livestock systems within our intricately interwoven world. This collective endeavor brings forth the potential to unearth pathways, informed by expert insights that not only fortify the robustness of livestock systems but also contribute to the well-being of human populations and the preservation of our precious ecosystems.

**Webinar Objective**

The aim of this webinar is to delve deep into how the health and diseases drivers are reshaping the landscape of livestock production and how effective solutions and strategies can be developed to address the challenges posed by these drivers under the GASL four sustainability domains. Through multidisciplinary and multi-stakeholder dialogue, the goal is to forge a comprehensive approach that addresses both health aspects and socio-economic impacts, striving for more resilient and sustainable livestock systems within a changing global context.
Livestock Challenges Due to Geopolitical and Socioeconomic Drivers

Livestock systems are subject to diverse geopolitical and socioeconomic drivers. Some of these drivers of change have for decades shaped demand for livestock products including population growth, urbanization and income growth. A growing number of countries have ageing populations. Recent shocks have accelerated inflation, undermining real incomes, and altering demand for food. Inflation also limits the capacity of producers and processors to innovate and invest. Some countries also attempt to de-couple or de-risk their supply chains reversing a decade-long period of trade liberalization (Steinfeld, Wassenaar y Jutzi, 2006)

The drivers of population and income growth are increasing the demand for animal products, especially in developing regions where population is expected to grow faster than in developed regions. Likewise, especially in emerging economies the increase in purchasing power of consumers is expected to stimulate the demand for higher quality and more diverse animal products (Shahbaz et al., 2021).

The driver of urbanization is shifting the consumption patterns of people from traditional to more diversified diets, including more animal products, thus, affecting the distribution and marketing of livestock products, requiring more processing, packaging, and transportation (Shahbaz et al., 2021).

The driver of trade liberalization is opening new markets and opportunities for livestock producers and consumers, but also exposes them to more competition and risks. Trade liberalization can also affect the environmental impacts of livestock production by changing the location and intensity of production (Shahbaz et al., 2021).

The growing geopolitical tensions and war conflicts have generated rising inflation, especially in food and energy prices. This escalating inflation has raised concerns about financial and price stability, especially in low-income countries. The disproportionate effects of inflation on vulnerable segments of the population have resulted in a decrease in the consumption of food of livestock origin among these groups. In addition, inflation is discouraging long-term investments, as future value flows are more heavily discounted.

Impact of the Situation in the Regions of the World

Demographic developments, driven by population growth and lifestyle preferences, climate change the armed conflicts, together with the lessons learned from the Covid-19 pandemic, have led countries to reorient their approach towards food and energy security, including livestock. Such effects differ across region and country, with marked differences between developing and developed countries.

These geopolitical and socioeconomic drivers affect the regions of the world in a differentiated way. In developing countries, inflation and trade restrictions can have an even more profound impact on food
security and economic stability. The decrease in the consumption of livestock foods among vulnerable segments of the population increases the challenges related to nutrition and health. The growing importance of food and energy security is also shaping political and economic priorities in various parts of the world, influencing the production and trade of livestock products.

**Importance of Visualizing Solutions and Proposals for Future Actions**

The complexity of these challenges demands a joint and anticipatory response to address the intersections between geopolitics, economics, and livestock. The visualization of solutions and proposals for future actions acquires critical importance in this context. Through the discussion and exchange of ideas in the webinars, it seeks to address how the livestock sector can navigate the challenges of inflation, trade restrictions, changing demographics, among other factors. By involving multiple stakeholders, from governments to producers to food security experts, strategies can be devised that effectively address the challenges and promote the resilience and sustainability of livestock systems.

**Webinar Objective**

The objective of this webinar is to explore in depth how geopolitical and socioeconomic drivers are shaping the dynamics of the livestock sector and how different actors can collaborate to develop innovative solutions and future actions that address the challenges posed by these drivers under the GASL four sustainability domains. Through multidisciplinary and multi-stakeholder dialogue, the aim is to generate ideas that contribute to strengthening the adaptability and sustainability of livestock systems in a changing global environment.

**REFERENCES:**


