WEBINAR 1
“ENVIRONMENTAL AND TECHNOLOGICAL INNOVATION DRIVERS

- SISTEMATIZATION REPORT –

Turrialba, Costa Rica
September 12th, 2023
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1. General Information

   **Webinar Title:** Environmental and Technological Innovation Drivers.

   **Date and Time:** September 5th, 2023, 2:00 UTC +2 (Rome Time)

   **Moderator/Facilitator:** Mariel Merayo, LLM / Danilo Pezo, Ph.D.

   **Coordination:** Astrid Pulido, Ph.D. / Ileana Avalos, Ph.D.

   **Panelists/Speakers:**

   **Welcome Address**
   - Shirley Tarawali, Chair GASL (Global Agenda for Sustainable Livestock).
   - Muhammad Ibrahim, Director General. CATIE.

   **Introduction**
   Henning Steinfeld, Consultant GASL.

   **Status of environmental drivers of change in livestock systems**

   **Keynote speaker:**
   Muhammad Ibrahim, Director General. CATIE.

   Solutions to Address the Pressures of Environmental drivers.
   **Panelists**
   - Pierre Gerber, Senior Livestock Specialist, World Bank.
   - Aditi Mukerji, Climate Adaptation and Mitigation Impact Area Platform.
   - Juan Jaramillo, Technical Support Unit, Mitigation Action Facility.

   Solutions to Address the Pressures of Innovation Technological drivers.
   **Panelists**
   - Daniel Mason-D’Croz, Senior Research Associate, Cornell Global Development. Cornell University
   - Alison Van Eenennaam. Department of Animal Science. University of California

   **Number of Participants:** [158 people connected – See Attendance Report ]

2. Event Summary:

   The world is undergoing significant transformations brought about by many factors such as demographics, the climate crisis, the COVID-19 pandemic, geopolitical tensions, and advancements in technology. These shifts have had a profound impact on various aspects of our lives, including livestock systems. To address these changes and ensure a sustainable future, it is crucial to develop a comprehensive agri-food systems strategy that encompasses the entire value
chain from resources to consumption. This strategy should also emphasize the importance of digitalization and modern technologies in livestock agriculture.

Global change is occurring at an unprecedented rate, exemplified by crises like pandemics, geopolitical conflicts, extreme weather events, and economic challenges. These elements have instilled a sense of volatility and the potential for major disruptions. To navigate these uncertainties, taking an integrated approach to agri-food systems is essential. This approach should focus on the entire livestock system and recognize the transformative role of digitalization, robotics, big data, and genomic breakthroughs in livestock agriculture. It is also important to acknowledge the emergence of alternative sources of livestock products.

One notable issue that deserves attention is the surge in meat production, especially in the Amazon, and its connection to deforestation. To address this concern, we need to emphasize the significance of digitalization and the adoption of eco-friendly technologies. Additionally, discussions should revolve around the impact of climate change on water resources and its implications for livestock agriculture.

The text also highlights the challenges posed by climate change in Uzbekistan, such as glacier affects and water shortages. It addresses issues like heat stress, which negatively affects livestock productivity due to climate change. It is essential to consider mitigation techniques and the interplay between climate change and social equity in addressing these challenges.

The pivotal role of innovation and technology in agri-food systems is a crucial topic, particularly considering the projected persistence of meat demand and the growing interest in alternative proteins. Additionally, the text emphasizes the importance of genetics in enhancing livestock yields. It calls for the integration of technologies like artificial insemination and highlights the need for agricultural outreach and public investment.

In conclusion, it is crucial to adopt a comprehensive and interdisciplinary strategy to address the challenges and opportunities in livestock systems amidst rapid global transitions. By focusing on the entire system, embracing digitalization and modern technologies, and considering the impact of climate change and genetic advancements, we can ensure a sustainable and resilient future for livestock agriculture.

2.1 Environmental and Technological innovation drivers

We are currently experiencing an era of unprecedented change, characterized by factors such as population growth, rapid urbanization, and increasing incomes. These dynamics, along with the climate crisis and the COVID-19 pandemic, are fundamentally transforming the global landscape, bringing about both challenges and opportunities across various sectors. The livestock sector is particularly affected, and it is important to consider the following drivers and specific aspects:
Population Growth and Urbanization: The increasing number of individuals in the population has led to the conversion of rural areas into urban environments, a process known as urbanization. This phenomenon, combined with economic growth, has resulted in higher incomes and altered consumption patterns, including increased demand for meat.

Environmental and Health Impact of Livestock: While livestock plays a crucial role in meeting the protein demands of a growing population, it also has adverse effects on the environment and human health. Unsustainable livestock practices contribute to deforestation, land degradation, water scarcity, and biodiversity loss. Additionally, livestock has been linked to zoonotic diseases, with ecosystem degradation worsening the emergence and spread of these diseases.

Climate Crisis, Climate Change, and Carbon Solutions: Drastic shifts in global climate, worsened by human activities like deforestation and greenhouse gas emissions, are leading to ever more extreme weather events. These events, along with heat stress and variability in temperature and humidity indices, directly affect livestock production and management. In response, carbon offsets and carbon sequestration have appeared as mechanisms to reduce and store atmospheric carbon. It is important to ensure that climate actions are fair for all communities, particularly the most vulnerable.

Technological Advances in Livestock: To address the challenges associated with livestock, advanced technologies have appeared. Digitalization, the use of big data, and genomics are tools aimed at optimizing production, reducing environmental impact, and enhancing livestock health. Genetic improvement, for example, involves the application of genetic and genomic techniques to enhance desirable traits in livestock. Digitalization and big data enable more efficient resource management.

Alternatives and Sustainable Solutions: Given the rising demand for meat and its environmental impacts, alternatives to traditional livestock products, such as plant-based or lab-produced proteins, have been developed. Furthermore, promoting sustainable livestock management practices, improved pastures, and optimized production through supplementation are important strategies. Knowledge transfer and agricultural extension services play a crucial role in disseminating these practices.

Geopolitical and Socio-economic Challenges: In addition to environmental and technological challenges, the world faces geopolitical tensions that have implications for trade and food security. Climate equity and justice have become central themes, acknowledging the need for inclusive and fair solutions that help all communities.

In summary, in the Anthropocene era, where human activities have a considerable influence on climate and the environment, it is essential to adopt a "One Health" approach that recognizes the interconnections between the health of the planet, people, and ecosystems. As we approach planetary boundaries, collaboration, innovation, and the convergence of sectors will be key to ensuring a sustainable and resilient future.
2.2 Driver’s impact

The effects of various drivers on livestock systems, and vice versa, have been examined and are outlined below.

Livestock Transformations. Challenges and Innovative Solutions Livestock plays a pivotal role in the global food supply and economy, and it is currently undergoing profound shifts influenced by multiple factors. These drivers are reshaping livestock farming practices, from animal rearing and feeding to the marketing and consumption of livestock products.

Drivers of Change in Livestock systems. The growing demand for animal products is clear, but it also raises concerns about the environmental and health impacts of intensive livestock production. Factors such as resource scarcity, climate change, and disease outbreaks are exerting pressures on livestock farming. For example, competition for land and water can increase production expenses, while diseases can lead to market shutdowns and economic setbacks.

Innovation and Technology: The Cornerstones of Sustainable Livestock Production.

Embracing innovative technologies and methodologies is crucial for the transformation of livestock farming. Digitalization and the use of big data, for instance, are enhancing the efficiency and sustainability of the sector. Additionally, the development of alternatives to conventional livestock products, such as plant-based proteins, provides consumers with more eco-friendly and ethical choices.

These driving factors highlight the importance of adopting environmentally conscious, health-promoting, and sustainable livestock practices. While challenges like deforestation and climate change pose significant obstacles to livestock farming, opportunities like digitalization can improve efficiency and sustainability.

Towards Resilient and Sustainable Livestock Production. Practices such as water efficiency, the rejuvenation of degraded grasslands, and carbon sequestration in grasslands can enhance production while reducing emissions. Moreover, carbon offsetting appears as a powerful strategy to mitigate the environmental footprint of livestock farming. Conversely, genetic enhancements and supplementation can boost livestock productivity and adaptability to changing circumstances. Taking a comprehensive, evidence-driven approach is crucial to progress towards sustainability in the livestock sector. Behavioral adaptations, pasture management, resource efficiency, and the integration of renewable energy are imperative to ensure the effectiveness of policies and practices, leading to intended results.

Collaboration and Adaptability: In the livestock sector, collaboration and adaptability are paramount. While high-level commitments such as the targets set by the Paris Agreement supply guidance, it is crucial to translate these commitments into tangible actions. The diverse nature of livestock systems suggests a variety of solutions and strategies that can be adapted based on local requirements and conditions.
In summary, livestock farming stands at a crossroads. Contemporary challenges demand innovative and collaborative solutions. A combination of innovative technologies, sustainable methodologies, and shifts in consumer behavior can supply a comprehensive approach to address the future challenges of sustainable livestock production.

2.3 Existing Solutions

During the webinar, a wide range of solutions related to the discussed drivers were presented, addressing important topics such as innovative technologies, equity, and climate justice.

**Technology and Digitalization:** Innovative technologies are playing a crucial role in transforming various sectors, including livestock. Digitalization, along with the use of Big Data and genomics, is enabling enhanced production efficiency, prediction of livestock diseases, and genetic improvements that promote disease resistance and optimize production.

**Sustainable Resource Management:** Given the challenges of resource scarcity and soil degradation, the adoption of sustainable practices is paramount. This includes enhancing pastures, implementing efficient irrigation systems, and promoting water-use efficiency to ensure responsible resource management.

**Climate Mitigation and Carbon:** Practical solutions like carbon sequestration and carbon offsets have appeared to reduce greenhouse gas emissions. By combining these practices with the adoption of renewable energy sources, farms can become more sustainable and resilient in the face of climate change.

**Biodiversity and Conservation:** Preserving biodiversity is vital for keeping ecological balance. Deforestation, partly driven by the expansion of livestock production, needs to be counteracted with trade policies and practices that prioritize sustainability and forest conservation.

**Equity and Climate Justice:** It is crucial to recognize that the impacts of climate change are not evenly distributed. Vulnerable communities often endure the most of these impacts, underscoring the need for policies that advocate for equity and climate justice.

These solutions supply a comprehensive approach to address the challenges presented by the drivers affecting the livestock sector. By embracing technology, sustainable resource management, climate mitigation, biodiversity conservation, and a commitment to equity and climate justice, we can work towards a more sustainable and resilient future for livestock agriculture.

2.4 The Role of Multi-Stakeholder Approach

In the webinar, experts emphasized the pivotal role of collaboration among diverse stakeholders in effectively implementing solutions. They cited many successful initiatives where such collaboration has yielded positive outcomes. For instance, in the context of climate change mitigation, governments, NGOs (Non-Governmental Organization), the private sector, and
academia have joined forces to promote sustainable livestock practices. One noteworthy example is the partnership between a leading agricultural university and a private agribusiness company to develop and disseminate eco-friendly farming techniques, reducing the carbon footprint of livestock operations. In the webinar, recommendations were put forth to further enhance collaboration among stakeholders, including the establishment of knowledge-sharing platforms, policy incentives, and funding mechanisms to encourage joint initiatives. These insights underscored the consensus that addressing livestock production challenges comprehensively requires a united effort across various sectors, ultimately ensuring a sustainable future for the industry.

2.5 Closing Remarks

Throughout the panel discussion, the significance of tackling livestock production challenges from various perspectives was underscored. Key factors, including genetic enhancement, production intensification, the embrace of innovative technologies, and shifts in diet, are pivotal in deciding the trajectory of livestock production.

The webinar's first segment delved into environmental drivers, spotlighting the primary obstacles confronting livestock systems, with particular emphasis on the Anthropocene era and planetary boundaries. The “One Health” approach was introduced, underscoring the intricate link between the well-being of the planet, its inhabitants, and ecosystems. The topic of Diet and Consumption was broached, drawing insights from the EAT-Lancet report. This segment explored the nexus between healthy diets and planetary boundaries, after steering the conversation towards meat and milk consumption. In this context, the surge in meat production, especially in the Amazon, and its correlation with deforestation was examined. The discourse accentuated the imperative for sustainable trade policies to address challenges in the Livestock Sector.

Climate change, as a determinant, exerts profound effects on water resources, influencing both livestock and food production. The discourse emphasized the significance of formulating policies for sustainable water management within livestock systems. Additionally, the repercussions of climate change on livestock-induced heat stress and the value of climate mitigation technologies were explored.

Regarding carbon neutrality, the dialogue highlighted the potential of carbon sequestration in enhanced pastures and lauded the initiatives of organizations like CATIE in curbing emissions. The conversation underscored the necessity to understand the synergies between sustainable practices and their socio-economic dividends.

In the webinar's later segment, the pivotal role of innovations and technologies in agri-food systems was spotlighted. As global population numbers swell, a surge in demand for agricultural produce and meat is expected. Yet, it's clear that regional disparities in meat consumption exist, and prevalent meat-centric diets are associated with non-communicable diseases. Transitioning towards plant-centric diets could yield health and environmental dividends. In this backdrop,
alternative proteins are posited as potential significant changes, though they aren’t projected to wholly supplant traditional meat sources.

Furthermore, the intricate relationship between livestock and their environment was emphasized, with a focus on the role of genetics in augmenting livestock productivity. The successful implementation of technologies, exemplified by the adoption of artificial insemination in India, was highlighted. However, the scope for enhancing efficiency in livestock production stays vast. A salient point raised during the panel discussion was whether the intensification of livestock production, helped by advanced technologies, would suffice to cater to the escalating food demand. The consensus was that an integrated strategy, melding technological innovation with shifts in consumer patterns, is indispensable for navigating impending challenges in the agri-food domain.

Key points of concluding remarks

The Educational Perspective:  
Dr. Danilo Pezo, a professor specializing in livestock and environmental management at CATIE Costa Rica, highlights the urgent need for education in this field. He raises a critical question: Are university and postgraduate curricula adequately addressing these issues? He delves deeper, emphasizing the imperative to overhaul the education of professionals, technicians, and farmers to drive meaningful transformations in the sector. This viewpoint gains strength from references to sustainable livestock production programs at prestigious institutions like the University of California, Davis.

The Connection between Consumption and Climate Change. Dr. Aditi Mukherjee supplies a complementary perspective, emphasizing the importance of a comprehensive understanding of climate change. She draws attention to the link between individual behavior, especially consumption habits, and their impact on climate change. While climate change often takes center stage in media discussions, the connection between personal choices and their global consequences may not always be clear to the public. Mukherjee also stresses the need for empathy toward those directly affected by climate change, including small-scale producers and farmers.

Mainstreaming Local Knowledge and Systems Diversity. The discussion also underscores the significance of local wisdom, particularly from indigenous communities, in fields such as climate change, agroforestry, and agroecology. It is emphasized that systems tailored to local conditions show greater resilience against climate change. Additionally, the conversation highlights the importance of avoiding broad generalizations, recognizing the diversity of livestock systems, and the urgency of rejuvenating soil health.

Definition and Impact of Livestock Drivers. Found drivers, including education, professional training, and climate change awareness, exert a direct influence on livestock practices. Education and training are crucial for the adoption of more sustainable and resilient methodologies.
Understanding and adapting to climate change, altering consumption behaviors, and integrating local knowledge offer more personalized and effective solutions to the sector's challenges.

**Concluding Remarks.** The synthesis of expert insights underscores the need to address livestock production challenges from diverse perspectives. A combination of innovative technologies shifts in consumer behavior, and well-considered policies can supply a comprehensive solution to the future challenges of livestock production. It is imperative for all stakeholders, including educators, farmers, and consumers, to collaborate in ensuring a sustainable future for livestock in the face of climate change.

3. **Attachments**

You can access the attachments by accessing the following online folder: Attachment Folder – Webinar 1