



**4th one-day symposium
Animal Task Force
& EAAP Commission on Livestock Farming Systems
Sunday 1st September 2024
EAAP Annual Meeting 2024 – Florence, Italy**

Report

Livestock are more than food

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Since 2013, the ATF-EAAP Special Session during the EAAP Annual Meeting aims to bring together animal science with practice of animal production and connect researchers, policy makers, industry representatives and societal organisations. Every year, a different topic is addressed during this session.

<http://www.eaap.org/>.

Background

In the context of climate change, measurement of the use of animal resources in all its components is a key question. It includes the use of animal products for human food consumption but also many other uses: fibre, feed, energy, manure for fertilisation, biodiversity and fire management, enhanced nutrition, insulation of houses, medical intervention, drugs production as well as culture and vibrant rural communities.

All these uses, in addition to food, contribute to the closing of the biological cycle, and are key points to reduce waste and valorise the contribution of animal production to the circular bioeconomy. Some of them, like manure, fibre and drug production are alternatives to the use of fossil resources and contribute significantly to improving the climate balance of animal production.

The theme covers all the species and involves all the actors including production, industry, and the co-product valorisation sector.

- Assessment methods to estimate all these non-food use benefits with the appropriate measurement tool;
- Demonstration of the contribution of these non-food uses to the overall balance of animal production and energy consumption or greenhouse gas emissions;
- Fields of research necessary to increase the benefit of non-food use of animal product;
- Estimation of synergies and trade-offs between food and the other valorisations;
- Compatibility of these uses with health and food security (the spectra of BSE is still present in the public opinion).
- Wool, leather, fur, feathers: clothes, bags, equipment's, insulation for houses or cars...
- By product of slaughtering: fat, protein, bones, and product extracted (collagen, gelatine (cooking))
- Methane or biogas production as a renewable energy source
- Manure to fertilise the soils.
- Landscape management (forest fire, avalanches); effect on soil with pasture and trampling
- Eco-shepherding in the towns
- Used as a mediator in certain mental illnesses (autism...)
- Support of human culture (cf. classification of transhumance on patrimony of UNESCO)...
- Animal traction: skidding (forest preservation); local transportation in some villages or towns for example for waste bin or children to school...

Format of the one-day symposium

In 2021, the EAAP Livestock Farming Systems Study Commission and the Animal Task Force organised a one-day symposium. The collaboration has continued since then.

The symposium would like to engage discussion with farmers, industries, scientists, policymakers and with the society. Most important findings will be discussed with a panel. The outcomes of the session will be discussed with a large panel of European stakeholders during the ATF seminar, in Brussels, on 20 November 2024.

Aim

This one-day symposium aims to contribute to:

- Address **how research and innovation can support the livestock sector: needs in R&I to help the livestock sector to adapt to climate change and mitigate its emissions;**
- **Provide input to European research and innovation agendas and to public policies** to secure Europe's role as a leading global provider of safe and healthy animal-derived products;
- **Engage a dialogue with various stakeholders;**
- **Foster ownership by farmers.**

Welcome and Introduction

Frank O'Mara, Michael Lee and Isabel Casasús introduced the session and welcomed participants.

Frank O'Mara presented the Animal Task Force, its recent papers ([Vision paper](#) and [SRIA – Strategic Research and Innovation Agenda](#)), responsible livestock defi, and introduced this year's theme.

The Animal Task Force (ATF) promotes a sustainable and competitive animal production in Europe. We are a public-private partnership of experts from knowledge institutes and industry representative organisations from across Europe. We work closely together with EAAP on setting the European agenda for research and innovation in the animal domain.

For more information:

www.animaltaskforce.eu

@AnimalTaskFrc

www.eaap.org/

@EAAPofficial

All presentations are available on the ATF website.

Morning session - EAAP session #10

Role of livestock in circular bioeconomy systems

By *Philippe Becquet, FAO* - @FAO - www.fao.org/home/en



Philippe Becquet is an agronomist by education, specialised in animal nutrition. He spent his career in the feed industry holding various positions (commercial, marketing, technical and regulatory) during the last 40 years. During the last years, Philippe Becquet has focused on the sustainability of the livestock production system, leading towards a better food system. In this context, Philippe has contributed to various guidelines, developed by the Livestock Environmental Assessment and Performance (LEAP) multistakeholder partnership led by FAO, the last one being the guidelines on Circular Bioeconomy Approaches, where he is a co-chair together with Tim MacAllister and Barbara Amon. He presented the guidelines on behalf of the LEAP Technical Advisory Group.

Book of abstracts: abstract # 215054.

The FAO's (Food and Agriculture Organization) LEAP guidelines, guide the environmental assessment of livestock's impact within a circular bioeconomy. Circular bioeconomy is at the junction of bioeconomy and circular economy. LEAP (Livestock Environmental Assessment and Performance) is a multi-stakeholder partnership involving experts from academia, industry, NGOs, and governments. Its collective goal is to develop guidelines to measure livestock's environmental impact. **Circular Bioeconomy in Livestock Systems:** The circular bioeconomy approach evaluates the livestock lifecycle, starting from feed supply chains to various animal products. This model emphasizes the reuse of by-products (like manure) and co-products from processing to minimize waste and environmental impact. **Metrics and Indicators:** New circularity indicators within LEAP focus on nutrient utilization rather than maximizing animal output. This includes assessing whether inputs are from circular or linear sources, aiding in evaluating the sustainability and circularity of livestock systems. **Environmental Impact and Lifecycle Analysis:** Three types of lifecycle assessment (LCA) are discussed, including an attributional LCA for farm-level impact insights and a consequential LCA for system-wide changes in feed practices. These metrics help determine ecological hotspots and the potential effects of substituting feed components. In addition, a larger food chain approach may be necessary to develop circular bioeconomy policies. **Co-products and Food System Integration:** The guidelines divide co-products into four categories: residuals from harvest, food processing by-products, fermentation by-products (e.g., from biogas production), and losses from food processing. Each category has its utility in livestock feed, but regulatory and safety constraints are considered for effective integration. **Challenges and Policy:** The primary challenges for circular bioeconomy practices include food safety, physical characteristics of feed inputs, nutrient value, and regulatory hurdles. Policy plays a significant role in encouraging sustainable bioeconomy practices, although few policies currently integrate both circular economy and bioeconomy concepts fully. **Prioritization in Resource Use:** There is an emphasis on prioritizing food production, including livestock production via feed use over other uses (e.g., biogas) or wastes in the circular bioeconomy hierarchy to support food security and human nutrition. **Exploring Additional Value in Co-products:** Low-value co-products could offer higher-value components (e.g., for pharmaceuticals or animal/human food supplements), underscoring the importance of maximizing resource use within the circular bioeconomy.

Highlights on FAO's structured approach to integrating livestock production into a circular bioeconomy to enhance sustainability, nutrient efficiency, and resource utilization, aiming to benefit both the environment and food systems.

Question: How much should we advocate the biogas? Is it that circular?

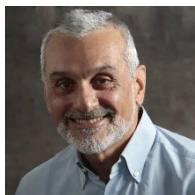
Answer: We need to keep the nutrients in the system. The carbon of biomass is lost when generating biogas. The important is to prioritize the use of nutrient.

[More information in the slideshow](#)

Beyond Edibles: Unveiling the Full socio-economic Value of Animal Production through Non-Food Products in Circular Economy Designs

By Luigi Cembalo, University of Naples Federico II- @UninaIT

www.international.unina.it/



Luigi Cembalo (MSc, PhD) is full Professor in Agricultural and Resource Economics at the University of Naples Federico II (Italy), Department of Agricultural Sciences. Luigi has got two MSc degrees: in Agricultural Economics and Policy (Centre of Advanced Training, Italy) and Agricultural and Resource Economics (AREC Department of the University of Arizona, USA), and a PhD in Agricultural Economics and Policy (University of Naples Federico II, Italy). He is Director of the CRISP (Interdepartmental Research Centre on the “Earth Critical Zone” for supporting the Landscape and Agroenvironment management) and of the SESS (Social-Ecological Systems Simulation Centre). Luigi is research fellow at the AREC Department (University of Arizona, USA).

Book of abstracts: abstract #2215834.

Luigi Cembalo started by framing the problem, by revisit the current debate between animal production/consumption vs “protein transition” politics pressures, and exploring the contribution of these two polarized speeches in relation to the new international agenda on transforming food systems toward a more sustainable (circular) future.

There is an ongoing “protein transition” toward sustainable and healthier diets, but this shift reveals starkly contrasting perspectives. On one side are advocates for traditional animal-based proteins, while on the other are proponents of alternative proteins, each with differing ethical, social, and environmental priorities. Animal products provide essential nutrients and play varied roles across global regions. In wealthier regions, there is a movement to reduce meat consumption, while in the Global South, increased animal protein access could benefit diets significantly. This geographical disparity highlights the need for nuanced solutions.

Economic drivers, such as market incentives and consumer preferences, shape global consumption trends. In wealthier countries, a gradual reduction in red meat is noted, but with substitution by other meats. Economic theory, like price elasticity, shows that price increases in one food type often shift consumption patterns rather than reduce overall meat consumption.

The problem of “Protein transition” involves conflicting trade-offs between economic, ethical, societal and environmental objectives and priorities. In a nutshell, two coalitions of actors are facing burning arguments:

- Pro-livestock supporters: Academics and experts, agri-food corporations and millions of smaller actors with their livelihood depending on livestock raising.
- Pro-alternative-protein supporters: International environmental or conservation organisations that push for a drastic cut in the production/consumption of animal-based-protein, mainly meat.

Current debate between pro-livestock and pro-alternative seems to be deadlocked. No general consensus on how to address this thorny problem and to navigate the necessary trade-offs between human health, nutrition, economic and environmental impacts seems to emerge. So, we need to refer to this as a “wicked problem”. A wicked problem is a problem that is challenging or impossible to solve

either because not enough is understood about the problem, the number of stakeholders involved, the number of varying opinions, the economic burden, or the impact of these problems with other problems. This problem cannot be solved by acquiring more data...

Circular economy principles could offer sustainability pathways for livestock production, but achieving true circularity remains challenging. Bioeconomy strategies, sustainable intensification, and agroecology are alternative models, though each presents unique implementation hurdles.

In summary, Luigi Cembalo illustrated the “wicked problem” of protein transition, where entrenched economic structures, global dietary needs, and contrasting sustainability priorities make finding a unified approach challenging. The discussion called for a balanced, inclusive framework that respects varied perspectives and regional needs while moving toward sustainable protein solutions.

[More information in the slideshow](#)

Genetic determinism of quality of lamb leather in Lacaune dairy sheep breed

By Laurence Drouilhet, INRAE - @INRAE_France

www.inrae.fr/en



Dr. Laurence Drouilhet is a researcher at INRAE, with 15 years of experience in animal genomics. Her research focuses on understanding the genetic and epigenetic processes underlying livestock phenotypes, specially linked to animals’ adaptation. She is involved in several projects aimed at identifying the genetic determinism of wool and leather quality. She has skills in data analysis and quantitative genetic modelling and molecular genetics. In recent years, she has dedicated some of her projects to further understanding the influence of epigenetics on trait development.

Book of abstracts: abstract #2214582.

Enhancing the economic valorisation of by-products such as skins and wool is an important element in ensuring the economic sustainability of sheep farming. However, achieving this valorisation needs a comprehensive understanding of the factors influencing its quality.

This presentation focussed on Lacaune lamb skins, that have long been esteemed for their exceptional quality. Over the past few decades in France, however, the quality of this leather has declined, primarily attributed to the increasing prevalence of two skin defects: pinhole and straw-like bushiness. To explore the genetic determinism of these defects and their potential correlation with wool traits, approximately 1,400 Lacaune lambs from 72 rams underwent phenotyping for the two skin defects and four wool traits. The pinhole defect exhibited a high heritability and demonstrated a strong genetic correlation with the predicted core bulk of the wool. The straw-like bushiness defect displayed a lower heritability and was found to be correlated with the mean fibre diameter.

In an initial study, the two skin defects exhibited either null or only weak genetic correlations, most often favourable, with milk production traits (milk yield, fat and protein contents). A genome wide association study revealed for the pinhole defect one major signal on chromosome 3 close to a cluster of keratin genes.

This presentation presented the importance of knowing and studying what are the environmental and genetic factors that affect the skin quality, and to provide information to ideally promote farmer’s better payment for the leather/skin.

[More information in the slideshow](#)

A systemic description of the dairy value chain's contribution to inclusive sustainable development in highland

By **Andrea Ceppatelli**, University of Padova - @UniPadova

www.unipd.it/en/



Andrea Ceppatelli is currently enrolled in the second year of a PhD programme at the University of Padova, focusing on the development and application of indicators for the agroecological transition of dairy systems. He obtained his Master's Degree in Animal Science and Technology at the University of Padova, and his Bachelor's degree in Agricultural Science at the University of Florence.

Book of abstracts: abstract #2213637.

This presentation presented the framework of the HIGHLANDS.3 project (H2020, MSCA-RISE) that aims to investigate the benefits of the dairy value chain beyond food provision, and their contribution to inclusive sustainable development in highlands.

A transdisciplinary team interviewed 15 cases related to the dairy value chain across four highland regions in Europe: Alps, Carpathians, Pyrénées, and Massif Central. Actors interviewed were farmers, cooperatives, retailers and associations. A system thinking approach was adopted to process data.

For each case were identified the factors contributing to inclusive sustainable development in highland, then clustered within similar topics. Then, a comparative analysis identified commonalities and differences between the cases. A causal loop diagram (CLD) was constructed for each region and another CLD integrating the regional data.

The CLDs were then interrogated to identify subsystems and potential points of leverage, to enhance the sustainability of the system and to identify differences and similarities across the regions.

The results indicate that dairy value chain in mountain areas provides multiple benefits beyond food production. They include enhanced ecosystem services, strengthened local communities, added value products, protected local resources and strengthened farm families. Activities like cooperation, diversification of activities and local commercialization contribute to strengthen the local community. Differences between the cases included traditional practices (transhumance), reuse of by-products and action to reduce the environmental impact.

[More information in the slideshow](#)

What is the performance of a low-input sheep flock integrated into an agroecological field crop system?

By **Jérôme Boucherot**, INRAE - @INRAE_France

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Jérôme Boucherot is an engineer in agriculture from ISARA Lyon and has a Master in genetic from PARIS Denis Diderot. He joined INRAE 3 years and a half ago as director of experimental unit P3R (Small Ruminant Phenotyping Unit) and researcher. This experimental unit is attached to the genetic department of INRAE but works with other departments such as physiology and farming system (PHASE) and others. With 1,500 ewes and 450 goats, they are searching for new characters that would permit to adapt to climate change (resilience, robustness, longevity, natural resistance to anthelmintic...). They work a lot on feed efficiency as well as mitigation with the help of research form GenPhySe from Toulouse, PRC from Tours and UMRH from Clermont Ferrand. Recently, they were involved in several European project such as SMARTER, GRASSTOGAS, and PEI SOBRIETE. Before joining INRAE, Jérôme had been working for ten years in the poultry genetic industry as export manager for duck, guinea fowl, rabbits.

Book of abstracts: abstract #2211830.

This presentation focussed on the association of crops and animals. This association is known to be a way of strengthening the sustainability of farming systems. For two years, the team tested the association of sheep with field crops grown without synthetic pesticides, on an experimental farm. The most fundamental point was to graze the intercrops planted after crops had been harvested. To achieve this, lambing was planned in September, and the great majority of lambs were fattened exclusively on these resources from November until their sale in April. The flock was kept in complete free-range conditions.

Productivity results (carcass weight and ewe productivity) were high. High fertility rates were achieved, with an average ewe productivity of 1.45 with limited use of concentrate, indicating successful integration of sheep and crop systems.

The use of concentrates (both for ewes and lambs) was much lower than in “conventional” sheep-crop farming systems. This technical performance translates into high economic and environmental performance: €126 gross margin per ewe (vs. €95 in reference), 24.3 EqCO₂/ kg carc. (vs 31.6 in ref), and 65 MJ/kg carc. (vs 92).

However, this performance could be improved as it is penalized by two points: the relatively high level of nitrogen fertilization, in view of crop yields, and the high proportion of lambs reared on artificial milk and then fattened with concentrates (24% of lambs), linked to the very high prolificacy. We consider these results to be promising. Not only does this system deliver excellent economic and environmental performance, it also meets the demands of the industry, with sales at the end of winter. However, we still have to overcome the cultural and organisational obstacles associated with setting up sheep flocks on specialised crop farms.

Overall, the study demonstrated a successful model of integrating sheep farming with crops, providing economic and ecological benefits by leveraging circular and agroecological principles.

[More information in the slideshow](#)

Livestock manure for fertiliser and biofuels

By Henrik Bjarne Møller, Aarhus University - @AarhusUni

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Henrik Bjarne Møller is a specialist in anaerobic digestion technology with more than 30 years' experience with process optimisation, biomass selection, gasyield, pre-treatment, sustainability etc. He has been involved in feasibility studies and a large amount of biogas projects through his employment in consultant companies. He was among the first Danish researchers looking into the vast energy potential of biogas and was one of the research pioneers in the Danish biogas development. He has been initiating the biogas research at AU and he was among the initiators of the biogas plant at AU Foulum and involved in dimensioning and projecting of the plant back in 2006. The biogas plant is today a cornerstone in Danish research in bioenergy. During the years he has headed a large amount of research projects with the aim to improve the efficiency and sustainability of biogas and placing biogas as one of the most important technologies for reducing emissions of greenhouse gases in the agricultural sector as well as contributing as a very important storable renewable energy that in the next few years will make Denmark independent of import and use of fossil natural gas.

Book of abstracts: abstract #2215934.

Henrik Bjarne Møller, an expert in anaerobic digestion, provided an overview of Denmark's advancements in biogas production from livestock manure and other organic materials, emphasizing its role in reducing greenhouse gas emissions and supporting renewable energy goals.

Technologies in Use: Denmark primarily uses anaerobic digestion to convert livestock manure into biogas, though other technologies like pyrolysis, gasification, and combustion are also explored. Anaerobic digestion is favoured for its efficiency in energy production and nutrient management, and co-digestion (adding organic residues to manure like straw or other fibrous materials) is commonly used to enhance the process.

Environmental Impact and Nutrient Cycling: Anaerobic digestion reduces greenhouse gas emissions by capturing methane that would otherwise be released during manure storage. It also plays a significant role in nutrient cycling, converting nitrogen into forms usable by plants, though there are challenges, like ammonia emissions during manure application, that the sector aims to mitigate.

Sustainability and Carbon Management: Retention time (how long materials stay in the digester) is critical for maximizing energy yield, especially with materials like straw. Enhanced biogas production, coupled with carbon management practices, contributes significantly to Denmark's climate goals. Studies also show that specific additives, like fats in animal feed, can improve biogas yield and reduce emissions.

Antibiotic Management and Environmental Health: Anaerobic digestion also helps degrade antibiotics present in livestock manure, contributing to healthier environmental management practices. Ongoing studies seek to improve this further through combined treatments.

Climate Targets and Biogas Sector Growth: Denmark's biogas sector continues to grow, with increased integration of renewable biogas contributing to climate targets. The focus is on optimizing substrate use for biogas to meet national and EU energy and environmental goals. Research is currently being conducted to store CO₂ in the ground with the objectives of further and future use in fuel with H₂ and other solutions.

The presentation highlighted anaerobic digestion as a key technology for Denmark's renewable energy strategy, emphasizing innovations and ongoing efforts to address environmental and operational challenges in biogas production from agricultural waste.

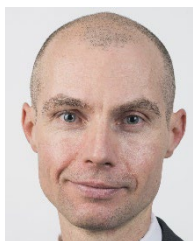
[More information in the slideshow](#)

Cow's Milk – Going beyond basic nutrition to harness functional components

By Paul Cotter, Teagasc - [@teagasc](#)

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Prof Paul Cotter is the Head of Food Biosciences at Teagasc, is a Principal Investigator with the large Irish Research Centres, APC Microbiome Ireland, VistaMilk and Food for Health Ireland and CTO/co-founder of SeqBiome, a microbiome sequencing and bioinformatics service provider. He is a molecular microbiologist, with a particular focus on the microbiology of foods (especially fermented foods), the food chain and of humans, as well as probiotics and postbiotics. Prof Cotter is the author of >400 peer-reviewed, was included in the Clarivate list of highly cited researchers for 2018-2023, received an honorary doctorate from the University of Antwerp in 2024 and is the Field Chief Editor of Frontiers in Microbiology.

Book of abstracts: [abstract #2212090](#).

The presentation explored the potential of milk to offer health benefits beyond basic nutrition by harnessing its functional components, particularly proteins like whey and casein.

Milk proteins and bioactive components: milk contains casein and whey proteins, which hold various bioactive components. When isolated or hydrolysed, these proteins release peptides with beneficial effects on health, such as anti-inflammatory, appetite-suppressing, and anti-hypertension properties.

Functional benefits of whey and casein: whey protein supports muscle development and cognitive health. Specific whey proteins, like beta-lactoglobulin and alpha-lactalbumin, have shown benefits in weight control, stress reduction, and gut microbiome modulation. Casein, when hydrolysed, releases peptides that can regulate hormones like GLP-1, which is associated with weight management.

Fermentation and microbial impact: Fermented dairy products, such as kefir, introduce beneficial microbes and metabolites that impact gut health, immune function, and nutrient bioavailability. Due to the sterilization of modern diets, fermented foods are gaining attention for their potential to restore beneficial microbiota and help prevent autoimmune conditions.

Case study on kefir's health benefits: the team studied various kefir grains, showing that artisanal kefir reduces weight gain and cholesterol more effectively than commercial kefir. They developed a scalable "pitched kefir" by replicating the microbial composition of effective kefir grains, retaining health benefits while allowing for mass production.

Applications and future prospects: milk's functional components can be optimised through processes like concentration, hydrolysis, and fermentation to offer broad health benefits. These compounds can help manage weight, inflammation, hypertension, stress, and gut health, showcasing milk's potential to support wellness beyond traditional nutrition.

Paul Cotter's research highlighted the untapped potential of milk's bioactive components, emphasizing innovative approaches for scaling these benefits in functional foods.

[More information in the slideshow](#)

Evolving standards: ethical perspectives on animal welfare in agroecology

By Jacopo Goracci, Tenuta di Paganico Farm & Italian Agroforestry Association

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www.agroforestry.it



Jacopo Goracci, an Italian agronomist and farm manager, holds both a bachelor's degree and a PhD in Animal Science, and brings over 20 years of experience in organic farming and agroforestry. He manages Tenuta di Paganico, a large organic farm in Tuscany, specializing in sustainable livestock, crop, and forest management. Jacopo is actively involved in EU agricultural policy as a member of the Civil Dialogue Group on Animal Production and the Expert Group for Technical Advice on Organic Production (EGTOP). He also serves on the board of the Italian Agroforestry Federation and actively contributes to several EU projects (Horizon, OG), having participated in high-level EU conferences and EIP-AGRI focus groups addressing animal welfare, biodiversity, and sustainable farming practices.

Book of abstracts: abstract #2215901.

Jacopo Goracci discussed the ethical nexus between animal welfare and agroecology, emphasizing the evolving role of farmers, the importance of biodiversity, and the need for systemic changes in food production. Key points include:

Agroecology and Animal Welfare: Agroecology is not merely agricultural practice but a scientific and social movement promoting sustainable farming systems. Animal welfare is increasingly recognized within agroecological frameworks, with growing importance in policy discussions and labelling.

Diversity and Environmental Challenges: Maintaining biodiversity in farming is essential, yet industrial farming practices and concentrated livestock farming create ecological stresses, such as pollution and land degradation. There is an ongoing need to define and regulate practices to align with agroecological and animal welfare principles.

Role of Smallholders and Farmers' Knowledge: Small-scale farmers represent a significant yet often under-recognized component of sustainable farming, providing biodiversity, traditional knowledge, and landscape conservation. Jacopo Goracci advocates for including these farmers in policy development and research, ensuring their unique insights and contributions are valued.

Ethics and Sustainable Intensification: Jacopo Goracci critiques "sustainable intensification," which may justify increased external inputs under the guise of sustainability. Instead, they advocate for "ecological intensification" and "sustainable extensification," approaches that maximize natural resources while maintaining ecological and social integrity.

Funding and Policy Inclusion: Despite claims that farmers are key players, their direct access to funding from programmes like Horizon Europe remains limited. Jacopo Goracci calls for better inclusion of farmers in funding distribution and decision-making processes to ensure they can actively contribute to sustainable food production.

Public Involvement and Transparency: Achieving meaningful change requires public awareness of food choices, the environmental costs of food production, and a collective shift toward more sustainable practices.

In conclusion, the presentation urged a shift from industrialized food systems to models that prioritize ecological balance, social justice, and active farmer involvement.

[More information in the slideshow](#)

Panel discussion with speakers and the audience

Moderators: Frank O'Mara & Michael Lee, co-chairs of the symposium.

Frank O'Mara to Philippe Becquet: How can we communicate the broad benefits of livestock beyond just greenhouse gas emissions, particularly to policymakers and society?

Philippe Becquet: Nutrition (not only protein, but also fat, micronutrients) should be central to the message. Emphasizing animal products as an integral part of a healthy diet can highlight their importance beyond environmental metrics. Furthermore, livestock do not bring only nutrition (e.g. manure, skin).

Frank O'Mara to Luigi Cembalo: You mentioned you don't like linking bioeconomy with circularity. Could you expand on this?

Luigi Cembalo: The circular economy aims for zero waste, while bioeconomy relies on waste as an input, creating a potential conflict. Circularity involves designing systems to avoid waste entirely, whereas bioeconomy tends to reduce environmental impact without fully eliminating waste.

Frank O'Mara to Henrik B. Møller: FAO suggests prioritising biomass for food production rather than energy. Is this the approach in Denmark?

Henrik B. Møller: I agree with this priority. However, economic incentives can make bioenergy appealing, especially with high natural gas prices, which leads to competition for waste products.

Frank O'Mara to Paul Cotter: Milk has various beneficial components. Would we find similar effects in plant-based foods?

Paul Cotter: Benefits differ by food type and preparation. For example, dairy and plant-based fermented foods can each contribute unique health benefits depending on the microbes involved. Blended products using both dairy and plants might address nutrient gaps effectively.

Audience - question to Henrik B. Møller: Is there a conflict between using manure for energy and the principles of circularity, as energy production might divert carbon from soils?

Henrik B. Møller: Biogas production mainly removes easily degradable carbon, which wouldn't contribute to long-term soil carbon. With technologies like pyrolysis, we can even add more stable carbon back to soils. However, further research is needed to understand the effect on soil microbiomes.

Audience - to Henrik B. Møller and Jacopo Goracci: What role do legume-rich grasslands play in anaerobic digestion, and how does this fit into agroecological practices?

Henrik B. Møller: Legume use in biogas production is promising, particularly in organic farming. Legumes help maintain nitrogen levels in the soil, benefiting both crops and sustainability goals.

Jean-Louis Peyraud (former ATF President) to all the panellists: How can we communicate livestock's full value to policymakers, especially considering the complexity of life cycle analysis?

Philippe Becquet: Simple narratives rooted in familiar concepts, like traditional circular practices, could resonate better. Life cycle analysis is limited to linear measurements; however, a more holistic system-wide view that includes all food items would be more comprehensive.

Paul Cotter: Showing specific success stories to both policymakers and the public could demonstrate livestock's broader benefits beyond nutrition, fostering appreciation and understanding.

Jacopo Goracci: Policy co-creation with farmers can ensure practical insights shape effective, adaptable policies. Farmers can offer tangible examples to support narratives that policymakers can better understand.

Luigi Cembalo: We need an approach that emotionally resonates with consumers and policymakers alike. Building a fresh narrative around the value of food and livestock, rather than purely factual data, could help drive positive change.

Audience: How can we address the disconnect between developed countries and the Global South, especially given the latter's heavy reliance on livestock?

Paul Cotter: Many regions globally have their own rich traditions, like fermented foods, which are often highly nutritious and sustainable. Scaling these traditional practices can help them reach more people, without adopting less beneficial industrial processes.

Moderator's addition: Observing these traditional practices could inspire us to re-incorporate similar sustainable methods in our food systems in the Global North.

Audience: Should customers also be included in the design of sustainable food systems?

Jacopo Goracci: Absolutely. Consumers are vital members of the food chain, and sustainable shifts in habits often come from a deeper understanding. Including consumers can strengthen networking across the supply chain, supporting transparency and shared goals.

Henrik B. Møller: Engaging consumers more actively could be valuable. Platforms that allow for collaboration with consumers could strengthen the connection to sustainable practices.

Audience: There's a need to simplify scientific messaging for broader public engagement.

Luigi Cembalo: Consumers and citizens often respond better to narratives than to technical data. We need new communication strategies that resonate with people's emotional connection to food and the ecosystem.

Moderators' closing remarks: Consumers need to understand that livestock offers benefits beyond meat production alone. Even if they choose not to consume animal products, the contributions of livestock to the environment and other sectors remain essential.

Afternoon session - EAAP session #24

Influence of pastoral management on the conservation of the cultural landscape and biodiversity of mountain pastures

By *Massimiliano Probo, Agroscope* - @agroscope

www.agroscope.admin.ch/agroscope/en/home.html

www.paturalpina.ch



Massimiliano Probo directs the Grazing Systems research group at Agroscope for the Swiss Confederation. Since 2018, he has been working with his team there on mountain grassland ecology and management, climate change adaptation and mitigation measures for forage production, and the use of new technologies for grassland monitoring and grazing management.

He is Director for the West Switzerland section of the Swiss Grassland Society.

Previously, he spent a decade at the Grassland Ecology and Management group at the University of Torino (Italy), where he received his PhD on the restoration of alpine shrub-encroached grasslands. He has also served as advisor for the public and private sector on grassland management and implementation of European policies for the conservation of alpine pastures.

Book of abstracts: abstract #2214741.

The presentation explored the origin, biodiversity, ecosystem services, and management of mountain grasslands, particularly focusing on their relationship with livestock. These grasslands, shaped over millennia by agricultural activities, represent significant cultural landscapes. The Alps, whose name originates from the Celtic word "alp" meaning pasture, are prime examples of this interaction between nature and human activity. Their cultural, ecological, and economic value is underscored by their recognition as UNESCO heritage sites.

Mountain grasslands are among the most biodiverse habitats globally, sometimes surpassing even tropical rainforests. This exceptional biodiversity is attributed to microclimatic variability, grazing practices, and unique topographic features. These grasslands provide critical ecosystem services, including pollination, carbon sequestration, wildfire prevention, food production, and tourism opportunities.

Livestock grazing plays a central role in shaping these ecosystems. Moderate grazing enhances biodiversity by creating varied ecological niches, while overgrazing or undergrazing can diminish species diversity, leaving only a few resilient species. Modern high-yield livestock breeds exacerbate this problem due to their increased pressure on grasslands and their concentrated grazing patterns. Effective management strategies, such as rotational grazing systems, proper stocking rates, and adaptive grazing practices tailored to specific sites, are essential for maintaining biodiversity and ecosystem health.

However, mountain grasslands face significant challenges. Economic pressures, including a decline in farmers and reduced income, are compounded by reliance on rule-based subsidies that fail to account for local conditions. Predators, such as wolves, necessitate costly protective measures, while climate change disrupts water availability, forage quality, and overall biodiversity. Land use issues, such as encroachment due to abandonment or intensification from overuse, further threaten these ecosystems.

The presentation outlined solutions to address these challenges. Shifting from rule-based to results-based payment systems, such as Switzerland's approach, has proven effective in encouraging biodiversity-focused management. Agro-silvopastoral systems that integrate forestry and grazing can

also mitigate wildfire risks and enhance ecosystem services. Advances in technology, like virtual-fencing and airborne sensors for monitoring forage quality, offer promising tools for modern management. Knowledge-sharing platforms, including multilingual guides, help farmers adopt sustainable practices.

In conclusion, mountain grasslands are invaluable ecosystems with profound environmental, cultural, and economic significance. Their preservation requires adaptive grazing management, innovative policies, and the integration of new technologies. By addressing these challenges, it is possible to conserve this vital heritage for future generations while maintaining its ecological and productive benefits.

Question: There are many difficulties in management of middle-elevation areas. Do you have some experience about management in this type of areas?

Answer: Yes, these are critical areas, and here there are also other problems related to this, namely the ownership of the land: these areas tend also to be more private owned, so there is more land fragmentation. There are different kinds of problems related to these middle elevation areas. The size of the herd and the flock is a critical point to their management. As mentioned, there could be some new possibilities related to new technologies, but with bigger flocks and herds is also even more complex, so the problem is a problem of complex solution and should always be related to the development of economical way to valorise the product of the farmer, this is something essential, we cannot skip this. Multiple use of the areas may be also a valuable solution.

There should be a recognition by the population of the importance of the job that farmers do to maintain these areas, and of the importance of the agricultural products they produce. So, I think the solution is to work on the different layers, there is not a miracle solution, you have to work on rising the product, you have to work to try to apply a new technology, you have to work to try to put the farmers together to have consistent ways of production.

Question: some payment related to the presence of a particular set of plant species in the pasture in Switzerland?

Answer: Yes, in Switzerland there is this system which the farmer needs to have at least 7% of the area managed as surface for biodiversity promotion to receive direct payments, and yes the presence of a particular set of plant species is one parameter that needs to be ensured to get access to a second level of direct payments for biodiversity promotion.

[More information in the slideshow](#)

Trends in the association of herbivores and pigs in the Massif Central

By Christine Roguet, IFIP - @IFIP_inst_porc

<https://ifip.asso.fr/>



Christine Roguet, agricultural engineer and doctor in life and environmental sciences, has been project manager at the Economy Department of the IFIP, the research and development institute serving the French pork industry, for 20 years. Mobilizing economics and sociology, and quantitative and qualitative approaches at different geographical levels (European, national, regional), her research work focuses on the dynamics and determinants of development (economic, financial, social, societal, political, regulatory, etc.) of livestock farms and on the transition of pig farming to meet environmental challenges, improving animal welfare and animal and human health. Christine Roguet coordinated from 2014 to 2018 a multi-partner research project on the social acceptability of livestock farming (ACCEPT project) and was involved in European projects on animal welfare (PPILOW) or the reduction of antibiotic use (ROADMAP). Christine Roguet has been a member of the organizing committee for the

Swine Research Days (JRP) since 2011 and a member of the French Academy of Agriculture, Livestock section, since 2020.

Book of abstracts: abstract #2212993.

The presentation focused on mixed farming systems in the Massif Central, a livestock-dominated region in France spanning 85,000 square kilometres. This area is critical to French agriculture, accounting for 37% of the nation's beef cattle and 54% of its meat production. Pigs are often integrated into mixed farms alongside herbivores, but pig farming has seen a significant decline. To address these challenges, the APOR THE project, launched in 2018, aims to enhance the resilience of mixed farms, modernize operations, and support new entrants in the sector. Through quantitative analyses using agricultural censuses and qualitative surveys with stakeholders, the project investigates the dynamics and barriers facing mixed farming systems in the region.

Despite their importance, mixed farms are declining more rapidly than specialized ones, particularly those combining pigs and dairy cattle. High workloads and operational complexity contribute to this trend. While farm sizes have increased, this growth has not compensated for the closures of many mixed farming operations. Pig herds in mixed farms are shrinking, whereas specialized pig farms have shown some growth.

These systems also differ fundamentally from specialized operations by integrating complementary livestock production. This integration strengthens their resilience and contributes to workforce diversity, making mixed farming essential to the sustainability of the Massif Central. However, current analytical methods often overlook the ecological, economic, and social benefits of mixed farming, focusing solely on technical and economic metrics.

In conclusion, mixed farming systems in the Massif Central offer substantial benefits, including ecological sustainability, economic contributions, and community resilience. Tailored analytical approaches are needed to fully understand and support these systems, recognizing their role as more than just agricultural operations but as integral parts of the region's diverse and sustainable agricultural landscape.

Question: Do mixed farms that combine pork production with other livestock have higher or more stable net incomes compared to specialized farms?

Answer: Mixed farms in the Massif Central tend to have a smaller pig herd and have slightly lower technical performance compared to national averages. However, they compensate for this through short-circuit marketing and quality certifications. While their economic results may sometimes be lower than those of specialized farms, they are more stable over time. Additionally, mixed farms provide significant social benefits, such as increased labour opportunities and a diverse workforce.

Question: Despite the benefits of mixed farming, why are pig farms and herds in decline, and what can be done to address this?

Answer: Pig herds in the Massif Central have declined significantly in the past, but production has stabilized in recent years. The decline is largely attributed to natural disadvantages in the region and its low pig density, which leads to additional costs. Boosting pig production in this area requires better understanding of its role and value, at the territorial and farm level, and by increasing its attractiveness, particularly for future breeders.

[More information in the slideshow](#)

Contribution of livestock in organic agriculture development: a study on nitrogen flows in expansion scenarios in France

By Fanny Vergely, INRAE - @INRAE_France

www.inrae.fr/en



Fanny Vergely is a second year PhD student at the French National Institute for Agricultural and Environmental Research in Rennes. She is in a unit that works mainly on water resources - soil - air, the biogeochemical cycles of carbon, nitrogen and phosphorus, and agricultural production systems. Throughout her studies, she has always been interested in environmental issues and the relationships between stakeholders in local areas. That is why her thesis is at the intersection of three research themes: the closure of biogeochemical cycles in livestock farming and local areas, the relationship between conventional and organic agriculture, and circularity in local areas. They try to position the role of livestock, distinguishing between ruminants and monogastrics, in the closure of nitrogen flows by modelling flows in organic agriculture on the one hand and between organic and conventional systems on the other.

Book of abstracts: abstract #2212838.

The presentation focussed on research on nitrogen flow in the development of organic agriculture, focusing on biogeochemical cycles, the relationship between organic and conventional farming, and local circularity. Fanny Vergely's work aligns with the European Green Deal's objective to expand organic agriculture to 25% of land by 2030, up from the current 9.9%. The study examines how nitrogen flows will function under this expansion, considering regulatory constraints, such as reducing livestock numbers and phasing out conventional manure use in organic systems.

Using a national nitrogen model for France, the study modelled nitrogen interactions across organic and conventional systems, incorporating livestock (ruminants and monogastrics) and cropland dynamics. Two scenarios were developed for 2030. The first scenario, based on recent trends, showed an overall decrease in conventional livestock and moderate growth in organic livestock. The second scenario assumed proportional growth of organic livestock in line with the expansion of organic land, with a smaller reduction in conventional livestock limited to ruminants.

In the trend-based growth scenario, organic livestock numbers increased (except for poultry), while conventional livestock declined, leading to a 50% overall reduction in total livestock numbers. Organic systems exhibited better nitrogen self-sufficiency and lower nitrogen outputs due to reduced reliance on imported feed. However, overall system productivity declined, though nitrogen use efficiency improved, reflecting a more efficient yet less productive system.

In the proportional growth scenario, organic livestock increased alongside the expansion of organic land, while conventional livestock numbers only decreased for ruminants. This led to an overall system with more organic animals and fewer conventional ones, resulting in higher nitrogen self-sufficiency but lower productivity, as organic livestock are inherently less productive.

The study highlights the trade-offs between environmental benefits, such as reduced nitrogen surpluses and improved self-sufficiency, and productivity losses. It provides a foundation for evaluating organic agriculture's potential at various scales and could be adapted to address other challenges, such as phosphorus flows. By exploring the balance between sustainability, productivity, and regulatory constraints, the research underscores the complexities of transitioning toward more organic agricultural systems.

Question: What are the regulations around the use of conventional manure in organic farming?

Answer: Conventional manure is allowed in organic farming within the European Union as long as it does not originate from industrial livestock. It serves as a significant nitrogen source for organic systems. However, the definition of "industrial livestock" varies by country. France currently has the

most flexible definition, but stricter regulations may be implemented in the future. In France, industrial livestock refers primarily to monogastric animals housed in slated, fully grated systems or cages, beyond a certain number of animals.

Question: Have you compared your model outputs with real-life data or statistics on organic farming development in Europe?

Answer: This comparison is a future step in the research. While the scenarios presented are based on initial modelling results, there is an earlier article that compares the current state data with actual statistics. Further work will involve comparing scenario outcomes with broader European statistics and refining the models based on these comparisons.

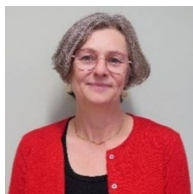
Question: Does your methodology include comparisons with other farming systems like regenerative farming, or is it limited to organic and conventional agriculture?

Answer: The current methodology focuses on comparing organic and conventional farming. Other systems, such as regenerative agriculture, are not included in the analysis at this stage.

[More information in the slideshow](#)

The representations and attractiveness of livestock farming professions under the influence of societal issues. The French situation in a European perspective.

By [Anne-Charlotte Dockes, Idele](#) - [@CharlotteDockes](#) [@InstitutElevage](#) www.idele.fr



From an agro-sociologist background, Anne-Charlotte Dockès currently heads the social approaches and transfer department of Idele (the French Livestock Institute), where she has spent most of her career after a brief involvement in international cooperation and at INRAE. Her main activities, within national and European projects, focus on social and societal approaches of livestock farming, advisory methods, innovation and change management, communication and transfer. She supports and facilitates multi-actor projects and foresight exercises. She is part of the board of directors of Idele and of the GIS “Avenirs Elevage”. She also is a member of the French Academy of Agriculture.

Book of abstracts: abstract #2215332.

The presentation explored the challenges and opportunities in improving the attractiveness of livestock farming in Europe, emphasizing the need to address demographic shifts, public perception, and structural issues within the sector. The discussion highlighted the declining number of farmers, particularly young people, and the underrepresentation of women and non-agricultural entrants in farming. With nearly 60% of European farmers over the age of 55 and only 20% under 40, generational renewal is critical. Additionally, only 10% of farmers receive professional training, and women account for just 30% of farm managers, signalling significant gaps in inclusivity and preparedness.

In France, replacement rates vary by sector, with higher rates in activities appealing to women and newcomers to farming. However, livestock farming faces a “female exodus,” as the proportion of daughters of farmers entering the profession has dropped from 40% in 1977 to just 6% today. Attracting more women to the profession requires attention to their specific expectations and improving working conditions.

Public perception of livestock farming remains complex, shaped by controversies in four key areas: the environment, animal welfare, public health, and socio-economic impacts. While livestock farming is often criticized for issues like greenhouse gas emissions and water pollution, it continues to have a strong overall image among European citizens, who view agriculture as integral to rural identity and

support increasing subsidies for farmers. However, discrepancies exist between citizens' expectations for sustainability and consumers' purchasing behaviour, with many expressing willingness to pay for sustainable products but failing to follow through due to economic constraints.

To enhance the sector's appeal, the presentation identified several key strategies. These include improving the work-life balance for farmers, addressing the heavy workload in livestock farming, and emphasizing the meaningful and autonomous nature of the profession. Livestock farming should also be positioned as a diverse career option with pathways for managers, workers, and entrepreneurs. Simplifying administrative procedures, facilitating access to land, adapting training programmes, and supporting non-agricultural entrants—especially those with romanticized or non-traditional views of farming—are essential to attract new talent.

The presentation also emphasized the importance of tailoring approaches to the expectations of different groups, such as citizens, aspiring farmers, and agricultural workers. For example, citizens prioritize environmental sustainability, high-quality food, and animal welfare, while future farmers seek autonomy, meaningful work, and improved income and working conditions. Bridging these perspectives requires collaborative efforts to design farming systems that are economically viable, socially appealing, and aligned with societal expectations.

In conclusion, we face 4 main challenges: improving the image of the profession, facilitating access conditions, increasing farmers' income and optimizing working conditions on farm. Revitalizing livestock farming as a career demands a multifaceted approach that includes improving working conditions, addressing public perception, fostering inclusivity, and adapting systems to meet the diverse needs of new entrants and stakeholders. By co-creating sustainable and socially acceptable farming systems, the sector can address its current challenges and secure its future.

Question: Did you analyse the size of farms run by individuals under 40 years old to assess generational trends?

Answer: Yes, there is a general trend toward larger farm sizes for younger farmers compared to older ones. However, this varies significantly by sector. For example, in French sheep farming, younger farmers often prefer smaller farms than previous generations, as they seek different production conditions. This creates two opposing trends: increasing farm size overall and greater diversity in farming systems with altogether the development of smaller farms.

Question: Why are certain sectors more attractive to newcomers than others?

Answer: Sectors like sheep and goat farming are more appealing to newcomers for several reasons. Starting a small-sized farm requires less capital investment, and these farms often produce high-value products. Additionally, handling small animals like sheep, goats or poultry is easier for those without an agricultural background. These sectors are also more suited for direct marketing systems, which attract more women and first-time farmers due to their manageable scale and simpler operations.

Question: How can companies support new farmers and entrants into agriculture?

Answer: Supporting new entrants is crucial, and companies can play a significant role in financing farms and providing resources like capital and infrastructure. There are already several innovative initiatives aimed at assisting new farmers, which include partnerships and support programmes that make it easier for newcomers to establish and sustain farming operations. Encouraging such collaborations can be instrumental in fostering the future of agriculture.

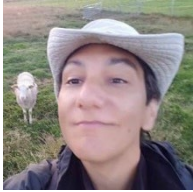
[More information in the slideshow](#)

Life cycle and ecosystem services assessments provide opposite evaluations of the food and non-food contributions of livestock farming systems

By Frédéric Joly, INRAE - @INRAE_France

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Frédéric Joly started his professional life in conservation, in a project working for the reintroduction of a wild equid in Mongolia. This animal had previously disappeared from its natural range and the purpose of the project was to re-establish a viable population. The project used an integrated approach, meaning that the local livestock systems that could compete for grass with the reintroduced equids were cautiously studied. Frédéric Joly used these studies to take a PhD on these local grass-based systems and in particular on their vulnerability to climate hazards, that are frequent in cold steppe environments. Now he works at INRAE, still on grass-based livestock systems and more specifically on their environmental evaluation. He is particularly interested by the combined study of the positive and negative environmental contributions of animal production systems.

Book of abstracts: abstract #2212152.

The presentation examined the combined assessment of livestock farming systems using two environmental evaluation frameworks: Life Cycle Assessment (LCA) and Ecosystem Services (ES). These frameworks provide contrasting perspectives on the environmental impacts and benefits of livestock systems. LCA focuses on negative environmental effects, such as greenhouse gas emissions and resource use, while ES emphasizes positive contributions like soil quality, carbon sequestration, and biodiversity. Developed from different origins—LCA in industry during the 1970s and ES in ecology and economics in the 2000s—these frameworks have distinct methodologies and tools, with LCA being more established and widely used.

Monogastrics (e.g., pigs and chickens) generally perform better in LCA metrics due to higher feed efficiency and lower greenhouse gas emissions. In contrast, ruminants (e.g., cattle and sheep) perform poorly in LCA but excel in ES metrics when they utilize grasslands, which contribute significantly to pollination, water regulation, and erosion control. This dichotomy reflects the underlying differences in the two approaches: LCA rather evaluates product-level environmental costs, whereas ES captures ecosystem-level benefits.

The study used data from French livestock systems, focusing on six ecosystem services (e.g., pollination, carbon stock, water quality) and correlating these with LCA indicators such as CO₂ emissions per kilogram of human-edible protein. Results revealed that ruminants, despite having higher environmental costs in LCA, provided greater ecosystem services due to their reliance on grasslands. Conversely, monogastrics had lower ecosystem contributions but better performance in LCA metrics.

A key finding was the antagonism between LCA and ES results. Systems with higher environmental impacts in LCA often delivered higher ecosystem services, while those performing well in LCA offered fewer ecosystem benefits. Grass-based extensive systems, which are penalized in LCA assessments, were shown to provide substantial ecosystem benefits that LCA fails to capture.

These findings have significant implications for land management and policy. Current reliance on LCA risks undervaluing the broader ecosystem contributions of extensive livestock systems. To address this, land management strategies should aim to balance food production with ecosystem service provision. Approaches to reduce the antagonism between LCA and ES metrics include improving ruminant feed efficiency through better forage quality and incorporating semi-natural features like hedgerows into monogastric systems.

In conclusion, integrating LCA and ES frameworks is essential for a comprehensive understanding of livestock systems. By considering both food production and ecosystem benefits, land management strategies can optimize sustainability and reduce trade-offs, creating a more balanced approach to livestock farming. This holistic perspective highlights the importance of maintaining diverse systems to support both productivity and environmental health.

Question: Could LCA and ecosystem services be brought together by using hectares as the functional unit? This would show extensive systems as lower-impact per hectare while delivering more ecosystem services. Alternatively, could LCA be modelled to assess impacts on ecosystem services, such as carbon storage?

Answer: These are excellent suggestions. Using hectares as the functional unit could better capture the contributions of extensive systems. Regarding impact modelling, while linking LCA impacts to ecosystem services like carbon storage is a promising approach, there are significant challenges due to differing methodologies and allocation factors. For example, allocation to ecosystem services in LCA often sparks debate, as some reviewers argue it lacks honesty or objectivity.

Question: Could CO₂ equivalence in LCA be reframed to reflect the true impact of temperature rise on ecosystem services? For example, by correlating the effect of rising temperatures on ecosystem services rather than using CO₂ equivalence?

Answer: This is an interesting concept. Connecting temperature rise directly to ecosystem service impacts could provide a more precise understanding of warming's consequences. However, the lack of detailed models linking temperature changes to ecosystem service quantification remains a limitation. This is an area where further research would be beneficial.

Question: Have you considered exploring the diversity within monogastric systems and comparing it with the broader diversity in ruminant systems to deepen conclusions about ecosystem services and LCA?

Answer: Yes, this is a valuable idea. Investigating the diversity of monogastric systems and contrasting it with the vast diversity of ruminant systems could refine the understanding of how these systems contribute differently to LCA and ecosystem services. Such comparative analysis would add depth to the current findings.

[More information in the slideshow](#)

Beyond the Pigs: Socio-Economic Impacts of African Swine Fever (ASF) on Indigenous Breeds in Bulgaria and Eastern EU

By *Giorgia Angeloni, IZS delle Venezie* www.izsvenezie.com



Giorgia Angeloni is a Doctor of Veterinary Medicine with more than ten years of experience in zoonotic diseases. She is a veterinary researcher at the Research and International Cooperation Department of IZSve, President of Vétérinaires Sans Frontières and Vice-president of Veterinari Senza Frontiere Italia (both since 2019). In the last ten years, she has been involved in several research projects and surveillance activities, mainly in Northern and Central Italy, and cooperation projects in North-West Africa, Eastern European Countries, the Balkans, the Middle East and South America. She performs surveillance plans, epidemiological studies, and studies on the social impact of animal diseases and social factors affecting transboundary animal diseases spread, awareness campaigns and the creation of communication tools. She is the author of several papers published in international journals.

Book of abstracts: abstract #2213006.

The presentation examined the socioeconomic impacts of African swine fever (ASF) on indigenous pig breeds and small-scale farming in Eastern Europe, focusing particularly on Bulgaria's East Balkan swine, the last indigenous breed in the country. These free-range pigs, known for their adaptability and high-quality meat, have been severely affected by ASF, which has stopped small farms and reduced their population due to culling campaigns. Farmers face significant challenges, including restrictive biosecurity laws, lack of slaughterhouses, and financial instability. Many farmers are unable to restart their operations due to economic and regulatory barriers.

The study emphasized the need for tailored solutions, including land-use planning that supports natural habitats, financial aid for biosecurity, updated slaughterhouse regulations, and conservation plans for indigenous breeds. It also highlighted disparities in subsidy systems across countries, urging better European-level coordination. Future projects aim to develop socio-economic indicators to assess ASF impacts more comprehensively, with plans to apply these tools in affected areas of both Eastern and Western Europe.

In conclusion, addressing ASF requires balancing disease control with the preservation of cultural heritage, biodiversity, and rural economies. By integrating regional realities into policy and fostering collaboration among stakeholders, sustainable solutions can be achieved.

Question: what kind of land planning do you mention to control the fever?

Answer: In Bulgaria, the suggestion involves allowing farmers to access land where they can raise animals with proper fencing and biosecurity measures. Currently, Bulgarian law prohibits fencing in natural resource areas, creating challenges. A compromise is needed to balance the needs of farmers, hunters, and other stakeholders. Similar issues occur in Italy, where rural settings face difficulties in implementing the biosecurity measures required by authorities.

Question: With 60% of income coming from meat production and the drastic reduction in backyard pigs, how have people coped with the resulting income loss?

Answer: Most affected farmers, particularly in rural areas, have not shifted to other forms of farming or livestock. Instead, they have reduced their activities and adapted by cutting personal expenses. Many of these farmers are elderly and prefer to wait for clearer information from authorities before restarting operations. The social and emotional impact of culling has also made them hesitant to resume farming without sufficient support or guidance.

Question: What are the primary barriers to implementing biosecurity measures for farmers in natural resource areas?

Answer: Natural resource areas in Bulgaria cannot legally be fenced, making it difficult to implement biosecurity measures like electrification or proper containment, which are required by animal health authorities. The issue also involves conflicting interests from groups like hunters, which complicates decision-making and policy enforcement.

[More information in the slideshow](#)

Biopolymers of animal origin: production, properties and applications

By Vitaliy Khutoryanskiy, University of Reading - @UniofReading

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Prof. Vitaliy Khutoryanskiy is a Professor of Formulation Science at the University of Reading's School of Pharmacy and a Royal Society Industry Fellow. His research focuses on materials for pharmaceutical applications, including drug delivery, mucoadhesive materials, hydrogels, and nanomaterials. He was elected as a Fellow of the Royal Society of Chemistry and Fellow of the Academy of Pharmaceutical Sciences and received several prestigious awards for his research and mentoring early career researchers. He has published >220 papers, accumulating >16,000 citations. In 2023, he became the founding director of the Physicochemical, Ex Vivo and Invertebrate Tests and Analysis Centre (PEVITAC) at the University of Reading.

Book of abstracts: abstract #2217101.

The presentation focused on the various materials derived from animals and their applications, particularly in the pharmaceutical, biomedical, and cosmetic industries. Six key materials were discussed: gelatine, collagen, insulin, chitosan, heparin, and hyaluronic acid, highlighting their properties, sources and uses.

Gelatine, extracted from pig skins, bovine hides, bones, and fish, is known for its unique gelation properties and is widely used in pharmaceuticals, including capsules and suppositories, as well as in cosmetics. Depending on its production process (acid or alkali), it forms different gel strengths suitable for varied applications. Modified versions, such as GelMA, have enhanced properties for tissue engineering.

Collagen, a parent compound of gelatine, is derived from sources like cows, pigs, chickens, rat tails, and even jellyfish. Its biocompatibility makes it ideal for wound care, drug delivery, and dermal fillers. It is also used in ocular regeneration and tissue engineering. Collagen's versatility stems from its triple-helix structure and diverse sources.

Insulin, primarily sourced from the pancreas of pigs and cows, is essential in diabetes management. It serves millions of users globally through injectable forms or specialised delivery devices.

Chitosan, derived from chitin found in aquatic livestock like crabs and shrimp, is a water-soluble polymer with applications in food supplements, pharmaceuticals, and wound healing. Its antimicrobial and mucus-adhesive properties make it valuable, and modifications like methylated or glycol chitosan enhance its solubility and functionality.

Heparin, a sulphated polysaccharide, is extracted from the mucosal tissues of animals and used as an anticoagulant in injectables and surface treatments.

Hyaluronic acid, widely recognised in the cosmetic industry, is also used in pharmaceuticals for ocular treatments, wound care, and moisturizers. While traditionally sourced from animal tissues, there is a shift toward biotechnological fermentation processes.

In conclusion, these animal-derived materials play a critical role in multiple industries. Their properties can be further modified for specific applications, demonstrating their adaptability and significance in advancing biomedical and pharmaceutical technologies.

Question: Is all insulin used for diabetes treatment extracted from animals, or are there biotechnological alternatives?

Answer: While insulin was traditionally extracted from animals like pigs and cows, much of it today is produced biotechnologically using bacteria or yeast through recombinant DNA technology.

Question: How would a significant reduction in animal production systems affect industries reliant on animal-derived materials?

Answer: A drastic decrease in animal production would heavily impact these industries, as many materials rely on animal-derived tissues. However, there is a growing push to replace animal raw materials with biotechnological alternatives. Advances in biotechnology, such as using bacteria to produce these materials, offer potential solutions, but the livestock industry remains an important source for now.

[More information in the slideshow](#)

Valorization of a waste from food industry: bovine hide to leather

By **Giacomo Zorzi, UNIC** - [@unicitalia](#) www.unic.it



Giacomo Zorzi graduated in Forestry at the University of Padua. He works on the issues of responsible forest management and traceability for companies in the wood-furniture sector. Since 2002 he has been working for Lineapelle and UNIC, the most important association in the world for tanning companies, managing the Executive Office within the Veneto District. In close contact with local tanneries, public offices and institutions, he coordinates activities and projects for the enhancement of Italian leather. He works as Lead Auditor for certifications at ICEC, an accredited certification body specialised in the field, whose experience has allowed to design over time numerous tools for certification of environmental, social and market efficiency, to manage peculiar risks connected to leather sector and correctly communicate responsible operating.

Book of abstracts: abstract #2215939.

The Italian Tanners' Association is one of the most important associations in the world for tanning companies. It has been protecting its associate companies since 1946 and represents a strategic industry, which is a fundamental component of Italy's manufacturing and economic fabric. It promotes the interests of the sector, it represents it on every level, boosts innovation, enhances both its social and environmental role and sets up commercial companies that are functional to the sectorial market. It is a member of Confindustria, COTANCE - the European Confederation of Tanners and ICT - the International Council of Tanners.

Leather is a natural by-product. Looking at Italian leather sector, the main sources of animal hides are bovine (83.6%), sheep (9.3%) and goats (6.7%). Their skins are a valuable global resource, and thanks to tanners' and manufacturers' skills and knowledge, they ensure this versatile material does not end up in landfill. Current estimates put this at a saving of 7.3 million tonnes worldwide for cattle hides alone and around 10 million tonnes in total per year. That is a lot of potential waste being transformed into a versatile, usable material.

The leather sector converts waste from the food industry that would be otherwise thrown away, to make products we use in everyday life. Leather keeps around 10 million tonnes out of landfill a year, it is long-lasting and leather products are repairable. Leather can be recycled at its end-of-life phase, leather degrades through chemical and biological means due to its nature of biodegradable material, tanning process produces a range of wastes which are actually recovered: in particular in Italy this value rises to more than 78%.

The leather industry creates employment and skills for millions worldwide, an important defining factor in sustainability and the circular economy.

Leather manufacturers upcycle this raw material and exploit its tremendous versatility. Depending on the source of the hide or skin and finishing technology used, they can create sumptuous-yet-tough footwear, handbags and clothing, and durable-yet-comfortable car and aviation seating and furniture

and interior design. Leather can be made hard enough for the sole of shoes or soft enough for the finest gloves.

In tanned leather, the content of bio-based carbon varies between 65% and 98% depending on the type of processing carried out, unlike "alternative to skin" materials, bio-based origin declarants, where the majority of the component comes from fossil sources.

Tanneries, serving leather market, guarantee raw hides are not sent to landfill disposal. Every year, world tanneries produce a total of about 1,700 sq km of finished leather (equivalent to 8 million tonnes of raw hides). The disposal as waste would produce 5 million tonnes of greenhouse gases. (estimates based on UNIDO data). Besides the relevance of waste prevention for related environmental problems, another current topic regards the rise of synthetics and fake leather. Replacing natural leather with synthetics will not stop animals from being processed to produce meat and milk. But mainly technical and environmental performances are not at all comparable.

Question: You mentioned a decrease in waste and water consumption, however, these were small reductions, why the data is not decreasing more?

Answer: Because of fashion requests in particular in the last years: brands are often requesting certain kinds of leather, with certain types of tanning processes and finishing specifications based on the not always correct belief that these "new" processes would lead to higher value items, including in terms of sustainability. So depending on these requests, the performance numbers vary a lot, and since we are talking of average numbers, despite the fact that in general there is a decrease, this decrease is higher in the much more consolidated chrome tanning process than in particular requests that come from the fashion area.

[More information in the slideshow](#)

Cross-analysis of crop-livestock integration, sustainability and biodiversity on 10 French experimental farms

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Gilles Martel is an animal scientist on the relation between livestock farming systems and landscape management. He focuses on the direct and indirect roles of livestock on biodiversity. Direct effect is analysed with his UMR BAGAP colleagues in ecology: Gilles tries to understand the grassland management of various stakeholders and his colleagues in ecology look at the plant biodiversity in grasslands. Indirect effect is studied through the relation between cropping plan and livestock management. This research is mainly done on integrated crop-livestock systems. He proposed a way to quantify the interaction level between crop and livestock on farms and evaluated the relationship of this level with sustainability of farms and with the landscape they produce.

Book of abstracts: [abstract #2213464](#).

The presentation examined the relationship between crop-livestock integration, sustainability, and biodiversity on ten French experimental farms. Using tools like the IDEAv4 methodology and the Farm Biodiversity tool BIOTEX, the study assessed how varying levels of integration between crops and livestock impact sustainability and biodiversity at the farm and landscape levels.

Farms were categorized into low, medium, and high levels of crop-livestock interaction. High-interaction farms exhibited greater autonomy in fertilization, feed, and dedicate more surface to animals. Those farms were associated with high agroecological and social-territorial sustainability. In contrast, low-interaction farms demonstrated limited autonomy and greater variability in resource use, particularly in feeding practices. The study highlighted that the integration of crops and livestock

could improve resource efficiency and reduce environmental impacts, making it a valuable strategy for enhancing farm sustainability.

Biodiversity outcomes, however, were less directly linked to crop-livestock interaction levels. While grassland management and agricultural land use were more favourable for biodiversity in high-interaction farms, the findings suggested that the diversity of crops and livestock may play a more significant role in biodiversity potential than the degree of interaction alone. This highlights the importance of incorporating both crop and livestock diversity and integration into sustainability and biodiversity strategies.

The tools used in the study offered valuable insights but required extensive data collection, making them more suitable for experimental farms than commercial operations. The IDEAv4 methodology evaluated sustainability across three dimensions, including autonomy and resource-sharing efficiency, while the Biotex tool assessed biodiversity potential through seven dimensions. Experimental farms, with their diverse practices and available data, provided a rich context for exploring these indicators and developing strategies for future research.

In conclusion, crop-livestock integration enhances farm autonomy and sustainability, particularly in agroecological dimensions. However, biodiversity improvements may depend more on the diversity of crops and livestock. Comprehensive assessments require combining multiple diagnostic tools to capture the complex interactions between sustainability and biodiversity.

Question: Why the farm with grass is inferior to the crop?

Question: Why were grasslands considered unfavourable to crops in the study? It seems counterintuitive since grasslands should benefit crops.

Answer: The unfavourable rating stems from the methodology used in the Biotex tool. Grasslands are treated uniformly in terms of biodiversity potential across different types of surfaces, which may not reflect their true value. For example, permanent grasslands may not be as detrimental as suggested. The methodology itself is questionable, and further discussion with experts, including the IDELE group and researchers like V. Manneville, is needed to validate these calculations.

Question: Why were experimental farms used in the study instead of non-experimental farms?

Answer: Experimental farms were chosen because they provide easier access to diverse data and practices, which are not always available or consistent in non-experimental farms. Collecting detailed values, as required by the methodologies, is time-consuming and more feasible in controlled, experimental settings. This approach allows for a more thorough exploration of sustainability and biodiversity indicators.

[More information in the slideshow](#)

Closing remarks

Take away messages and closing

Frank O'Mara:

Today's discussions were centred around the theme "Livestock are more than food", emphasizing the multifaceted contributions of livestock to ecosystems, industries, and society beyond their primary role in food production.

Reflections:

The several presentations highlighted how livestock systems contribute to ecosystem services, such as soil health improvement through manure and biofuel production, and how animal by-products support non-food applications in pharmaceuticals, cosmetics, pet food, and other industries.

It was clear the importance of recognizing these broader contributions while acknowledging the challenges often associated with livestock, such as climate change impacts. It was noticed that much of the criticism directed at livestock stems from a narrow narrative focusing on negative externalities. To counter this, we proposed either reframing or correcting the current narrative to include livestock's positive contributions. The day's discussions underscored that livestock systems are essential to food production but also offer additional benefits that should not be overlooked.

Research indicating that public perception of livestock is more balanced and positive than media and policy discussions often suggest was presented and this is interesting. This perspective from the "silent majority" offers hope and a reminder to consider these broader views in shaping the narrative around livestock.

Looking ahead, the insights from the session will inform a follow-up discussion with policymakers in Brussels, aiming to use scientific evidence to better assess and improve livestock systems.

Frank O'Mara thanked the speakers, the ATF team and the LFS commission of EAAP for this great day of discussion.

Michael Lee:

Some suggest that it is possible to remove livestock from global diets, however, this is a very narrow and wicked narrative, a broader perspective clearly recognizes livestock's contributions beyond food production, including socio-economic benefits, biodiversity, by-products, and even mental well-being.

We have to emphasise the importance of socio-economic, biodiversity, by-products and other components that livestock deliver for us all. And of course, the role that livestock play also in mental wellbeing, a key component of that is the critical role of pets in human lives and the livestock industry's support of pet-related products was highlighted as an area deserving further exploration. Livestock was reaffirmed as essential to future sustainable living, contributing significantly to human life in ways beyond food production.

Michael Lee referred the upcoming policy session in November by the Animal Task Force (ATF) and expressed appreciation for Frank's leadership as president of ATF, acknowledging its critical role in supporting and advocating for livestock within sustainable systems. The session concluded with hopes for a successful continuation of the conference and recognition of ATF's important work.

The next ATF event on the topic will be held on 20 November 2024 in Brussels (hybrid conference)