

# Societal Role of Red Meat – Extension Project

Project code	Prepared by	Date submitted
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	Published by	Date published
	AMPC	5/1/2025

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## 1.0 Abstract

Over the past 20 years ideological attack coupled with adroit communication to mass audiences and policy makers has led to a largely accepted view that livestock, and beef in particular, are responsible for human health issues and critical environmental damage with their number needing to be extensively reduced to stay within “planetary boundaries”. These attacks are heavily funded, have ramped up since the lead up to the UN Food System Summit in 2021, and are influencing international policy making.

This project relates to the October 2024 Denver Societal Role of Meat and Livestock summit that expanded on the evidence presented at the initial Dublin summit in 2022. Both summits established that the ideological views are refuted by high quality scientific evidence. The importance of recognising ethical frameworks in communication and of the need to engage via appropriate channels was extensively discussed. The summit sessions can be viewed in video and pdf form and are expanded in a special February edition of Animal Frontiers.

A strong delegation of Australian industry leaders participated in Denver leading to commitment to establish a long-term collaborative strategic framework to support the establishment and maintenance of an independent scientific evidence resource that can be readily accessed by communication developers. While the scientific reference library is critical to ensure communication is based on strong evidence it is essential that the evidence is translated to “stories” developed and delivered through multiple channels applicable to policy makers, industry members and global consumers to maintain a strong industry social license.

## 2.0 Executive summary

The project, centred on the Denver Societal Role of Meat and Livestock summit, responded to ideological activist attacks on the livestock and meat industry that are a threat to the industry social license. The industry failed to take these threats seriously in the early stages and are now seriously behind in influencing both the regulatory and societal narrative. Ironically the evidence strongly suggests that livestock and meat are critical long-term foundations to meet UN strategic development goals to ensure zero hunger for a predicted 2050 global population of 10 billion while producing this food within sustainable environmental boundaries.

Industry has been acutely aware of these challenges and invested heavily in research, and more importantly direct action, to deliver increased high quality human nutrition with increased efficiency and reduced environmental footprint. These achievements are overlooked by activists and the prevailing consumer narrative that meat and livestock are detrimental to both human health and the environment.

It is essential that the scientific evidence be catalogued in an assessable form that can be accessed and utilised as a base to advocate for evidence-based policy and to support general communication. An international summit, The Societal Role of Meat, was held in Dublin in 2022 and provided a high level evidence based rebuttal of the predominant ideology together with creation of The Dublin Declaration, hosted by the International Meat Research 3G Foundation (IMR3GF) and signed by over 1,200 global scientists who defend the critical and positive role of livestock for human health, environment and societal benefit. This initiative has impacted the global discussion and supported resistance to planned anti-meat legislation in the EU and a much stronger push back from industry groups.

The Denver summit, held in October 2024, built on the Dublin base presenting recent scientific results that amplified the essential role of meat in human health and of livestock in converting human inedible grasses, shrubs and agricultural and food industry byproducts into nutrient dense human food. In contrast to emission reduction approaches, livestock can improve environmental outcomes at scale through removing CO<sub>2</sub> from the atmosphere and sequestering it in soil. The project ensured that the Australian industry was strongly represented, both through industry leaders physical attendance and through the use of Australian data to confirm that the science could be applied commercially.

While the Dublin, and following Australian Good Meat Summit, had focussed on the science, the Denver summit recognised that while the science was strongly positive the public narrative had not substantially changed. The Denver agenda involved successful communicators to inform the translation of science to effective consumer discussion. It was agreed that, as a matter of urgency, a coordinated strategy to amplify the science using all contemporary channels and lobbying was essential, linking with international stakeholders to achieve maximum cut through with uniform global messaging for customers and policymakers.

An important summit outcome has been a coordinated Australian industry commitment to prioritise effective communication to inform government policy development and to redress misinformation through an evidence-based narrative.

### 3.0 Introduction

Attacks on meat consumption and livestock systems are not new, with various parties driven by animal welfare, dietary choices or environmental major motivations. The release of *Animal Liberation*, a book by Peter Singer (Singer 1975), an Australian Philosopher, in 1975 was a major influence in the transition from animal welfare, being the concern of well-regarded organisations such as the RSPCA, to animal rights and the rise of activists with philosophical objections to harvesting animals for food. In similar manner vegetarianism is not new but has become a crusade with activist vegan groups engaged in campaigning strongly for plant-based diets and elimination of animal sourced foods. Environmental issues have also grown from isolated debates on grazing in national parks or feedlot effluent or odour issues to a mainstream contention that livestock, and cattle in particular, represent a major environmental threat, this myth being kick started by a contentious 2006 FAO report, *Livestock's Long Shadow* (FAO 2006).

Through the late 1900's and early 2000's Australian industry paid slight attention to these negative views, believing them to be of minor concern and mostly relating to individuals who had agendas that represented a lack of industry understanding and would be of little impact given the regulatory systems that enforced welfare and environmental standards. More recently cell cultured meat was promoted as a replacement for the genuine product amid much Silicon Valley investment hype, with claims it would put the dairy and beef industries out of business due to a lower cost, environmentally superior and animal cruelty free nirvana (Tubb & Seba 2019).

What was not initially recognised was a much larger background coordination that effectively captured these individual concerns and created a unified anti livestock and meat agenda backed by substantial funding and commercial agendas. Concerted and well-funded messaging has led to meat being aligned with being bad for the environment and health, with simple messages such as "Save the Planet, Eat less Meat" becoming the norm. The issue is now recognised as a priority that must be urgently addressed.

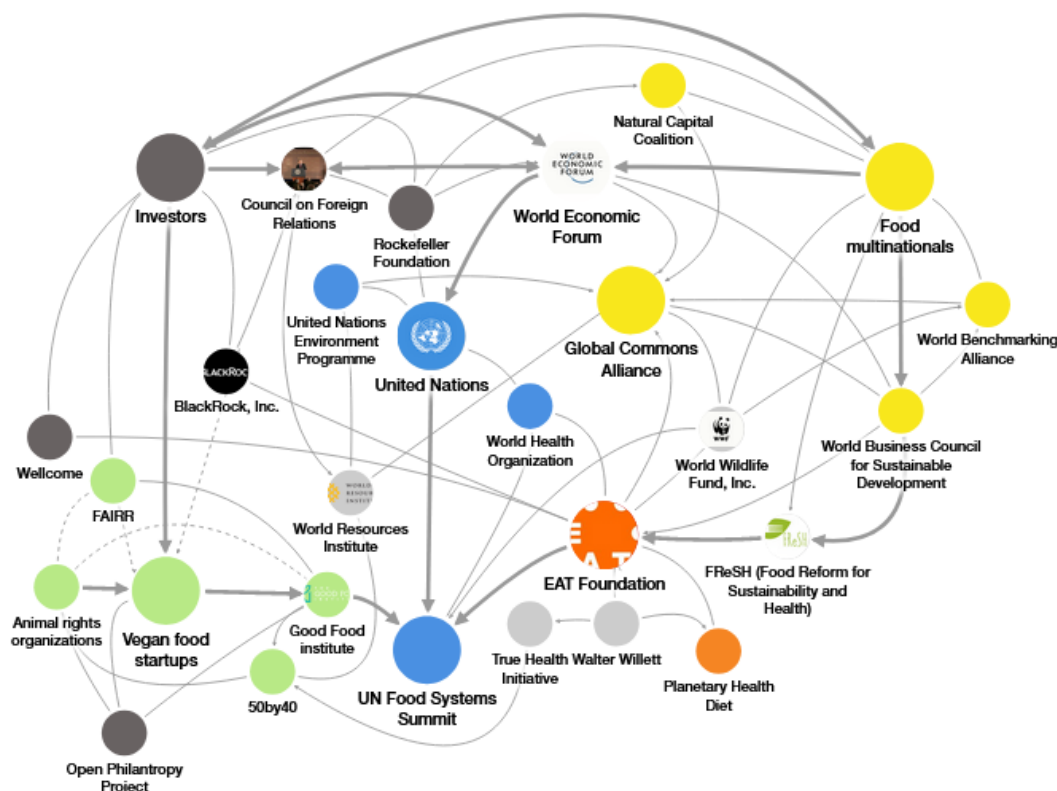
The AMPC commissioned report, *Meat Science toward 2030* (Polkinghorne et al. 2022), engaged strongly with international meat researchers and industry to assess the key threats and issues for meat science over the decade to 2030. While the initial focus was expected to identify declining resources and critical loss of scientific experience with the closure of many institutions and retirement of leading scientists, ideological attacks on meat and livestock were identified as major contributors to the decline in funding and reduced intake of young meat scientists. The development of the report included moderated audience discussion at three major meat science events; the USA Reciprocal Meat Conference in Reno (RMC), the MSA Pathways meeting by Zoom link with Reno and the International Congress of Meat Science and Technology (ICoMST) in Kraków, also by Zoom from Australia. It was agreed that the threat was substantial and that a solid evidence-based rebuttal was needed. It was further agreed that the subject could not be adequately covered in a one-hour session at various conferences, leading to a call for a special purpose international event that could have leading subject matter experts present current evidence to an invited audience of global policy and commercial decision makers. An organising committee was formed to progress the decision post ICoMST, resulting in the Dublin Summit on the societal role of meat.

Active coordinated Australian consideration of this narrative was initiated when the agenda for the UN Food System Summit, held in New York in 2021, provided a wakeup call to the industry when various traditionally non-aligned interest/activist groups, were appointed to chair key “action tracks” relating to diet and sustainable consumption patterns. It became obvious that activist groups were being backed by substantial funding from influential backers, including large food companies and the cell-based meat startups. The isolation of the FAO with the summit managed from New York and apparent links to the World Economic Forum was concerning and indicated the degree of influence within the UN structures and the WHO in particular.

Concern relating to the UNFSS agenda resulted in the formation of the Australian Sustainable Protein Production (ASAPP) group, chaired by Paul Wood, to coordinate Australian industry and liaise with government. ASAPP developed a significant resource of scientific evidence though examining over 1,000 peer reviewed papers that were assembled within a SharePoint site. This review added confidence that the evidence strongly supported the valuable role of meat in the diet and of livestock in environmental management.

Fig.1, produced by Prof, Frédéric Leroy who has extensively studied and tracked the source of anti-meat and livestock activity and funding, illustrates the closely interlinked activity that supports and amplifies the very effective communication of ideological positions that are predominantly not supported by evidence.

Figure 1. The anti-meat and livestock network (pers. comm.)



The Dublin Summit – The Societal Role of Meat agenda was framed around the SharePoint themes of the role of livestock in human health and nutrition, environment and society with a half day allocated to address each theme with a final afternoon wrap up session. Active planning commenced immediately post ICoMST with the summit held in October 2022. The summit was well attended and presented a large body of evidence that upheld the essential nature of meat in the human diet, tracing this from the origin of humans to present day nutrition. A highly concerning aspect was the degree of activist intervention reported in scientific publication, with The Lancet, a leading medical journal prominent in publishing both the Global Burden of Disease (GBD 2020) report and the Food in the Anthropocene (Willett et al. 2019) paper authored by the EAT Lancet Commission and advocating drastic reductions of meat for health and environmental reasons. Professor Alice Stanton had established that the GBD report was highly flawed (Stanton et al. 2022) but was yet to obtain a retraction. Bradley Johnson, another Dublin speaker, had also been subject to extreme attack and attempts to block publication (Rubin 2020) of 4 meta-analysis that concluded there was “low to very low evidence of any negative health association with red meat consumption” (Johnston et al. 2019).

The environmental session presented ecological evidence of how grazing by native herbivores had created typical global grasslands and healthy soils over millennia. Further evidence confirmed the strong positive role of controlled grazing on net emissions with carbon sequestration significantly greater than emissions. An outstanding presentation by Candice Croney examined the ethical arguments for meat consumption and Paul Wood provided a detailed critique of the physical and economic challenges faced by cell-based meat startups and the biological restraints on these products ever serving anything beyond a high-priced niche market (Wood et al. 2023).

At the conference conclusion The Dublin Declaration (Appendix 1) was issued calling for evidence-based decision making and establishing that a large cohort of meat and animal scientists opposed the popular

anti-meat and livestock claims. The declaration has since been signed by over 1200 verified scientists and been influential in alerting policy makers to the fact that the evidence is positive and refutes the ideological claims being promulgated by activist groups. A special edition of *Animal Frontiers* published a series of papers relating to the Dublin presentations providing a valuable reference source. The pattern of personal and public attack from activist groups and closely aligned communication channels was repeated for the Dublin Declaration with the core authors and Teagasc being subjected to FOI requests and challenged in the press and through questions in parliament suggesting that Teagasc, the leading agriculture and food research organisation in Ireland, should not be hosting a summit that promoted red meat due to ethical and environmental concerns. These attacks and associated internal politics emphasized the need for a truly independent, nonaligned channel to ensure that scientific findings could be publicised without restriction from internal politics, sensitivities due to perceived political correctness or organisational conflicts arising from shareholders, commercial clients or internal departments being invested in competing product development or production. The International Meat Research 3G Foundation (IMR3GF) provided a suitable framework having a long-established collaborative science based not for profit structure and agreed to host the Declaration. More detail on the opposing strategies and actions are reported by Ederer (2024) and the ALEPH2020 (2024).

The Dublin summit encouraged further events including the Australian Good Meat Summit held in Sydney and utilising some of the Dublin presenters and local experts amplifying the disconnect between the positive evidence and the widely divergent ideological challenges.

It was agreed that a further summit should be held in 2024 to review scientific evidence produced since Dublin and to address the perceived gap between the evidence and the public narrative that continued to denigrate livestock and meat. AMPC, who had high level participation in the Dublin summit and had initiated the Good Meat event, supported the need for a second global summit with this project initiated to assist in preparation and presentation of a scientific paper to present large scale field results from several diverse countries where positive environmental outcomes had resulted from increased cattle numbers and good management, while also increasing human food supply. An important objective was to examine the required linkage and coordination between the grazing, supplemental feeding and meat processing sectors to optimise meat and byproduct production to support larger populations while reducing environmental impact through greater production efficiency, improved soils, utilisation of non-human edible byproducts and consistent year round product supply.

## 4.0 Project objectives

The project objectives as specified in the Research agreement were:

1. Continue to engage with the world scientific community to understand the real facts around red meat production and consumption.
2. Develop a paper outlining the impact of well managed animal agriculture on environmental outcomes.
3. Deliver the paper at the Colorado summit and publish it in a scientific journal.
4. Provide a report to disseminate outcomes from summit for AMPC to share with industry.
5. Participate in AMPC webinars, as required, to deliver the key findings from the summit.



## 5.0 Methodology

The Dublin organising committee reviewed the summit outcomes, noting significant support from participants and encouragement to stage a follow up event in 2024, allowing two years to plan the event and a suitable period for further scientific discovery and publication.

### 5.1 Preparation for a further Summit event in 2024

The Dublin organising committee began planning for the follow up summit in early 2023 agreeing that the next event should be in USA or South America to enable more participation from these regions. The Dublin organising committee members were Dr Declan Troy (Teagasc), Prof, Dr Frederic Leroy (Brussels), Dr Peer Ederer (Goal Sciences, Switzerland), Dr Mohammad Koochmaraie (IEH Inc, USA), Collette Kaster (CEO, AMSA, USA) and Dr Rod Polkinghorne (Birkenwood, Australia) with Alix Neveu (Birkenwood Europe) providing administrative and secretariat services to the committee.

Several organisations indicated their support and willingness to host the next event with Colorado State University (CSU) selected after presentations at ICoMST in Padua in August 2023. A factor in this selection was the offer of the new Spur Campus facility located in downtown Denver with a mission of connecting the city population with agriculture and rural communities. Denver also provided excellent access by road or air, including international connections. The CSU leads, Dr John Scanga and Dr Keith Belk, were also extremely strong in their desire to present the essential value of livestock agriculture and meat consumption and assurances that the summit arrangements and publications would not be impacted by political pressures arising from activist interventions.

Dr Scanga and Dr Belk joined the steering committee with Dr Frank Dunshea, President of the World association for animal production, also joining in May 2024. The committee met virtually on a two-weekly basis from August 2023 until the summit event and on further occasions since to review the event, and to discuss publication of the presentations and the Animal Frontiers special edition. Alix Neveu coordinated the meetings and provided extensive support in recording meeting minutes, liaising with paper authors and arranging Zoom meetings to connect Australian and USA feedlot and processor/packer groups. Alix was also heavily engaged in the summit delivery through the Mentimeter tool, translating the Dublin Declaration and Denver Call for Action into French and arranging for its further translation into Polish and Chinese.

#### 5.1.1 Case studies

In planning the Denver event it was agreed that the environmental section should be expanded from the scientific evidence to include commercial case studies that confirmed that the science could be practically applied, and in fact demonstrate that leading practitioners had led the scientific development in a number of cases.

A feature of commercial application was acknowledged as the need for very local adaption to suit climate, soil, livestock and societal circumstances which needed to be reflected in the case studies. This was achieved with the recruitment of:

Dr John Gilliland, OBE, a farmer from Northern Ireland who had chaired a number of groundbreaking environmental projects including the ARC Zero project which intensively benchmarked and followed up extensive production and environmental data on 5 farms including his own. This project and further work



led to the £38m Northern Irish Soil Nutrient Health Scheme (ARCZero n.d.) in which the Northern Irish government is funding extensive benchmarking of every farm in Northern Ireland utilising aerial Lidar scanning at 16 scans per metre of above ground topography and biomass coupled with soil testing to 1 metre in 2 ha blocks of each farm. John is also active in advocating for farmer engagement in environmental policy as a member of the UN soils moonshot and as an advisor to the UK Agriculture and Horticulture Development Board (AHDB) and Quality Meat Scotland (QMS).

Max Makuvise, General manager of Shangani Ranch Zimbabwe, a 69,000 ha property running 7,600 native Nguni cattle in a regenerative grazing system with co-grazing of 11 major African wildlife species including elephants, leopards, Zebra and antelopes. Local adaption is to have 400 local African staff manage the cattle in 27 separate herds without fencing, with grazing areas assigned from satellite biomass imaging and refined by direct herder observation.

Dr Terry McCosker OAM from Australia who has over 50 years direct experience in developing advanced grazing systems and soil carbon measurement technologies, with a strong record of adoption across over 1m ha through the RMS program and CarbonLink. Over his career Terry has worked in research, extension and property management in both government and private sectors. He has led the development of carbon credits with initial success of 4 properties that generated 258,808 t CO<sub>2</sub>e in credits after statutory discounts, with ACCUs issued based on the increase in soil carbon stocks.

A further USA case study was initially planned but was changed to a summit presentation by Paige Stanley to align with the release of research data from the Management, and Monitoring: An Investigation of Pasture and Rangeland Soil Health and its Drivers research program. The US\$19m program commenced in 2022 and brought together researchers from 11 nonprofit organizations, for-profit businesses, private research institutes and public universities in the United States and the United Kingdom. Led by Noble Research Institute, Michigan State University, Colorado State University and the University of Wyoming, collaborators include Oregon State University, National Grazing Lands Coalition, USDA-ARS (Maryland, Colorado and Wyoming), Savory Institute, Snaplands LLC, The Nature Conservancy and the UK's Quanterra Systems.

Each case study was also linked to a major paper to be published in the Animal Frontiers special edition for the Denver Summit. Preparation of their individual presentations commenced in April 2024 with written overviews of each scenario and field data, supporting the validity of at scale environmental outcomes directly aligned to higher production levels and profitability.

### 5.1.2 Industry Data

An important component of the project was to “connect the dots” linking the entire beef production chain from birth to harvest and the important interaction between sectors that has a significant impact on production efficiency, final product volume and quality plus environmental impact. It was recognised that in most global systems the cow calf phase was conducted on grazed pasture, with calving locations varying from rangeland where climate permitted to housed systems where weather during the calving period prohibited grazing, typical of Northern Europe including Ireland, due to extreme wet and pasture pugging, and of North America where freezing temperatures and snowfall mandate winter housing.

In these, and many other situations, there is a mix of grazing and supplementary feeding ranging from “a bale of hay” at one extreme to full lot feeding at the other. The Australian and African situation allows outdoor calving on grazed pasture with supplementation often related to dry or drought conditions where pasture growth is insufficient. Under good management the evidence supports claims that grazed

livestock can be strongly emissions negative with soil sequestration well above emissions and delivering improved pasture, soil and water system benefits.

The transition from supplemented grazing to full intensive feeding is a feature of the North American industry and also common in Australia for cattle finishing to slaughter, often the target of criticism by environmental or animal welfare activists. The environmental impact however is different, but still positive, in well managed intensive dairy or beef feedlot operations. Positive environmental outcomes stem from faster growth and earlier turnoff, producing reduced lifetime emissions and in most cases increased meat supply often of higher eating quality and consumer value. This results in “emissions avoided” rather than net emissions and is extended by the often extensive utilisation of non-human edible byproducts including distillers grain, whole cottonseed, almond hulls, bakery waste or fruit, viticulture and vegetable packing shed waste streams which contribute to agricultural circularity, again with increased high quality human food supply and reduced environmental impact from waste stream emissions. Further circularity is delivered by returning liquid effluent and manure to crop or pasture land.

The final transition from livestock to meat also has an extensive byproduct value adding/waste elimination component, significantly more effective than most other food system products with waste close to zero relative to around 50% for vegetable production. The “5<sup>th</sup> quarter” processing industry value is often not recognised in calculations of emissions per unit of carcass weight, and if so, even less reported per unit of nutritional value, a key benefit of meat due to its nutritional density.

The processing segment is closely linked to both grazed and intensive livestock, delivering the final products for consumer distribution. Translation of year round consumer requirements, or desires, must be managed in conversion and sale of all meat and byproducts in balance, a challenging requirement and by definition dependent on livestock specification and supply. Processing labour and energy efficiency is strongly related to throughput, in turn building the need for cooperative livestock supply arrangements, often through the feedlot sector, to offset seasonal grassland production. The sector is focussed on technology that can lower cost through reduced emissions and water use in concert with recycling, behind the switch energy production on site and use of paunch material.

The project acted to quantify some of these interactions through a feedlot survey in conjunction with ALFA (Australian Lot Feeders Association) who identified 5 feedlots that provided data relating to cattle produced, ration ingredients and manure utilisation. AMPC reports, and industry discussion, was also accessed to extract benchmarking data relating to efficiency change over time and related explanation. These data and sector interaction were included in the Animal Frontiers papers and in the Denver Summit presentations. To gain and deliver a global view a number of Teams and Zoom conferences were held between Australian feedlot and processing representatives, the Texas Cattle Feeders Association (TCFA) and NAMI (National American Meat Institute) CEO's and selected industry representatives

## 5.2 Denver Societal Role of Meat and Livestock program

The Denver Summit, held on October 30<sup>th</sup> and 31<sup>st</sup> 2024, was arranged to follow the same general format of the successful Dublin event with major half day segments devoted to human health and nutrition, environmental interaction, societal considerations and a final “where to from here” wrap up. A new well received addition was an optional industry tours day after the summit. The program was developed over a 12 month period with extensive steering committee discussion regarding prospective program content, particularly related to scientific progress since the Dublin event, linkage to the Denver conversation and to the most appropriate speakers to present the information. It was agreed that whereas the Dublin summit

had provided confidence that the scientific evidence strongly supported a critical positive role for animal agriculture and meat consumption, this consensus scientific view had not translated to the broad consumer population which remained heavily influenced by the ideological views promoted by influential activist communication channels.

Accordingly, the Denver event sought to encourage discussion with communication experts within the program to assist in developing more effective communication approaches and channels to encourage improved evidence based policy making and to better inform the 90% of consumers that enjoyed eating meat that they should be confident in their food choices and not impacted by the misleading ideology. It was believed that all industry participants from farmer to butcher needed to have confidence and pride in their role of delivering high quality human nutrition to global societies while also delivering substantial environmental, ecological and societal value as the custodians and managers of all farmed land.

The final program structure is presented below.

## October 30<sup>th</sup>, Morning program

### Introduction

Trust, Science, and Global Considerations for the Societal Role of Meat and Livestock. *Charlie Arnot, Look East, USA*

### Session I: Health & Nutrition

Journey since Dublin. *Frédéric Leroy, Vrije Universiteit- Brussel, Belgium*

Insights from PURE diet score. *Andrew Mente, McMaster University, Canada*

Malnutrition in low and middle-income countries. *Lora Iannotti, Washington University, USA*

Malnutrition in modern Western diets. *Ty Beal, GAIN, USA*

Audience discussion including Mentimeter

## October 30<sup>th</sup>, Afternoon program

### Session II: Ecology and the Environment

Journey since Dublin. *Pablo Manzano, Bilbao Climate Center, Spain*

Role of Species Production Systems in Society. *Elna de Lange, GOALSciences, South Africa*

Making sense of livestock grazing management for improved soil health and greenhouse gas mitigation. *Paige Stanley, Colorado State University, USA*

Greenhouse gas measurement and accounting approaches to multidimensional impact. *Sara Place, Colorado State University, USA*

The importance of localization of solutions. *Enrike Maree, GOALSciences, South Africa*

### Global Panel of Practitioners: Squaring Ecological Circles while Producing Affordable Food

– moderator *John Scanga, Colorado State University, USA*

*John Gilliland, Queens University, Environment Advisor to AHDB, Northern Ireland*

*Terry McCosker, Carbon Link Limited, Australia.*

*Max Makuvise, Shangani Ranch, Zimbabwe (presented by Rod Polkinghorne)*

*Ben Weinheimer, Texas Cattle Feeders Association, USA*

*Eric Mittenenthal, Lead for the Meat Institute's Protein PACT, USA*

Audience discussion including Mentimeter

## October 31st, Morning program

### Introduction

Political Considerations for the Societal Role of Meat and Livestock. *Frank Dunshea- The University of Melbourne, Australia*

### Session III: Societal Considerations

Journey since Dublin: Using Applied Ethics & Science to Guide us on the Societal Role of Meat and Livestock Production, *Collette Kaster, Professional Animal Auditor Certification Organization (PACCO), USA*

Balancing Animal Welfare Science & Societal Expectations for Meat and Livestock Production. *Ed Pajor, University of Calgary, Canada*

Current and Future Uses of Genetic Improvement & Other Technologies. *Alison Van Eenennaam, University of California-Davis, USA*

Ethical Considerations Surrounding the Application of Livestock Production Technologies. *Paul Thompson, Michigan State University, USA*

Alleviating Food Insecurity in the USA: The critical role of meat Food Insecurity Solutions and Impact of Regulations. *Craig Gundersen Baylor University, USA*

Audience discussion including Mentimeter

## October 31st, Afternoon program

### Session IV: Moving Forward

Moderator: Peer Ederer, GOALSciences, Switzerland

The Dublin Declaration: The Political and Media Context. *Frédéric Leroy, Vrije Universiteit-Brussel, Belgium*

The Dublin Declaration: Impact in Asia. *Qingxiang Meng- China Agricultural University, China*

The Role of Science in Society. *Keith Belk, Colorado State University, USA*

Making an Impact: Communicating the Science to Policymakers/consumers. *Alexa Lamm, University of Georgia, USA*

The Path Forward- Denver Call for Action

Concluding Remarks and Adjourn

## 5.3 Animal Frontiers special edition

Planning for the Animal Frontiers papers was progressed immediately on confirmation that the journal would provide a special edition, the first edition in 2025, to publish papers relating to the Denver summit scientific presentations and supporting evidence. It was agreed that, as with the Dublin edition, multiple authors would collaborate within each subject area. Lead authors were approached and once confirmed coauthors recruited to develop paper structures and commence drafting. The first versions were required to meet a June 30<sup>th</sup> deadline in order to ensure that peer review and amendments could be completed prior to the summit and final proofs for publication approved before Jan 1<sup>st</sup>, 2025.

## 5.4 Supporting Resources

In the interval between the two summits a number of resources were developed to support access to relevant information relating to the summit themes and assist in analysis. Principle resources were:

- Development of the GOAL SCIENCES PLANET program.
- Upgrading of the ALEPH2020 blog to a website format.
- Creation of a nutrition calculator
- Upgrading and updating of the ASAPP SharePoint site to create the G.I.S.T website

## 6.0 Results

The Denver summit was highly successful, exceeding the initial Dublin event. Attendance was close to the agreed maximum of 200 invited participants with a higher proportion of senior decision makers than the Dublin event. This was particularly true of the Australian contingent which represented AMPC, MLA, AMIC, AUS-MEAT, RMAC, Cattle Australia, Sheep Producers and ALFA at senior level together with individual industry leaders. This attendance was valuable in that it facilitated group discussion and interaction with others of similar seniority from Europe, USA and other countries (21 countries represented). Several meetings relating to communication were held outside the agenda with strong Australian participation aimed at developing a united Australian policy and strategy following the summit. This also provided an exchange of views and improved understanding of other international initiatives.

The facilitated Mentimeter discussions (a web-based tool where audience members rate a series of statements using their smartphones with Mentimeter counting the number for each proposition and also recording and displaying member comment/questions and building word clouds) worked well in enabling strong engagement and debate/discussion from a large audience. To encourage frank and open discussion the Mentimeter sessions were not recorded.

With the exception of the opening address by Charlie Arnott of Look East links to all presentation pdf's and the video recording of each presentation are provided in Appendix 2. A brief synopsis of each session is presented below.

### Introduction

Trust, Science, and Global Considerations for the Societal Role of Meat and Livestock. *Charlie Arnot, Look East, USA*

This opening session on the first morning of October 30<sup>th</sup> was extremely strong. Charlie Arnott gave a compelling argument for the critical industry need to build trust with the broad community by appropriate communication channels and strict adherence to being open, transparent and truthful. A positive was that farmers and ranchers currently were mostly well regarded. The need to identify potential major challenges early and to take ownership to avoid moving from a position of social license, built on trust, to social control where trust was lost and replaced by regulation, was an important message.

### Session I: Health & Nutrition

The human nutrition and health presentations were all excellent. The first paper reporting on the highly credible PURE (Prospective Urban and Rural Epidemiology) study that collected and analysed dietary and disease data from 135,335 people from 667 communities of differing social and economic status in 18 countries from 5 continents examined diets and, in particular, diet relationships between coronary heart disease (CVD) and saturated fatty acids.

Conclusions from the evidence were:

- A high carbohydrate diet (>50-55%E) is associated with higher risk of mortality
- Fats, including saturated and unsaturated fats, are associated with lower risk of mortality
- No association between total fat, types of fat and CVD events
- Current advice to limit total fat to <30%E and saturated fat to <10%E are not supported by this global study

Red meat intake and full fat dairy products were associated with decreased mortality risk but, despite this strong evidence that countered the popular dietary narrative the authors could not get the paper published when it included red meat in the calculation of the PURE Healthy Diet Score.

***This is a concerning, and consistent, critically important issue for the industry; the sublimation of scientific evidence resulting from ideology and politically correct pressures is both a major industry threat and damaging to society.*** It is widespread in both nutritional and environmental areas with previous serious misinformation being addressed by Prof Alice Stanton and coauthors in challenging the 2017 Global Burden of Disease evidence published in the Lancet (Stanton et al. 2022).

The following presentations exposed the contrasting situations of malnutrition related to stunting and starvation through a lack of food in many developing countries and malnutrition in first world countries from over consumption of nutritionally poor diets.

***A critical message was that access to adequate food overwhelmed all other considerations, including environmental impact, in developing countries and further compounded by these being forecast to have most of the predicted additional 2 million people by 2050.***

## **Session II: Ecology and the Environment**

The second session on the afternoon of October 30<sup>th</sup> addressed the interaction between livestock production systems and ecological and environmental outcomes. A feature of the original Dublin Summit had been very strong evidence of both the role of meat in human evolution and the ecological impact of undomesticated livestock grazing over many thousands of years.

Again, this session presented compelling positive evidence relating to livestock and environmental interaction. The historic impact of undomesticated livestock in shaping landscapes where non mountainous regions are typified by shrubs and trees interspersed with grassland was reinforced, together with the impact of different species. The critical interaction between soil health, grazed plant species, water and carbon cycles was documented with further discussion on emissions measurement and the critical need to evaluate livestock on a net rather than gross emissions basis.

Pasture and rangelands are among the largest ecosystems on the planet, covering 70 percent of the world agricultural area. There are 655 million acres of pasture and rangeland in the United States. This is 41 percent of the land usage in the continental United States, making it the single largest use of land in the nation – more than row crops, cities and timberlands (Michigan State University n.d.). Of the 7.7 million hectare Australian landmass 3.5 million (45%) are native vegetation utilised for grazing, predominantly by cattle. These areas are characterised by low rainfall and fragile soils and are unsuitable for cropping. Only 13% of land is suitable for cropping and horticulture or grazing on improved pastures, with less than 1% irrigated. The majority of this 13% requires grazing with crop rotation to maintain production. The second largest category of Australian land use is conservation (23%) (Climateworks Centre n.d.). These numbers reinforce the critical importance of non arable land management and the unique ability for livestock to deliver both nutrient dense human food from land that cannot be cropped while delivering massive environmental benefit through soil carbon sequestration.



From the discussion it appeared that Australia had a more rigorous and uniform regulated system to measure soil carbon and an associated trading structure. ***A concerning issue was the plethora of different measurement systems being used globally, and often within countries, making comparisons or accumulation of data difficult and often inappropriate.***

Due to time constraints a panel format was adopted to discuss the practitioner's material rather than the earlier preferred 30 minutes per speaker format. Similar restrictions on the Animal Frontiers paper length restricted including important data detail which will be published as supplementary material. Direct practitioner presentations were an important addition to the Dublin format to establish credible field based evidence that existing livestock systems delivered highly positive environmental outcomes when managed well, with a critical observation that, while the principles were common, the detail was highly dependent on very local conditions making any "one size fits all" proposal inappropriate.

This was demonstrated by each of the practitioner discussions which illustrated the common positive environmental outcomes in Northern Ireland, Zimbabwe and Australia from adapted grazing systems and the essential complementary role of supplementary feeding from basic to intensive feedlot systems.

John Gilliland delivered a very strong message on the importance of measurement, and of consistent accurate measurement protocols. ***He stressed that without data improvement could not be proven and this was essential to gaining government support for livestock farming, in contrast to Republic of Ireland calls for a 40% reduction in cattle numbers.***

The ARC Zero project in Northern Ireland was a pioneering initiative aimed at demonstrating the potential for farms to achieve net-zero carbon emissions through innovative management practices and carbon sequestration strategies. The project, which began in 2021, sought to provide high-quality, science-based evidence from 7 farms including dairy, beef, sheep and arable systems, to counter criticisms of the farming sector's environmental impact and to showcase the ability of farms to capture, manage, and store carbon effectively. The project firstly established a baseline for carbon stocks through detailed soil sampling, analysis, and aerial scanning via LiDAR. Each farm was divided into 2-hectare blocks, and core soil nutrient samples were taken to a depth of 7.5 cm in grassland and 15 cm in arable fields. Below carbon measurements were taken to a minimum of 30cm, with Soil Organic Carbon and bulk density sampling done at 0-15cm, 15- 30cm, 30cm to 60cm and 60cm to 100cm. Above-ground carbon was measured in trees and hedgerows using aircraft-mounted LiDAR to form precise 3D images. The study also involved comprehensive audits of greenhouse gas (GHG) emissions using the SAC's accredited AgreCalc tool, capturing data on stock numbers, animal production performance, feed use, fuel, and fertiliser use, as well as fodder conservation and electricity consumption.

The initial phase of the project revealed that farmers manage substantial carbon stocks, with a total of over 515,000 tonnes of CO<sub>2</sub>e stored across the seven farms. Two farms were found to be already beyond net-zero emissions. The second phase of the project focused on practical steps to further reduce GHG emissions and increase carbon capture, including the use of multispecies swards, strategic tree planting, and improved animal health and genetics. Key findings included significant reductions in carbon emissions across all participating farms, with some achieving reductions of up to 53% in CO<sub>2</sub>e per kilogram of product. The findings underscored the decision by the Northern Ireland Government for broader application of these practices across the agricultural sector, suggesting all farms could achieve similar results through their new £38m, Soil Nutrient Health Scheme.

Rod Polkinghorne described the dramatically different solution developed by Max Makuvise in Zimbabwe, reinforcing the need for local circumstance differentiation. Shangani ranch had been converted from



traditional commercial crop and grazing to a holistic system after removing all internal fencing and adopting Savory system principles. These were expanded to include extensive independent scientific measurement and research activities related to wildlife populations and biodiversity in addition to the cattle grazing business. Reflecting tradition and the cost of labour the 6,900 cattle were grazed by traditional herding methods with the 27 mobs each herded by 3 to 4 people who guided the cattle to a prescribed grazing area each day, conducting health observations and a count each evening as they were returned to a kraal. The kraals were also traditional utilising a circle of cut very prickly shrubs which leopards could not cross. This very low-tech system, employing 400 local people, was complemented by very high tech satellite imaging and herbage estimation adjusted by direct on the ground observation from the herders to determine when a mob was moved to a new area. The ranch supported a huge range of African game species including over 400 elephants with the cattle grazed across the same 69,000 ha area with only a single boundary fence. This outstanding example of above ground biodiversity was delivering improved soil structure and carbon sequestration. The native Nguni cattle genetic improvement program, in conjunction with the improved forage and soil base, was also delivering higher cattle productivity and environmental contribution through younger turnoff age. Given that Africa is central to the global food insecurity crisis, and predicted to have the majority of the additional 2 million people by 2050, the Shangani model could potentially be adopted to deliver a significant local contribution to food security and reduced dependence on foreign aid.

Terry McCosker provided Australian Government audited data from 5 properties with areas ranging from 578 to 4,352 hectares. Soil measurements were made every 5 cm to a depth of 1 metre and reported based on equivalent soil mass. Soil carbon sequestration across the four properties was 467,175 t CO<sub>2</sub>e on the project area, significantly higher than the total emissions of 26,355 t CO<sub>2</sub>e from livestock and fuel. ***This indicated a net carbon sequestration effect, with beef produced on these properties having a carbon-negative footprint, drawing down 32 to 61 t CO<sub>2</sub>e for each tonne of livestock carried over five years.*** The projects had generated 258,808 t CO<sub>2</sub>e in credits after statutory discounts, with ACCUs issued based on the increase in soil carbon stocks. A substantial portion of carbon sequestration occurred below 30 cm, with 4 properties sequestering 21% to 69% of carbon at these depths. This deep soil carbon storage highlighted the potential for long-term carbon sequestration. Increased soil organic carbon also improved water holding capacity, estimated at 247,000 to 279,000 m<sup>3</sup> for the properties. This enhancement in water use efficiency contributed to better pasture productivity and resilience to drought.

Supplementary feeding programs integrated with grazing systems can provide an offset to seasonal variation and extremes in forage availability and are often essential to enabling maximum utilisation of non-arable areas while avoiding environmental degradation. Supplementary systems often utilise large volumes of non-human edible waste streams while reducing emissions due to increased growth rate and earlier turnoff while manure and liquid effluent is returned to crop or pasture.

Ben Weinheimer, the TCFA CEO, represented the global feedlot industry including ALFA who had provided valuable data relating to ration ingredients and manure use obtained through a survey of 5 feedlots of differing size and across locations from central Victoria to central Queensland. Tables 1 and 2 summarise the Australian survey data which provided empirical evidence relating to the high % of non-human grade and inedible commodities used in feedlots and the close relationship to local feed availability. The utilisation of manure also varied widely with local adaptations. These data and extensive discussion plus research reports were shared with TCFA prior to the summit and providing useful comparisons to USA practice that also were reported as being highly related to regional circumstances.

Table 1. Survey results for ration ingredients utilised in 5 Australian beef feedlots

Feedlot		A			B			C			D			E		
Capacity(Head)		30,000			3,000			17,000			22,500			20,000		
Annual turnover(Head)		90,000			8,000 to 10,000			51,000			60,000			60,000		
% Domestic (<100 days on feed)		0%			90%			0%			35%			0%		
% Short fed export (<100 - 200 days on feed)		100%			10%			90%			35%			100%		
% Long fed export (>200 days on feed)		0%			0%			10%			30%			0%		
Distance to principal abattoir(s) (km)		350 / 400			160			100			80			270 / 480		
Ration Commodities.		Tonne	Grade	Km Purchase Radius (km)	Tonne	Grade	Km Purchase Radius (km)	Tonne	Grade	Km Purchase Radius (km)	Tonne	Grade	Km Purchase Radius (km)	Tonne	Grade	Km Purchase Radius (km)
Grains	Wheat	16,600	AUH2	350	1,000	SFW1	60				60,000	SFW1	10 to 600			
		66,400	FED1	350										28,000	FED1	300
	Barley	6500	Barley1	350	1,200	Barley1	10	62,000	Barley1	400	50,000	Barley1	10 to 600	28,000	Barley1	300
	Maize				2,500	Prime	40									
					2,500	Feed No 1	40									
Pulses / Legumes																
	Faba Beans										4,000	No 1	50 to 300			
ByProducts																
	Almond hulls										3,600		600 to 800			
	Bread waste				4,500		125							6,000		250
	Dough				160		125									
	Oilseed meals							150		50				150		250
	Whole cottonseed	15,600		250	1,000		40	8,400		250	7,000		200	6,500		375
Roughage																
	Cereal hay	1,000		250							7,000		10	2,400		150
	Cereal straw	3,400		250	450		0				3,500		50 to 700			
	Rice hulls															
	Lucerne hay				350		0	1,100		250						
	Corn silage										13,000		0			
	Barley silage							35,000		50				1,500		50
	Sorghum silage	20,000		50	2,500		0									
Liquids																
	Oil	2,100		500				1400		500	1,000		300 to 700	1,700		250
	Molasses	2,000		500							2,500		300 to 700	400		CSEB-1 160
	Molasses based liquid supplement	4,300		500				2,500		600				2,500		160

Table 2. Survey results for manure and effluent utilisation in 5 Australian beef feedlots

Feedlot		A	B	C	D	E
Capacity(Head)		30,000	3,000	17,000	22,500	20,000
Annual turnover(Head)		90,000	8,000 to 10,000	51,000	60,000	60,000
% Domestic (<100 days on feed)		0%	90%	0%	35%	0%
% Short fed export (<100 - 200 days on feed)		100%	10%	90%	35%	100%
% Long fed export (>200 days on feed)		0%	0%	10%	30%	0%
Distance to principal abattoir(s) (km)		350 / 400	160	100	80	270 / 480
Total Standard Cattle Units (SCU)						
Domestic (<100 days on feed) 0.87 SCU			7,047		18,270	
Short fed (<100 - 200 days on feed) 0.93 SCU		83,700	837	42,687	19,530	55,800
Long fed (>200 days on feed) 1.00 SCU				5,100	18,000	
Total SCU		83,700	7,884	47,787	55,800	55,800
Liquid effluent disposal						
- Evaporative ponds with prior solids sedimentation & drying		100%		100%		100%
- Spray application to adjacent company cropland			100%		100%	
Solid manure treatment and utilisation						
- Windrowed & turned - Sold to local farmers		100%				
- Windrowed & turned - Sold to orchards & vineyards						28%
- Windrowed & turned - Company cropland			100%			
- Composted and screened - External sales farms & garden supplies						
- Company cropland				50%	30%	72%
- External sales local farm & garden supplies					70%	
- Sold to city green waste plant				50%		
Est Tonne manure solids (500kg / SCU)		41,850	3,942	23,894	27,900	27,900
- Est Tonne N (2.18% db)		912	86	521	608	608
- Est Tonne P (0.80% db)		335	32	191	223	223
- Est Tonne K (1.86% db)		778	73	444	519	519

The global meat processing sector discussion was delivered by Eric Mittenthal CEO of the NAMI Protein Pact who emphasised the continual improvement in efficiency through new technologies relating to energy and water management combined with utilisation of by product waste streams to both reduce cost

and deliver improved environmental outcomes. Again, empirical evidence was provided from AMPC benchmarking reports for Australian industry.

The meat processing sector completes the lifecycle by producing high value nutrient dense human food in addition to valuable co-products. Interaction between the grazing, intensive feeding and processing sectors is central to maintaining consistent supply, a critical driver of packing plant process efficiency (Horwood 2023). This sector is also the contact point for retailer Scope 3 emissions reporting, with major retailers demanding substantial reductions by 2030. Meat processing requires significant energy and water use driving an acute focus on efficiency and recycling. Table 3, displaying Australian industry data from 2008 to 2022 (Horwood & Kember 2023), reflects progress, with progression in “behind the switch” plant actions including a strong focus on renewable energy with heat pumps, solar PV with batteries, biogas boilers and biogas capture and reuse with technologies being adopted at scale (Horwood 2023).

Table 3. Australian abattoir energy and carbon emissions by period (Horwood & Kember 2023)

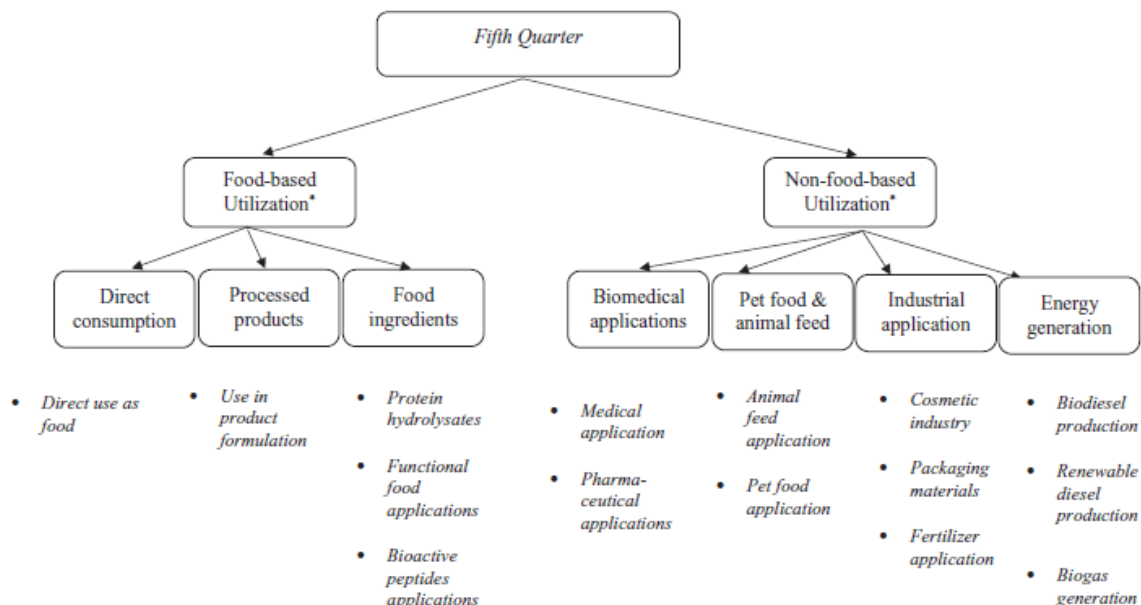
Resource	2008/9	2013/14	2019/20	2021/22
Energy intensity (MJ/tHSCW)	4108	3005	3316	3435
Carbon emissions intensity* (kgCO <sub>2</sub> e/tHSCW)	554	432	397	447

\*Includes an estimate of carbon emissions from wastewater treatment

Australian 2022 survey data reported 3-fold variation between the best and lower performers confirming the potential for rapid further improvement. Externally decarbonisation of grid electricity will deliver 40 to 90% reduction dependent on location (Horwood & Kember 2023).

In addition to sales of muscle meat and trim, coproducts contribute substantial value and are critical to eliminating industry waste and creating value. While emissions metrics relate to carcass weight this is little more than a third of the live animal, with the “5<sup>th</sup> quarter”, illustrated in Fig.2, contributing human food and environmental benefits. Offal products directly provide nutrient dense human nutrition while other byproducts provide extensive value ranging from biomedical and pharmaceutical products to fertilizer (Soladoye et al. 2022, Coleby 2023).

Figure 2. “5th quarter” utilization across industries



### Session III: Societal Considerations

Session 3 on October 31<sup>st</sup> addressed societal relationships and in particular the ethical constructs relating to animals and meat production across the very different backgrounds of first world urbanised populations and the third world reality of food insecurity. More privileged and wealthy communities had no concern regarding personal food security whereas in disadvantaged communities, found in all countries, food security trumped all other considerations.

These topics and presentations raised interesting, and often challenging, questions and insights central to communication between typically urban populations with decreasing direct contact with food production, livestock producers and farmers. Both cohorts also communicate with policy makers but can have very different views. As emphasised by Charlie Arnott's address the need to maintain a high level of trust and social license was central to balanced policy and legislative outcomes, the more so where the rural population was in minority.

An early question was do consumers care more about how many animal lives are taken to provide food versus the species? Is it more acceptable to harvest 500 chickens or 1,000 fish than a single beef steer for the same amount of human food? It was emphasised that animal welfare related to both the physical and mental state of the animal, involving both science and beliefs, linked closely to ethics. A construct combining feelings, functioning and natural behaviour was presented noting the impact of pets influencing other animal interaction beliefs. For animal welfare auditing a structure of physical/functional and affective domains was recommended. The challenges included examples of calf handling and white and brown egg production, with calf handling pitting tradition against public perspectives whereas brown versus white eggs contrasted the public perception of brown eggs relative to white egg poultry breeds that were more naturally adapted to housed systems. It was stated that ***the majority of people hold values about how food is produced without having direct involvement in food production.*** Animal welfare was described as "a wicked problem" defined as being highly complex and involving many different stakeholders with very different expectations. Wicked problems were defined as having no solution and requiring management, with this management changing over time. ***The consequence was that due to their social complexity wicked problems have no stopping point requiring action that shifts from solution to continuous dialogue and intervention.***

The communication and social license challenges relating to new technologies and associated moral complexity was also well covered in discussions of gene technologies and in the diverse views within alternative agricultural systems including urban agriculture, regional food systems, technological modernisation and sustainable intensification. It was noted that ethical constructs could vary for gene editing that could also be replicated by conventional breeding selection over a prolonged time period relative to genetic manipulation that could not. The huge impact of genomic change on productivity and resulting decrease in emissions per unit of product was also emphasised. In comparison to the biomedical sector, to information technology (including AI) and the built environment, ***the agricultural sector was noted to be underinvested in capacity for ethical analysis.***

### Session IV: Moving Forward

The final Summit on session focussed on the progress and importance of the Dublin Declaration and requirements to move forward constructively.

The degree of attack on the Dublin Declaration and its authors indicated its importance. Having no evidence to counter the declaration contents activist attacks often denigrated individuals and attempted to frame the declaration itself as heavily biased and driven by industry. This contrasts with presumed moral

clarity and pureness for those making the accusations. ***An important issue is the need to convey the virtue of the extensive research funding and activity by the livestock and meat industry. It is also critical that the research evidence is presented without bias and in open forums to gain or retain credibility that this work, while often having industry funding, does not have industry control over the results or their dissemination.***

A principal outcome was the agreement that while the science continued to be very strong and supportive of livestock production and meat consumption this message had failed to gain momentum since Dublin. It was universally agreed that more effective communication was urgently required if policy development and broad community support were to be improved.

A highlight was the outstanding address by Alexa Lamm who expertly described the multiple community groups, their widely different communication systems and the need to adapt messaging to each. She also stressed ***the very strong emotional engagement with personal and family food choices, suggesting that this should be a common shared entry point for discussion between food producers and consumers.*** Further advice in relation to communication was provided by Red Flag in a pre-summit workshop with similar messaging. ***Points of strong agreement were that evidence was a poor cousin of personal belief and that scientists talking at length about their findings did not fit with an 8 second attention span!***

Links to the summit presentations and video recordings of the addresses is attached in Appendix 2.

***The need for concerted action at country and global level was agreed***, with the detail of how this could be delivered, discussed and debated extensively throughout the meeting in Mentimeter sessions and externally with the Australian contingent participating strongly.

A draft Denver Declaration was debated intensively, with principle concerns around the limited number of signatories and how provocative the text should be. The signatories had been intentionally restricted to a core group of senior scientists to protect those at an earlier career stage from the consistent attacks that had been made on the Dublin Declaration and its authors, this being documented in the ALEPH2020 (2024), and in recognition that their ability to publish and receive academic promotion could be adversely impacted. It was agreed that the draft would be circulated to allow further input. This was done and a final version issued on November 15<sup>th</sup>. This is a very strong document that it is hoped will be read and respected, leading to a more balanced, evidence focussed public and policy discussion. The Denver Call for Action is attached as Appendix 3.

Table 4. *Animal Frontiers* Issue February 2025 papers arising from the Denver summit

Authors	Paper title
Leroy, F., Beal, T., de Mûelenaere, N., De Smet, S., Heinrich, F., Iannotti, L., Johnston, B., Mann, N., Mente, A., and A. Stanton	A framework for adequate nourishment: balancing nutrient density and food processing levels within the context of culturally and regionally appropriate diets
Gundersen, C., Iannotti, L., and F. Leroy	Food security at risk: the consequences of limiting animal source foods.
Manzano, P., de Aragão Pereira, M., Windisch, W., and P. Stanley	Vast but positive, reduced but negative: complexity and nuances in evaluating land use by livestock and crops.
Maree, E., Blignaut, J., Gilliland, J., Lee, M. R. F., Manzano, P., McCosker, T., du Toit, L., Truter, W., Weinheimer, B., and R. Polkinghorne	Livestock farmers and industry are leading innovation to deliver human nutrition and improved environmental outcomes through sector lifecycle collaboration: A review of case studies
de Lange, E., du Toit, L., Fletcher, A., Iliushyk, T., Kalinowska, B., Lupton, N., Maree, E., and P. Ederer.	Shifting Focus from Animal Species to Livestock Production Systems: An Interactive Tool for Evaluating Food Contributions relative to Environmental Impacts
Van Eenennaam, A. L	Current and Future Uses of Genetic Improvement Technologies
Ederer, P., and T. Ilyushik. 2025	In search of better models for explaining atmospheric methane accumulation
Belk, K. E., Scanga, J. A., Nair, M. N., Zhang, P., Geornaras, G., and R. J. Delmore	Perspectives: The Role of Science in Society
Thompson, P. B	Perspective: Ethical Considerations of Animal Sourced Foods
Lamm, A	Communicating with Society about the Science Behind Meat and Livestock Production

All papers to be published in the February 2025 edition of *Animal Frontiers* have been peer reviewed and print proofs accepted. The paper titles and authors are shown in Table 4. The editorial, providing a useful summary of the edition, was provided to Denver attendees and is attached as Appendix 4.

## 7.0 Discussion

The Denver Summit was a successful and inspirational event, engaging a wide international audience from the global livestock and meat industry, high profile science communicators and scientists who were expert in their fields. This facilitated valuable discussion and, at times debate, in every formal session and outside the conference sessions. While the sessions are briefly reported in the results section it is strongly



recommended that the actual content be directly accessed via the links to the video and pdf presentations (Appendix 2).

The Denver discussion reinforced and expanded on the previous Dublin Summit evidence that livestock and meat production were critically important in meeting the demands to provide adequate nutrition to a global population of 10 billion people by 2050. The evidence was also overwhelming that while livestock industries in total contributed only 12% of global GHG emissions (FAO 2023) they provided outstanding capacity to combat climate change through soil carbon sequestration. Industry emissions could also be reduced with increased productivity, as demonstrated by continuing genetic gain and by feeding livestock to match their production potential, of particular relevance in many low and medium countries but also in high income countries where grazing and intensive feeding systems combined to counter seasonal variation and maintain high productivity. Effective collaboration between industry sectors from birth to processing is needed to optimise results.

While both the Dublin and Denver summits delivered outstanding evidence relating to the essential value of the livestock and meat industries to global society the Denver event placed more emphasis on communication of this evidence to policy makers and society. This acknowledged that, while there had been signs of improvement in the public narrative, the ideological anti meat messaging had not abated creating serious challenges to ensuring sound policy making and maintaining community support and social license.

This was underlined by the stronger tone and definitive Denver call for action following the Denver Declaration. The Dublin Declaration established that over 1,200 scientists strongly advocated for open science where evidence was published without ideological interference or suppression.

The Denver call for action does just that: We must act to ensure that the evidence, favourable or not and including dissenting claims, is publicly accessible, fully transparent and maintained within an independent non-aligned global structure that enables scientists to publish high calibre research without interference from individual institutional restraints relating to funding or political pressures. This is being delivered by building on the ASAPP SharePoint reference site, developed to assemble related evidence prior to the UN Food System Summit updated and extended to include the Dublin and Denver material, to create the Global Independent Source of Trust for animal agriculture (The G.I.S.T) resource. This is accessed on the International Meat Research 3G Foundation website facilitating global collaborative input.

The Denver summit also brought together all Australian livestock and meat industry bodies with commitment to deliver a joint collaborative Australian strategy and structure to ensure that evidence relating to livestock and meat production is collated for ready access and that communication developers can access material in forms that they require to ensure communication is embedded in truth. ***While the science must critically remain impartial and evidence based, it is also critical that the industry ensure communication is effective and well targeted to assist both policy decisions and building a factual understanding within the broader community.*** Effective communication will require expert utilisation of multiple channels to reach different community segments and can also be supported by controlled access to independent scientists who are leaders in each of the subject matter fields. Contacts built around the Denver event also provide a strong base for collaboration with international organisations, and key individuals, on matters of mutual concern.



## 8.0 Conclusions

In simple terms the conclusions of this project were:

- That the most recent and authoritative evidence overwhelmingly supports the essential role of meat, milk and eggs in human diets, and critically those most at risk being the young, the pregnant or nursing mothers, the sick and the elderly.
- That malnutrition impacts both first and third world populations, through stunting and starvation in the third world and through dietary imbalance in the first.
- That while livestock and meat contribute only 12% of global emissions (FAO 2023) these can be further reduced with existing knowledge and management systems delivering higher productivity.
- That soil sequestration of CO<sub>2</sub> has proven potential to be a major contributor to delivering IPCC climate goals, second only to dramatic reduction in fossil fuel use. Australia has the greatest potential to deliver this outcome due to extensive size, suitable soils and established regulatory systems.
- That ethical constructs are important in establishing individual conversation between industry members and the broader community. A shared perspective facilitates discussion as people deeply and emotionally engaged with decisions on what they and their families eat. This is a recommended entry point to conversation with those who are not acquainted with animal production but are highly interested in how their food is produced.
- That the heavily funded anti meat and livestock ideological agenda has been successful in casting doubt on industry credibility and is unlikely to subside.
- That the Australian industry must act collaboratively to develop a long term strategy and structure that can improve policy making and general community attitudes.
- That in the many cases where Australian issues align with others international collaboration should be sought.
- That given the funding scale and prior impact of meat industry misinformation a long term program and substantial funding beyond levy funds will be required to rebuild trust and ensure consumer support and social license.

## 9.0 Recommendations

Principle recommendations are:

1. That the Australian industry develop a coordinated long term “Australia Inc” strategy and structure to reinforce confidence in animal agriculture and meat consumption within the 90% of the population that currently eat red meat.
2. That a substantial independent scientific structure be resourced to ensure ready access to the latest, and highest quality, evidence, including that from opposing sectors.
3. That strong global links be maintained with leading scientists across all subject matter areas to ensure industry and communicators have immediate access to current information.
4. That effective communication structures be prioritised and funded through joint levy arrangements further supported by external funding appropriate to the scale of the misinformation problem.
5. That communication be meticulously grounded in high quality evidence to ensure credibility relative to the opposing, often evidence free, ideological agenda.

6. That communication strategies be developed to support evidence based policy making and community attitudes to livestock and meat production.
7. That Government bodies be fully appraised of the evidence and of the substantial industry investment in rural communities, commitment to sound policy and continual improvement.
8. That each of the health and nutrition, environmental and societal summit themes be expertly addressed through the large number of media channels as appropriate for population segments.
9. That existing proven high impact communicators in health, nutrition, environmental and societal subjects be incentivised to expand their output through existing and additional channels.
10. That consumer communication assume a “food for your family” focus to establish empathy with urban consumers who share an intimate personal engagement with the food they select for their family’s health.
11. That industry present as food producers rather than farmers, graziers or processors.
12. That industry review issues that have already or are at risk of reaching a tipping point between social license and social control and urgently engage to retain social license.
13. That urgent attention be placed on issues identified as being close to a tipping point.
14. That where interests align strong international collaboration be sought to effectively counter global activist ideology.

## 10.0 Project outputs

This report is the direct output of the project but has stimulated coordinated Australian industry and international awareness of the evidence supporting livestock production and meat consumption, together with an understanding of the global nature of the opposing ideological attacks, though the successful Denver Summit – The Societal Role of Meat and Livestock; what the scientific evidence says.

A large and committed Australian industry body presence in Denver has resulted in a commitment to building a long term collaborative Australian strategy to better inform policy makers and the general public of the essential role of meat and livestock, supported by high quality independent evidence. By making this evidence readily assessable through an independent scientific structure more aggressive and effective communication development will be facilitated, delivering on the Denver Call to Action.

Webinar or other communication in relation to the summit or broader subject matter will be enthusiastically supported on request by AMPC.

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## 12.0 Appendices

### 12.1 Appendix 1: The Dublin Declaration

provide solutions for the additional challenge of today, to stay within the safe operating zone of planet Earth's boundaries, the only Earth we have.

For scientific evidence, please refer to presentation recordings from the 19/20 October 2022 International Summit on the Societal Role of Meat and the [Special Issue of Animal Frontiers](#).

## 12.2 Appendix 2: Denver Summit presentations and videos

Links to Denver video and PowerPoint presentations.

Presenter & Presentations	Video Direct link
Frédéric Leroy	Journey since Dublin
Andrew Mente	Insights from PURE diet score
Lora Iannotti	Malnutrition in low and middle-income countries
Ty Beal	Malnutrition in modern Western diets
Pablo Manzano	Journey since Dublin
Elna de Lange	Role of Species Production Systems in Society
Paige Stanley	Making sense of livestock grazing management for improved soil health and greenhouse gas mitigation
Sara Place	Greenhouse gas measurement and accounting approaches to multidimensional impact
Enrike Maree	The importance of localization of solutions
John Scanga	Global Panel of Practitioners: Squaring Ecological Circles while Producing Affordable Food
Frank Dunshea	Political Considerations for the Societal Role of Meat and Livestock
Collette Kaster	Journey since Dublin: Using Applied Ethics & Science to Guide us on the Societal Role of Meat and Livestock Production
Ed Pajor	Balancing Animal Welfare Science & Societal Expectations for Meat and Livestock Production
Alison Van Eenennaam	Current and Future Uses of Genetic Improvement & Other Technologies
Paul Thompson	Ethical Considerations Surrounding the Application of Livestock Production Technologies
Craig Gundersen	Alleviating Food Insecurity in the USA: The critical role of meat Food Insecurity Solutions and Impact of Regulations
Frédéric Leroy	The Dublin Declaration: The Political and Media Context
Qingxiang Meng	The Dublin Declaration: Impact in Asia
Keith Belk	The Role of Science in Society
Alexa Lamm	Making an Impact: Communicating the Science to Policymakers/Consumers
The Nourishment Table	Nourish Your Choice



## 12.3 Appendix 3: Denver Call for Action

### THE DENVER CALL FOR ACTION

#### THE DUBLIN DECLARATION

In October 2022, the Dublin Declaration of Scientists on the Societal Role of Livestock was initiated during the International Summit on the Societal Role of Meat, held in Dublin. The Declaration has since been signed by more than 1,200 scientists from around the world, each verified to hold relevant scientific credentials. The Declaration begins with the words:

*“Livestock systems must progress on the basis of the highest scientific standards. They are too precious to society to become the victim of simplification, reductionism or zealotry. These systems must continue to be embedded in and have broad approval of society. For that, scientists are asked to provide reliable evidence of their nutrition and health benefits, environmental sustainability, socio-cultural and economic values, as well as for solutions for the many improvements that are needed. This declaration aims to give voice to the many scientists around the world who research diligently, honestly and successfully in the various disciplines in order to achieve a balanced view of the future of animal agriculture.”*

Today, two years later, these words have lost none of their importance. Renewed urgency led to this Denver Call for Action.

#### CALLING FOR NOURISHMENT-ORIENTED POLICY

**Widespread discreditation of meat, dairy and eggs must cease so that we can return to fully evidence-based and economically and culturally appropriate dietary guidance that nourishes and respects the people consuming and producing those foods instead of harming them.**

We observe a trend in policymaking to deploy patronizing approaches aimed at restricting dietary choice involving nudging, pressuring, and taxing consumers away from consuming proven nutrient-dense animal-sourced foods far beyond what can be justified as reasonable dietary interventions. It is worrying that proposed “substitutes” are nutritionally incomparable and often inadequate, devoid of the flavors and textures people desire. Moreover, they are often ultra-processed (e.g., faux ‘meat’ and ‘dairy’), culturally inappropriate (e.g., insects in regions where their consumption is met with resistance), or unscalable (e.g., tissue-engineered muscle).

Large parts of the global population, in rich and poor countries alike, are malnourished. Nutrient deficiencies, cardiometabolic diseases, auto-immune disorders, and mental illnesses have been increasing at alarming rates. These major public health challenges remain under-addressed, while the affordability of nutritious foods that would make a positive difference has decreased. Some of the current global policy priorities even worsen matters, as exemplified by the deliberate tearing apart of global trade matrices. Policymakers must prioritize human well-being first, or they risk losing their authority to make policy at all.



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#### CALLING FOR RECOGNITION OF SYSTEM COMPLEXITIES IN LIVESTOCK AND ECOLOGY

**We call on policymakers to reject overgeneralizing portrayals of livestock systems as inherently harmful to the planet; moreover, such judgements need to be consistent with holistic approaches to ethical, economic, social, and environmental sustainability.**

Planetary resources are now stretched to the limits or beyond. To protect natural resources and improve respect for animals, managers of livestock production systems can, should and will act based on evolving scientific insights. However, it is unhelpful to overstate livestock's footprint or to approach environmental sustainability in a reductionist manner based on single elements and metrics. Only through broad evidence-driven assessments can the complex contributions to society and nature that well-managed animals provide in terms of nutrient availability, biodiversity, hydrology, soil fertility and other ecosystem services be recognized.

Oversimplified one-size-fits-all assumptions and inappropriate or unusable data are not suitable guides to policy. The frequently pronounced notion that the agricultural sector can be easily transitioned to a new state of climate neutrality by decimating or eliminating livestock, is not only dangerously misconceived but also not solicited by most of the public. Regulatory approaches and financial mechanisms to dramatically downsize animal production are usually hidden away from the public eye, not least because they could trigger hostile reactions from communities already experiencing fragile food supply systems.

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#### CALLING FOR HIGH STANDARDS OF EVIDENCE AND RESPECT FOR SCIENCE

**We encourage policymakers to listen carefully to those scientific commissions and expert panels where the *totality* of the evidence is presented, outlining what is known and what is not known; and where the function of scientists is to challenge each other through the application of the scientific method, with respect and openness.**

Policymakers who take responsibility for their choices based on rigorous and honest scientific discourse will gain the trust of their electorates through the objectivity of their decision-making. Including and engaging with the broader views that fill the scientific and societal spectrum makes policies robust and impactful in driving positive outcomes that are better for people, animals, and the environment.

The Dublin Declaration has emboldened scientists to alert policymakers and the public to the importance of basing food policy on sound scientific evidence. They do so conscientiously and at the personal cost of becoming the target of activist campaigns, resulting in unsubstantiated accusations of "Industry bias" and other attempts to discredit inconvenient scientific voices. Despite diverse perspectives among the Declaration's signatories on how we might best implement scientific findings or what the nature and size of future livestock systems should look like, there is firm agreement on the critical importance of upholding rigorous standards of evidence, ethics and informed debate.

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## THE CALL FOR ACTION

*“Livestock systems must progress on the basis of the highest scientific standards. They are too precious to society to become the victim of simplification, reductionism or zealotry.”* This first sentence of the Dublin Declaration prompted scientists on the occasion of the Second International Summit on the Societal Role of Meat and Livestock in Denver in October 2024, where the state-of-the-art scientific evidence was reviewed and updated, to issue this Call for Action.

**This calls on policymakers worldwide to commit themselves to plurality and rigor in evidence-based decision-making. Meeting the massive challenge of nourishing global populations while minimizing environmental harm, will only be achieved through the transparent application of the scientific method, steering clear of hubris, presumptuousness, and dogma.**

DENVER, THE 31<sup>ST</sup> OF OCTOBER 2024

Prof Dr Wilhelm Windisch, Prof Dr Robyn Warner, Prof Dr Alison Van Eenennaam, Prof Dr John Thompson, Prof Dr Alice Stanton, Prof Dr John Scanga, Prof Dr Jason Rowntree, Dr Andrea Rosati, Prof Dr Jane Quinn, Prof Dr Guiseppe Pulina, Dr Rod Polkinghorne, Prof Dr Sara Place, Prof Dr David Pethick, Prof Dr Mahesh Nair, Dr Fabio Montossi, Prof Dr Frank Mitloehner, Prof Dr Andy Milkowski, Prof Dr Heinz Meissner, Dr Pablo Manzano, Prof Dr Neil Mann, Prof Dr Carol Lorenzen, Prof Dr ir Frédéric Leroy, Prof Dr Michael Lee, Prof Dr Steven Lonergan, Prof Dr Ian Lean, Prof Dr Kim Stackhouse-Lawson, Prof Dr Alexa Lamm, Dr Mohammad Koohmaraie, Collette Kaster, Prof Dr Anders Karlsson, Dr Jean-François Hocquette, Prof Dr Craig Gundersen, Prof Dr John Gilliland, Dr Mohammed Gagaoua, Prof Dr Mario Estévez García, Prof Dr Bjørg Egelanddal, Prof Dr Peer Ederer, Prof Dr Frank Dunshea, Prof Dr Robert Delmore, Prof Dr ir Stefaan De Smet, Dr Mariana De Aragão Pereira, Prof Dr Antonella Dalle Zotte, Prof Dr H. Russell Cross, Dr Paolo Colombani, Prof Dr Keith Belk

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## EVIDENCE IN SUPPORT

- Dublin presentations: <https://www.teagasc.ie/food/food-quality-and-sensory-science/meat-technology/international-meat-summit/>
- Dublin videos: <https://www.youtube.com/playlist?list=PLdcRN-ArFOFjHlxD-N2pNGHNI LL4GbDR>
- Denver presentations and videos: <https://societalroleofmeat.org/>
- Animal Frontiers, Special Issue, 2023: <https://academic.oup.com/af/issue/13/2>
- Animal Frontiers, Special Issue, 2025: <https://academic.oup.com/af/pages/animal-frontiers-themed-issues>
- ALEPH2020: <https://www.aleph2020.org/>
- GOALSciences: <https://goalsciences.org/>
- The GIST: <https://www.thegist-aa.org>
- Nourishment Table: <http://www.nourishment-table.org/>

## 12.4 Appendix 4: Editorial AF Issue February 2025

Denver in October 2024, based on the scientific evidence again submitted for peer review, they decided that a mere warning is no longer sufficient and that a “Denver Call for Action” was needed.

In this Denver Call for Action, policy makers, media professionals, and business leaders around the world are urged to not only act, and urgently so, but also to align their action more closely with the scientific evidence: *“We observe a trend in policymaking to deploy patronizing approaches aimed at restricting dietary choice involving nudging, pressuring, and taxing consumers away from consuming proven nutrient-dense animal-sourced foods far beyond what can be justified as reasonable dietary interventions. It is worrying that proposed “substitutes” are nutritionally incomparable and often inadequate, devoid of the flavors and textures people desire. Moreover, they are often ultra-processed (e.g., faux ‘meat’ and ‘dairy’), culturally inappropriate (e.g., insects in regions where their consumption is met with resistance), or unscalable (e.g., tissue-engineered muscle).”* (Denver Call for Action, 2025).

Issuing such a Call for Action raises the question of the necessary contributions of science, scientists, and scientific evidence to the solution space of challenges in the global food system. In that context, Hoppe (1999) observed that *‘increasing scientification of politics leads to a politicisation of science’*. This might be either welcomed or seen as deplorable, but either way, the development is unlikely to disappear. Furthermore, all scientists, including us guest editors and co-authors of this Special Issue, have biases, leanings, and preferences – not only because we are human beings, but also because we function better as scientists if we make judicious use of our intuition and experience. With these human imperfections in mind, academia developed the scientific method to ensure that evidence can be produced within the scientific community according to the highest achievable objective standards. This brings us to this Special Issue’s article, “The Role of Science in Society” (Belk et al. 2025), and its concluding appeal: *“To advance, society must better understand science. Scientists themselves must be truthful and differentiate personal convictions from objective results of investigation. A scientist’s primary role is not to modify value systems in society—only to inform them.”*

### **Advancing a paradigmatic shift in nutritional guidelines**

By the looks of it, dietary advice may be ranking among the most popular pastimes of media makers and appears a favorite among policy makers. Worldwide, there is a proliferation of food pyramids, food plates, food scoring systems, and food certification systems, accompanied by an even larger community of dietitians, nutritionists, and lifestyle advisors, packing all available channels with food choice recommendations. A common theme is that one can and should eat oneself and/or the planet towards healthiness, by obediently following the specifics of the proposed models and refraining from deviations labelled as “unhealthy” and irresponsible. Putting their finger on this pervasive problem, a consortium of 18 anthropologists criticized the EAT-Lancet Commission’s Planetary Health Diet as a problematic effort that *“frames premature death as primarily a consequence of individual dietary and lifestyle choices, repeating the term ‘healthy diets’ nearly 100 times [and] health as an issue of personal responsibility. [It] overlooks the socio-cultural practices of the people who will be eating these healthy diets, and the complexities of nourishment that are at the*



*heart of kinship, social life, and caregiving [...] By prioritizing and promoting 'healthy diets' over other ways of nourishing, the Commission defines the problem as one of individual behavior and education rather than inequality within food systems and across societies"* (Burnett et al., 2020).

Facing today's *modern diet paradox*, with diet-related chronic diseases being on the rise even though there is more dietary advice than ever and given that most of the prevailing dietary recommendations since the 1980s are based on low-certainty evidence, a better way forward is needed. In this Special Issue, Leroy et al. (2025) elaborate on the concept of what elsewhere has been referred to as a Nourishment Table (cf. also [www.nourishment-table.org](http://www.nourishment-table.org)), as a novel common-sense framework for adequate nourishment that is much more respectful of personal, cultural, and economic circumstances. It enshrines the consumer as food-sovereign, emphasizing the role of self-selection amidst a large variety of satiating and nourishing foods according to personal needs and preferences, if this is achieved with diets that are neither nutrient-poor overall nor dominated by ultra-processed foods.

In an accompanying article, Gundersen et al. (2025) described the risks to the food security of populations if highly nutrient-dense foods from animal sources are not sufficiently available or become restricted: *"Anti-meat taxes and regulations are being imposed and proposed in high-income countries. One of the consequences of these interventions is higher rates of food insecurity due to higher prices."*

### **Ecological impacts of livestock require fresh thinking**

In many countries, public policy development and implementation are being affected by a small but vocal group of "cargo cult" scientists (Ederer et al., 2024), as well as a larger agenda-driven peri-scientific community that proclaims that the planetary boundaries are being burst by too much livestock inventory – and hence their numbers must be drastically reduced or, according to some of the more radical voices, even abolished (Leroy et al. 2023). The farming community and their surrounding industries are at a loss of how to effectively respond to the distortions of agricultural realities and excessive finger-pointing. They too often must acquiesce to resulting lopsided public policies. Such policies may be well-intentioned but typically achieve very little, if any, ecological improvement at the cost of making nutrient-dense food sources significantly more expensive, all while damaging rural communities.

To be certain, improvements in livestock management systems worldwide are much needed. One such arena of improvement is the urgency to recognize the indispensable role of well-managed grazing ruminant herds for the restoration of soil health, biodiversity, ecological balance, hydrology, fire control, and carbon flux fixation – and to deploy such ruminants in sufficient numbers and with the vast amount of scientific knowledge that has been accumulated in this field in recent years. In this Special Issue, Manzano et al. (2025) provide a landmark overview to this effect, summarizing: *"Livestock uses vast expanses of land, but the outcome of such use is often simplistically evaluated. Considering such land use as invariably negative ignores the ecological importance of herbivory, mediated either by wild or by*

*domestic herbivores, as well as the factors such as adequate herd composition and management, or adequate governance of grazed lands, which drive to positive outcomes.”*

In a related article, Maree et al. (2025) explore with case studies how livestock farmers and industry are leading innovation to deliver human nutrition and improved environmental outcomes through sector lifecycle collaboration: *“The unsurpassed up-cycling ratio of grazing or intensively fed animals, turning human inedible grasses and many agricultural or human food by-products into high value nutrient dense foods, gives livestock a central and critical role in achieving food security and improved nutrition through sustainable agriculture.”*

The theme is carried forward by De Lange et al. (2025), where a new interactive website-based tool is introduced to shift the discussion on environmental impacts and national food basket contributions from species to production systems. Only through holistic assessments, that recognize the complexity of all these systems, will it be possible to identify sustainable food production practices that are fit-for-purpose for any given biome.

The ecological section within this Special Issue is then completed by Ederer and Ilyushik (2025), who observe that, concerning methane accumulation in the atmosphere, there are still several empirically observed phenomena that defy explanations by the community of atmospheric chemistry. Given the climate change impacts that these methane concentrations have in the atmosphere, it is of high importance to resolve these knowledge gaps to provide solid recommendations on how to reduce them and abate climate change.

### **Doing right and communicating better**

There already exist animal production opportunities to utilize technologies that could address many areas of concern to the public. Focusing artificial intelligence options for livestock husbandry, commercial seedstock genetic selection, growth and yield improvement technologies, gene editing and other molecular methods, as well as grazing and feed management efforts towards issues tied to climate change and production efficiency, likely could result in vast impacts on sustainability outcomes, while avoiding issues affecting the ethical treatment of animals. Perhaps, given the large opportunity that exists in using such powerful techniques, scientific means will exist in the near term to address grand challenge issues of significance to society. It seems that it would be a terrifying omission if we are to feed 10 billion people of the future, to not utilize all tools in our arsenal to address food security and nutrient density concerns.

But, as livestock industries try to utilize the ever-evolving tools for improvement, hurdles faced due to legislation, regulation, and overall hesitance result in “opportunity” losses. As highlighted by Van Eenennaam (2025) in this Special issue, *“Genetic improvement has not been as rapid in Low- and Middle-Income Countries, home to 76% of the global cattle herd and 75% of the global ruminant GHG emissions”*, therefore: *“Delaying access to genetic improvement technologies that help to accelerate the rate of genetic gain and address intractable problems like animal disease is associated with a high opportunity cost of unrealized benefits”*.

The use of technology in livestock production cannot occur in a vacuum; indeed, considerations of the ethical and moral responsibilities to animals, humans, and the environment are ever pervasive. As described by Thompson (2025), “. . . *technological modernization has become the dominant way that many people look at agriculture. They are no longer persuaded that agriculture has duties or purposes that justify exceptions to society’s moral expectations for any other sector in a complex industrial economy. This creates a unique challenge for ethical inquiry in agriculture, presenting those who see agriculture as having unique moral objectives with an even greater reason to articulate their value commitments clearly.*”

So, a primary challenge to science is outreach and communication, particularly if new and additional technologies are to be implemented in production. If society is to take scientists seriously, then scientists themselves must become accountable and do better in helping society understand their findings and their efforts to minimize bias. But, as noted by Lamm (2025), scientists may not currently be the most trustworthy to the public when new information is disseminated as an outcome. In fact, it is the producers themselves that appear most credible to the public. To quote Lamm (2025), “. . . *most segments of society want to make informed decisions. Societal shifts and changes will require members of the scientific community [to] remain nimble and adjust to new communication messaging strategies, channels, and methods over time. However, if scientists can meet audiences where they are and share information about scientific topics the audience cares about in a way they can understand, the innate curiosity we all associate with how science works can be nurtured and used across society to inform science-based decisions.*”

### **Acknowledgements**

As guest editors, we find it important to repeat verbatim here what we wrote two years ago in the Animal Frontier issue on The Societal Role of Meat (Ederer & Leroy, 2023): “*We wish to emphasize our trust in the value of scientific debate, and in the on-going questioning and challenging of what may appear common knowledge or established paradigm. More than by providing answers, science progresses by asking questions. At best, we can know what is not true. We know with certainty that planet Earth is neither a disc, nor a perfectly round sphere, but precise knowledge of the planet’s morphological and behavioral intricacies will forever elude us, even as our methodologies are getting increasingly precise. The same approach characterizes this Special Issue. We appreciate and ask for debate on how to interpret the scientific evidence, but we decidedly reject torturing the data until it confesses to a desired outcome. We want to neither suppress the inherent complexity of the subject, nor do we want to hide behind it.*”

We are therefore grateful and indebted to all the co-authors and many more unnamed researchers who provided groundwork for presenting evidence and insights that made this Animal Frontiers issue possible – as well as the Denver Call for Action. Several of the co-authors presented their findings at the International Summit on the Societal Role of Meat and



Livestock, which was conducted on 30/31 October 2024 in Denver, Colorado, hosted by Colorado State University. Their presentations are available at the meeting website (<https://societalroleofmeat.org/>). Numerous helpers at Colorado State were making the Summit possible, among which we must especially single out Corrie Oleson, and we owe our sincere gratitude to them.

At the Denver Summit, we were fortunate to welcome approximately 200 leading decision makers from the global meat sector, hailing from public administration, associations, farming, industry and the sciences. Across four workshops, they provided invaluable feedback for refining the line of reasoning and avenues for further investigation. We hope that we did justice to their contributions and expectations.

We are also most thankful to the American Meat Science Association for giving us yet again the opportunity to publish its annual issue of Animal Frontiers on our topic. The Editor-in-Chief Sarah Reed of Animal Frontiers and the network of reviewers and production staff in the background have not only been most helpful and supportive but also enormously patient and yielding to our many extraordinary demands on publishing this issue. Their dedication to our science cannot be praised enough.

As the three guest-editors, we want to emphasize that this issue, as well as the Denver Summit, has been foremost the product of an incredibly dedicated team effort by eight individuals, whose lives crossed paths four years ago at the International Congress of Meat Science and Technology, the Reciprocal Meat Conference and the United Nations Food System Summit of 2021, which then led us to this mission. Each member of the team has a full plate of day jobs to do, but they thought this effort important enough to 'clear the deck' to make this meeting and publication possible. We therefore consider this issue to be the work of all eight members of the organizing team, who have as much claim to creatorship as us. Please therefore consider Collette Kaster, CEO American Meat Science Association and CEO of the Professional Animal Auditor Certification Organization (PAACO); Mohammad Koohmaraie, President Meat Division, IEH Laboratories & Consulting Group; Rod Polkinghorne, Director Birkenwood; Frank Dunshea, Redmond Barry Distinguished Professor and President of the World Association for Animal Production, The University of Melbourne; and John Scanga, Professor, Colorado State University as equal co-creators. Moreover, Alix Neveu, as a highly talented scientist, has served as the de facto general secretariat to our group, and her dedication to keeping us all on track cannot be praised enough.

As part of our overall effort, we formulated the Denver Call for Action (2025), included in this Special Issue. We thank all scientists who signed with their name and their professional reputation on this Action. The Denver Call for Action is based off of the Dublin Declaration of Scientists on the Societal Role of Livestock. We continue to invite scientists from around the world to support the Declaration by virtually signing it and joining the more than 1,200+ scientists who already are lending their voice to the scientific mission that too often is ignored or undermined. Instructions for the virtual signature can be found under [www.dublin-declaration.org](http://www.dublin-declaration.org).

The last paragraph of the Dublin Declaration was taken from the text of the 2021 UN Food System Summit final documentation on Sustainable Livestock and remains as valid as ever. It reads: “*Human civilization has been built on livestock from initiating the bronze-age more than 5000 years ago towards being the bedrock of food security for modern societies today. Livestock is the millennial-long proven method to create healthy nutrition and secure livelihoods, a wisdom deeply embedded in cultural values everywhere. Sustainable livestock will also provide solutions for the additional challenge of today, to stay within the safe operating zone of planet Earth’s boundaries, the only Earth we have.*”

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