



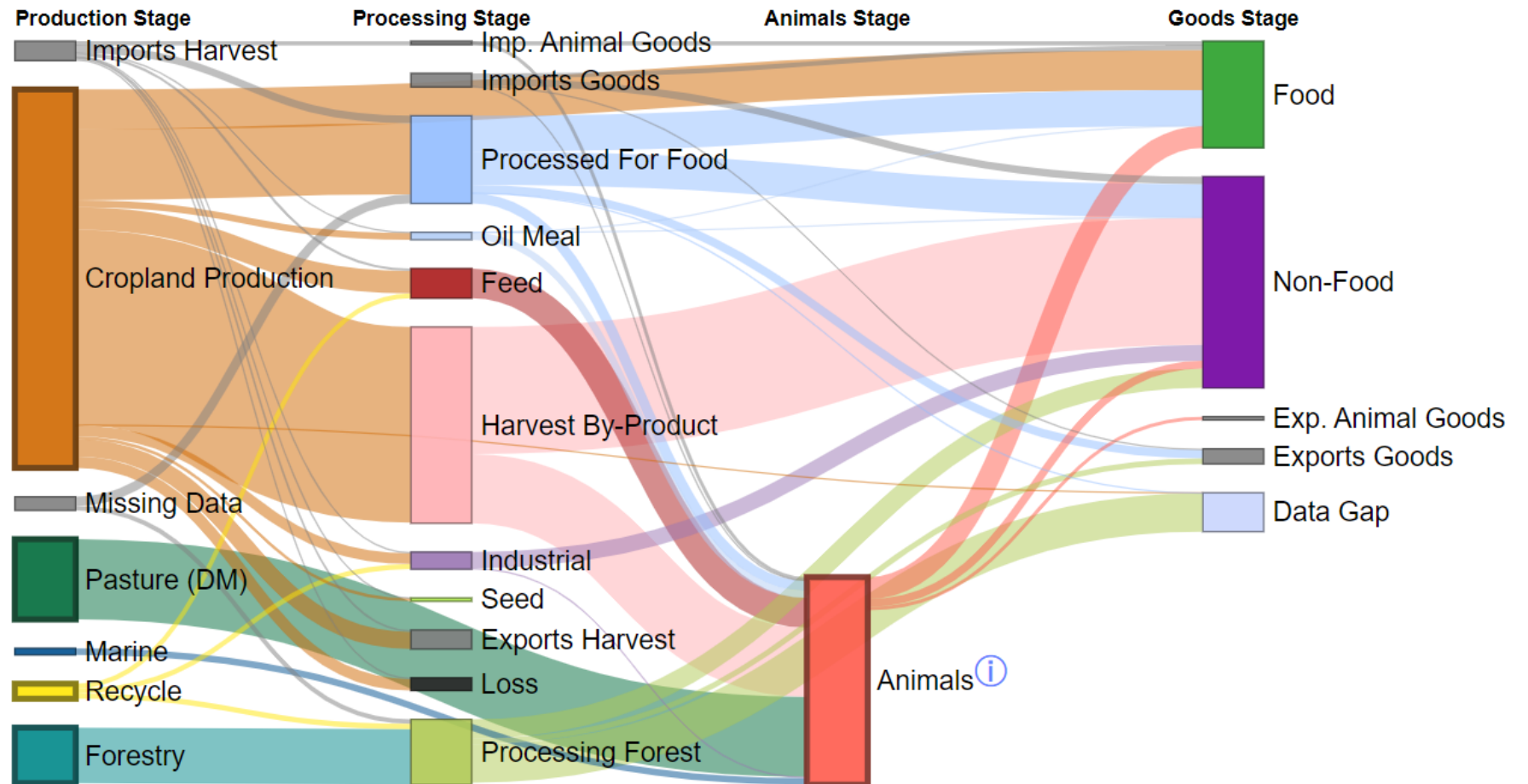
Global Observatory for
Accurate Livestock Sciences

OECD Food and feed for the future

The Dublin Declaration of Scientists
About roles, services and impacts of
livestock

PLANET V 1.3/FAO Syn - all biomass/World/2020

25 px ~ 1,922,376 kilotons (kt) mass pa Click on bold for zoom More info Mouseover for values



Why we need to look closely



Animal Frontiers – April 2023



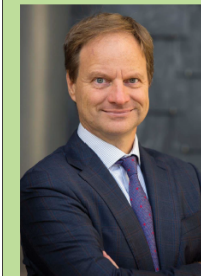
System Summit final documentation on Sustainable Livestock, which we believe is a most appropriate statement to conclude this editorial piece. It reads: “*Human civilization has been built on livestock from initiating the bronze-age more than 5000 years ago toward being the bedrock of food security for 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.*”

Acknowledgments

This Special Issue of Animal Frontiers has been the product of 36 coauthors, and many more unnamed researchers who provided the groundwork for evidence and insights. We are more thankful than words can express for them to contribute their knowledge to this publication. Fourteen authors also presented their findings at the International Summit on the Societal Role of Meat, which was conducted on October 19/20, 2022 in Dublin. The Summit was hosted by Teagasc, the Irish Agriculture and Food Development Authority. Numerous helpers at Teagasc made the Summit possible, among whom we must especially single out the untiring organizational efforts by Dr. Kaye Burgess and Ciara McDonagh. We owe our sincere gratitude to them. At the Summit we were fortunate to welcome close to 200 leading decision makers from the global meat sector, hailing from public administration, associations, the meat and livestock production industries, and the sciences. Across four workshops, they provided invaluable feedback for refining the line of reasoning and avenues for further investigation. Almost 400 viewers watched the proceedings online. The sessions were skillfully moderated by Diana Rogers, Dr. Peter Ballerstedt, and Dr. Theo de Jager. A pre-workshop with around 50 participants for inviting feedback was organized by the Global Meat Alliance in Sacramento, California on September 2, 2022, under the masterly stewardship of Ashley Gray, Connor McGovern, and Kit Arkwright. Susan MacMillan has been an always-giving source of support in our communications. Our deep appreciation to all of you! We are also most thankful to the American Meat Science Association to give us the opportunity to provide their annual Special Issue of Animal Frontiers for our topic. The AMSA Managing Editor, Dr. Anna Dilger, and the Editor-in-Chief, Dr. James L. Sartin of Animal Frontiers, and their 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 Special Issue. Dr. Marianna Behrends provided all coordination between the editors and the authors streamlining the process in an amazing manner. Their dedication to our science cannot be praised enough. As the two guest editors, we want to emphasize that this Special Issue as well as the International Summit in Dublin has been foremost the product of an incredibly dedicated team effort by six individuals, whose

lives crossed paths first at the International Congress of Meat Science and Technology and Reciprocal Meat Conference leading us to this mission. Each member of the team already had a full plate of jobs and cleared the deck to make this effort possible. We therefore consider this Special Issue to be the work of all six members of the organizing team, who have as much claim to creatorship as us. Please therefore consider Collette Kaster (CEO, American Meat Science Association), Dr. Mohammad Koohmaraie (President, Meat Division, IEH Laboratories and Consulting Group), Dr. Rod Polkinghorne (CEO, Birkenwood International), and Dr. Declan Troy (Assistant Director of Research, Teagasc) as equal cocreators. And as last but never the least, we must express our thanks to dedicated team members behind the scenes: Urs Boesswetter, Dr. Holly Cuthbertson, Taras Iliushyk, Enrike Maree, and Alix Neveu who diligently supported all the planning, preparation, and execution throughout.

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The Dublin Declaration – October 2022

The Dublin Declaration

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THE DUBLIN DECLARATION OF SCIENTISTS ON THE SOCIETAL ROLE OF LIVESTOCK

Purpose of this Declaration

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.



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'Tax beef' - Denmark finds ways to tackle climate change



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EN SAVOIR PLUS

Prof Alice Stanton, Ireland

How Much Red Meat is Good for Us?

The Importance of Transparent Evidence-Based Health Metrics

Alice V. Stanton

Professor, Royal College of Surgeons in Ireland

&

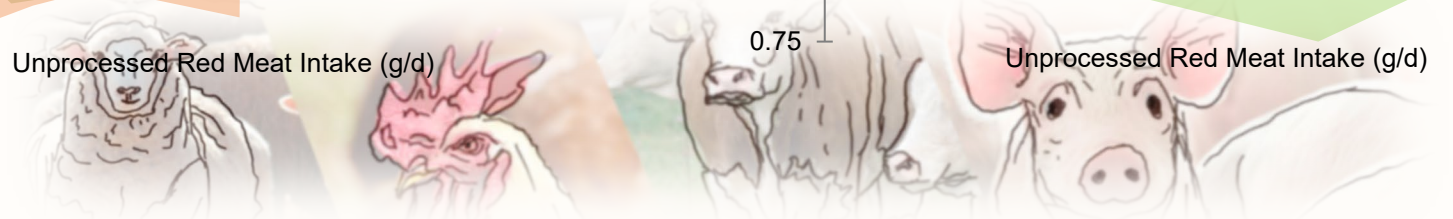
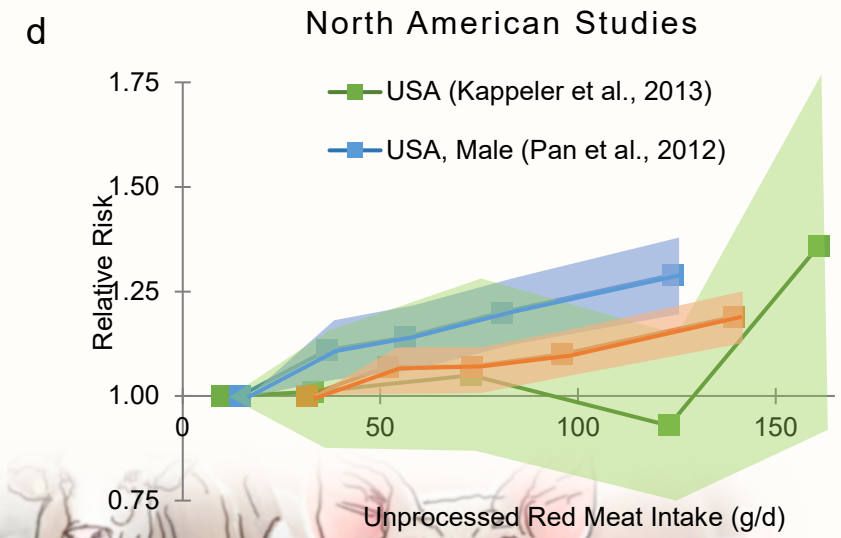
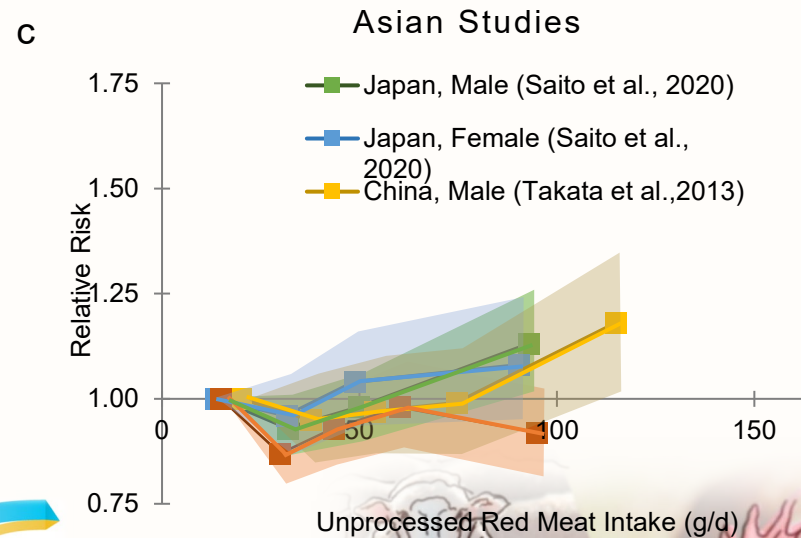
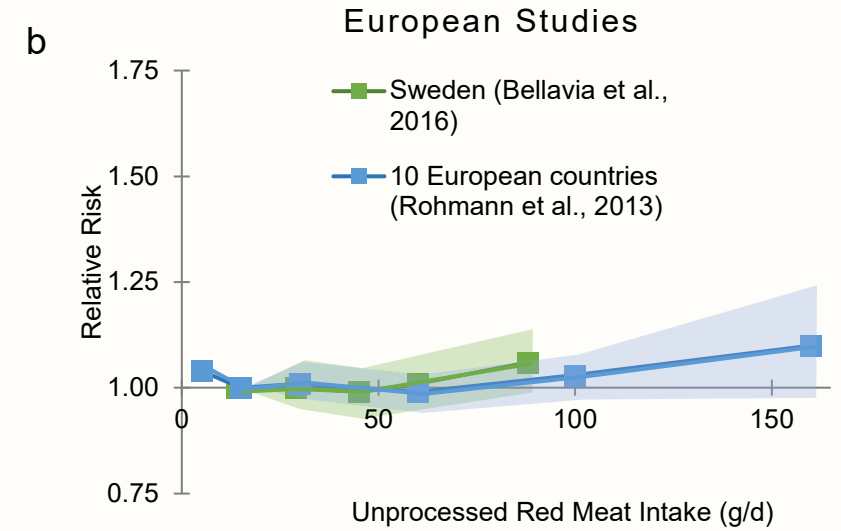
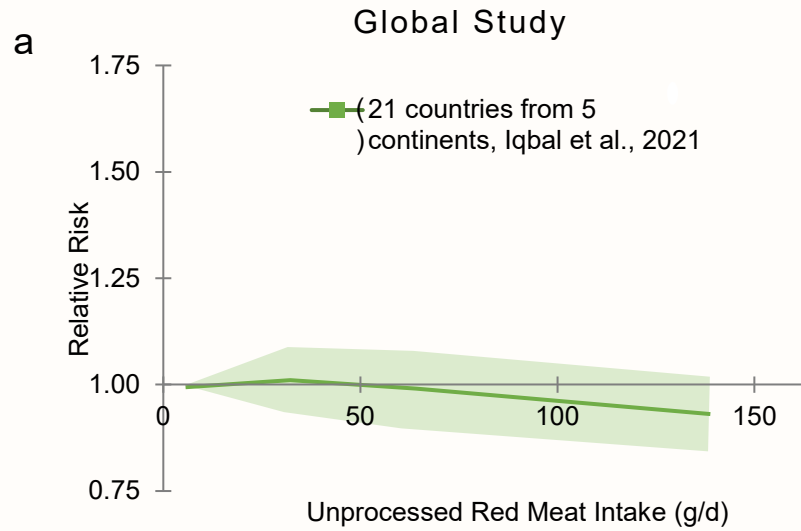
Director Human Health, Devenish Nutrition



UNIVERSITY



Fleisch und Gesundheit



Global Burden of Disease Study

Fares Alahdab, Umar Bacha, Victoria F Bachman, Hamid Badali, Alaa Badawi, Isabela M Bensenor, Eduardo Bernabe, Stan H Biryukov, Sibhatu Kassa K Badjiligin, Leah E Cahill, Juan J Carrero, Kelly M Cerey, Lalit Dandona, Rakhi Dandona, Anh Kim Dang, Meaza Girma Degefa, Maysaa El Sayed Zaki, Alireza Esteghamati, Sadaf Esteghamati, Jessica Fanzo, Carla Sofia E Sá Fariña, Maysaa S Fawad, Farshad Farzafar, Valery I Feigin, Joao C Fernandes, Luisa Sorio Flor, Nataliya A Foigt, Mohammad H Forouzanfar, Morsaleh Ganji, Johanna M Geleijnse, Richard F Gillum, Alessandra C Goulart, Giuseppe Grosso, Idris Goussous, Samer Hamidi, Graeme J Hankey, Svadasanpillai Harikrishnan, Hamid Yimam Hassen, Simon I Hay, Chi Linh Hoang, Masako Horino, Farhad Islami, Maria D Jackson, Spencer L James, Lars Johansson, Jost B Jonas, Amir Kasaeian, Yousef Saleh Khader, Ibrahim A Khalil, Young-Ho Khang, Ruth W Kimokoti, Yoshihiro Kokubo, G Anil Kumar, Tea Lallukka, Alan D Lopez, Stefan Lorkowski, Paulo A Lotufo, Rafael Lozano, Reza Malekzadeh, Winfried März, Toni Meier, Yohannes A Melaku, Walter Mendoza, Gert B M Mensink, Renata Micha, Ted R Miller, Mojdé Mirarefin, Viswanathan Mohan, Ali H Mokdad, Dariush Mozaffarian, Gabriele Nagel, Mohsen Naghavi, Cuong Tat Nguyen, Molly R Nixon, Kamyln L Ong, David M Pereira, Hossein Poustchi, Mostafa Qorbani, Rajesh Kumar Rai, Christian Razo-García, Colin D Rehm, Juan A Rivera, Sonia Rodriguez-Ramirez, Gholamreza Roshandel, Gregory A Roth, Juan Sanabria, Tania G Sánchez-Pimienta, Benn Sartorius, Josef Schmidhuber, Aletta Elisabeth Schutte, Sadaf G Sepanlou, Mosef Jeong Shin, Reed J D Sorensen, Marco Springmann, Lucjan Szponar, Andrew L Thorne-Lyman, Amanda G Thrift, Mathilde Touvier, Bach Xuan Tran, Stefanos Tyrovolas, Kingsley Nnamdi Ukwaja, Ifeoluwa Ullah, Oleksandr A Uthman, Masoud Vaezghasemi, Tommi Juhani Vasankari, Stejn Emil Vollset, Thee Vos, Giang Thu Vu, Linh Gia Vu, Elisabete Weiderpass, Andrea Werdecker, Tissa Wijeratne, Walter C Willett, Jason H Wu, Gelin Xu, Naohiro Yonemoto, Chuanhua Yu, and Christopher J L Murray.

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Contributors
AAF prepared the first draft. KAF and KMC constructed the figures and tables. AAF and PJS developed models for dietary risks. CLM provided overall guidance. JSS managed the project. AAF and ECM finalised the manuscript on the basis of comments from other authors and reviewer feedback. All other authors provided data, reviewed results, or reviewed and contributed to the paper.

Declaration of interests
JMG reports grants from Unilever. LJ reports personal fees from Mills Scientific Council. SL reports personal fees from Amgen, Berlin-Chemie, Merck Sharp & Dohme (MSD), Novo Nordisk, Sanofi-Aventis, Synlab, Unilever, and Upfield, and non-financial support from Preventicus. SL is also a member of the Scientific Board of the German Nutrition Society and a co-author of the evidence-based guideline Fat Intake and Prevention of Nutrition-Related Diseases of the German Nutrition Society. WM reports grants and personal fees from Siemens Diagnostics, Aegerion Pharmaceuticals, Amgen, AstraZeneca, Danone Research, Pfizer, BASF, Numares AG, and Berlin-Chemie; personal fees from Hoffmann-La Roche, MSD, Sanofi, and Synageva; grants from Abbott Diagnostics; and employment with Synlab Holding Deutschland GmbH. WMe is currently a program analyst for Population and Development at the Peru Country Office of the United Nations Population Fund (UNFPA), an institution that does not necessarily endorse this study. RMI reports grants from the US National Institutes of Health, Bill & Melinda Gates Foundation, and Unilever; and personal fees from World Bank and Bunge. DM reports research funding from the US National Institutes of Health and the Bill & Melinda Gates Foundation; personal fees from GOED, DSM, Nutrition Impact, Pollock Communications, Bunge, Indigo Agriculture, Amarin, Acashi Pharma, and America's Test Kitchen; scientific advisory board roles with Elysium Health (with stock options), Omada Health, and DayTwo; and chapter royalties from UpToDate. In addition, DM is listed as a co-inventor on patents US8889739 and US9987243 issued to Tufts University (Somerville, MA, USA; unlicensed) for use of trans-palmitoleic acid to prevent and treat insulin resistance, type 2 diabetes, and related conditions, as well as reduce metabolic risk factors. CDR reports personal fees from Dairy Management Institute. AES reports personal fees from IEM, Novartis, Servier, and Abbott. ACT reports grants from National Health and Medical Research Council, Australia. All other authors declare no competing interests.

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GOAL
Sciences



36-fold higher estimate of deaths attributable to red meat intake in GBD 2019: is this reliable?

Alice V Stanton, Frédéric Leroy, Christopher Elliott, Neil Mann, Patrick Wall, Stefaan De Smet

Published: February 25, 2022 DOI:[https://doi.org/10.1016/S0140-6736\(22\)00311-7](https://doi.org/10.1016/S0140-6736(22)00311-7)

Key Questions

- **Where are the peer-reviewed publications of their updated or new systematic reviews, which;**
 - Address the 27 item PRISMA Statement and the 20 item GATHER Statement checklists?
 - Provide the evidence for the changing of the red meat TMREL from 22.5g/day to 0g/day?
- Have the **additional deaths and illnesses, from iron deficiency anaemia, elderly fragility, child and maternal malnutrition**, that would result from imposition of a red meat TMREL of zero been included in the GBD 2019 estimates?

THE LANCET

CORRESPONDENCE | VOLUME 399, ISSUE 10332, E27-E28, APRIL 02, 2022

36-fold higher estimate of deaths attributable to red meat intake in GBD 2019: is this reliable? – Author's reply

Christopher J L Murray on behalf of the GBD Risk Factors Collaborators

Published: March 21, 2022 DOI:[https://doi.org/10.1016/S0140-6736\(22\)00518-9](https://doi.org/10.1016/S0140-6736(22)00518-9)

Admission of Errors

- “Clear protective relationship between red meat intake and haemorrhagic stroke”
- *“No evidence supporting a relationship between red meat consumption & sub-arachnoid haemorrhage.”*
- “The strength of evidence regarding the relationship between red meat and various outcomes - including ischaemic heart disease - is relatively weak.”
- *“Setting of the red meat TMREL to zero in the GBD 2019 analysis is not correct.”*
- “Estimates of attributable deaths for red meat will be reduced in all future GBD analyses.”

Immediate correction of all errors of fact is mandatory according to Lancet’s guidelines, Committee on Publication Ethics (COPE) & International Committee of Medical Journal Editors (ICMJE).

Key Questions Unanswered

- GBD Collaborators unable/unwilling to provide peer-reviewed published evidence to substantiate their new systematic reviews - *Professor Murray has since confirmed that GBD 2019 is not PRISMA compliant.*
- GBD Collaborators do not intend to include the totality of nutritional effects of red meat in their analyses

Prof Neil Mann, Australia



The Evolutionary Role of Meat and Implications for Contemporary Nutrition and Health Challenges

Neil Mann

Professor of Food Science and Nutrition

BAppSc, BSc(Hons), DipEd, PhD, RNutr, FNSA



Dr Pablo Manzano, Spain



What ecosystems are we talking about?

Journal of Vegetation Science 16: 261-266, 2005
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□ Bond

INVITED PERSPECTIVE

Large parts of the world are brown or black: A different view on the 'Green World' hypothesis

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Abstract. Climate sets the limits to plant growth but does climate determine the global distribution of major biomes? I suggest methods for evaluating whether vegetation is largely climate or consumer-controlled, focusing on large mammal herbivores and fire as influential consumers. Large parts of the world appear not to be at equilibrium with climate. Consumer-controlled ecosystems are ancient and diverse. Their distinc-

Prof Jason Rowntree, USA



Center for Regenerative Agriculture
MICHIGAN STATE UNIVERSITY



Teagasc Zoom Even...

Ruminants - contribution to a sustainable grassland environment, it is not as it seems

Jason Rowntree, Ph.D.

C.S. Mott Distinguished Professor of Sustainable Agriculture
Department of Animal Science
October 19th, 2022



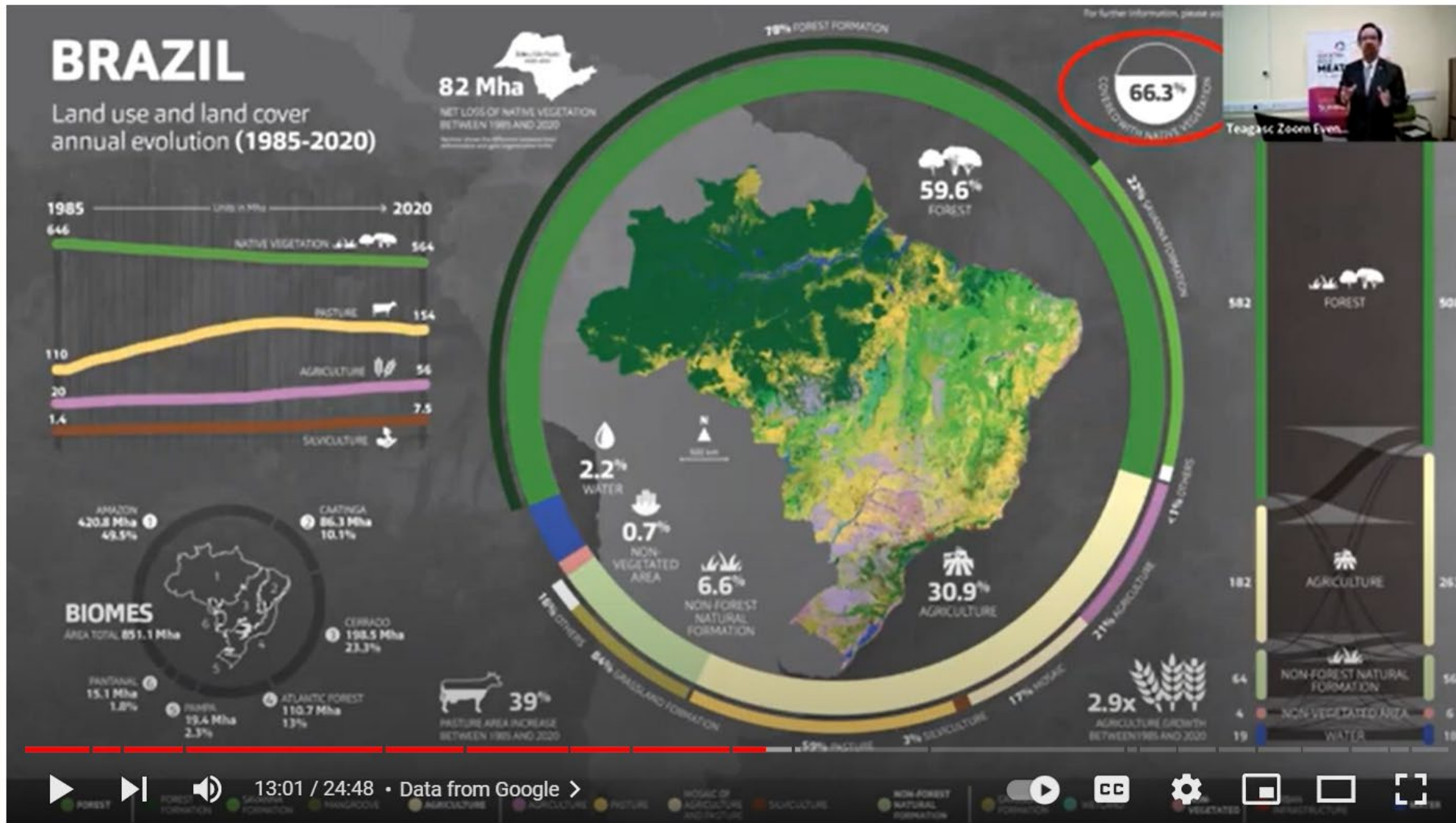
College of Agriculture
and Natural Resources

Max Makuvise, Zimbabwe



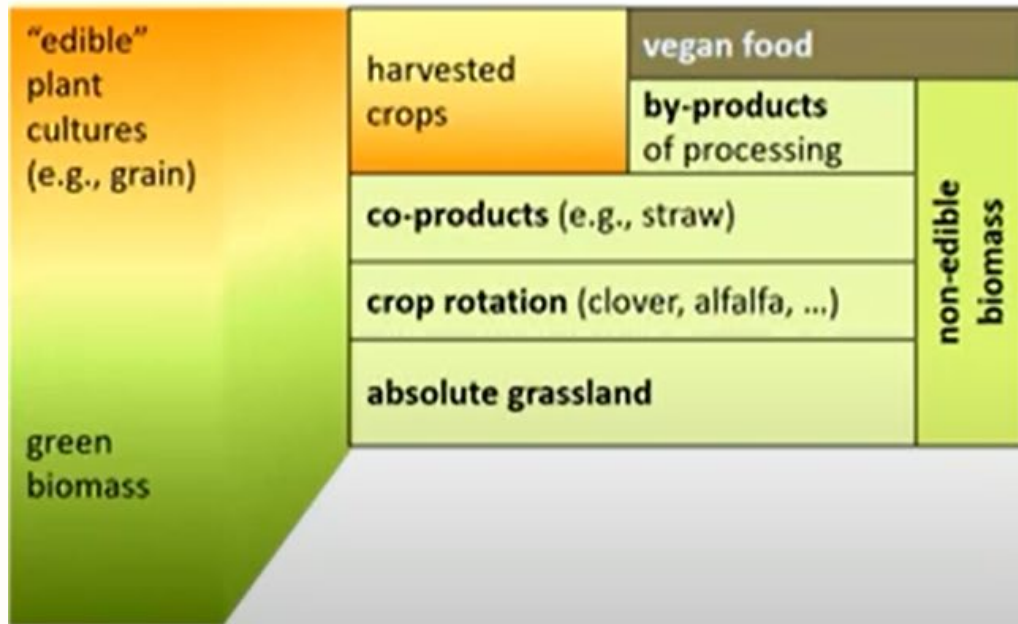
One Size Fits All?

Prof Celso Moretti, Brazil



Prof Wilhelm Windisch, TU Munich

Agriculture produces mainly
non-edible biomass



Absolute grasslands cannot be converted into arable land producing vegan food because of

- climate (too humid/dry, short vegetation period, ...)
- topography (too steep, periodically flooded, ...)
- conversion would release dramatic amounts of CO₂

Absolute grassland covers major proportions of total agricultural areas, e.g.,

- >70% global agricultural area
- 40 – 70% Alpine regions
- ca. 30% Central European areas with intensive plant production

Prof Candace Croney, USA on ethics



meat consumption could be morally justified and even regarded as ethically preferable as it not only offers a practical option, it also potentially reduces some forms of harm. This is particularly the case if the harms considered include the inequity of allowing those who are affluent, empowered, and food secure to constrain the dietary options available to those who are socially, politically, and economically disempowered.

Moving forward, we must be open to discussing what food availability and security means in the global context, how climate change will impact our natural resources and the food dynamic, and where the ethical boundaries are drawn with respect to what we eat and the multitude of factors that affect our choices and those of others. “Food shaming” in any form must be avoided in discussions of what we eat given the constraints on food security, quality, access, and affordability faced by many who are often the subjects of and rarely the agents of public discussions and decision-making. To that end, we must also be open to discussing current and future natural resource limitations and pro-actively seek solutions that are scientifically sound and ethically supported. This includes actively engaging or discovering new methods to produce high quality food, including meat and not just foods perceived to hold the “moral high ground”. Finally, we must be pro-actively prepared to face the possibility that life-sustaining natural resource scarcity like water may force choices, both social and political, that may cause a reduction or phase-out of using animals to produce some foods, including meat and water intensive crops.

Conflict of interest statement. None declared.

About the Author(s)



Dr. Candace Croney is director of Purdue University's Center for Animal Welfare Science and professor of animal behavior and well-being in the departments of Comparative Pathobiology and Animal Sciences. Her animal-focused research, teaching, and outreach efforts include enhancing the welfare of companion and agricultural animals through developing and refining noninvasive metrics of welfare, including animal behavior, cognition, and health, and translating these into standards and guidelines. Her scholarship and outreach on the human dimensions of animal welfare examine public perceptions of animal agriculture and welfare, bioethical considerations relating to animal care and use, and their socio-political and practical implications. Corresponding author: ccroney@purdue.edu

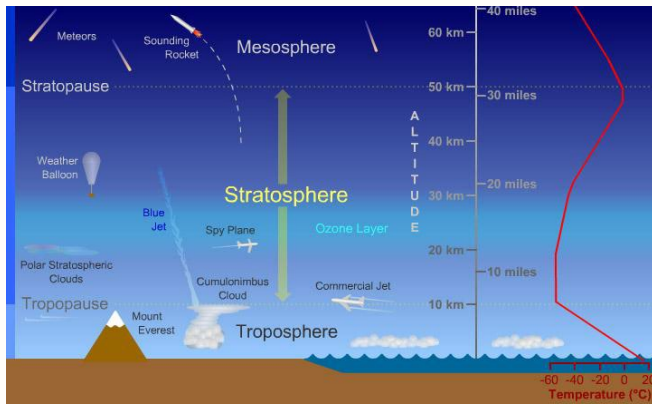


Dr. Janice Swanson is a professor in the Departments of Animal Science and Large Animal Clinical Sciences at Michigan State University. Her area of focus is social responsibility in the food system as it relates to farm animal welfare. Dr. Swanson is a member of the MSU Animal Behavior and Welfare Group which conducts research into problems and issues of farm animal behavior and welfare. Her leadership and outreach efforts include the development of evidence-based food industry and commodity level animal welfare policies, standards and guidelines, public policy, and educational programming for the public and other stakeholders in the food system.

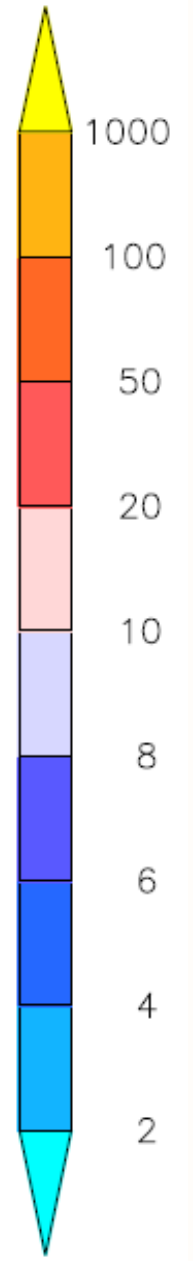
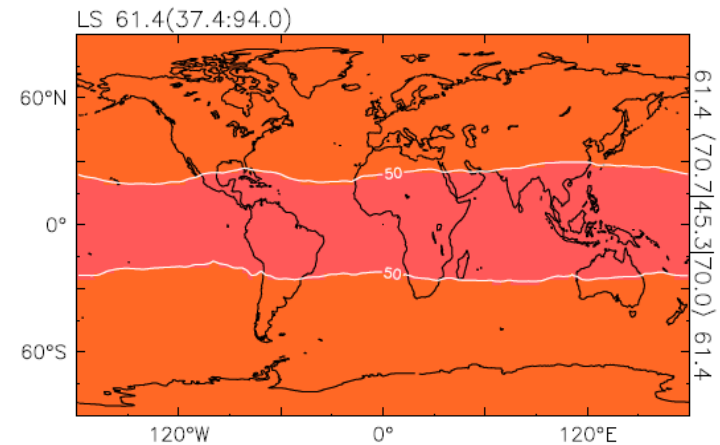
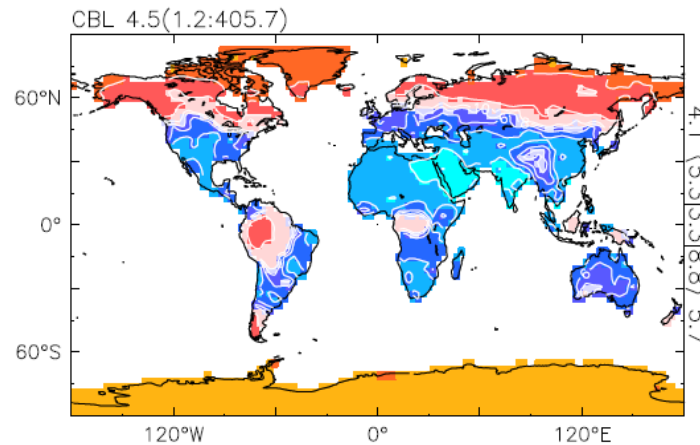
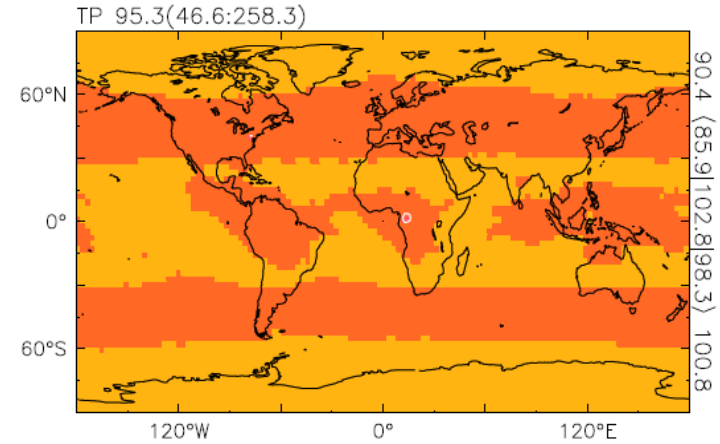
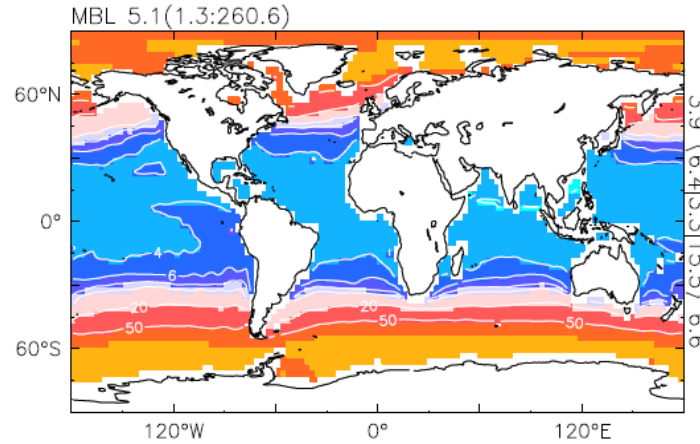
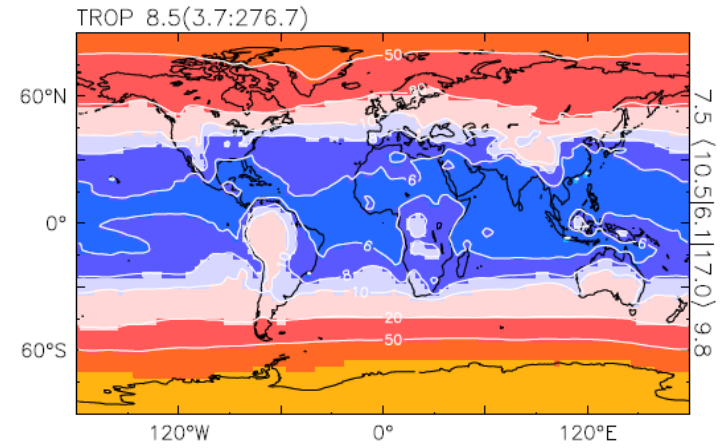
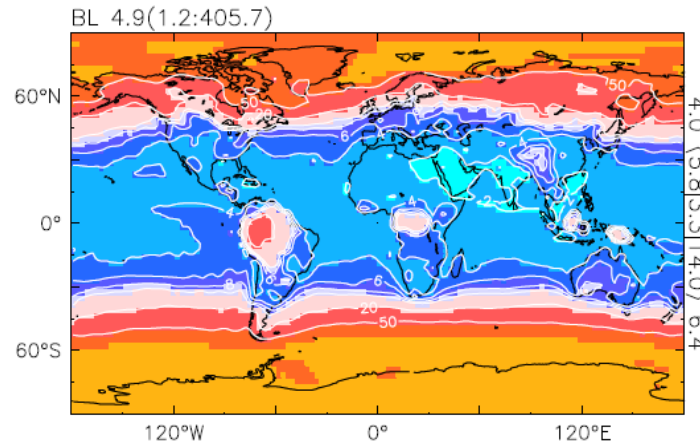
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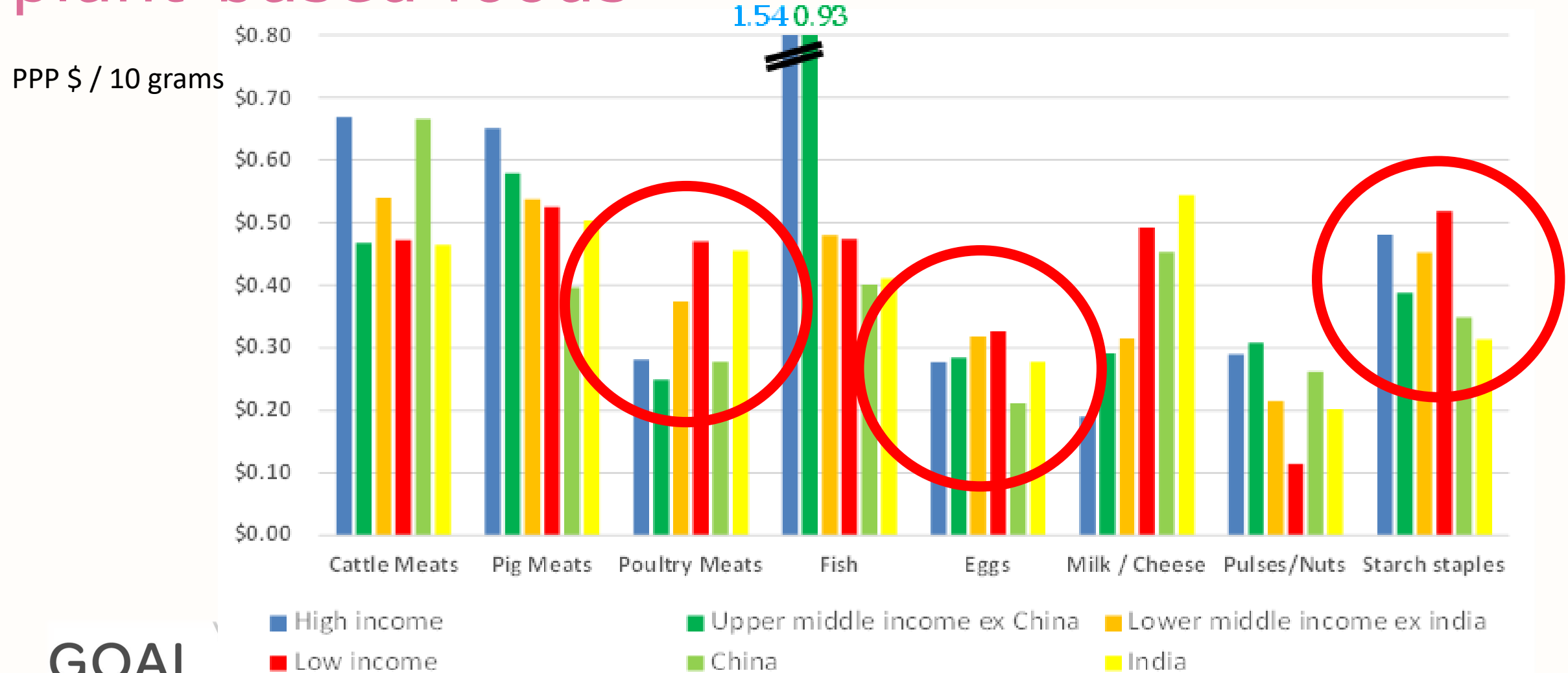
Prof Dr Lelieveld: Methane-concentration in Atmosphäre



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**Economics of Protein -
a Documentary**

by Peer Ederer

Olena Horodetska
Taras Iliushyk
Bohdana Kalinovska
Elna de Lange
Enrike Maree

of GOALSciences

March, 2023

Documentary # 01



Herd Structure and Nutrient Requirements in Livestock Across the World: A Modeling Approach



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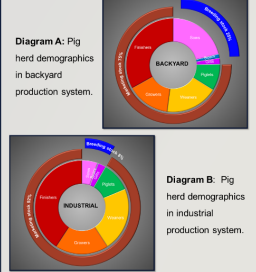
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1. Rationale

- Livestock are crucial in global food systems and sustainable development.
- A knowledge gap exists linking livestock nutrient requirements into the global food system supply.
- One key factor affecting nutrient requirements is herd dynamics.
- The study aims to model global livestock **herd structure** and **nutrient needs** by animal class and production system, for each major species.

3. Herd Structure Aspects

- Diagram A and B visually compares pig herd demographics in backyard and industrial production systems.
- Backyard systems estimate 17 piglets born per sow per year, while industrial systems estimate 38, as one of the many input parameters.
- Backyard breeding stock is estimated at 25%, significantly higher than the industrial system's 8%.



Key Points

Livestock's Global Significance:

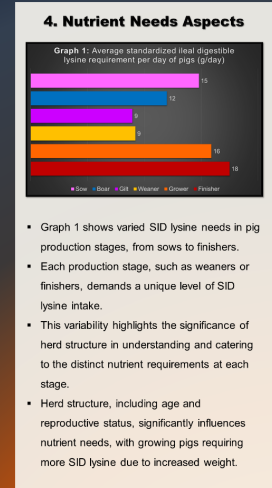
- Growing global demand for animal products underscores the importance of understanding nutrient needs of livestock.
- Herd dynamics and performance parameters have a substantial impact on livestock nutrient requirements and need to be understood.

Key Model Differentiators:

- The model provides an extensive level of herd structure analysis, both on a per-country and globally aggregated basis.
- A comprehensive breakdown of nutrient requirements for livestock is explored—unlike energy-centric conventional models.
- This research envisions an interactive platform accessible to the broad public, enabling scenario creation and promoting transparency.

Foundation for Future Research:

- The model forms a foundational platform for future research, involving exploration of nutrient supply, demand, gap identification, scenario testing, and informed decision-making.



5. Application

Comparison of pig meat production:

- Table 1 compares pig meat production in different systems with the same sow count.
- The industrial system yields 2249 ton more meat annually than the backyard system.

Sankay illustration:

- Diagram C depicts estimated global pig herd structure, flow, and production over a year period.

Table 1: Pig Meat Production Scenario

Parameter/ System	Industrial	Backyard
Farrowing rate	90%	50%
Piglet born/year/ sow	38	17
Mortality rate piglets	13%	17%
Live weight (kg)*	115	70
Dressing percentage	75%	65%
*Approximately 6 months of age.		

Scenario	Industrial	Backyard
Sows in herd	1 000	1 000
Sows farrowing	900	500
Piglets born	34 200	8 500
Piglet production	29 781	7 019
Total live weight (ton)**	3 425	491
Total meat production (ton)	2 569	319

**Assuming all piglets survive to slaughter.

Diagram C: Sankay illustration of World Pig Herd Structure

Developing a composite sustainability index: milk and milk analogues



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Declarations

The project is funded by M&SA. The authors declare no conflict of interest or bias.

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Introduction

In a world battling with climate change, resource scarcity, and malnutrition, the need for sustainable decision-making is essential. While global food supply appears adequate, issues like food waste and affordability hinder nutritional access. Stakeholders, producers and consumer alike are further increasingly aware of environmental impacts, particularly in the dairy industry. Milk alternatives also emerge, of which the sustainability and nutritional contribution is still poorly understood. This importance emphasises the importance of minimising footprints while ensuring economic viability, as well as holistic evaluation of the sustainability of milk and milk analogues. To address these challenges within local contexts, this study aims to create a sustainability index tailored to milk and milk analogues, within a specific country. This index, which can be adapted to any country, can inform stakeholders to assess footprints and make informed choices, based on economics, nutrition and the environment, aligning the industry with global sustainability goals.

NUTRITION	ENVIRONMENT	ECONOMICS
<p>A similar approach to the nutrient rich food index (NRFI) was followed, with weighting factor according to eg:</p> <ul style="list-style-type: none"> bioavailability of nutrients food matrix effects age and sex specific requirements groups demographic strata contribution to global nutrient supply associated diseases or protective effects protein quality as a sub-score. 	<p>The same principles of a life-cycle analysis (LCA) are used, with practical adaptations according to what is already measured on farms and within production systems, eg:</p> <ul style="list-style-type: none"> blue water use, fertiliser use, land use electricity/energy use recyclable materials & waste LCA results (if system boundaries are alike) management practices 	<p>This is assessed with consumer and producer indicators, as well as self-report binomial and point related questions, eg:</p> <ul style="list-style-type: none"> product price poverty levels (incl % of the population per level) financial contribution to the country number of employees production efficiencies future potential

Application

The three scores are expressed by means of shorthand notation. This avoids masking of a poor score for one indicator with a good score of another indicator, but rather gives a transparent view of the different indicators and their respective score. The notation 'Ni(pq); EnS; EcS' will be used (Ni = nutrient index; pq= protein quality; EnS = Environmental Score, and EcS= Economic Score. A high Ni or NS, low EnS and low EcS is favourable

Example: Ni(pq); EnS; EcS = 175.414 (2.65); 0.781; 1.043

Why the index?

Robust methods are needed to measure and compare the sustainability of dairy products, which are tailored to specific industry and countries. It should be easy-to-use based on available data.

Who will use it?

Producers and policy makers can use this for their own business decisions or science-based policy making. Consumers can use the results for their own informed consumer choices.

What are the benefits?

It is based on scientific data which has already been sourced and will continuously be updated, reducing the data input required by users in limited, yet it will still select reliable methods.

Conclusion

The composite Sustainability index for Environment, Economics and Nutrition (SEEN), which has been adapted to for milk and milk analogues as DIET (Dairy Index for Environment, Economics and Nutrition), integrates environmental, economic, and nutritional aspects of current validated tools, offering a practical means to assess and compare key sustainability indicators within a specific country. It contains adaptable data levels, based on scientific literature, which ensures industry relevance while accounting for data gaps. However, it's essential for producers to take up the responsibility of measuring their sustainability indicators and conducting more comprehensive nutrient testing to enable accurate comparisons. Ongoing refinement and validation of this index will be necessary in the aim continue to provide a transparent, sensible, and actionable measurement approach.



The Dublin Declaration – October 2022

The Dublin Declaration

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THE DUBLIN DECLARATION OF SCIENTISTS ON THE SOCIETAL ROLE OF LIVESTOCK

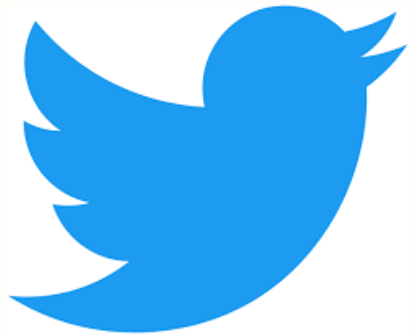
Purpose of this Declaration

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.



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SIGNATURES

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