Economic benefits of health resilience

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Hannah Dairy Research Foundation Conference 24th November 2025

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There’s an animal disease on-farm

- What losses and costs do you expect?

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What losses and costs do you expect?

HEALTH AND PRODUCTION

VISIBLE LOSSES

FOR FARMERS

- Deaths in animals
- Low yields (e.g., reduction in milk production)

FOR SOCIETY

- Deaths in humans
- Decreased access to food
- Poor quality animal products

HIDDEN LOSSES

FOR FARMERS

- Less fertile animals
- Change in animal population structure
- Increased labour costs
- Delayed sale of animals and by-products

FOR SOCIETY

- Higher cost of animal products
- Environmental degradation and CO2 emissions

SHORTFALLS

ADDITIONAL COSTS

- Medicines / Insecticides
- Vaccines
- Time
- Public health costs

LOST REVENUE

- Limited access to markets
- Sub-optimal use of technology

Modified from Rushton J., Thonton P.K. & Otte M.J. (1999). : Methods of economic impact assessment. Rev. sci. tech. Off. int. Epiz., 18 (2), 315 - 342. http://dx.doi.org/10.20506/rst.18.2.1172.

Rushton J. (2008). – The Economics of Animal Health & Production. CAB International, United Kingdom.

Unintended consequences of livestock production

- Livestock production, transport and slaughter can have impacts that prices do not take into account
- In broad categories these are:
  - Environmental impacts
  - Public Health impacts
  - Animal Welfare impacts

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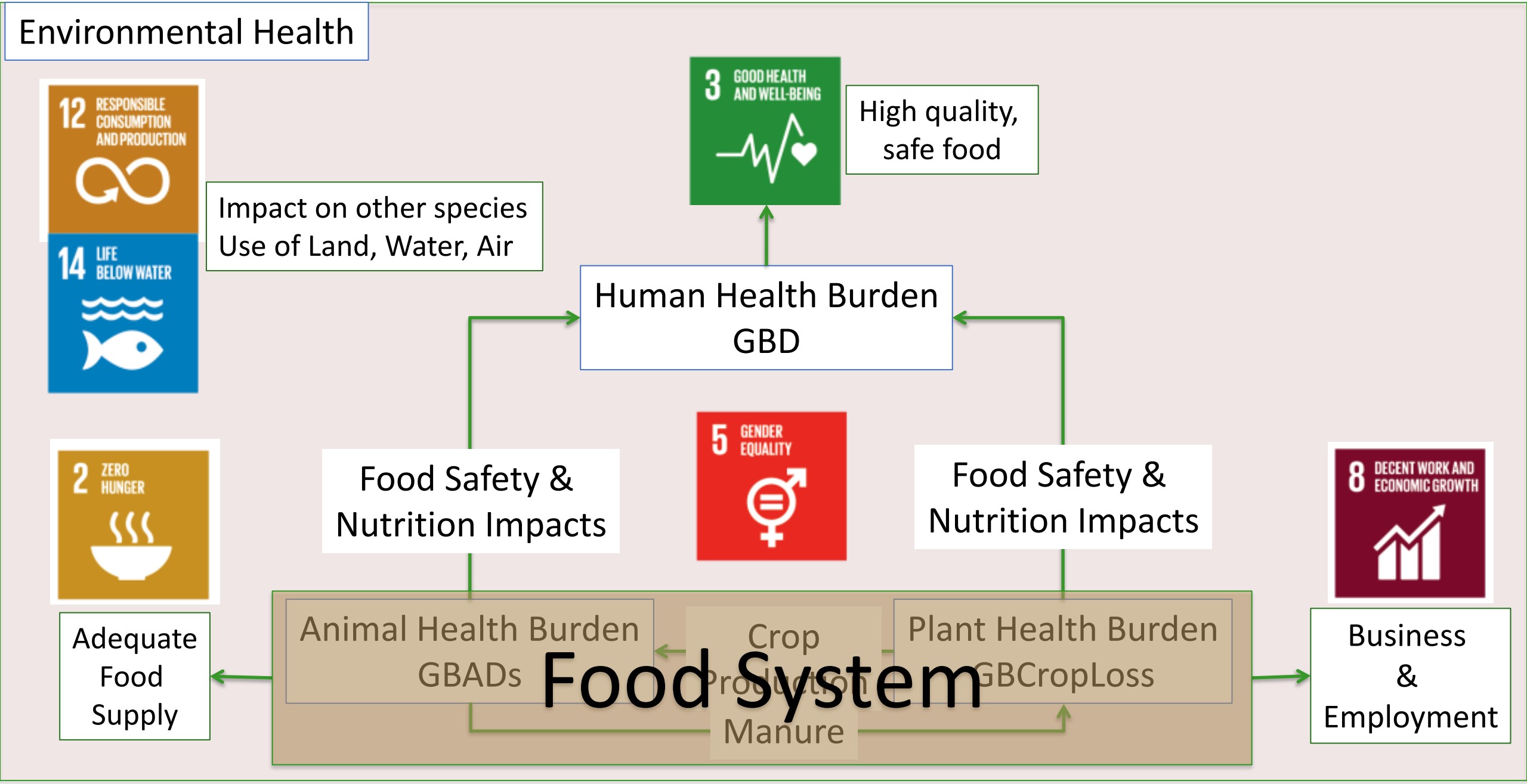

Huntington et al 2021, https://doi.org/10.20506/rst.40.2.3246

Human Health GBD

- Compare population health across communities and over time;
- Identify key diseases, injuries, and risk factors affecting health and tracking their changes over time;
- Assess gaps in data quality or availability

WHO. WHO methods and data sources for global burden of disease estimates 2000-2019. Department of Data and Analytics Division of Data, Analytics and Delivery for Impact; 2020.

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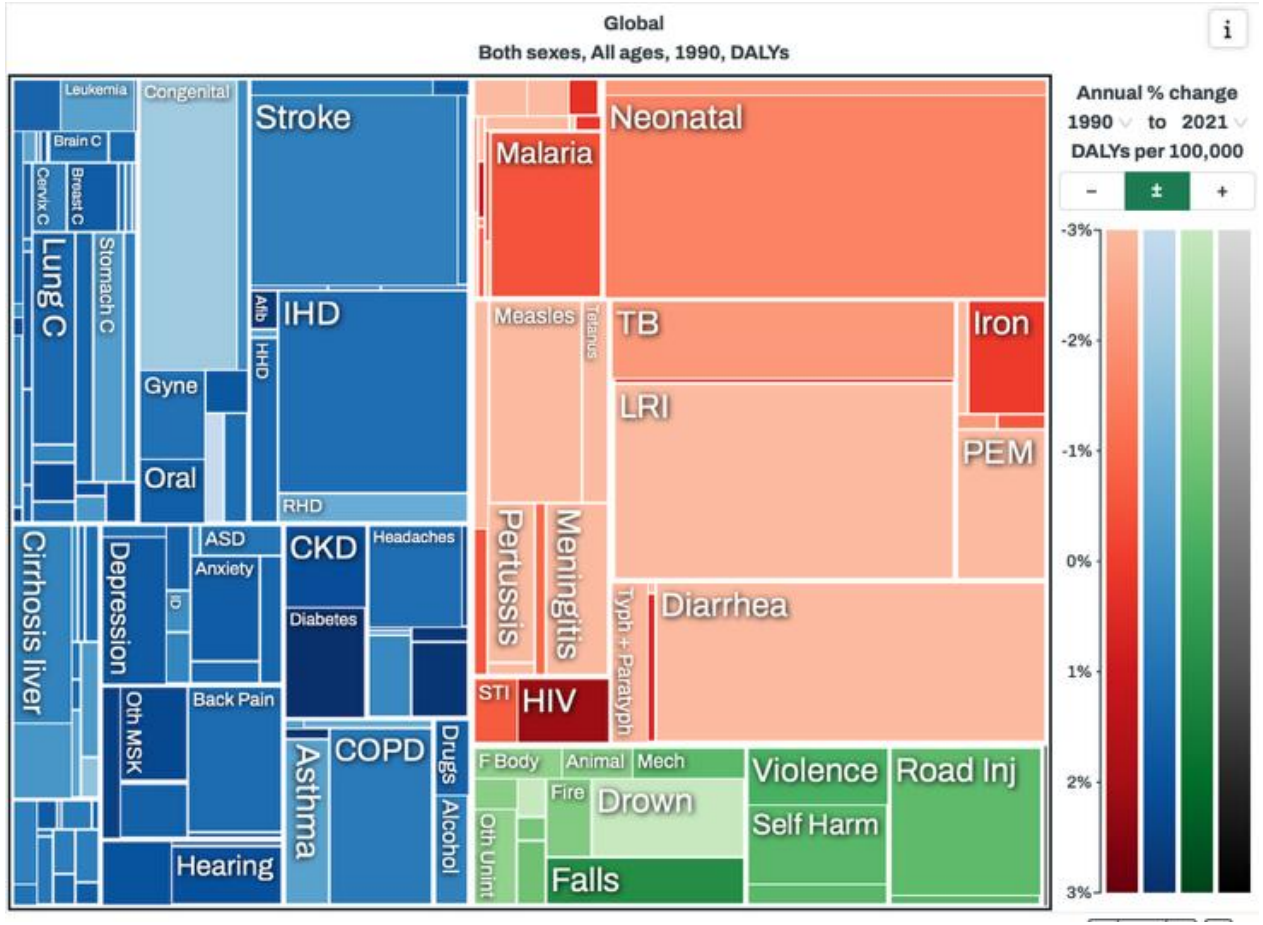
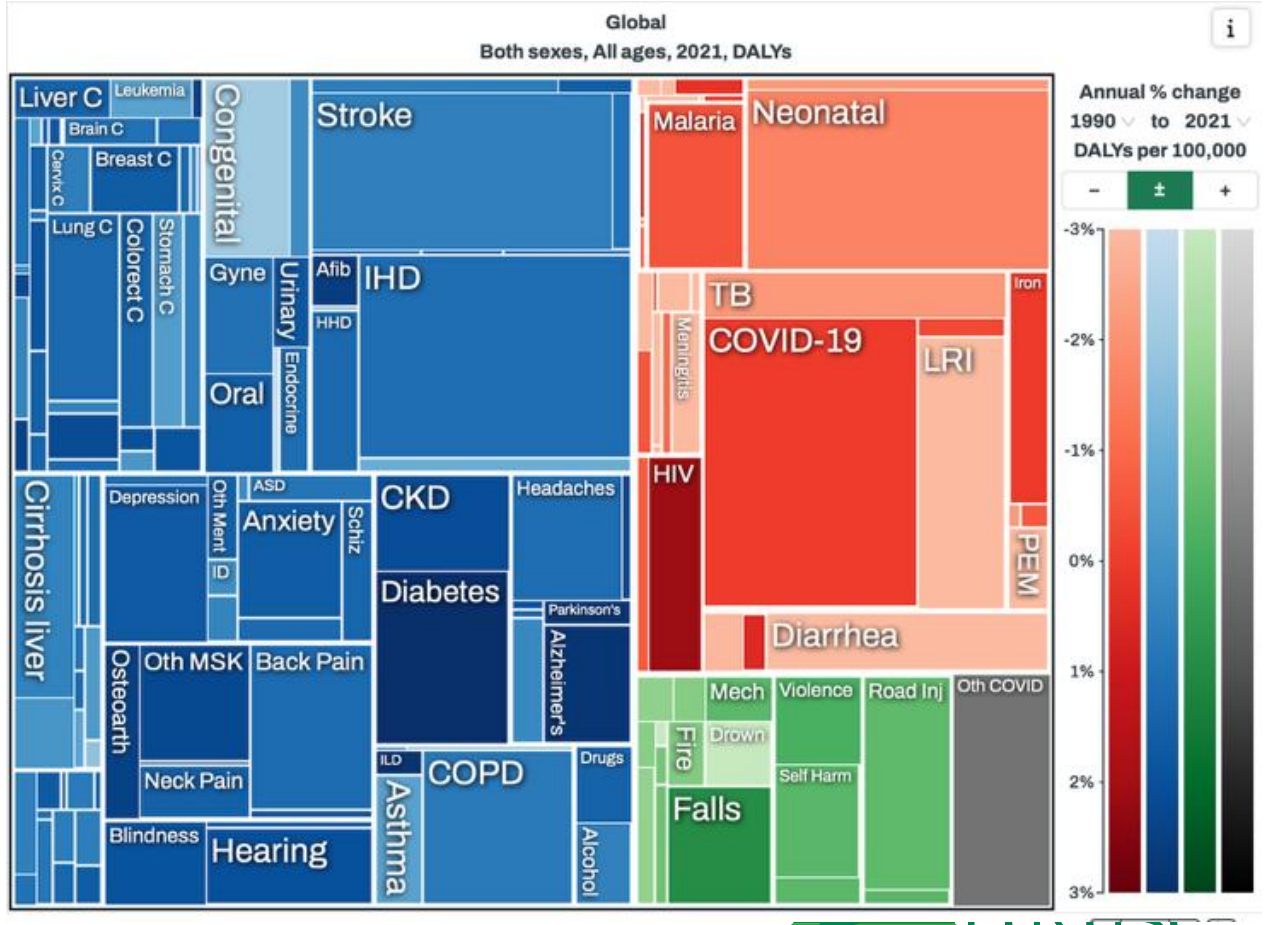
Global - DALYs 1990 and 2021





https://vizhub.healthdata.org/gbd-compare/

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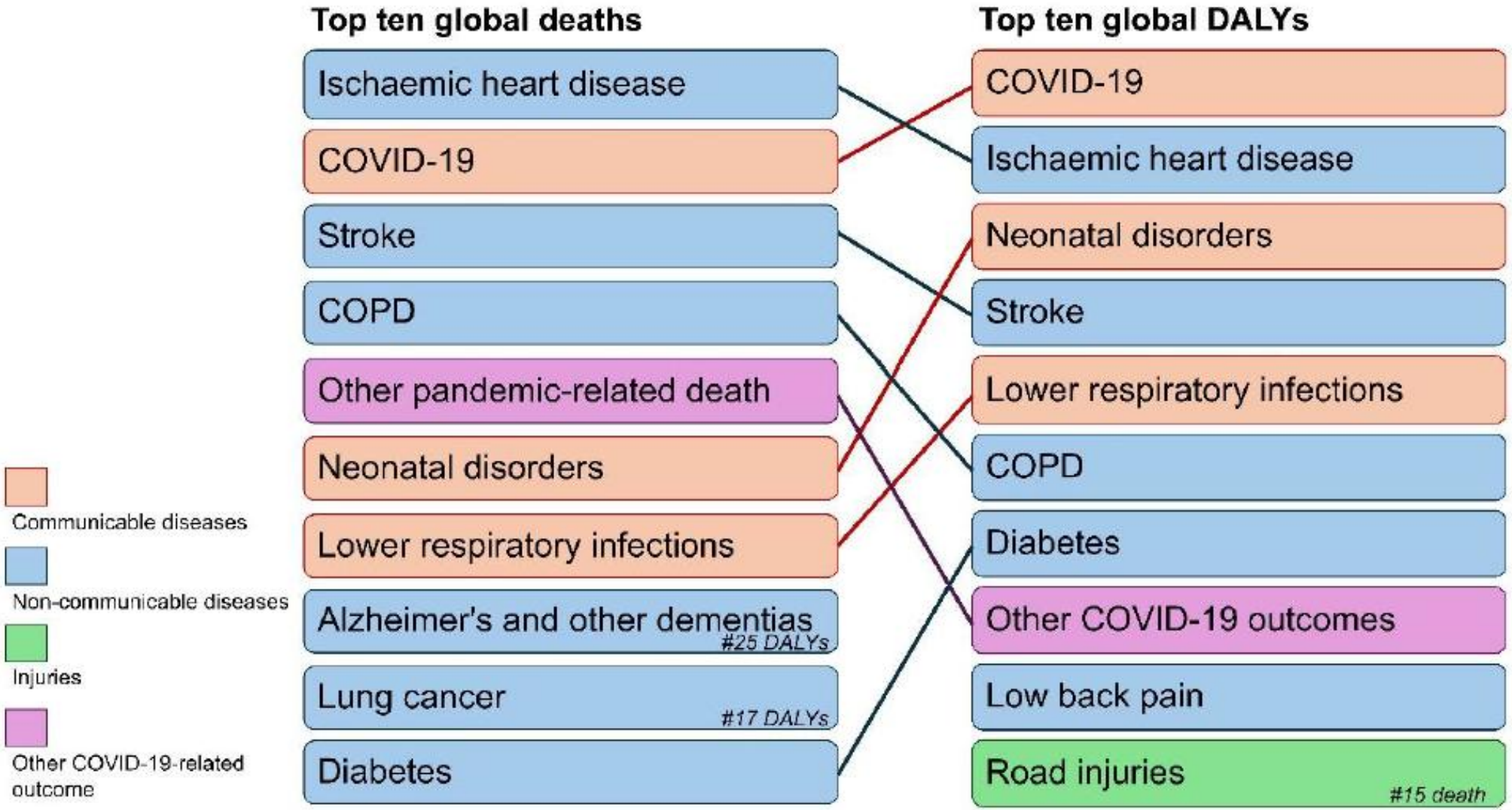
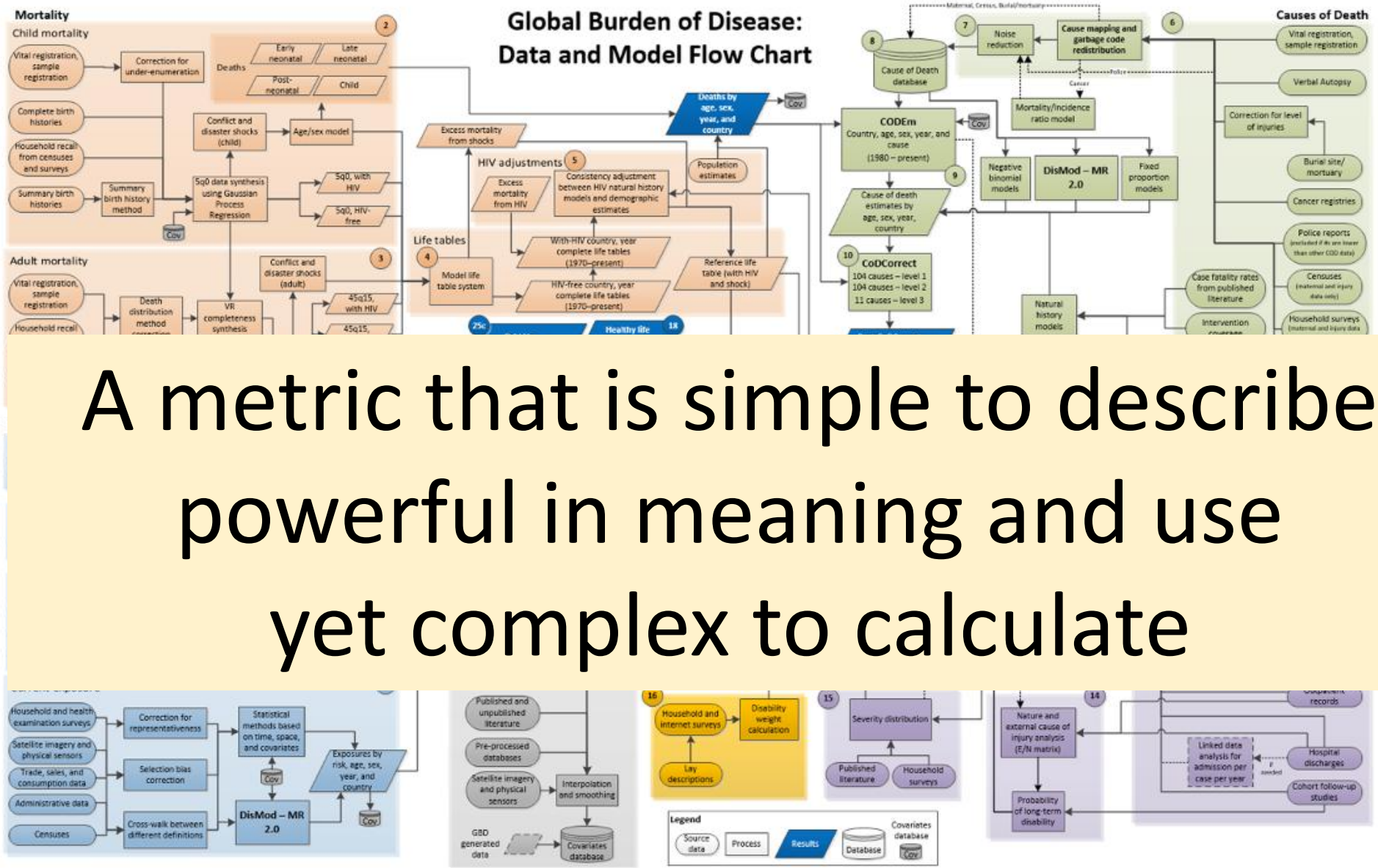


Modified from:

GBD 2021 Diseases and Injuries Collaborators. Global burden of 288 causes of death and life expectancy decomposition in 204 countries and territories and 811 subnational locations, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021. Lancet. 2024;403(10440):2100-32.
GBD 2021 Diseases and Injuries Collaborators. Global incidence, prevalence, years lived with disability (YLDs), disability-adjusted life-years (DALYs), and healthy life expectancy (HALE) for 371 diseases and injuries in 204 countries and territories and 811 subnational locations, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021. Lancet. 2024;403(10440):2133-61.



A metric that is simple to describe
powerful in meaning and use
yet complex to calculate

Global Burden of Animal Diseases (GBADs)

GBADs Case Study Countries

Key

Ongoing

Completed

Note

Several studies at proposal stage are not shown

https://animalhealthmetrics.org

GBADs

GBADs concerns

- Livestock health is critical for ensuring human and environmental health and creating and maintaining stable livelihoods
- Hundreds of millions of livestock keepers have no or poor access to veterinary services and technologies
- Poor information on the success (or failure) of animal health programmes
- **Global society needs better information on the health of livestock**

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GBADs

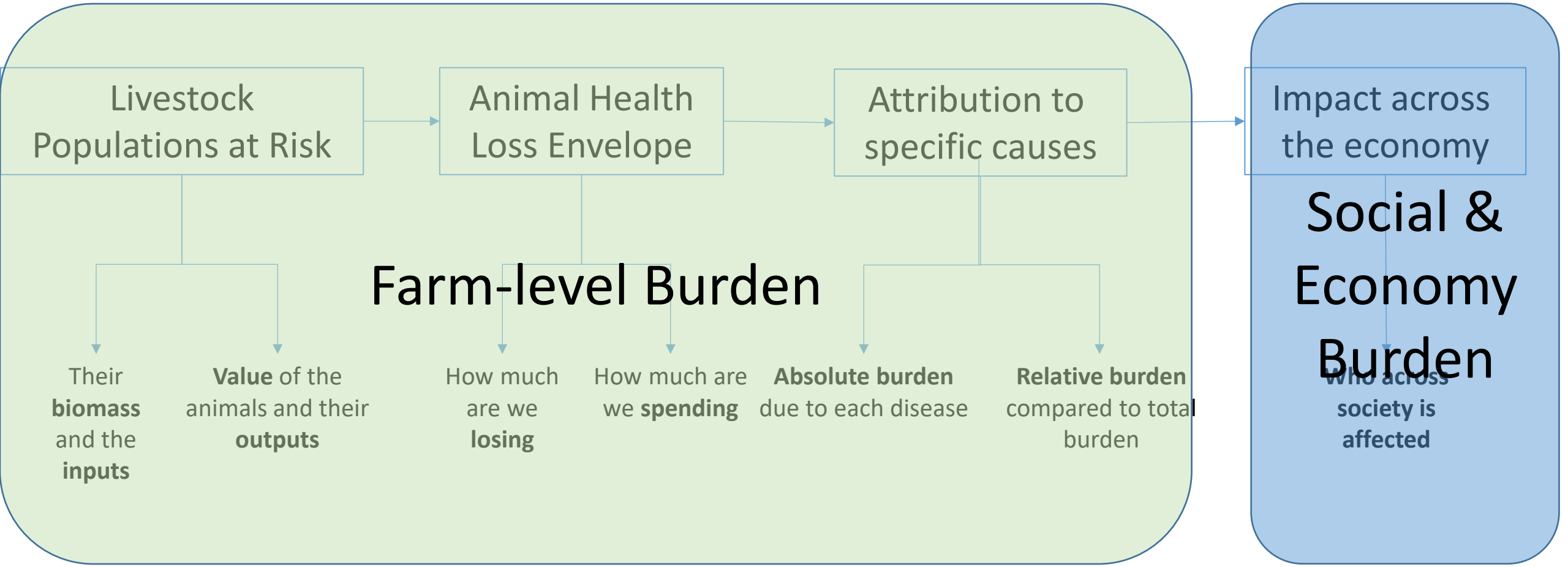
Background

- **Imagine a situation:**
  - Where **the scale of investments** in animal health is based on **gut feelings** at best, **guesses** at worst…
  - We rely on **perceptions** to **allocate the resources** to diseases and animal health problems to achieve our goals…
  - And when the animal health investment and allocations have been made, there are **no systematic ways to capture data and information to evaluate our successes or failures.**
- This is reality for animal health - the Global Burden of Animal Diseases programme aims to **fill this void of data and information for animal health and One Health**

What is GBADs?

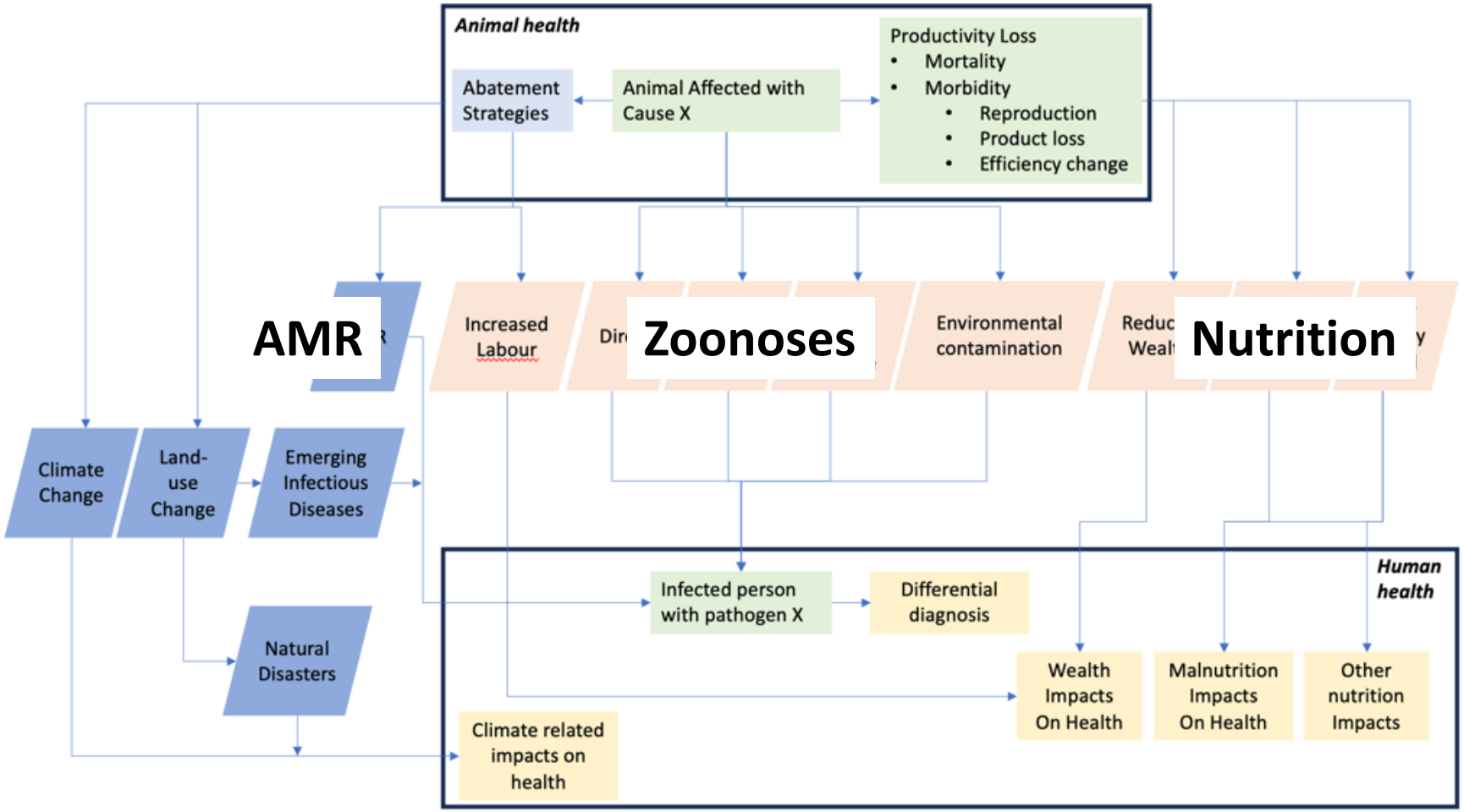
- **GBADs** is an alliance of organisations, founded by WOAH and the University of Liverpool and now led by the University of Edinburgh, that aims to tackle these challenges through the development of innovative methods for estimating the burden of animal diseases.
- **GBADs** generates estimates of the social and economic burden of animal diseases through an innovative framework that provides data and information to support sustainable animal health investment opportunities that achieve sustainable development goals (SDGs)

GBADs - Analytical structure to provide clarity on data and analysis



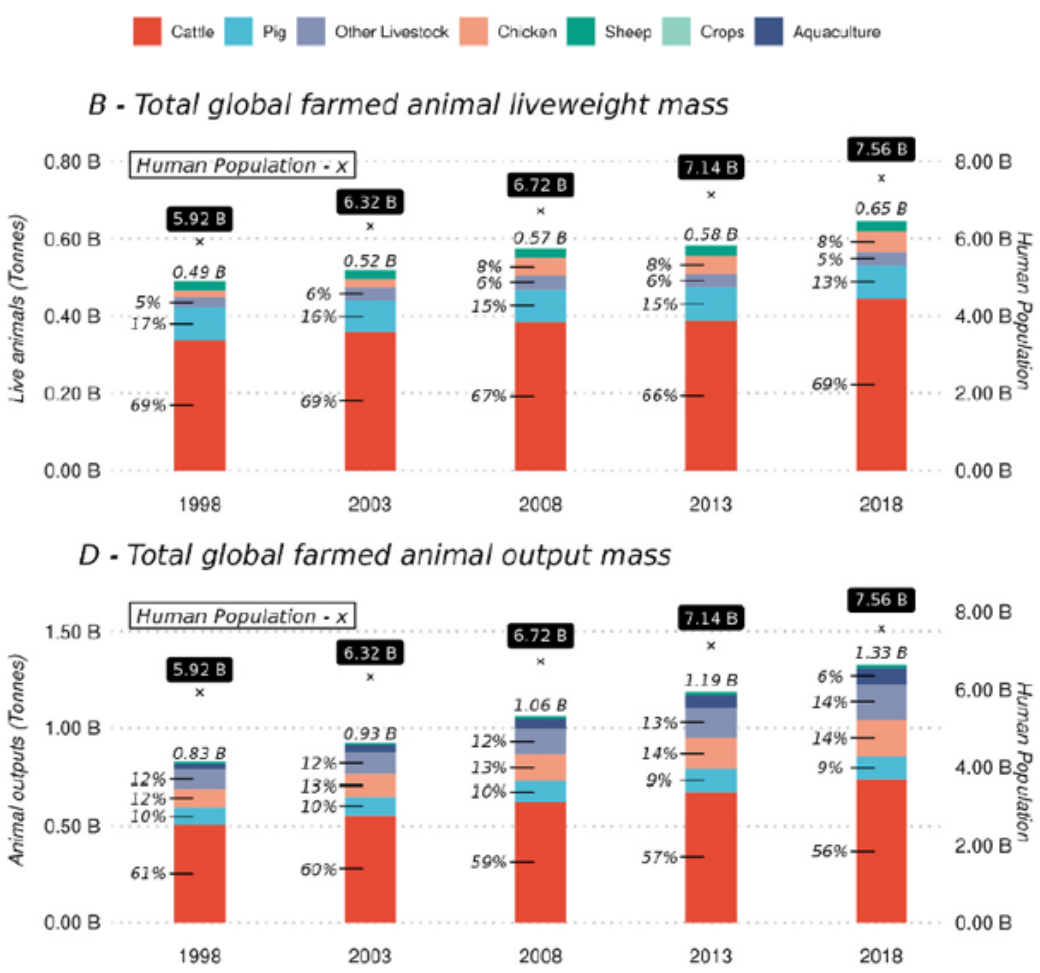
https://animalhealthmetrics.org Rushton et al 2021, https://doi.org/10.1016/S0140-6736(21)00189-6

Managing indirect effects



https://animalhealthmetrics.org Devleesschawuer et al, 2024, https://doi.org/10.20506/rst.43.3520

Global livestock biomass (Schrobback et al, 2023)



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https://doi.org/10.1016/j.prevetmed.2024.106164

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Global livestock biomass (Schrobback et al, 2023)

0.6 billion tonnes of livestock and farmed aquatic species
US$1.6 trillion invested in these animals
US$ 1.7 trillion in meat, milk and eggs

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https://doi.org/10.1016/j.prevetmed.2024.106164

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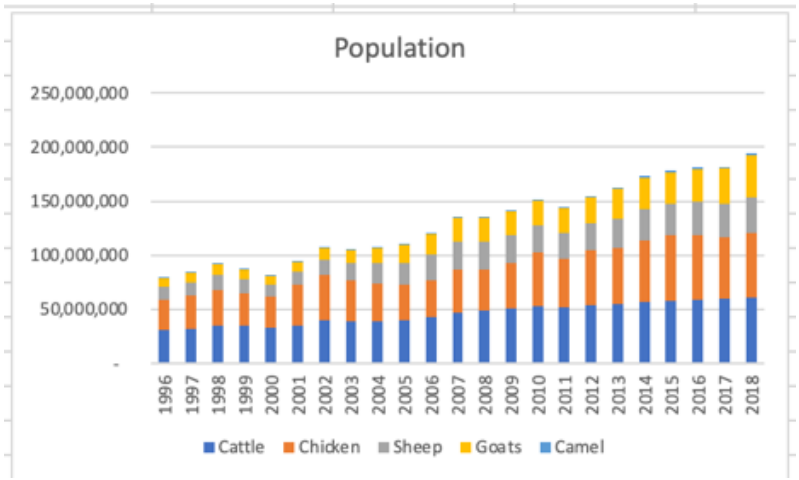
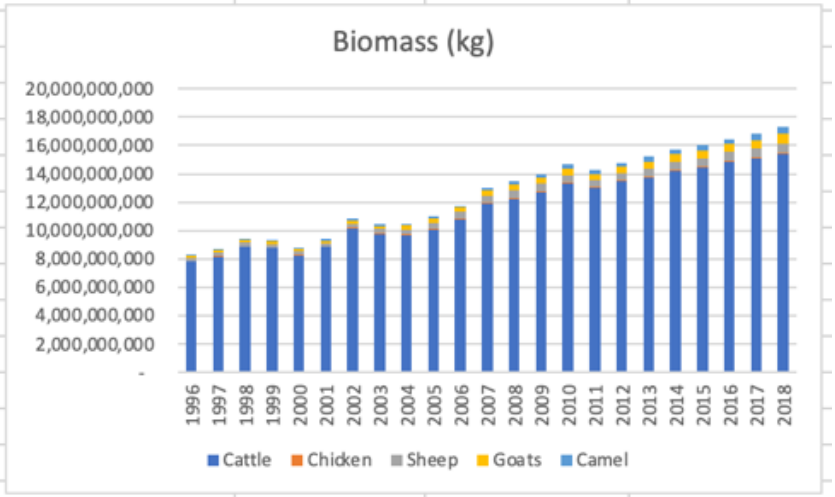
Understanding the context biomass and value (from the GBADs webpage)

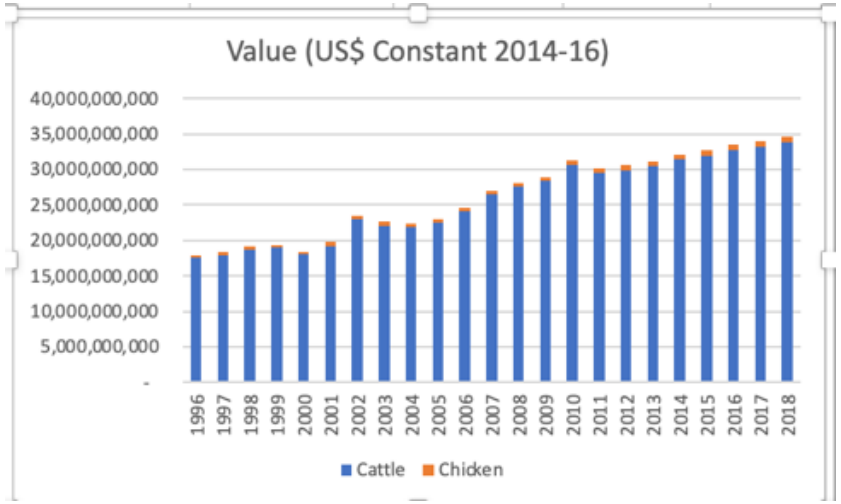
Population (head)



Biomass (kg)



Value of animals ($)



Weights → Prices

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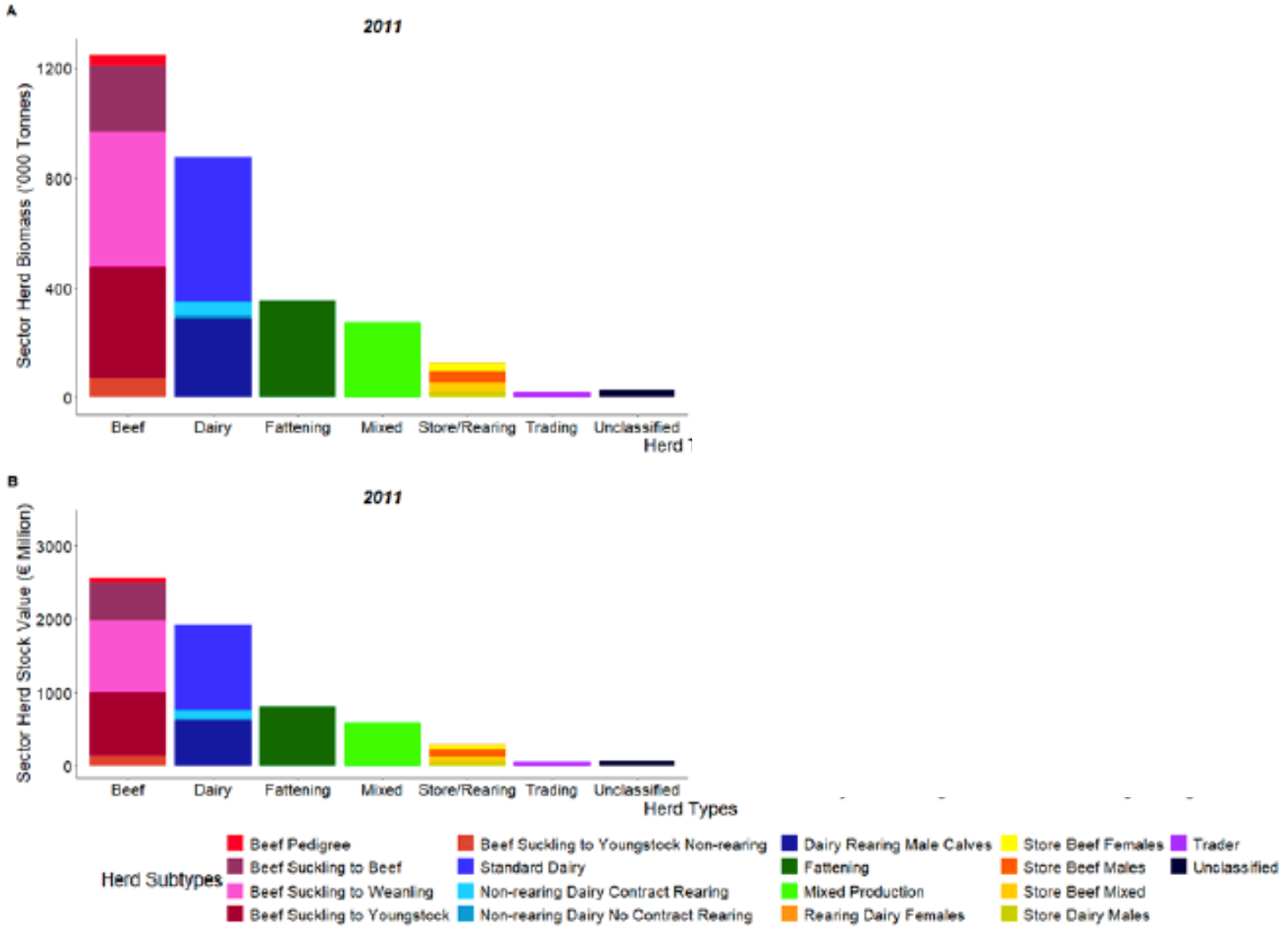
The population at risk – their biomass and value

- Irish cattle between 2011 and 2021 have shifted from beef to dairy
  - Genetics and systems have changed
- And there has been an increase in value from €6 to 8 billion
  - Liability has changed



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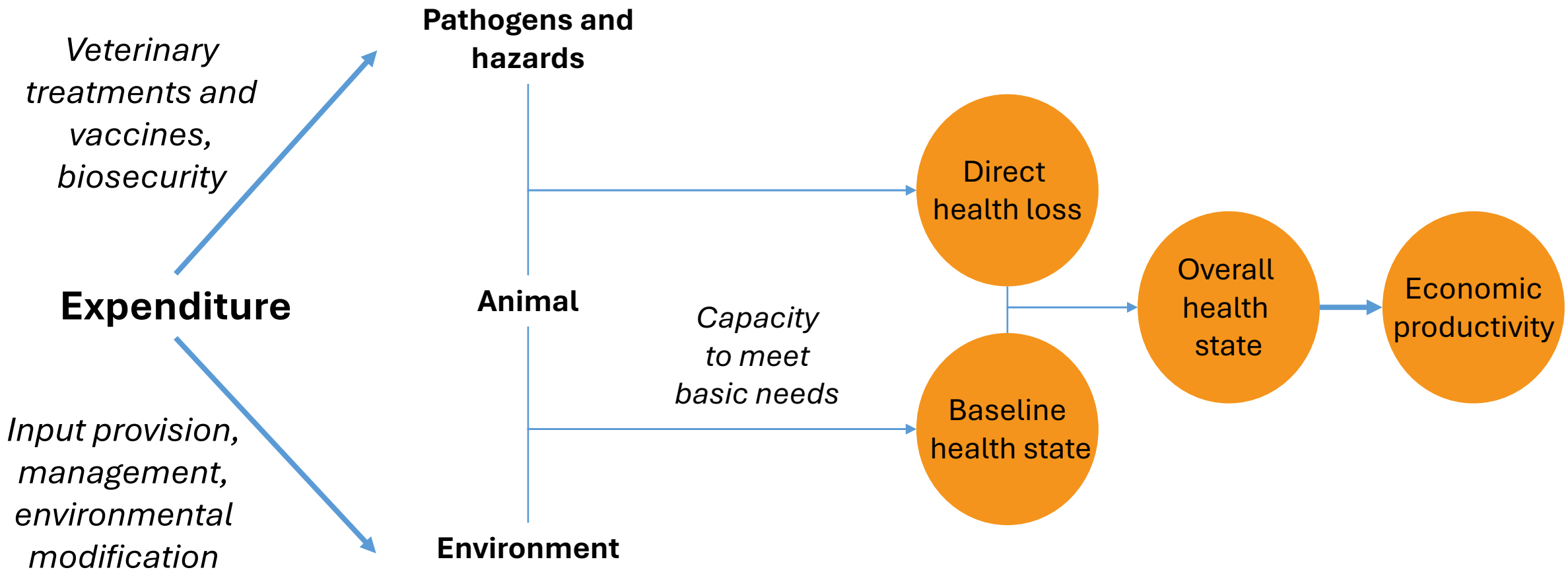
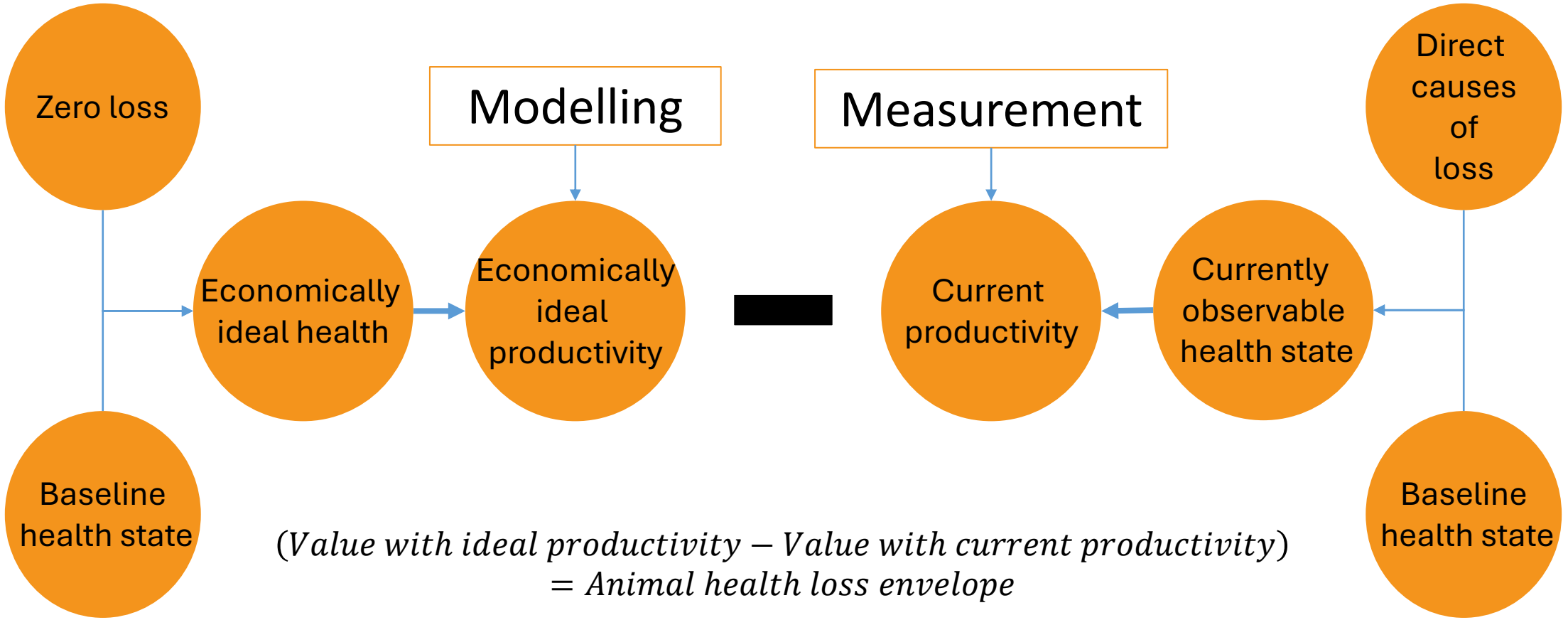
Murray et al., 2025, https://doi.org/10.3389/fvets.2025.1648948

GBADs

Health and productivity of livestock

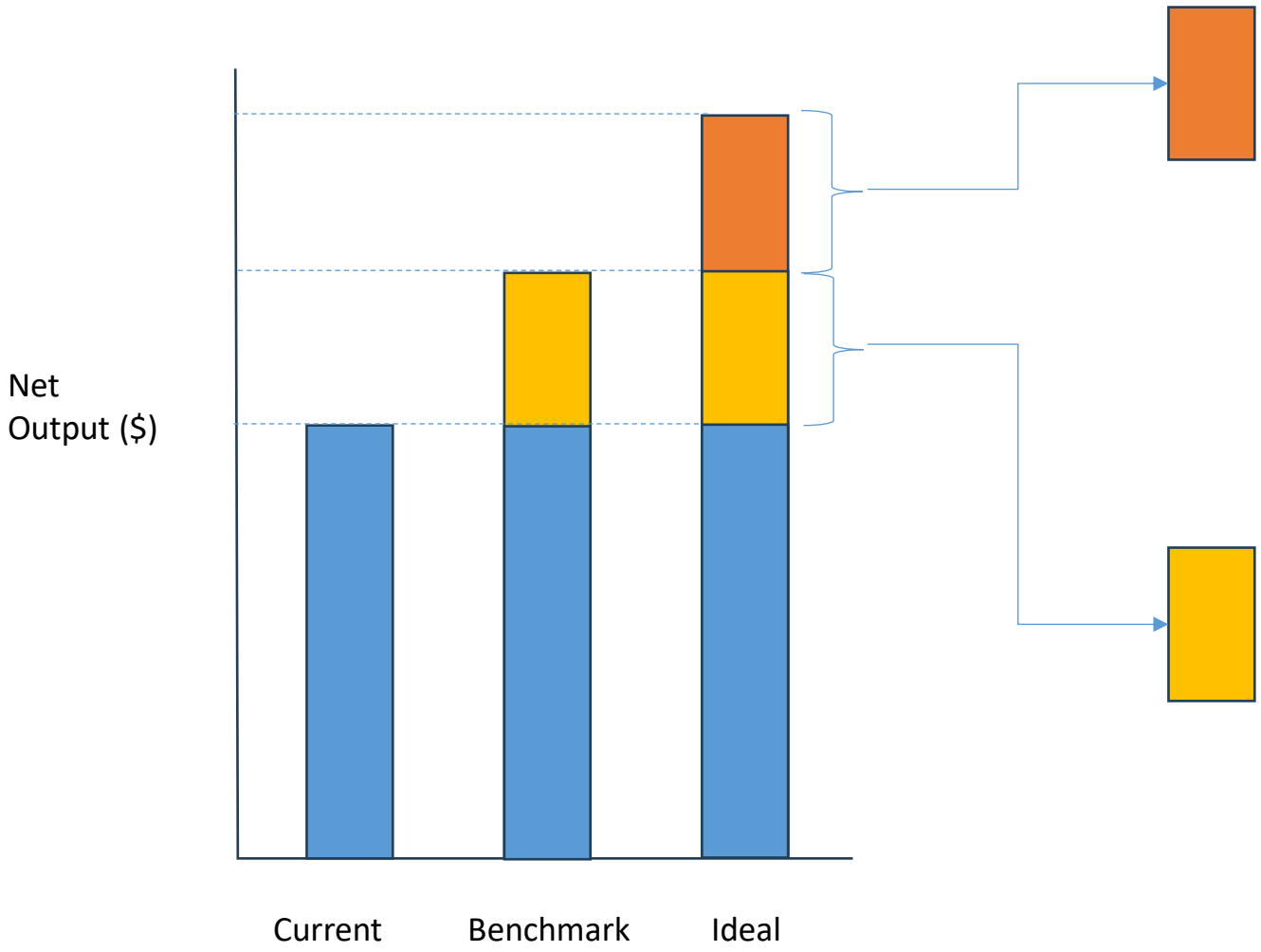


The value of health loss



$$(Value\ with\ ideal\ productivity - Value\ with\ current\ productivity) = Animal\ health\ loss\ envelope$$

GBADs gap analysis



Nature of the gap	Reason for the gap	Policy correction
Not Attainable	Technologies absent Delivery methods & management absent	Research & Development
Attainable	Access to technologies Poor allocation of inputs and services	Coordination Education, extension Information provision

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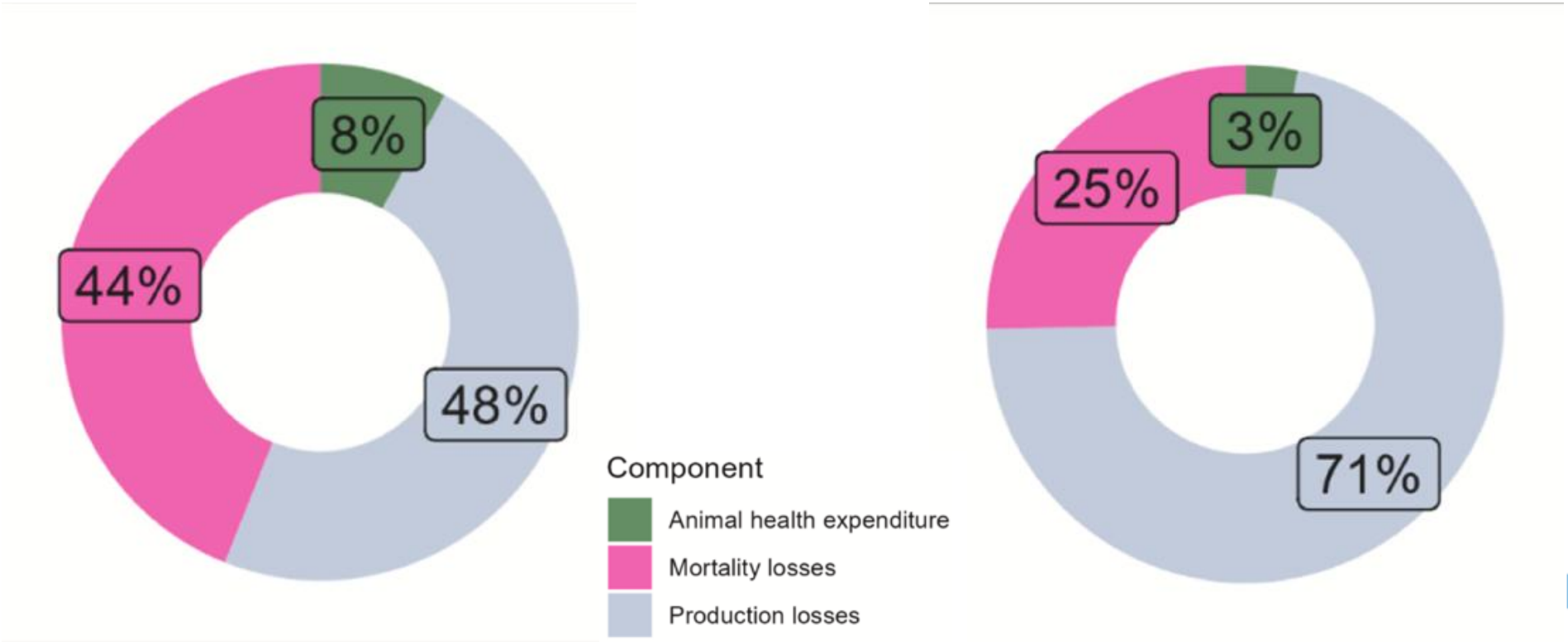
Senegal estimated losses in mixed crop livestock systems in sheep and goats (Meyer et al, 2025)

Goats

Sheep



IDRC · CRDI

https://animalhealthmetrics.org

https://doi.org/10.1016/j.prevetmed.2024.106382

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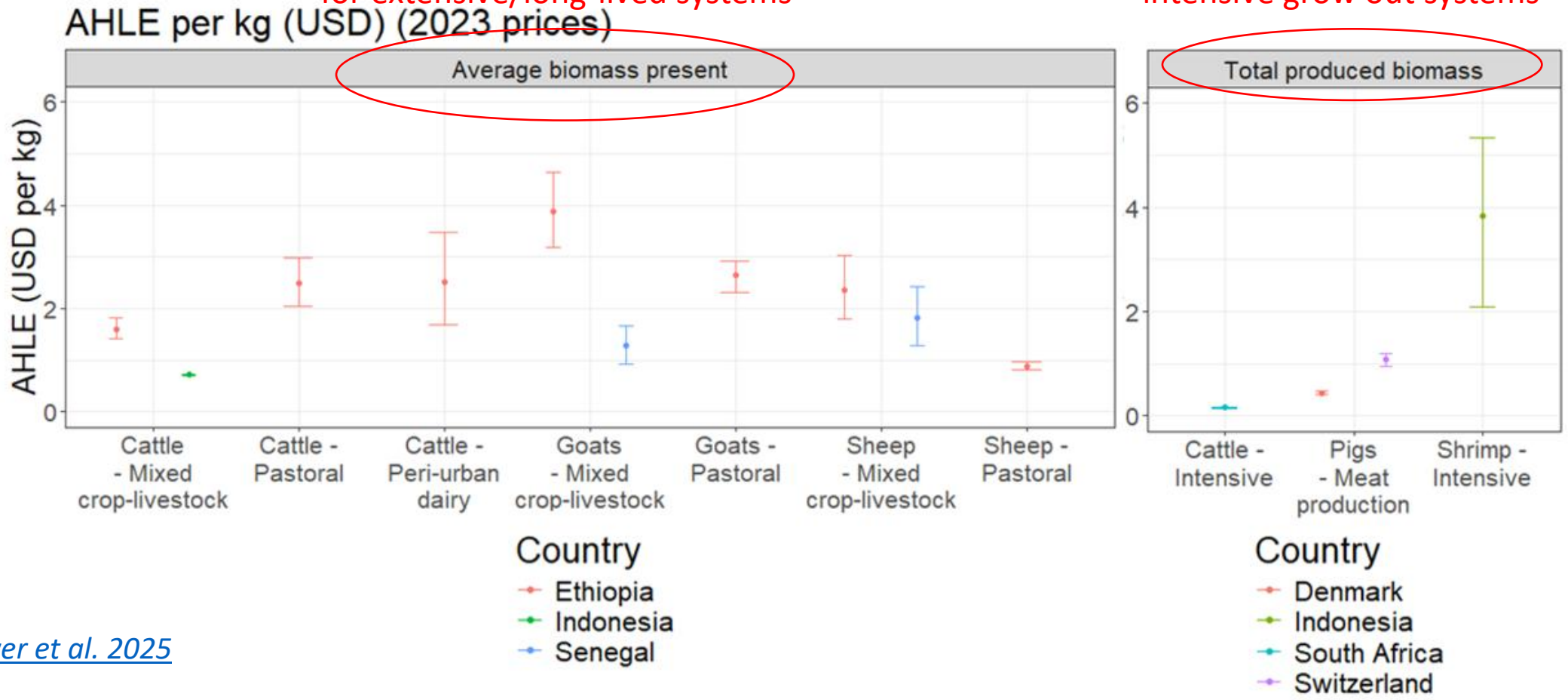
Using biomass denominator to compare AHLE across species and systems

Based on average biomass present for extensive/long-lived systems

Annual production for intensive grow out systems

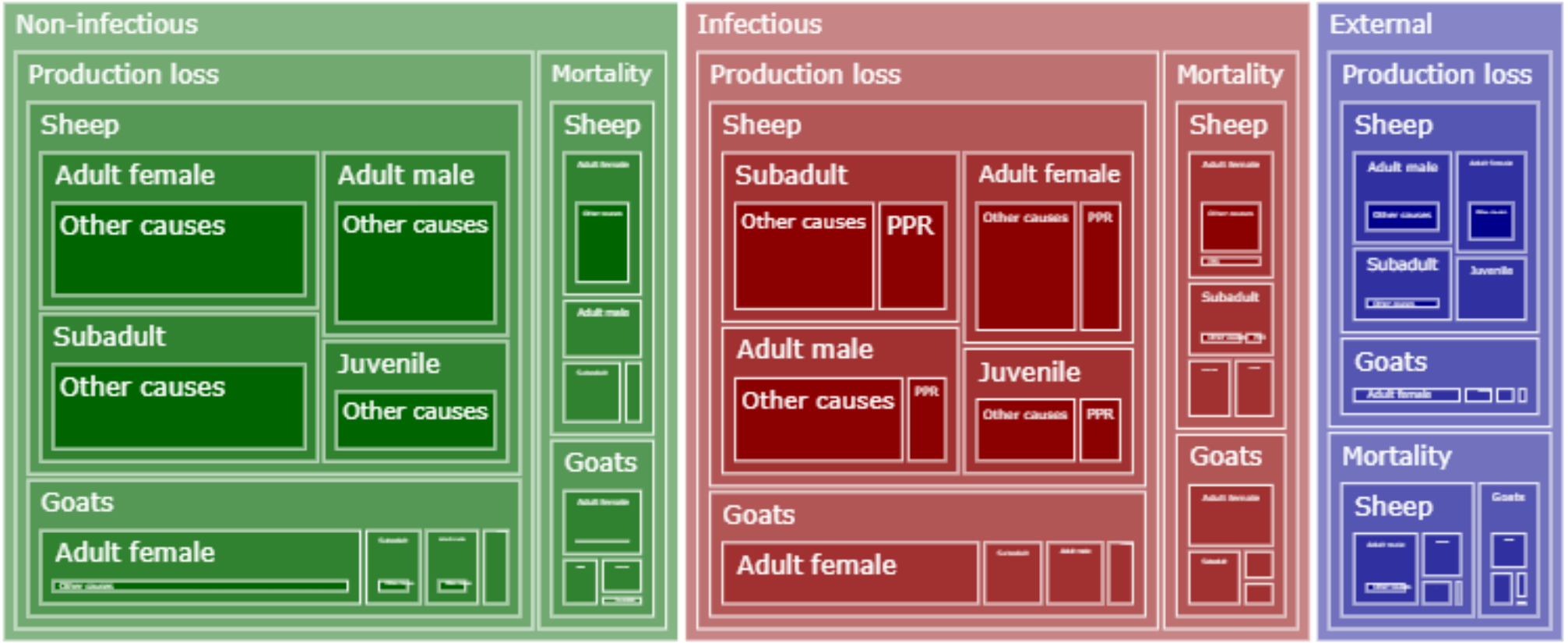


Meyer et al. 2025

https

BADs

Disaggregation of disease burden
- PPR in context: small ruminants in Senegalese mixed crop livestock production



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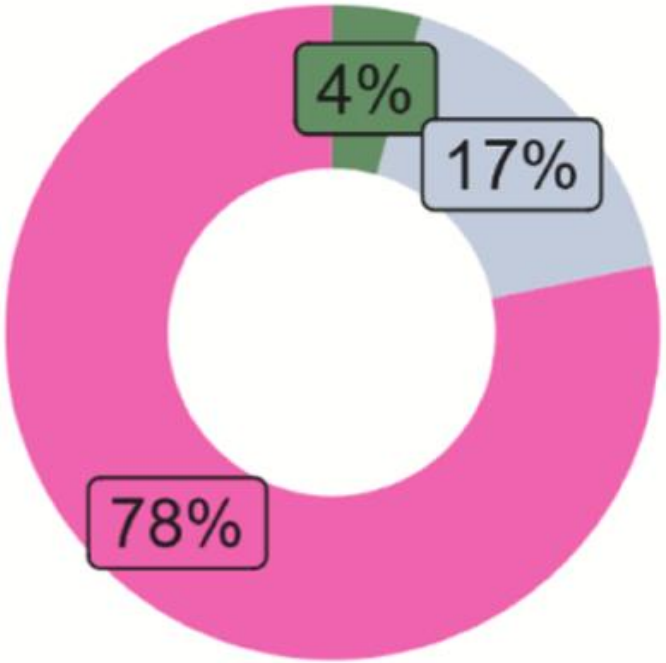
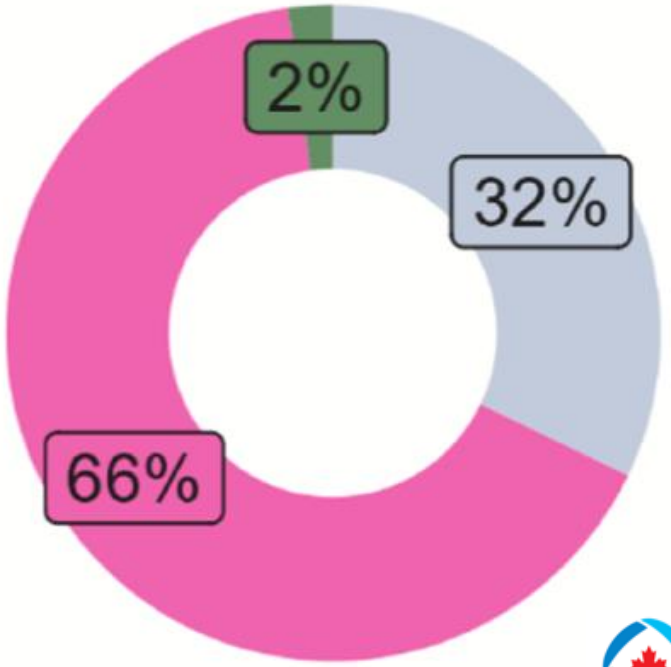
Meyer et al, 2025

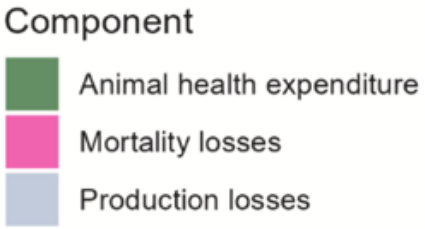
Senegal PPR attribution in mixed crop livestock systems in sheep and goats (Meyer et al, 2025)

Goats



Sheep





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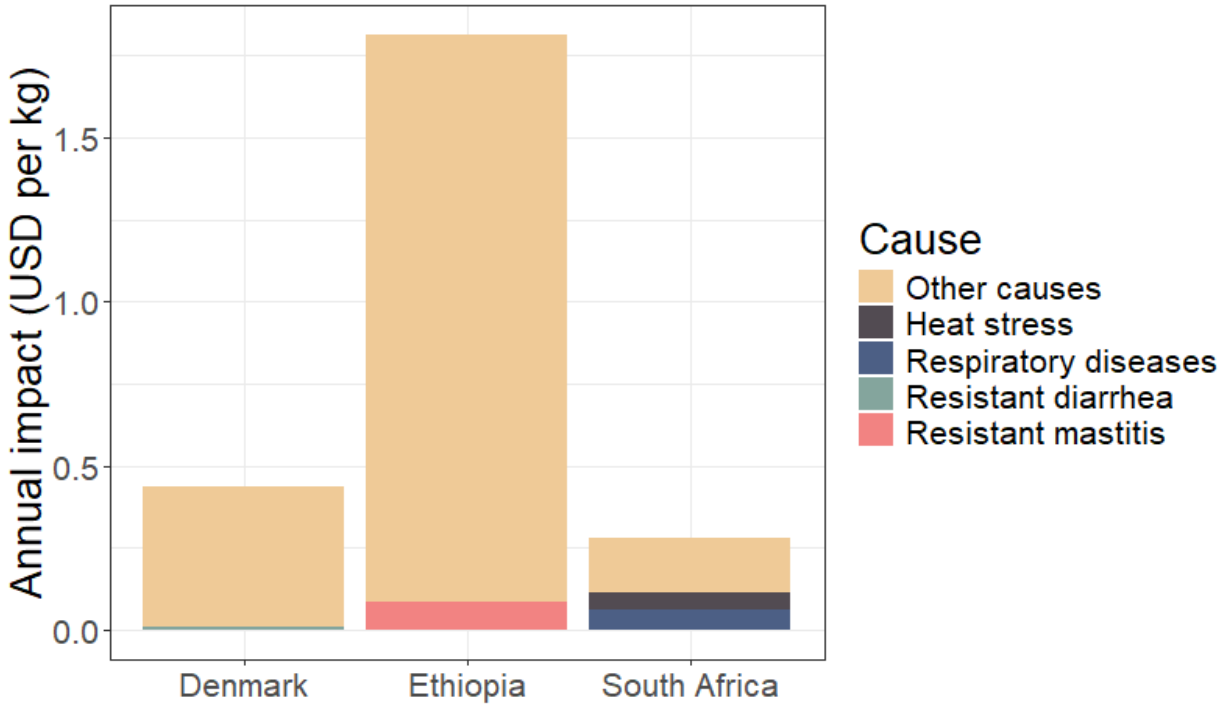
Attributing the AHLE to cause



Denmark: impact of post-weaning diarrhoea resistant to antimicrobials on the pork sector

Ethiopia: Impact of antibiotic-resistant mastitis on the cattle sector

South Africa: impact of heat stress and bovine respiratory disease complex on beef cattle in feedlots

https://animalhealthmetrics.org

Meyer et al. 2025

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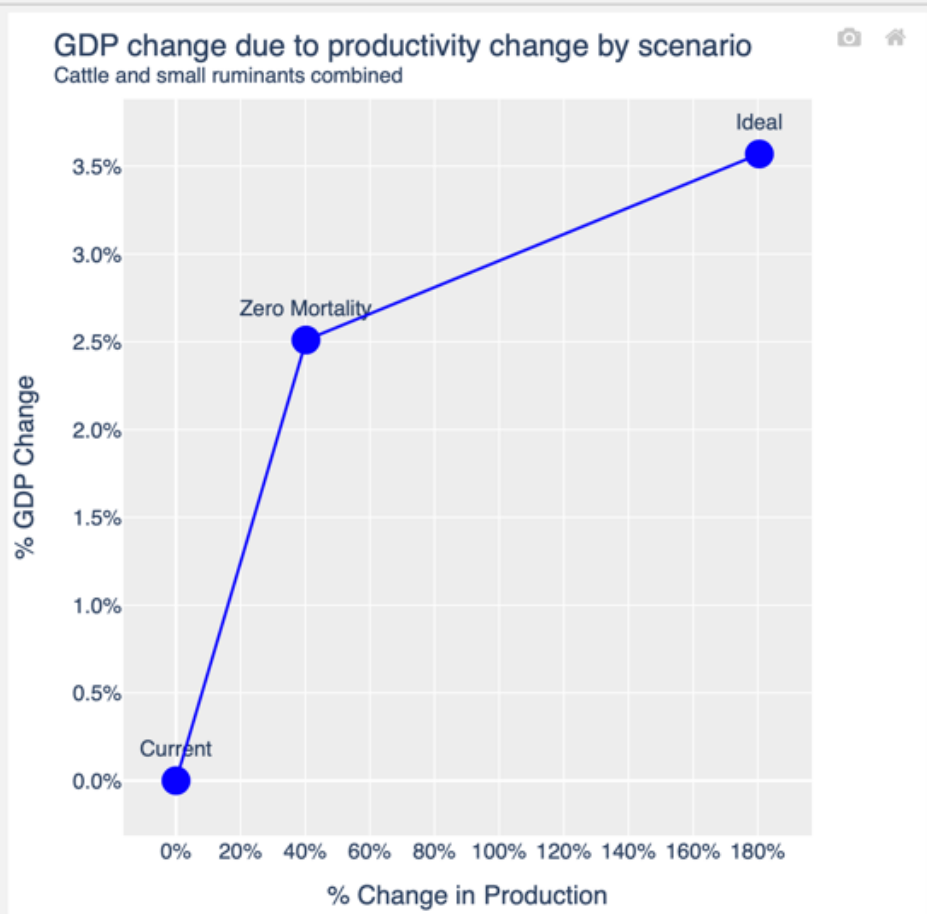
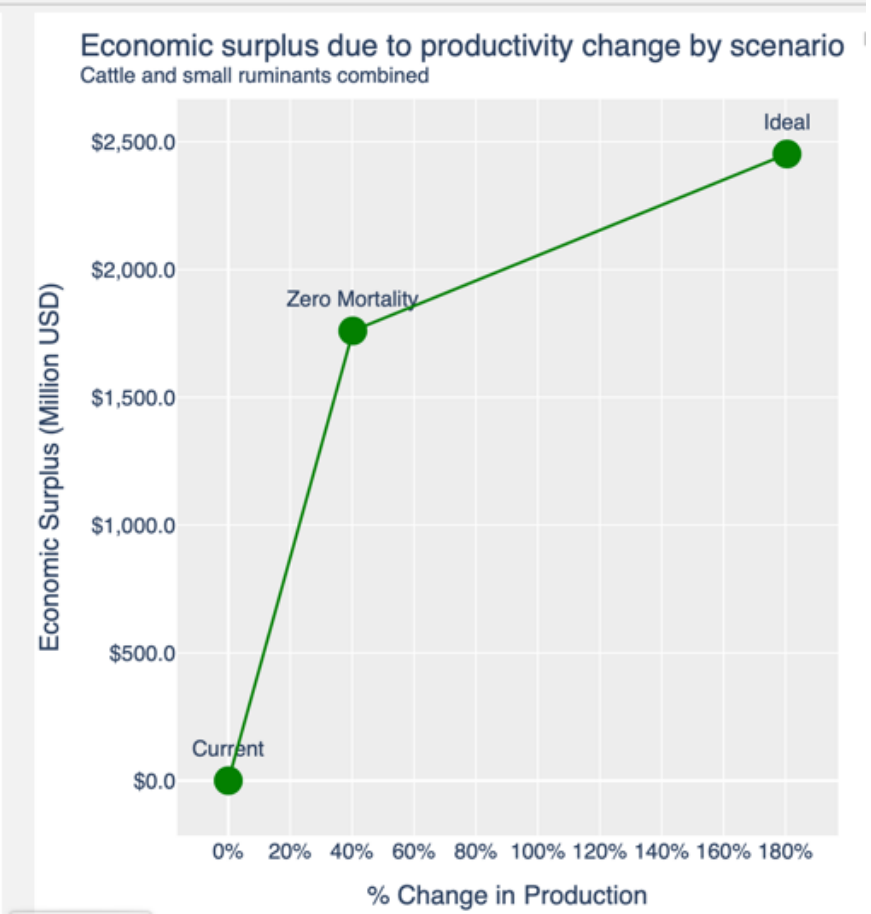
Dashboards that provide information on economy and market shifts





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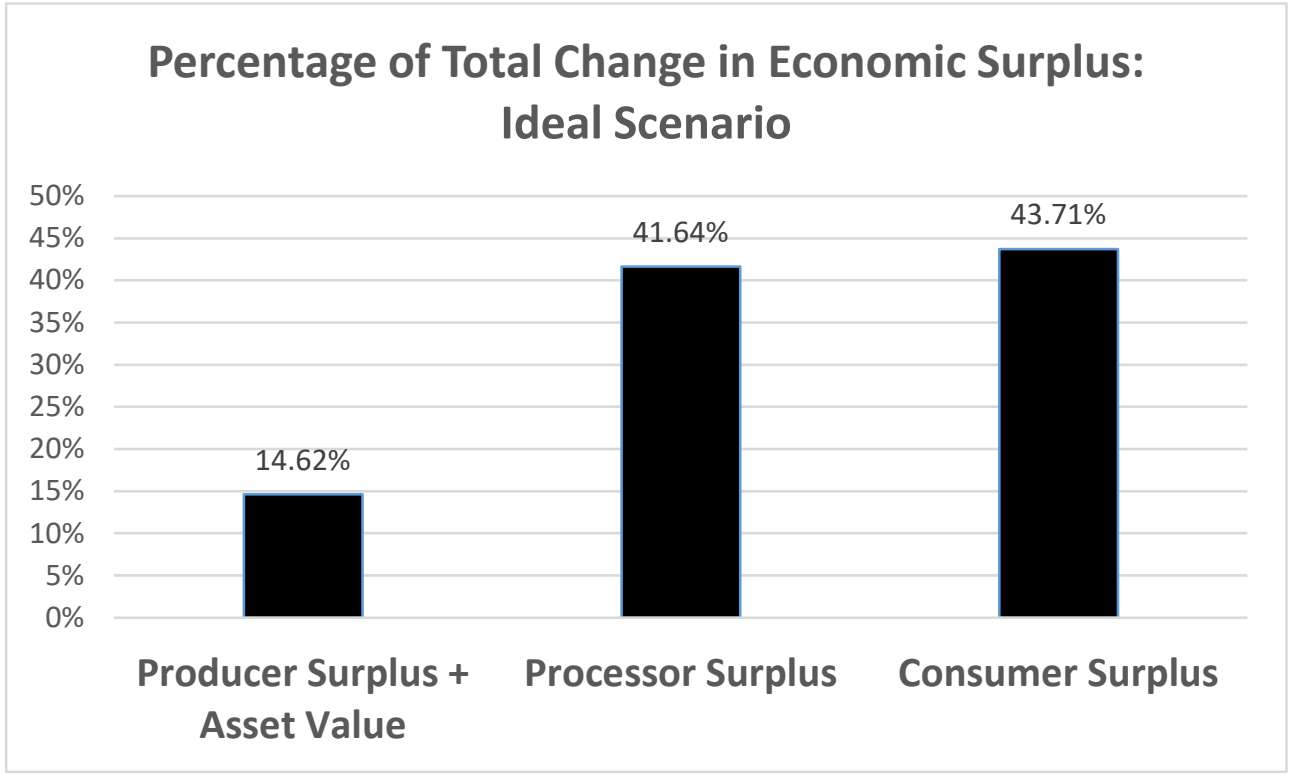
Courtesy of Tom Marsh, Golam Shakil, Dustin Pendell

Animal health services impact consumers

- Animal health burdens affect consumers and value chain actors more than producers
- A shift in animal health burdens will generate benefits across society and in particular urban consumers



Work led by Tom Marsh WSU and Dustin Pendell KSU – published Shakil et al, 2025

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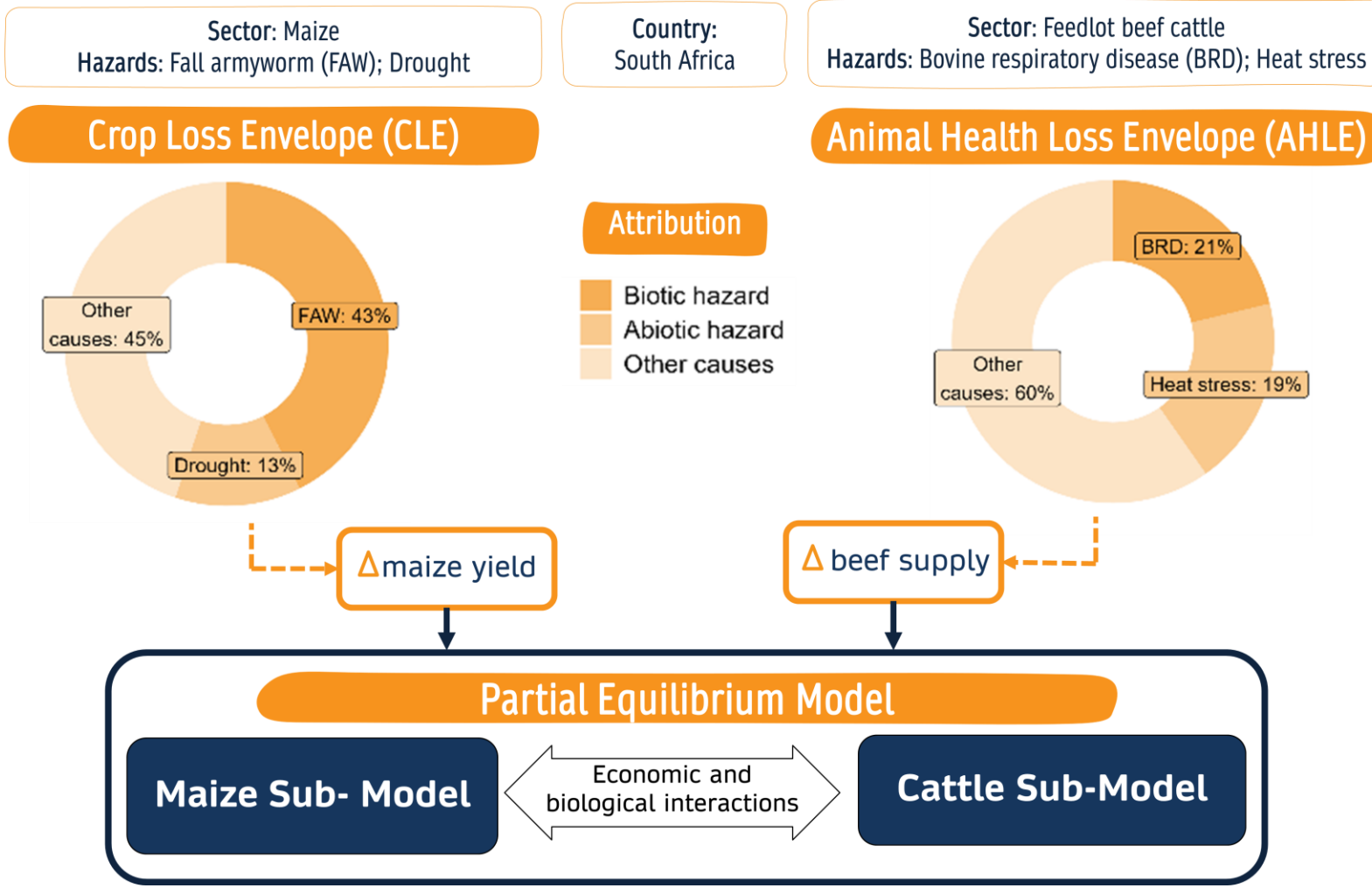
Counting the Cost of Food System Hazards

- Biotic and abiotic hazards are a major cause of biological and economic loss in crop and livestock systems.
- A novel framework to capture these losses across food systems.
- ellen.hughes@ed.ac.uk



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Kieran Simpkins, Anna Szyniszewska, Anne Meyer, Zakary Diakite, Salar Mahmood, Ellen Hughes, Gaby Oliver, Rasaki Arasah, Ben Huntington, Hannah Davies, Jonathan Rushton, Tom Marsh
Presented at ISESSAH 2025

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Counting the Cost of Food System Hazards

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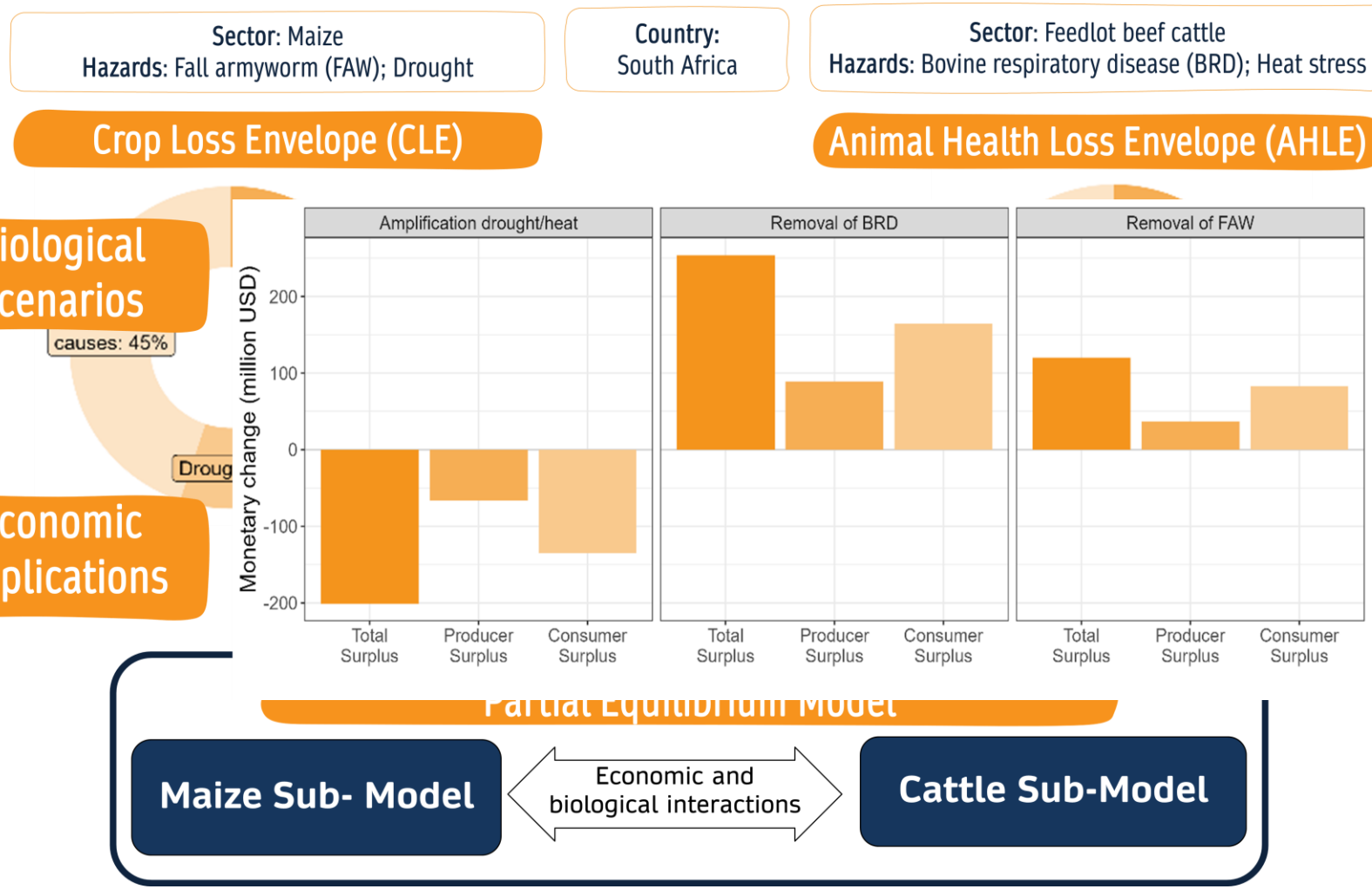

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Presented at ISESSAH 2025

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An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

The Irish Cattle Case Study

A data-driven approach

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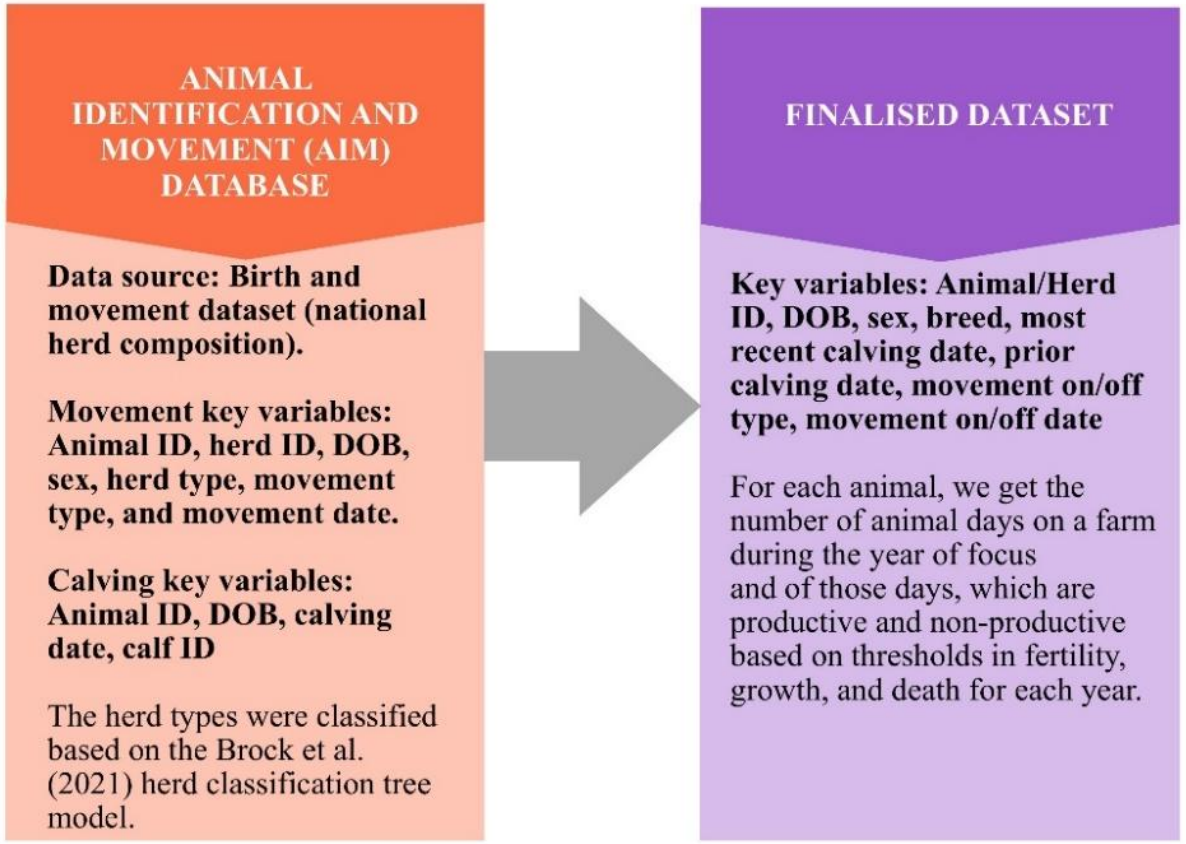
Impact of animal health losses

- Using routinely collected data.
- Simple metric that can be applied at animal-, herd-, and national-level. Allowing for benchmarking.
- Data-driven approach.



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Parameters

Title	Acronym	Description
Total Animal Days	TAD	Total number of animal days cattle are alive on the herd during the year of interest
Non-Productive Animal Days due to growth	NPADgrowth	The number of animal days prior to a productive event (calving or slaughter) that are over the threshold defined in the model
Non-Productive Animal Days due to death on farm	NPADdeath	The number of animal days classified as non-productive due to the animal dying on farm, including days attributable to the dam of pre-weaned suckler beef calves
Non-Productive Animal Days due to fertility	NPADfertility	The number of animal days over the model threshold for calving interval (the time period between consecutive calvings)
Total Non-Productive Animal Days	TNPAD	The sum of NPADgrowth, NPADdeath, and NPADfertility for a given herd over the year of interest
Total Productive Animal Days	TPAD	TAD less TNPAD for a given herd over the year of interest
Productive Day Efficiency %	PDE%	TPAD / TAD * 100
Non-productive Day Efficiency %	NPAD%	TNPAD / TAD * 100

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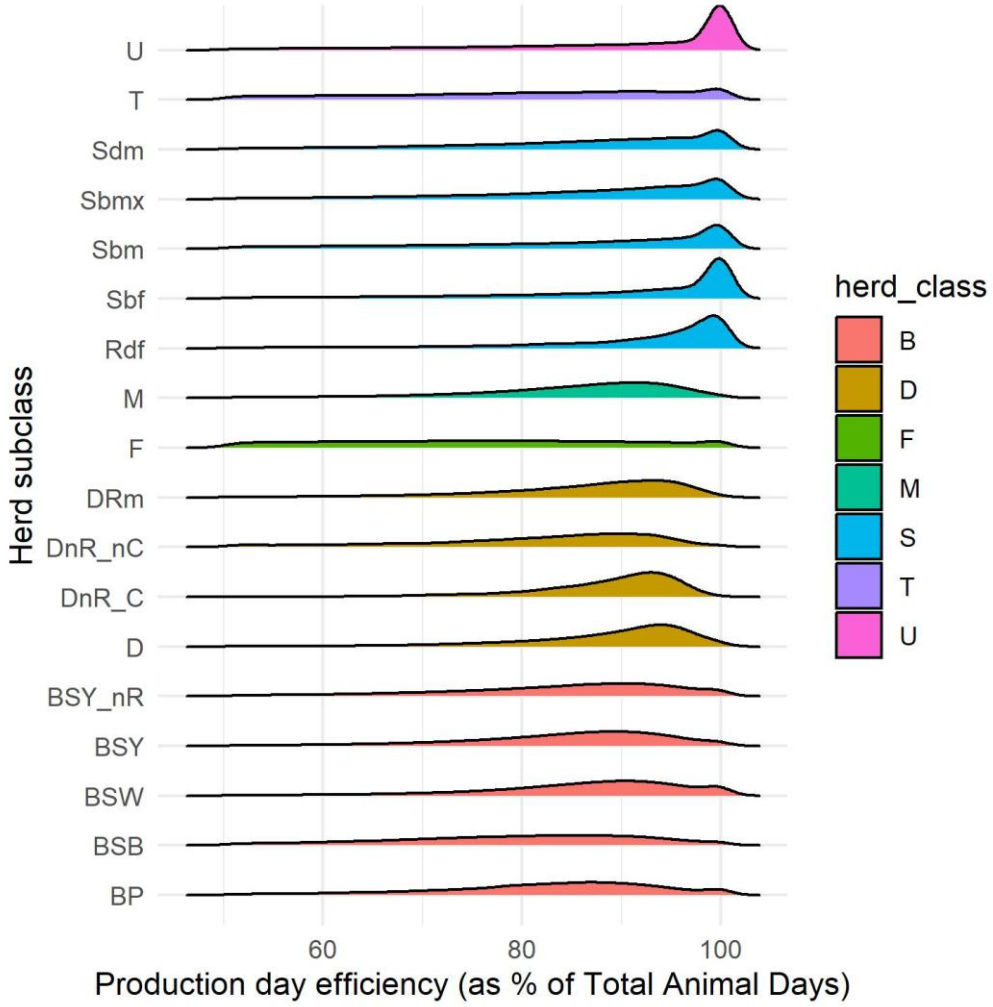
Results: Total Animal Days

- 1.4 billion in 2012 to 2.6 billion in 2021.
- Of these, 208 million and 550 million animal days were considered non-productive days.
- NPADs into economics:
  - €328 million in 2012, increasing to €1.06 billion in 2021.
- Mean production day efficiencies of 86% and 78% in 2012 and 2021.
- PDE% were highest in the dairy sector approx. 87%.
- PDE% lowest in the fattener herds 53.5%.



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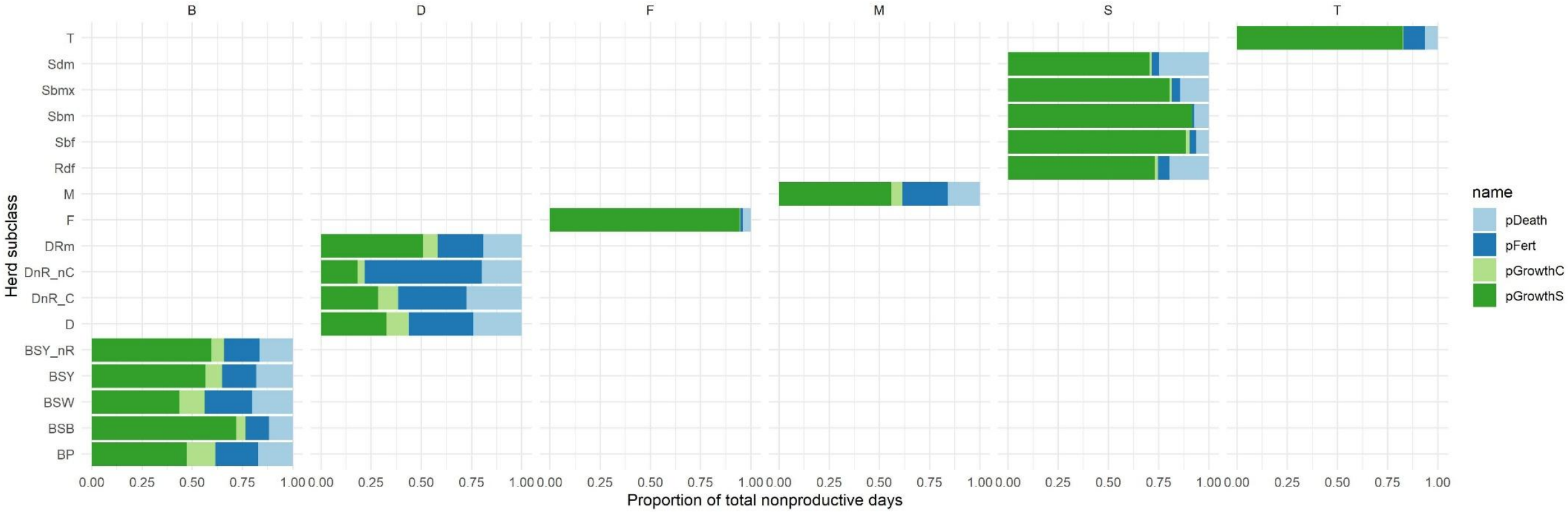
Where does the impact fall along the parameters?



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NPADs: Liver Fluke and BVD

Year	Mean difference in additional NPADs	
	BVD	LF
2014	70.2	-
2015	64.3	-
2016	41.3	74.6
2017	30	81.2
2018	18.5	75.1
2019	13.1	69.6
2020	9.61	71.2
2021	9.6	68.6

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Courtesy of Hannah Davies

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GBADs

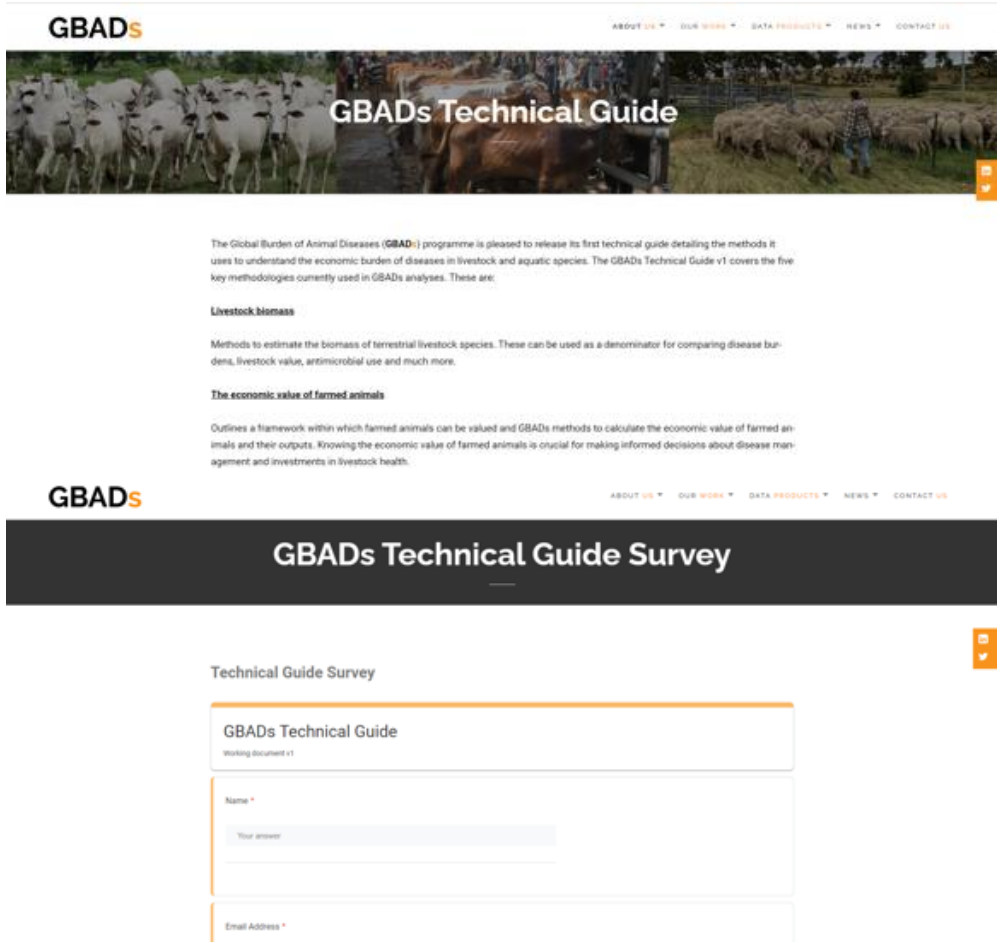
The GBADs Technical Guide

Released 30th July 2024

Available via the GBADs website - https://animalhealthmetrics.org/gbads-technical-guide/

Contact details requested at download

enable follow up and feedback



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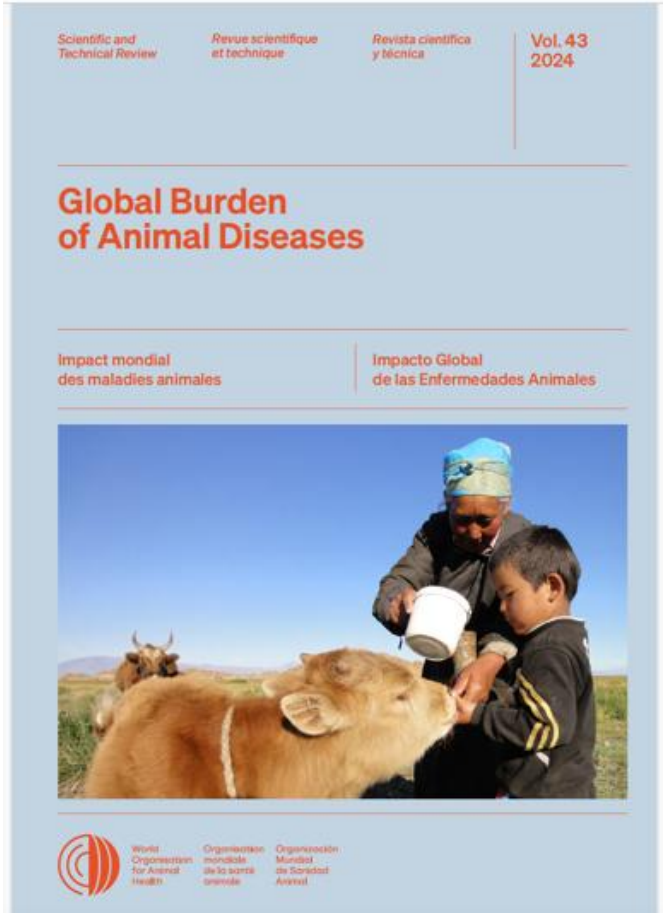
GBADs

GBADs special edition of WOAH Scientific and Technical Review (Rev Tech Sci)

- GBADs special edition of WOAH's Rev Tech Sci
- 18 articles from methods and data to links with crop and human burden estimations
- Also papers on policy issues
- https://doc.woah.org/dyn/portal/index.xhtml



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Acknowledgment: GBADs funders & collaborators

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Any Questions?

Thank you for listening

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