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Elizabeth Magowan

A deep dive into the role of livestock in our ecosystems and economy

Director of Sustainable Agri-Food Sciences, AFBI
President of BSAS (2023/24)

afbini.gov.uk

Key messages

- Due to the environmental impact (N, P, C and Biodiversity) resulting from the volume of livestock to feed the demand of a global population, livestock production is being challenged
- The primary function of livestock is to produce meat and milk for human consumption
- Livestock also contribute to society in many more ways
- They are part of a larger and highly interconnected economic and biological ecosystem
- As livestock scientists we need to expand our thinking to consider their role in the ‘system’ and challenge ourselves on how Livestock ‘fit’

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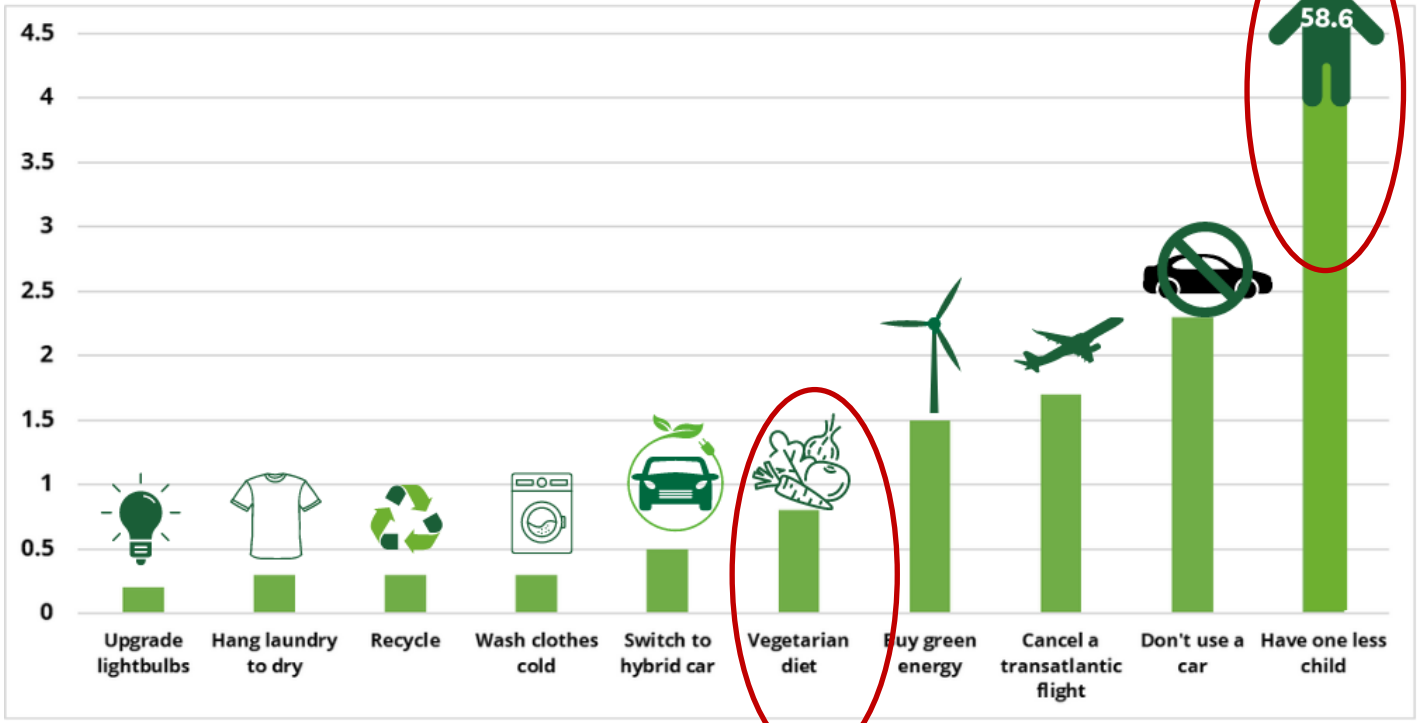
Ways to reduce your CO2 emissions

Annual reduction in tonnes CO2-equivalent (tCO2e)



Source: Seth Wynes; Kimberly A Nicholas | Environmental Research Letters, Volume 12, Number 7

Legitimacy for livestock – Prof F O'Mara:

- Highly nutritious food
- Maximises use of land
- Plays a key role in circularity

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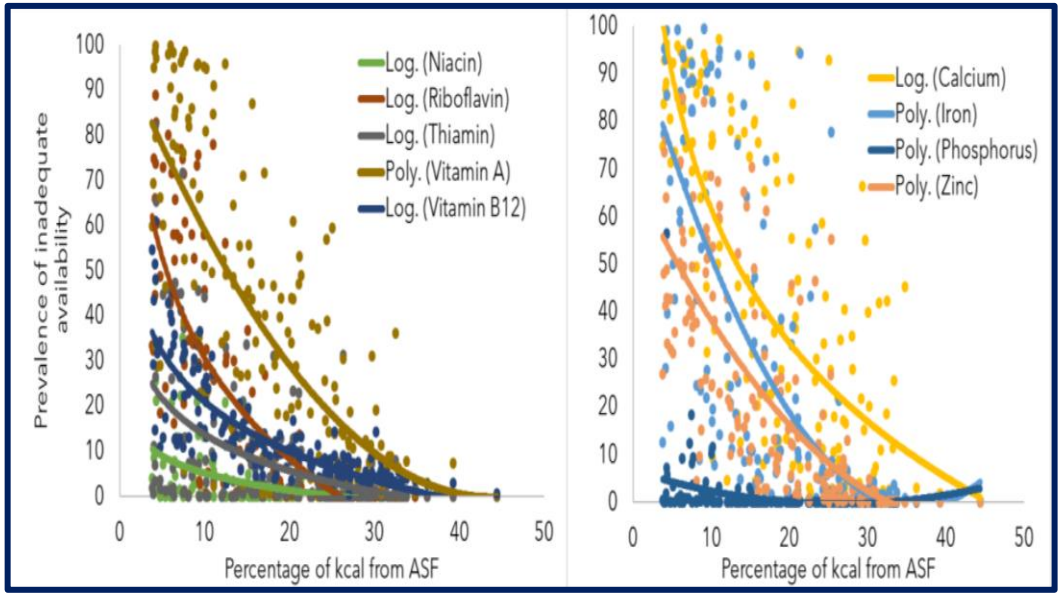
Average National Diets Low in Animal-Source Foods Do Not Meet Needs for Essential Micronutrients



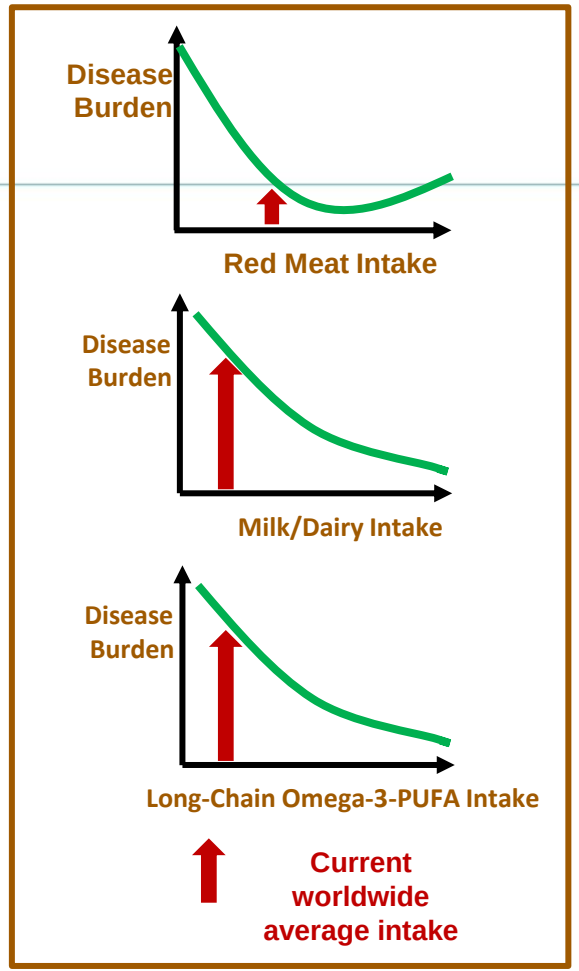
Nordhagen S, Beal T & Haddad L. The role of animal-source foods in healthy, sustainable, and equitable food systems. GAIN Discussion Paper 2020

Prof Alice Stanton pers. communication

Animal-Source Foods are the Top Sources of Commonly Lacking Nutrients

	2+ nutrients	Iron	Zinc	Vitamin A	Calcium	Folate	Vitamin B_{12}
Liver	Very high	Very high	Very high	Very high	Low	Very high	Very high
Spleen	Very high	Very high	Very high	Low	Low	Low	Very high
Small dried fish	Very high	Very high	Very high	Very high	Very high	Low	Very high
Dark leafy greens	Very high	High	Low	Very high	Very high	Very high	Low
Bivalves	Very high	Very high	Very high	Very high	Very high	Moderate	Very high
Kidney	Very high	Very high	Very high	High	Low	High	Very high
Heart	Very high	Very high	Very high	Low	Low	Moderate	Very high
Crustaceans	Very high	Moderate	Very high	Low	Moderate	Low	Very high
Goat	Very high	Very high	Very high	Low	Low	Low	Very high
Beef	Very high	High	Very high	Low	Low	Low	Very high
Eggs	Very high	Moderate	Very high	Very high	Low	Very high	Very high
Cow milk	Very high	Low	High	Very high	Very high	Low	Very high
Canned fish w/ bones	Very high	Moderate	Very high	Low	Very high	Low	Very high
Lamb/mutton	Very high	High	Very high	Low	Low	Low	Very high
Cheese	Very high	Low	Very high	Very high	Very high	Low	Very high
Goat milk	High	Low	Moderate	High	Very high	Low	Low
Pork	High	Low	Very high	Low	Low	Low	Very high
Yoghurt	Moderate	Low	Low	Low	Very high	Low	Very high
Fresh fish	Moderate	Low	Moderate	Low	Low	Low	Very high
Pulses	Moderate	Moderate	Moderate	Low	Low	Very high	Low
Teff	Moderate	Very high	Moderate	Low	Low	High	Low
Vit A-rich fruit/veg	Low	Low	Low	Very high	Low	High	Low
Other vegetables	Low	Low	Low	Low	Low	Low	Low
Quinoa	Low	Moderate	Moderate	Low	Low	Very high	Low
Canned fish w/o bones	Low	Low	Moderate	Low	Low	Low	Very high
Seeds	Low	Low	High	Low	High	High	Low
Fonio	Low	Moderate	Moderate	Low	Low	Moderate	Low
Chicken	Low	Low	High	Low	Low	Low	High
Other fruits	Low	Low	Low	Low	Low	High	Low
Millet	Low	Moderate	Moderate	Low	Low	Moderate	Low
Unrefined grain prod	Low	Low	Moderate	Low	Low	Moderate	Low
Sorghum	Low	Moderate	Low	Low	Low	Low	Low
Roots/tubers/plantains	Low	Low	Low	Low	Low	Low	Low
Whole grains	Low	Low	Moderate	Low	Low	Low	Low
Nuts	Low	Low	Low	Low	Low	Low	Low
Refined grain products	Low	Low	Low	Low	Low	Low	Low
Refined grains	Low	Low	Moderate	Low	Low	Low	Low

Beal T & Ortenzi F. Priority micronutrient density in foods. Frontiers in Nutrition 2022



Prof Alice Stanton pers. communication

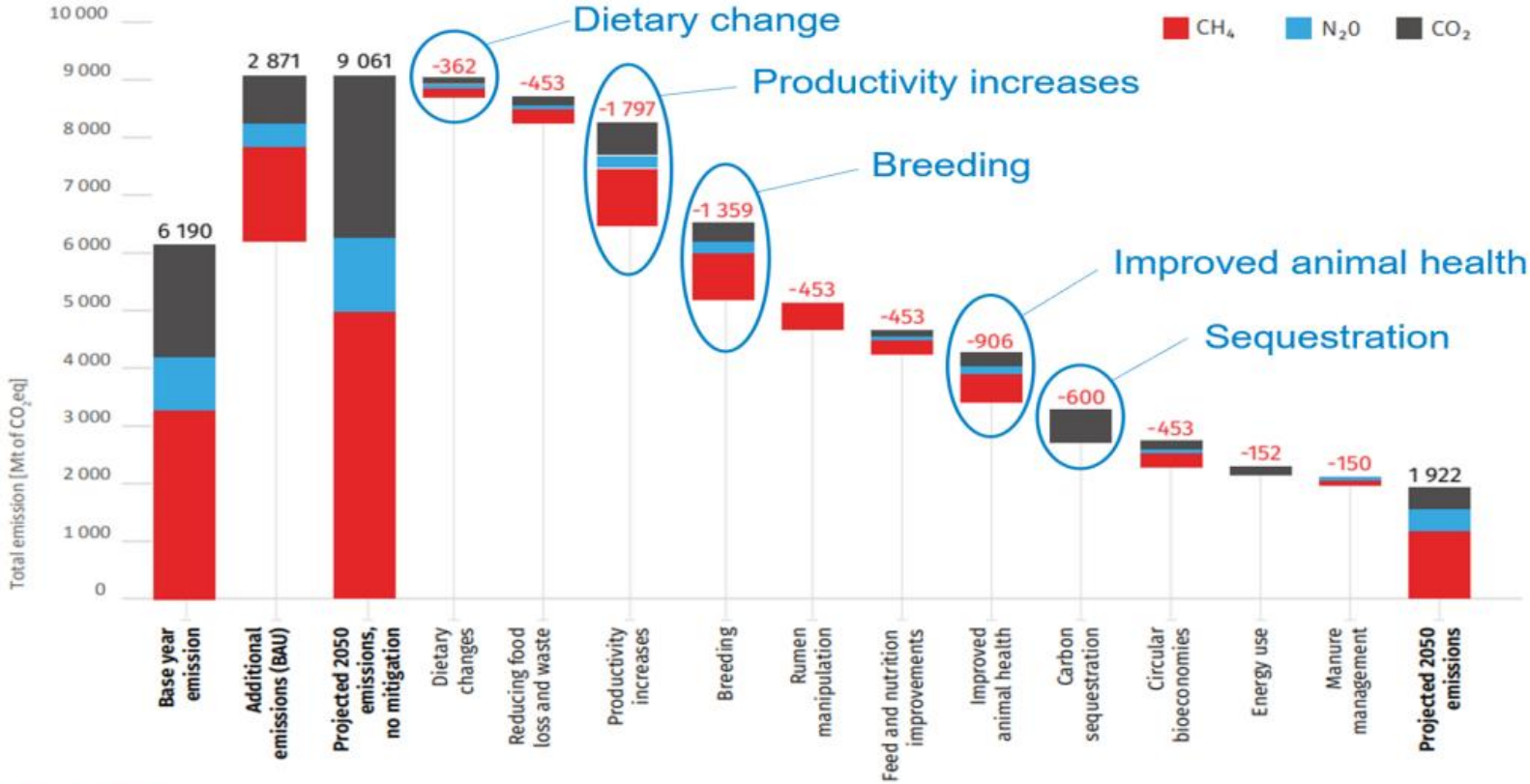
There is increasing acceptance and recognition within government policies and advice that meat and milk are important in human diets e.g.

FAO (Dec 2023)
Achieving SDG 2 without breaching the 1.5 °C threshold: A global roadmap

Food Standards Scotland (March 2024):
Approaches to modelling impact of reduction in meat and dairy consumption on nutrient intakes and disease risk

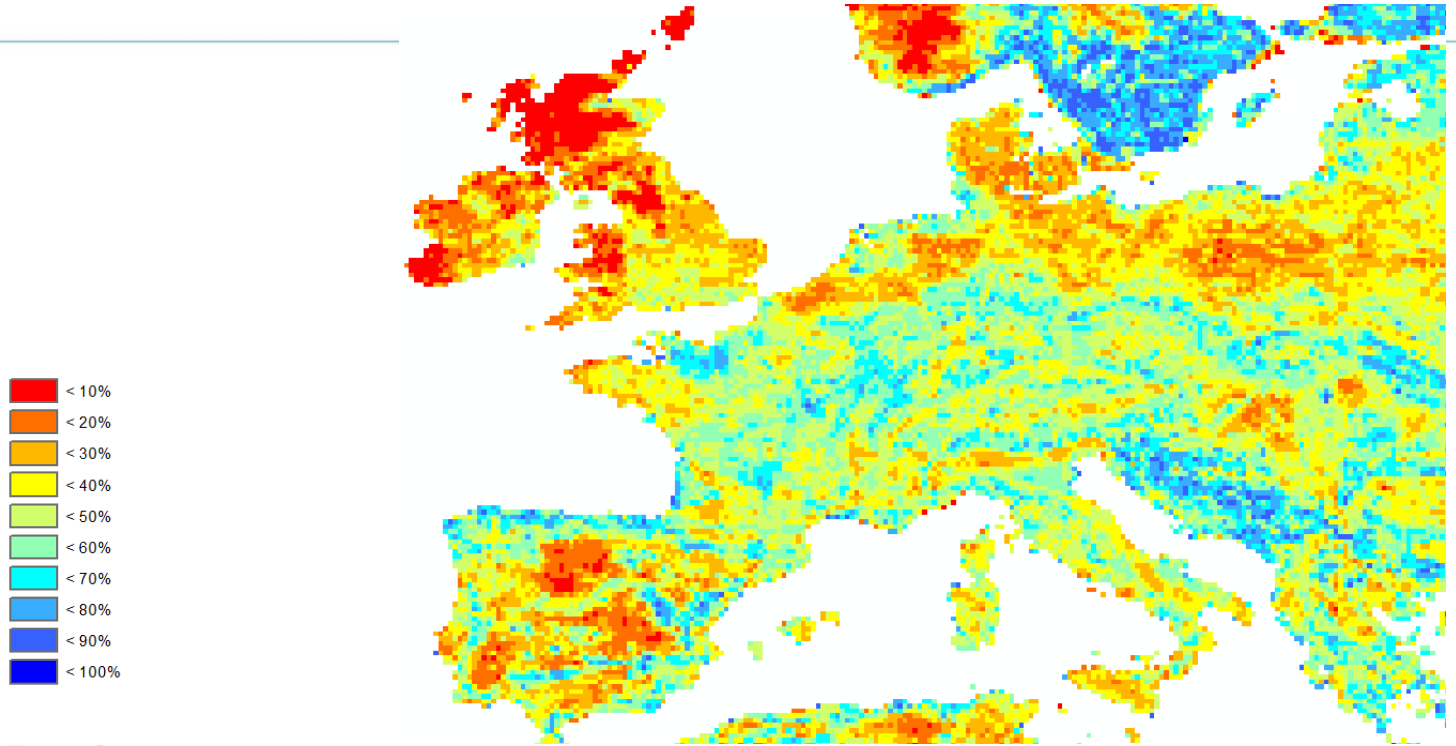
FAO, Pathway to Lower Emissions by 2050

Prioritising & Giving Context to the Change required Globally



Source: UN FAO 2023 Pathways towards lower emissions (fao.org)

Suitability for arable conversion:



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Čengić *et al*. (2023). Similar results from Ramankutty *et al*. (2002), Zabel *et al*. (2014), Schneider *et al*. (2022) and others.

MEAT TUNNEL VISION

The Regeneration Weekly | soil.works!

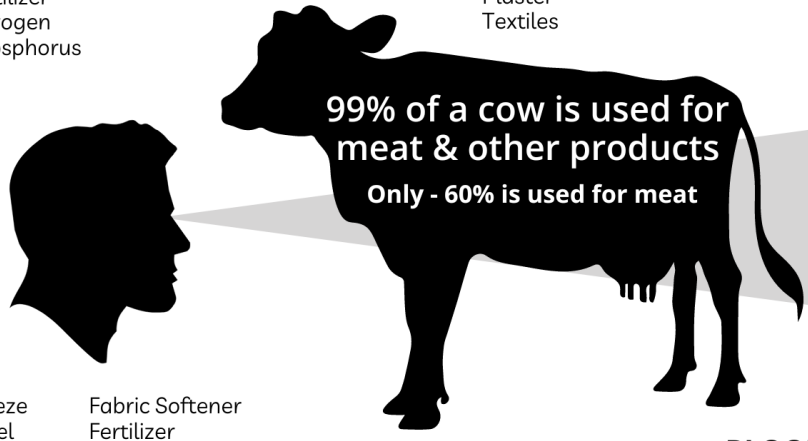
BONES
Charcoal
Fertilizer
Glass
Refined Sugar

HAIR
Air Filters
Brushes
Felt
Hair
Insulation
Plaster
Textiles

MILK
Adhesives
Cosmetics
Medicines
Plastics

SKIN
Adhesives
Baseballs
Candles
Confectionery
Flavourings
Footballs
Gelatin
Leather
Medicines
Sheetrock

MANURE
Fertilizer
Nitrogen
Phosphorus



MEAT
Steaks
Roasts
Hamburger
Etc

FAT
Antifreeze
Biodiesel
Candles
Cement
Chalk
Chewing Gum
Cosmetics
Crayons
Creams
Deodorant
Detergents
Explosives
Fabric Softener
Fertilizer
Insulation
Linoleum
Matches
Medicines
Lubricants
Paint
Perfume
Plastics
Rubber
Textiles

ORGANS
Anti-aging creams
Hormones, enzymes, vitamins & other medicial materials
Instrument strings
Medicine

BLOOD
Adhesives
Cake Mixes
Dyes
Imitation eggs
Lab materials
Minerals

HOOVES & HORNS
Adhesives
Conditioner
Lamination
Pet Food
Photo Film
Plant Food
Plastics
Plywood
Shampoo
Wallpaper

Livestock has a role in many biological and economic systems

Key questions…

- Quantifying the wider role of livestock – currently and in the future…
- How do we take forward science to explore and verify this role
- What skills do we need to think and work in a systems based manner?
- How can we better communicate the ‘fit’ of livestock in the wider economic and biological ecosystem at a local, national and global level?

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