

The Connection Between Animal Proteins and Why We Eat the Foods We Do

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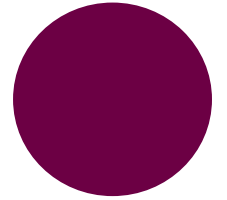
Disclosures

AFFILIATION/FINANCIAL INTERESTS (prior 12 months)	ENTITIES
Grants/Research Support	
Scientific Advisory Board/Consultant/ Board of Directors	
Owner	
Speakers Bureau	
Stock Shareholder	
Employee	National Pork Board
Other	

About Me

My Background:

- University of Wisconsin-Stout
- Iowa State University
- Retail Dietitian, Coborn's Inc.
- Director of Nutrition, Health and Wellness Initiatives, National Pork Board



Overview

1. Identify at least 3 key factors influencing Americans' food choices related to animal proteins.
2. Differentiate between various animal proteins in terms of their nutritional value and nutritional benefits across the lifespan.
3. Evaluate the role of animal proteins in a sustainable and health-conscious dietary pattern.

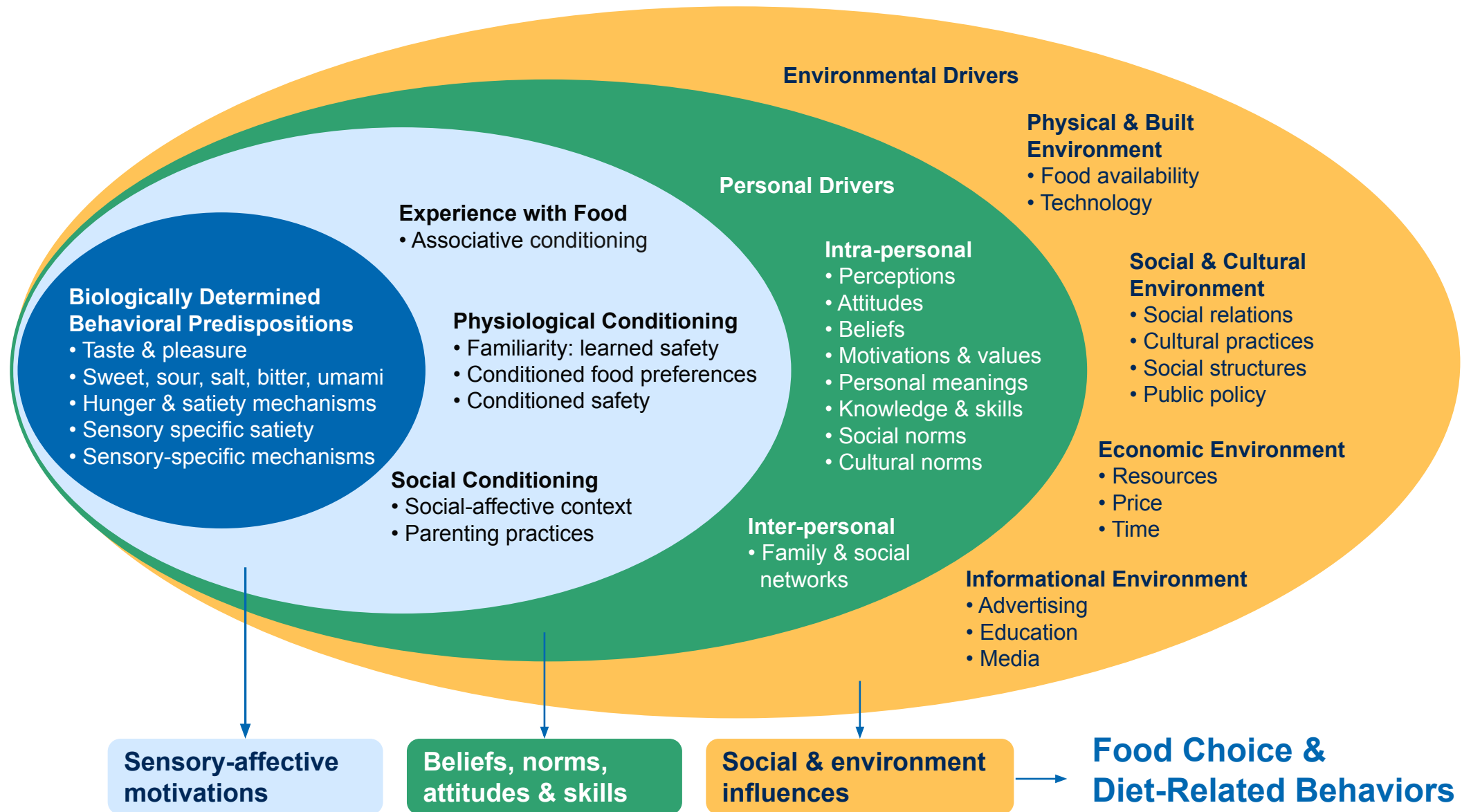


Key Factors Influencing Americans' Food Choices Related To Animal Proteins

Factors that Drive Food Choices

- Taste, texture, appearance
- Economics
- Early food experiences
- Habits
- Culture
- Geography
- Advertising
- Social factors
- Health concerns
- Emotions
- Green foods
- Sustainable foods

Socioecological Model Influencing Food Choice



Nearly 9 in 10
Americans Include
Meat In Their Diet

Another record year

Meat volume remains above pre-pandemic levels

Meat department sales 2018-2022:



Dollars:
+25.9% vs. 2019

Pounds:
+0.8% vs. 2019

Source: IRI, Integrated Fresh, MULO, 1 week % growth versus year ago 2018-2022


























































































































Importance of 'Taste', 'Value' and 'Protein'

Importance When Purchasing Meat (% A lot of influence) (2022)



National Total Protein Perceptions - Scorecard

Fresh and Processed Perceptions – Total US National

	Key Measures:	Share of Importance			2021					2022					H1'23							
		2021	2022	H1'23	PROTEIN RANKING																	
Tastes Good 	Tastes delicious Something I love eating Something I crave Something my family requests Is fun to eat Good for when I want to indulge	29%	17%	17%																		
Good for Me/My Family 	I feel good about eating Good source of protein Has many health benefits/Is nutritious Good option when eating light Is hearty/filling	21%	15%	15%																		
Easy Prep 	Easy to prepare Quick to prepare Less involved to cook than other meat Clean-up is easy/minimal	18%	12%	12%																		
Routine/Versatile 	Regular part of our weekly meal routine Featured in recipes I want to try Is a "go-to" when I don't have time Don't have to give much thought about how to make/use it	18%	13%	13%																		
Safety 	Safe to eat Not concerned about undercooking it	NA	14%	14%	<i>Not Reported Previously</i>																	
Value 	Good value for the money Fits my budget	NA	20%	21%	<i>Not Reported Previously</i>																	
Good For The Planet* 	Sourced from animals raised in a clean environment Farmers committed to animal care Sourced from animals fed a nutritious diet Produced in environmentally responsible way Is locally sourced	14%	9%	8%																		

*Total Protein Ranking
(not asked for fresh/processed)

Base: Total US National (2021 n=6515; 2022 n=6462; H1'23 n=3201)

Q9: Which of the following types of meat/seafood does this statement apply to?

Q9b: For each type of meat, please indicate whether you believe the statement is true of the fresh meat products available to buy in the store(s) where you buy meat.

*Good for the Planet attributes only asked at protein level in 2021 and 2022 so it was not weighted by usage. In Q4'21, "Produced in an environmentally responsible way" was asked for Plant-based meat alternatives.

See slide 74 for explanation of how this data is calculated | Plant based asked at the cut level starting in H1'23

Purchase Drivers & Pork Positioning

Most important to communicate:

Taste / Flavor

Consumer Drivers Impacting Consumption and Purchase Intent:

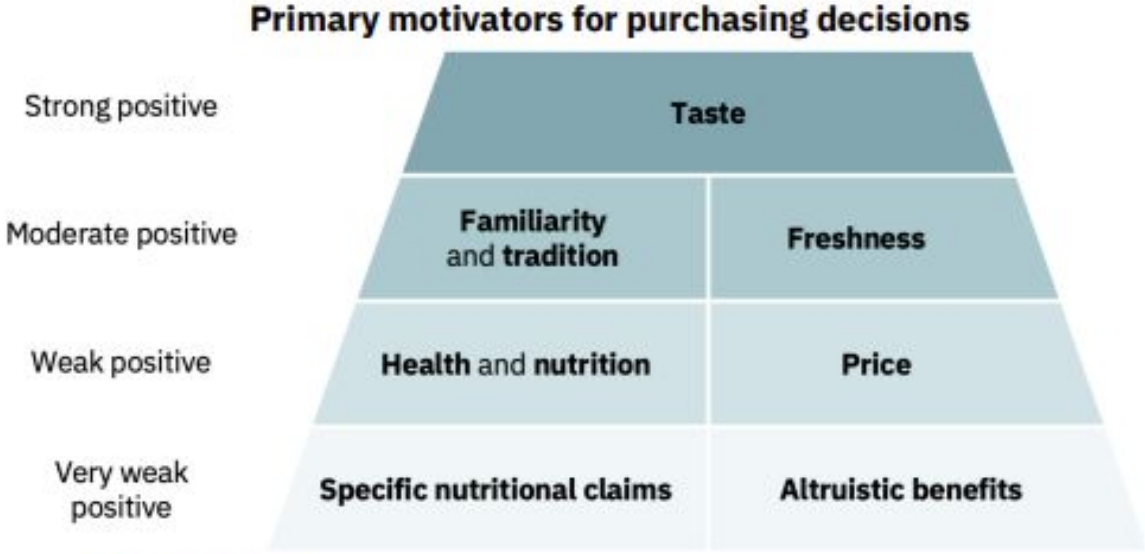
(in order of importance)

1. Price*
2. **Taste/Flavor**
3. **Nutrition**
4. **Value**
5. Safe to Eat
6. Routine/Versatile
7. Easy Prep
8. Sustainability

*take price off the table

Purchase Drivers are Consistent

When implicit + explicit tests are run, here are the motivators:



Source: GFI & Mindlab study

Meat department category performance
Total U.S., 52 Weeks ending Dec 28, 2019

Category	Total pounds sold	% of pounds sold on promotion	% of pounds sold on promotion change vs. year ago	Avg. retail price	Plant-based price premium
Beef	5,349,192,669	38.0%	-0.5	\$4.82	105%
Chicken	4,930,548,632	37.9%	-0.5	\$2.33	324%
Pork	2,360,773,609	45.8%	2.1	\$2.78	255%
Turkey	1,125,408,344	49.6%	2.0	\$2.17	355%
Meat Alternatives	7,555,188	29.9%	10.6	\$9.87	-
Total Fresh Meat*	14,059,766,800	40.0%	0.1	\$3.39	191%
Total Meat*	19,584,977,666	38.9%	-0.4	\$3.53	180%

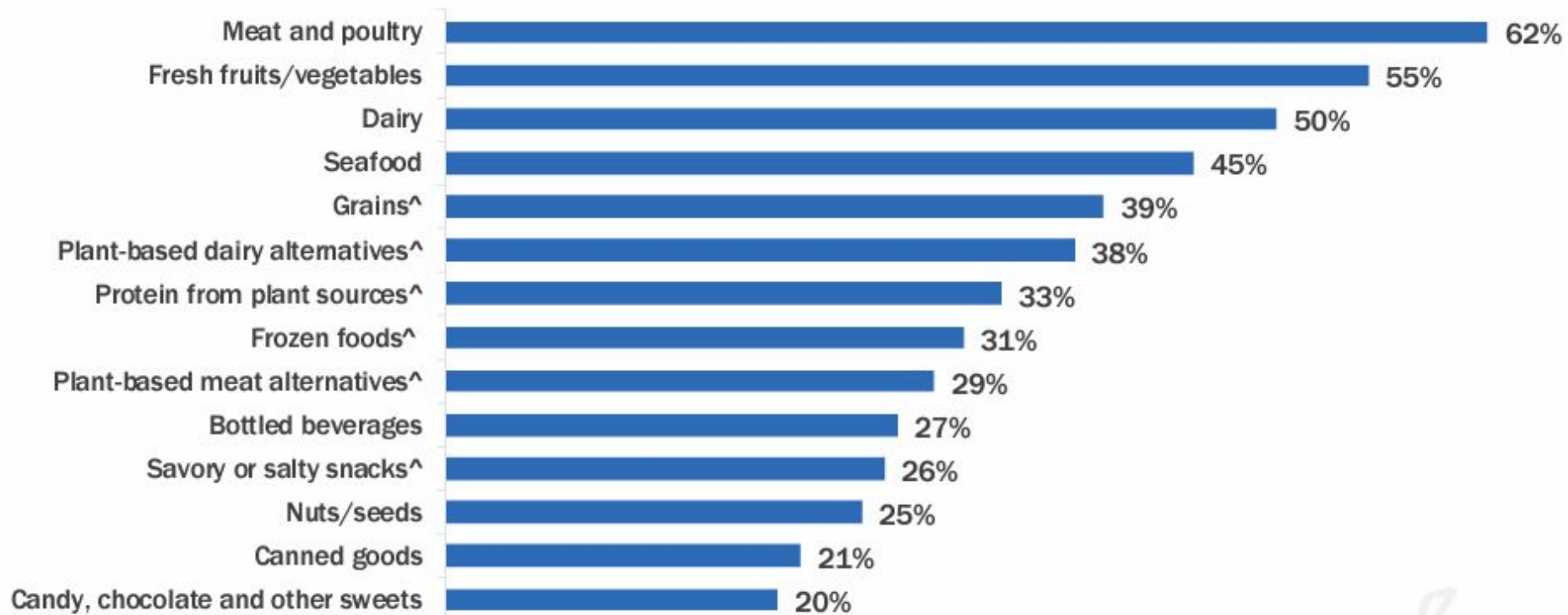
Source: Nielsen Perishables Group

*Note: Total fresh meat includes the categories above it as well as other categories like veal and lamb. Total meat includes total fresh meat and other categories like processed meat, lunch meat, and fully cooked meat.

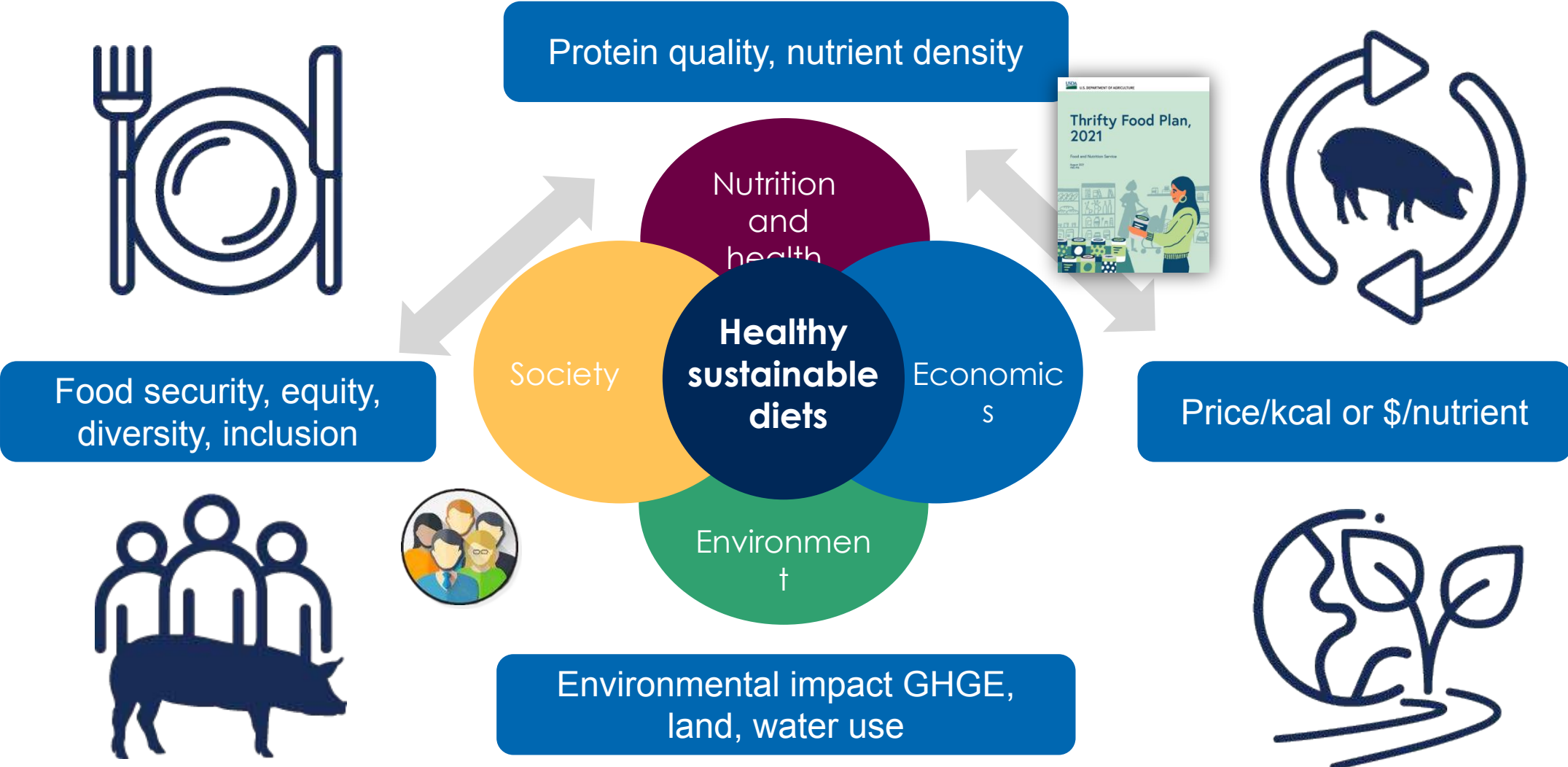
Meat and poultry purchase decisions are most impacted by climate concerns

Fresh fruits and vegetables, dairy, and seafood purchases are commonly impacted by those concerned with climate friendliness.

Types of Foods/Beverages Most Impacted by Climate Friendliness
(Of those who say climate friendliness has an impact, and care more about it on certain foods)

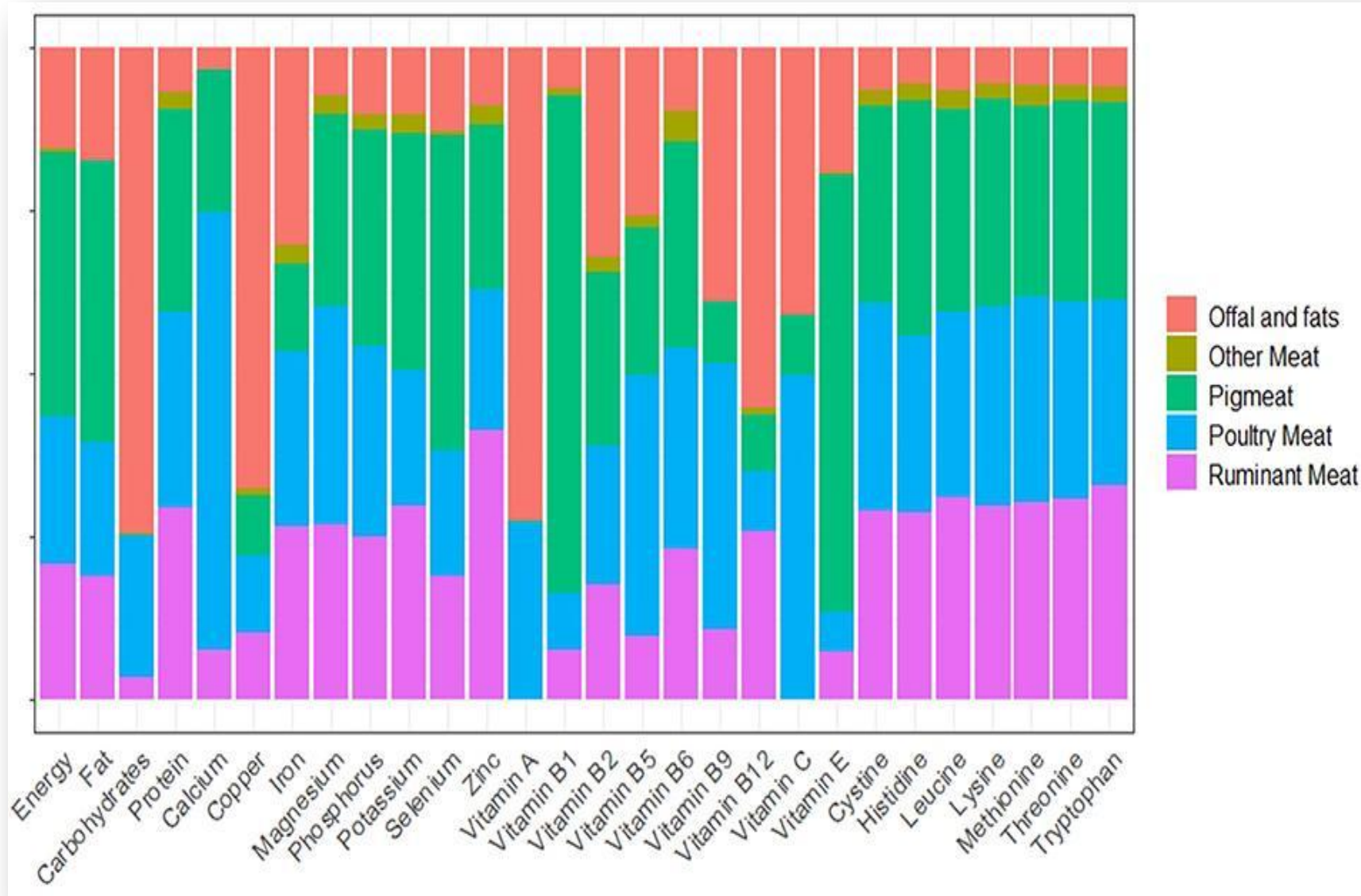


Sustainability Domains



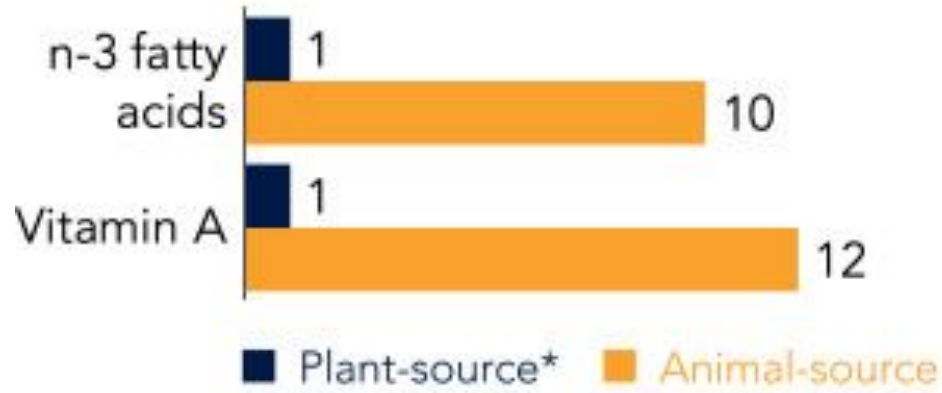
Animal Proteins And Their Nutritional Value And Benefits Across The Lifespan

Meat Delivers High-Quality Nutrients

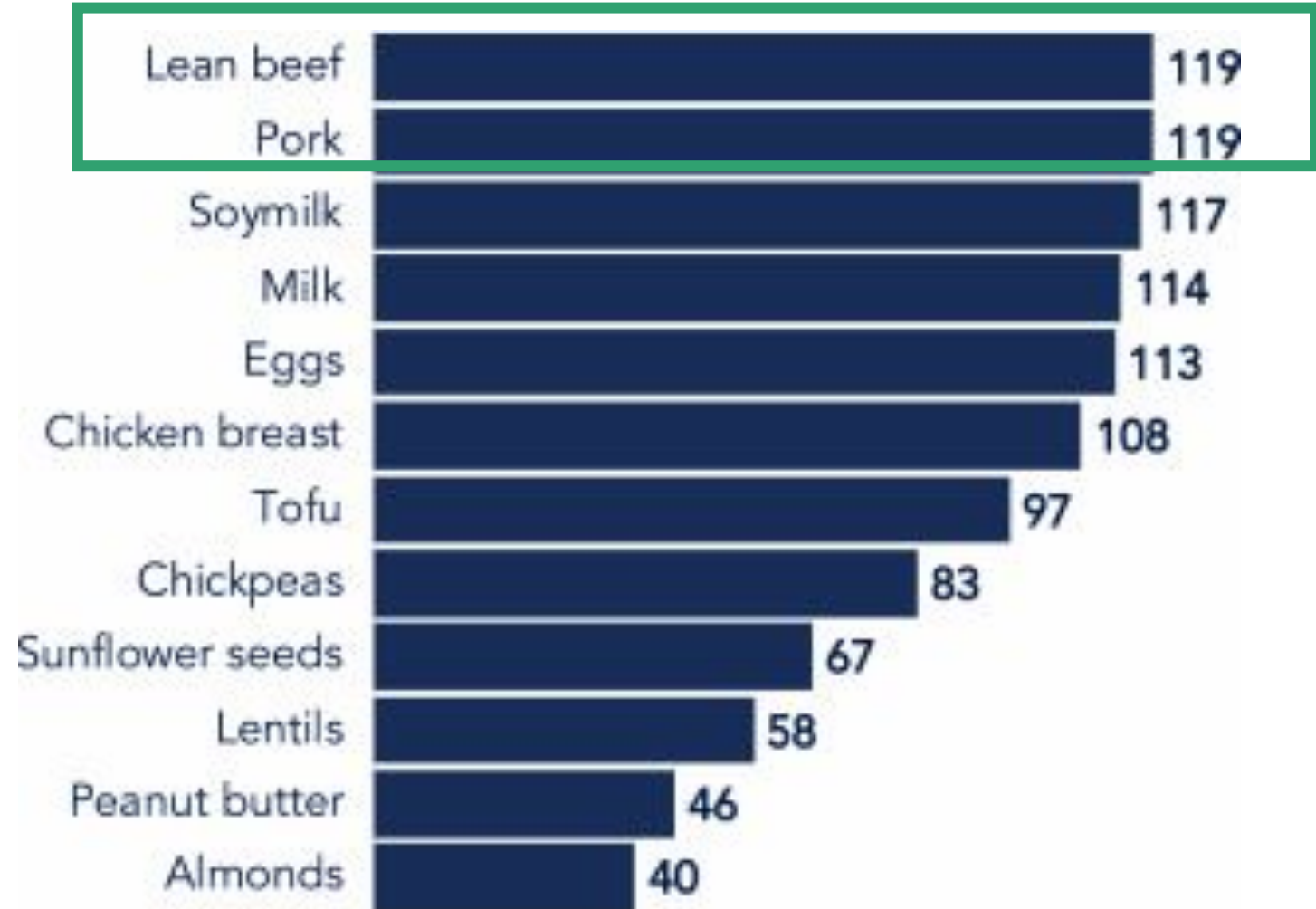
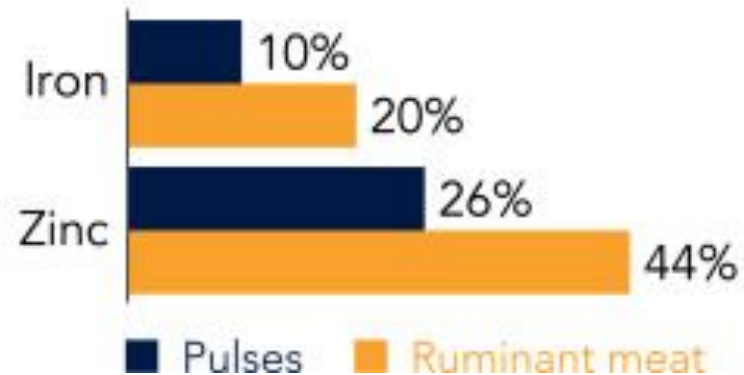


Bioavailability

Bioavailability (proportion of plant-source)

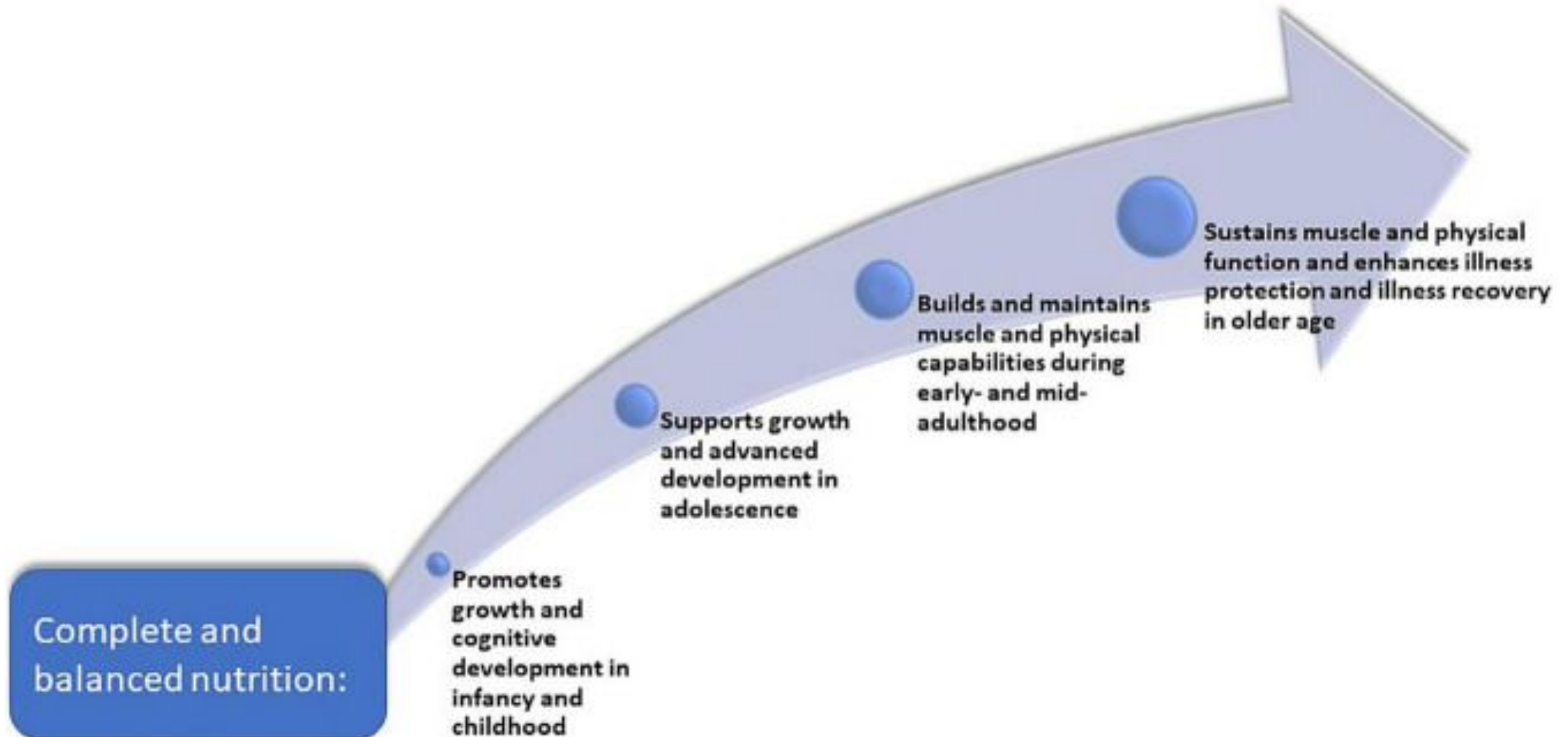


Bioavailability (% absorbed)



Digestible Indispensable Amino Acids Scores (DIAAS) Of Select Foods

Nutrition Across the Lifespan



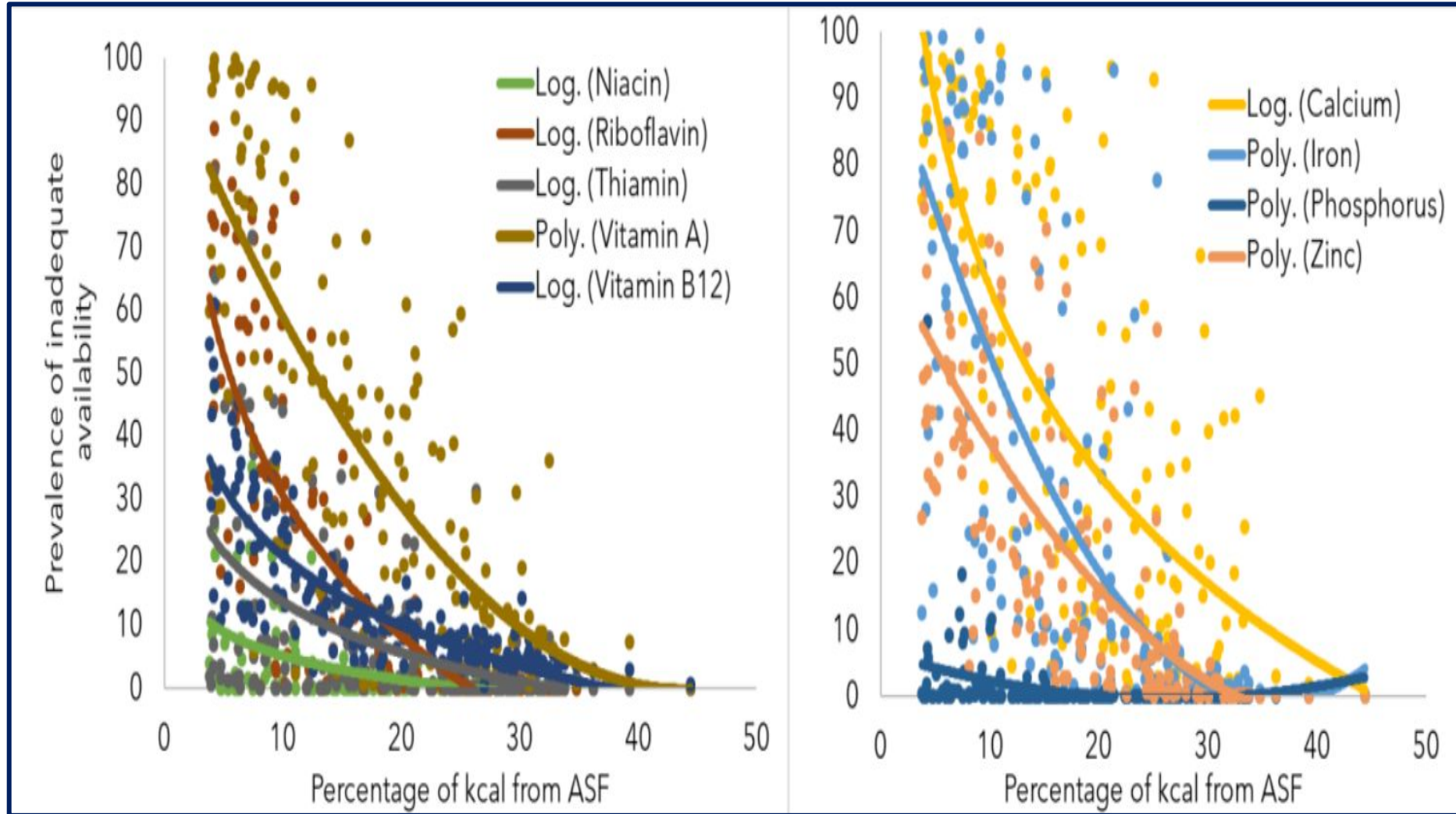
Nutrient Needs Change By Life Stage

Changing Nutrient Needs Through the Life Cycle

Life Stage	Change in Nutrient Needs
Pregnancy*	Increased requirements: energy, protein, essential fatty acids, vitamin A, vitamin C, B-vitamins (B1, B2, B3, B5, B6, B12, folate, choline) & calcium, phosphorus,** magnesium, potassium, iron, zinc, copper, chromium, selenium, iodine, manganese, molybdenum
Lactation*	Increased requirements: vitamins A, C, E, all B-vitamins, sodium, magnesium** Decreased requirements: iron
Infancy, childhood*	Increased requirements: energy, protein, essential fatty acids
Adolescence*	Increased requirements: energy, protein, calcium, phosphorus, magnesium, zinc (females only)
Early adulthood (ages 19-50)	Increased requirements for males, compared with females: vitamins C, K; B1, B2, B3, and choline; magnesium, zinc, chromium, manganese Increased requirements for females, compared with males: iron
Middle age (ages 51-70)*	Increased requirements: vitamin B ₆ , vitamin D
Elderly (age 70+)*	Increased requirements: vitamin D Decreased requirements: energy; iron (females only)

* Relative to adult requirements for those 19-50 years of age (and on a per-kg basis for macronutrients).

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

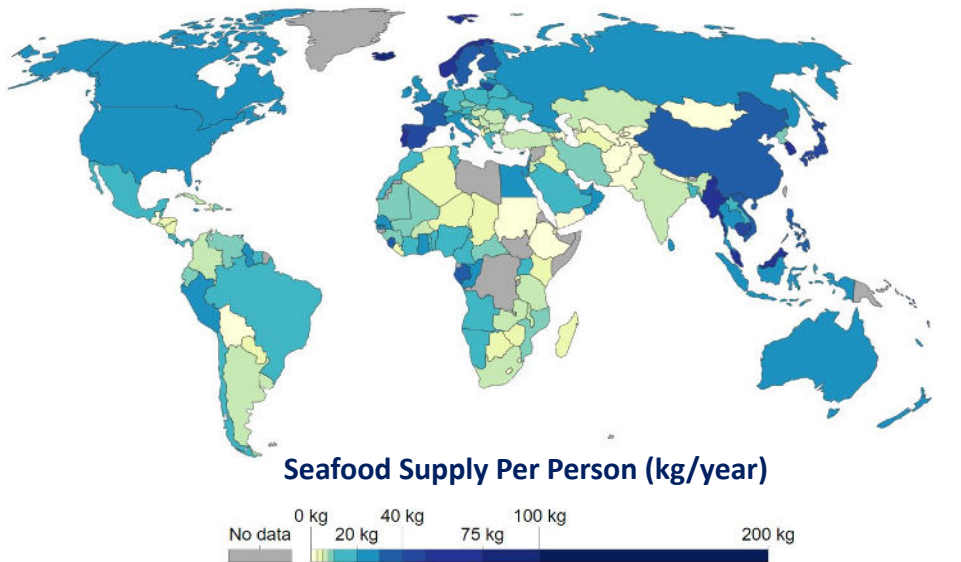
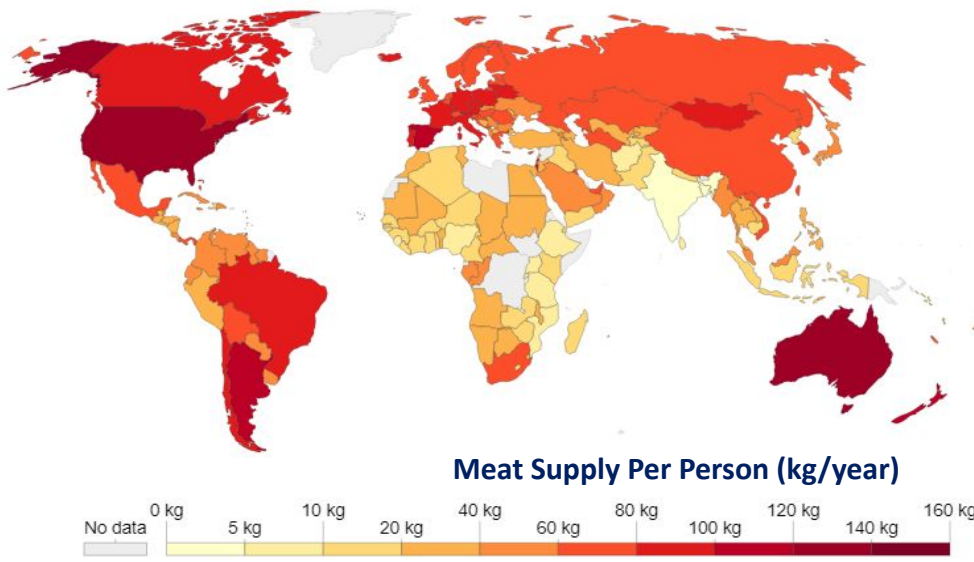
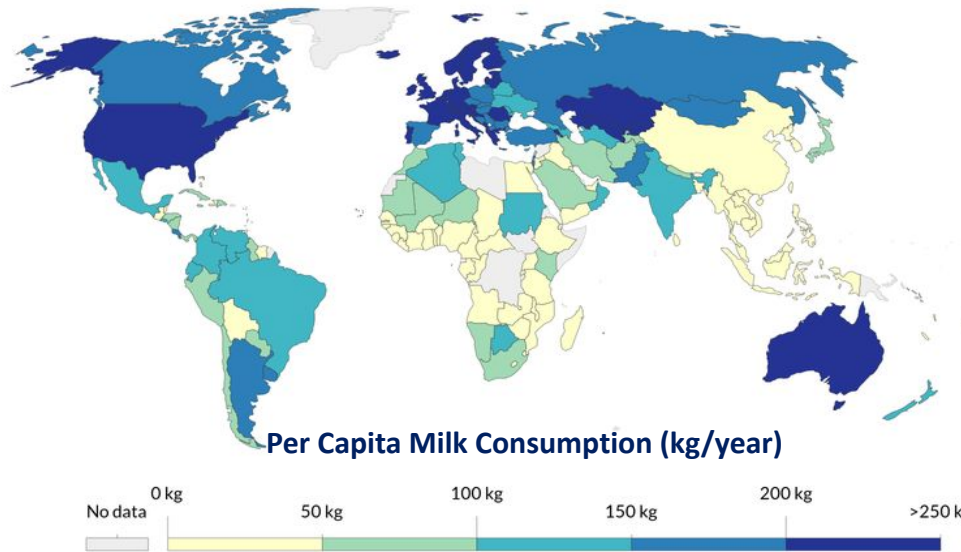
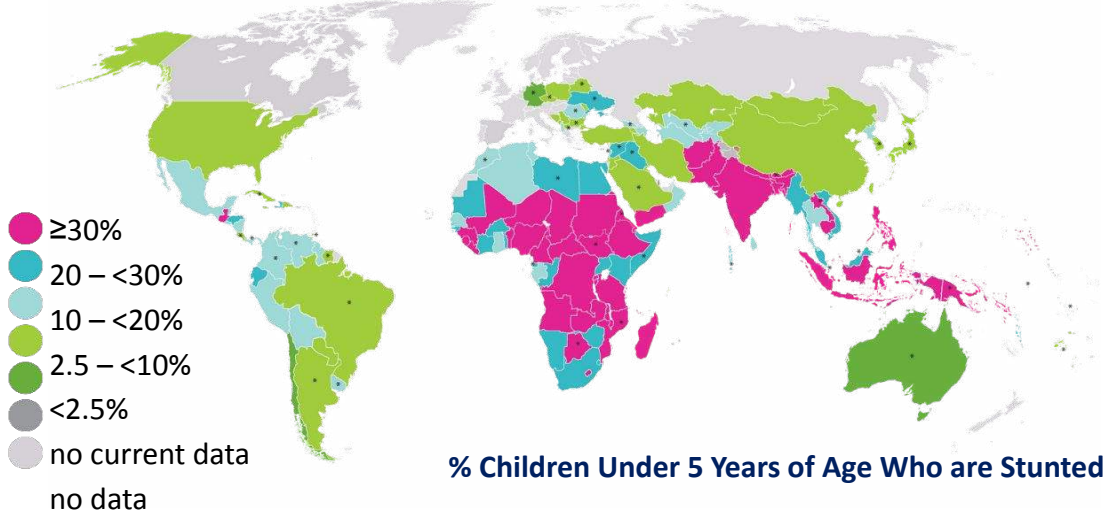


Animal-Source Foods Are The Top Sources of Commonly Lacking Nutrients

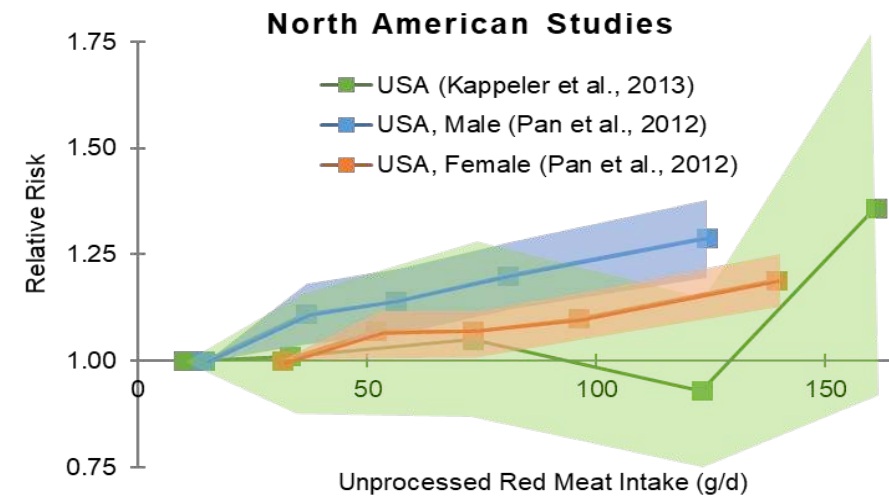
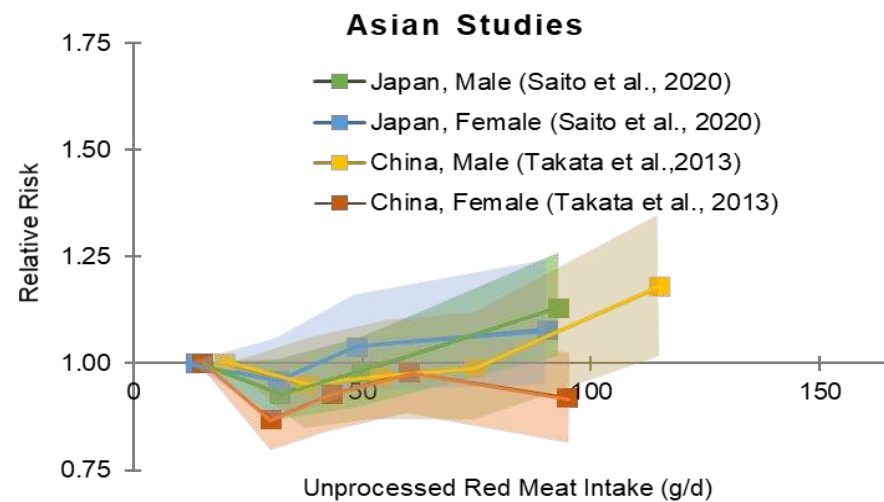
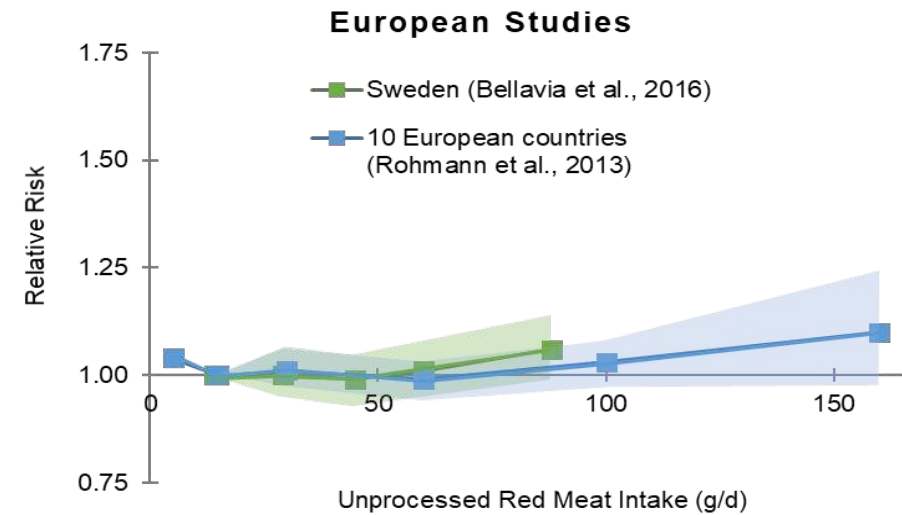
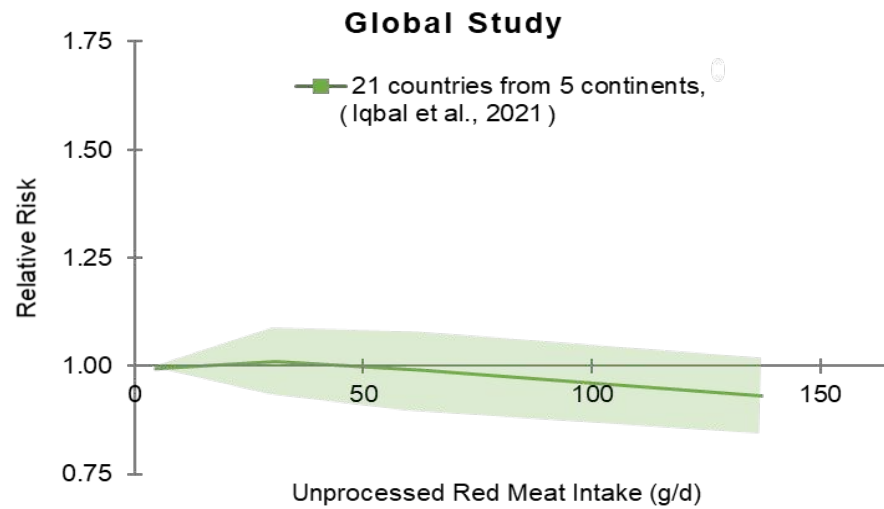
	2+ nutrients	Iron	Zinc	Vitamin A	Calcium	Folate	Vitamin B ₁₂
Liver	Very high	Very high	Very high	Very high	Low	Very high	Very high
Spleen	Very high	Very high	Very high	Low	Low	Low	Very high
Small dried fish	Very high	Very high	Very high	Very high	Very high	Low	Very high
Dark leafy greens	Very high	High	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

Inverse Relationship between Childhood Stunting & Annual Meat, Milk & Seafood Consumption

UNICEF, WHO, World Bank Joint Child Malnutrition dataset, March 2019 edition
 UN Food and Agriculture Organization (FAO) 2017



Relative Risk for All-Cause Mortality from Large Published Cohort Studies



Bradley Johnston, Stefaan De Smet, Frédéric Leroy, Andrew Mente, Alice Stanton.

Non-communicable disease risk associated with red and processed meat consumption—magnitude, certainty, and contextuality of risk?

Animal Frontiers 2023;13(2):19–27.

Enjoyment of Food

- Sharing meals with friends and family can:
 - Increase food enjoyment
 - Provide a great opportunity to share a lifetime of stories
 - All while improving dietary patterns.



What Is A 'Carrier Food'?

- Under-consumed nutrients
 - Choline, fiber, iron and potassium
- Under-consumed food groups
 - Vegetables, fruits, legumes, whole grains



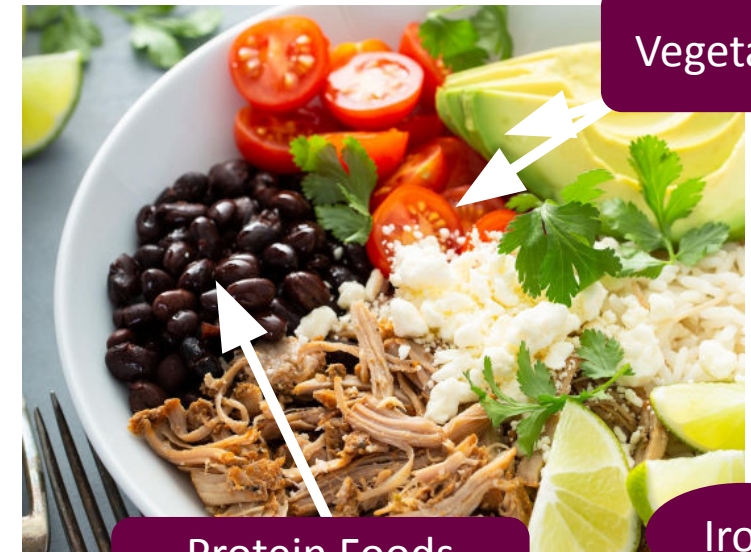
Fruit

Potassium



Whole Grains

Fiber



Vegetables

Protein Foods
(Beans)

Iron

Meats Like Lean Pork Are Carrier Foods



CHILDREN – 9 NUTRIENTS “CARRIED” BY PORK*

Copper
Magnesium
Potassium
Selenium
Zinc
Thiamin
Niacin
Vitamin B6
Choline

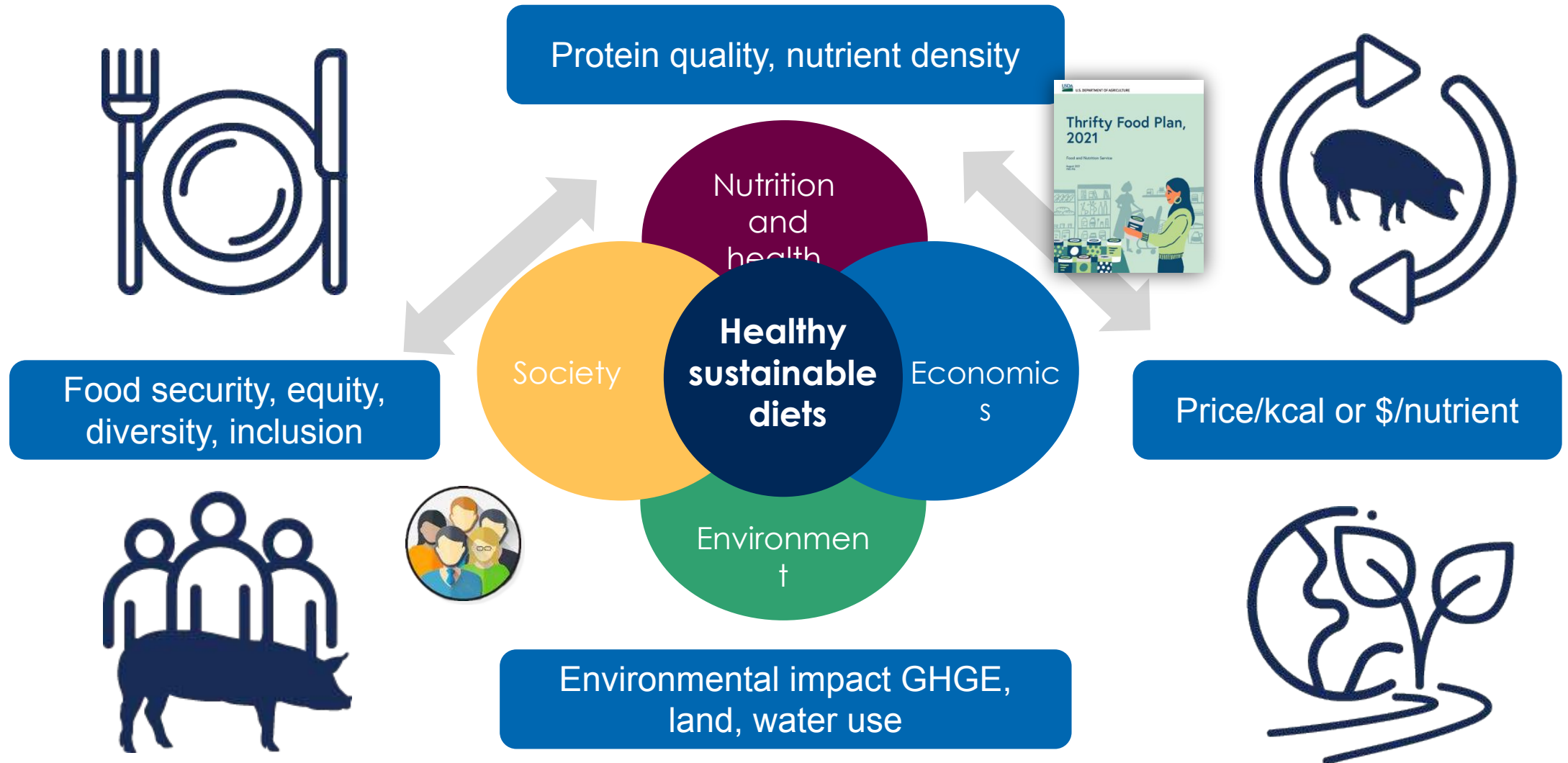
ADULTS – 10 NUTRIENTS “CARRIED” BY PORK*

Iron
Phosphorus
Potassium
Selenium
Zinc
Thamin
Riboflavin
Niacin
Vitamin B6
Choline

*About 52, 15, and 45% of children aged 2-18 years were consumers of all pork, fresh pork, and processed pork, respectively, with an average intake of 47, 60 and 38 g/day, respectively.
 +About 59, 20, and 49% of adults age 19+ years were consumers of all pork, fresh pork, and processed pork, respectively, with an average intake of 61, 77, and 48 g/day, respectively.

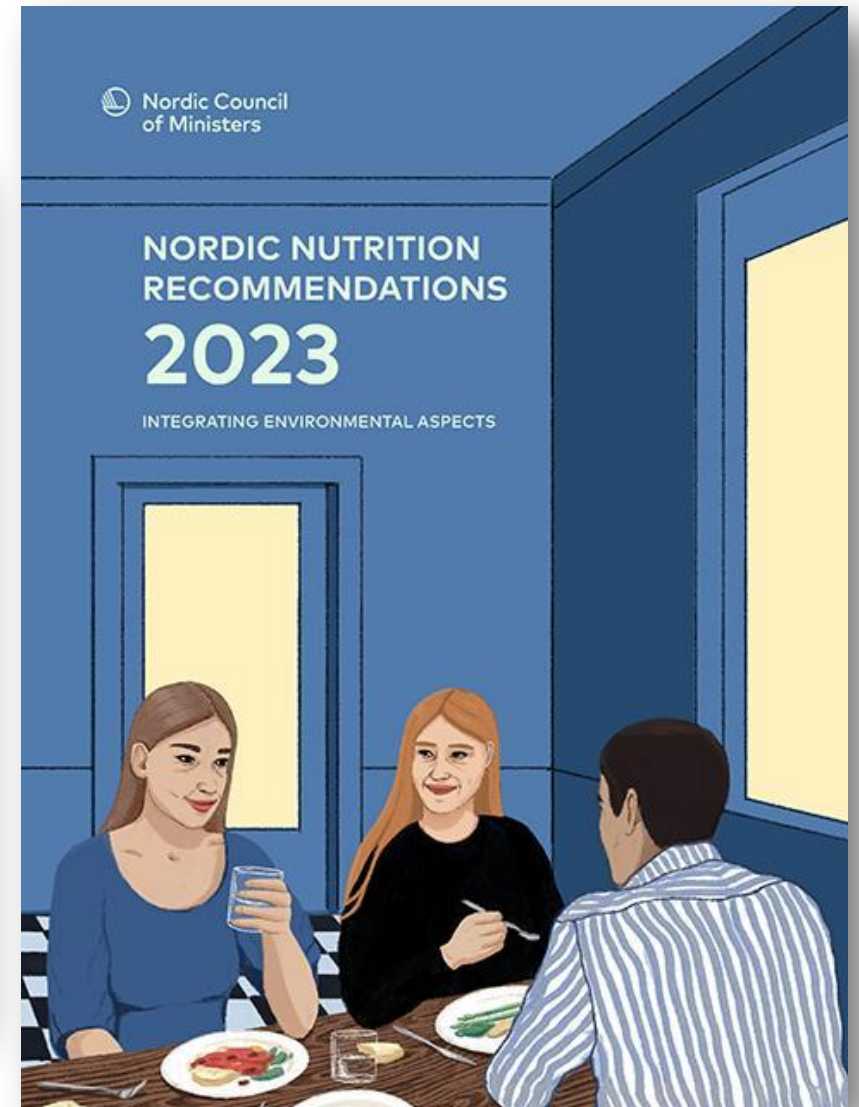
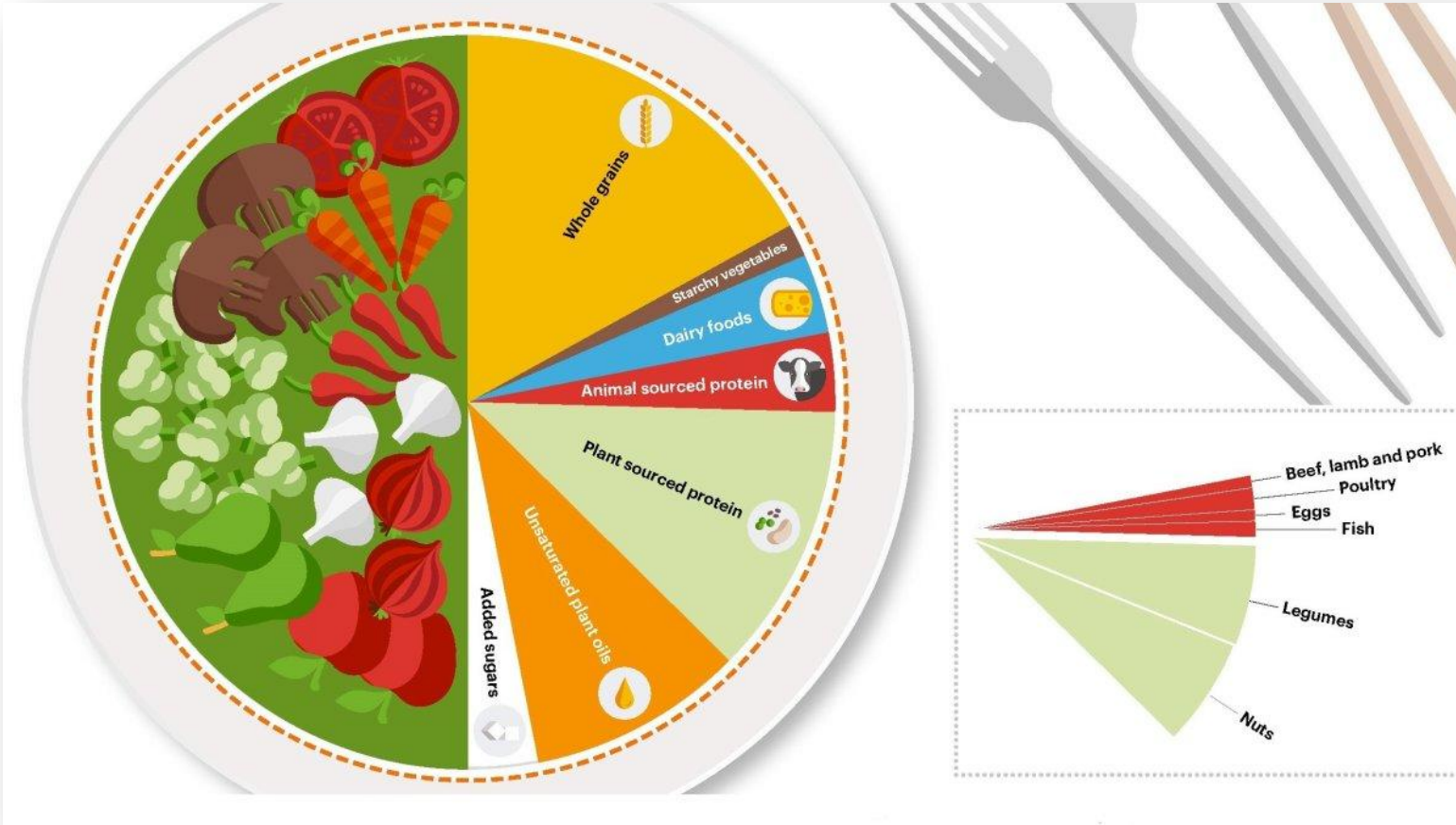
What's The Role Of Animal Proteins In A Sustainable and Health-Conscious Dietary Pattern?

Sustainability Domains



Impact On Nutrition & Health

World Recommendations Reducing Animal Protein

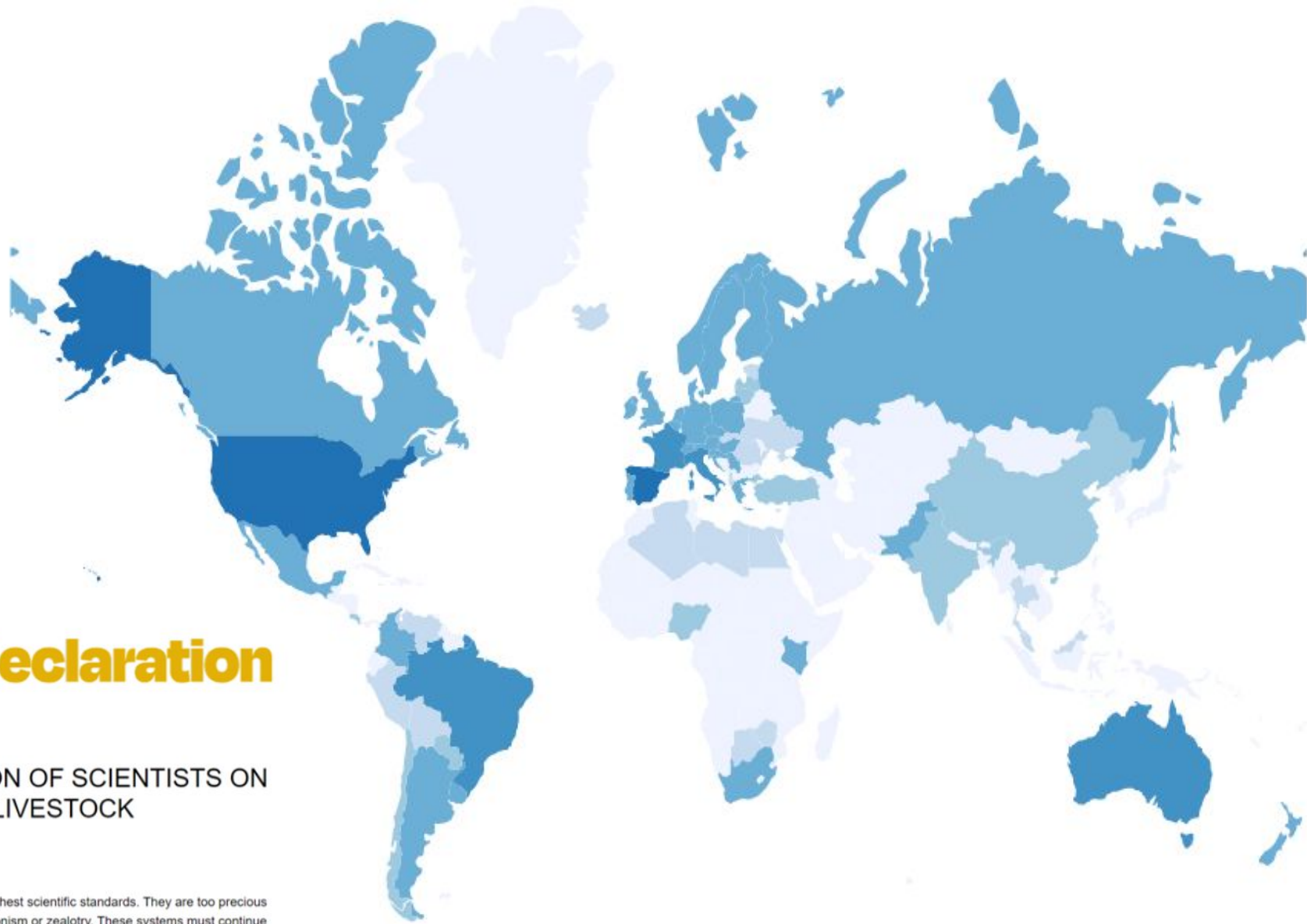


The Dublin Declaration

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.



990
SIGNATURES



Contribution of terrestrial animal source food to healthy diets for improved nutrition and health outcomes

An evidence and policy overview on the state of knowledge and gaps



And world leaders are taking notice...

“It’s the most comprehensive analysis yet of the benefits and risks of consuming animal source foods and is based on data and evidence **from more than 500 scientific papers and some 250 policy documents, said FAO.**

Meat, eggs and milk, can provide a range of important so-called “macro-nutrients”, such as protein, fats and carbs, and **also micro-nutrients that are hard to find in plants**, “in the required quality and quantity”, said FAO.

High quality protein, a number of essential fatty-acids - together with iron, calcium, zinc, selenium, Vitamin B12, choline and bioactive compounds like carnitine, creatine, taurine - are provided by foods from farm and other livestock animals, and have important health and developmental functions.”



United
Nations

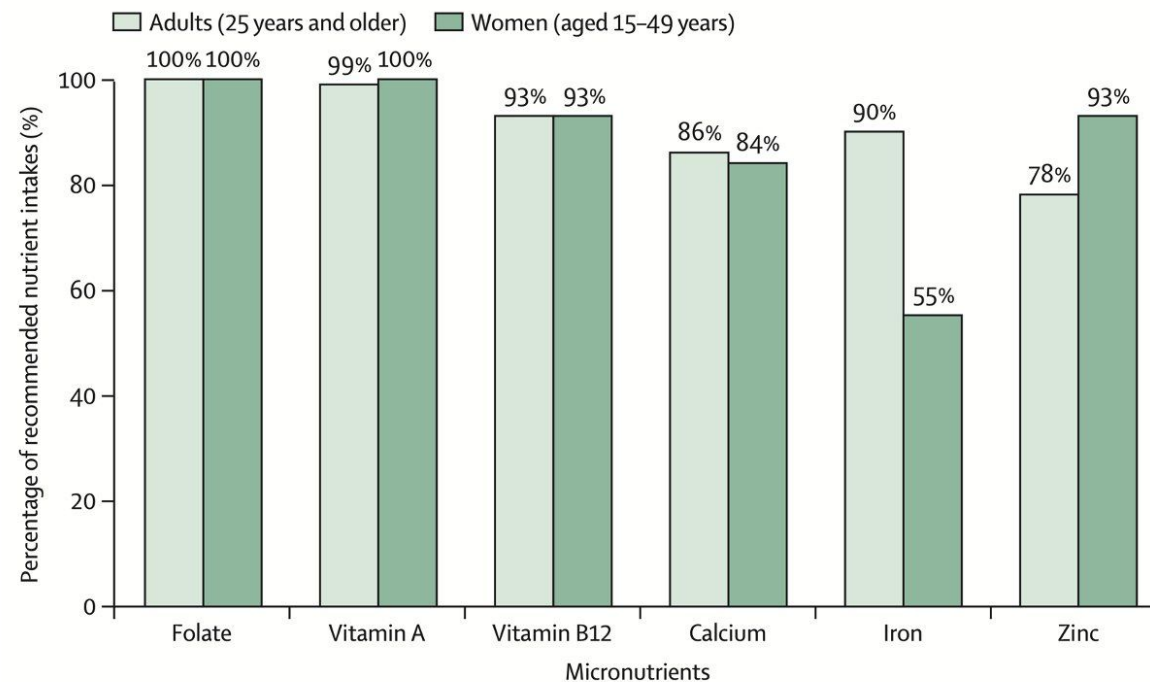
UN News

Global perspective Human stories

Popular “Healthy” Planetary Health Diet Falls Short On Certain Nutrients

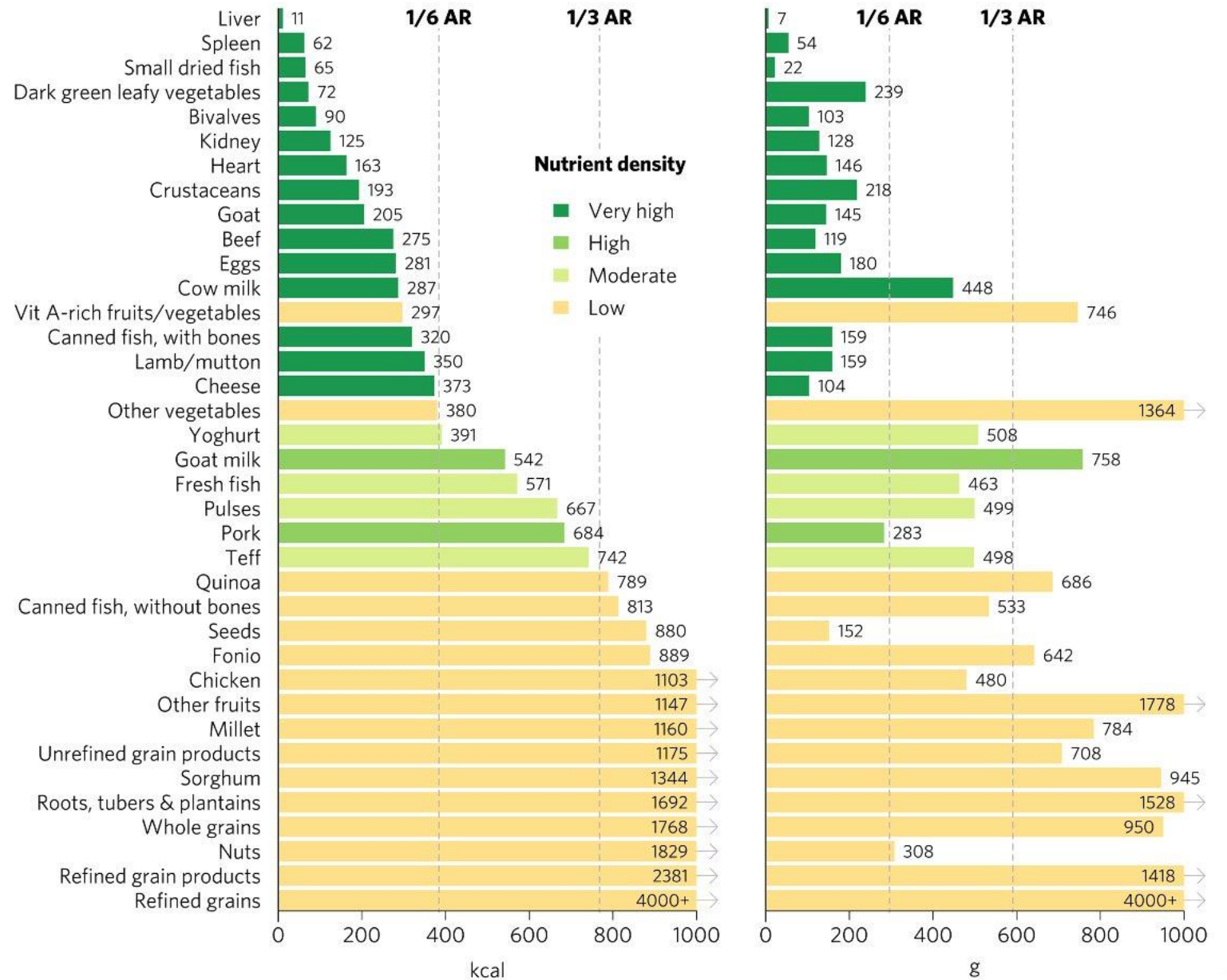
Estimated micronutrient shortfalls of the EAT-Lancet planetary health diet

Ty Beal, Flaminia Ortenzi, Jessica Fanzo

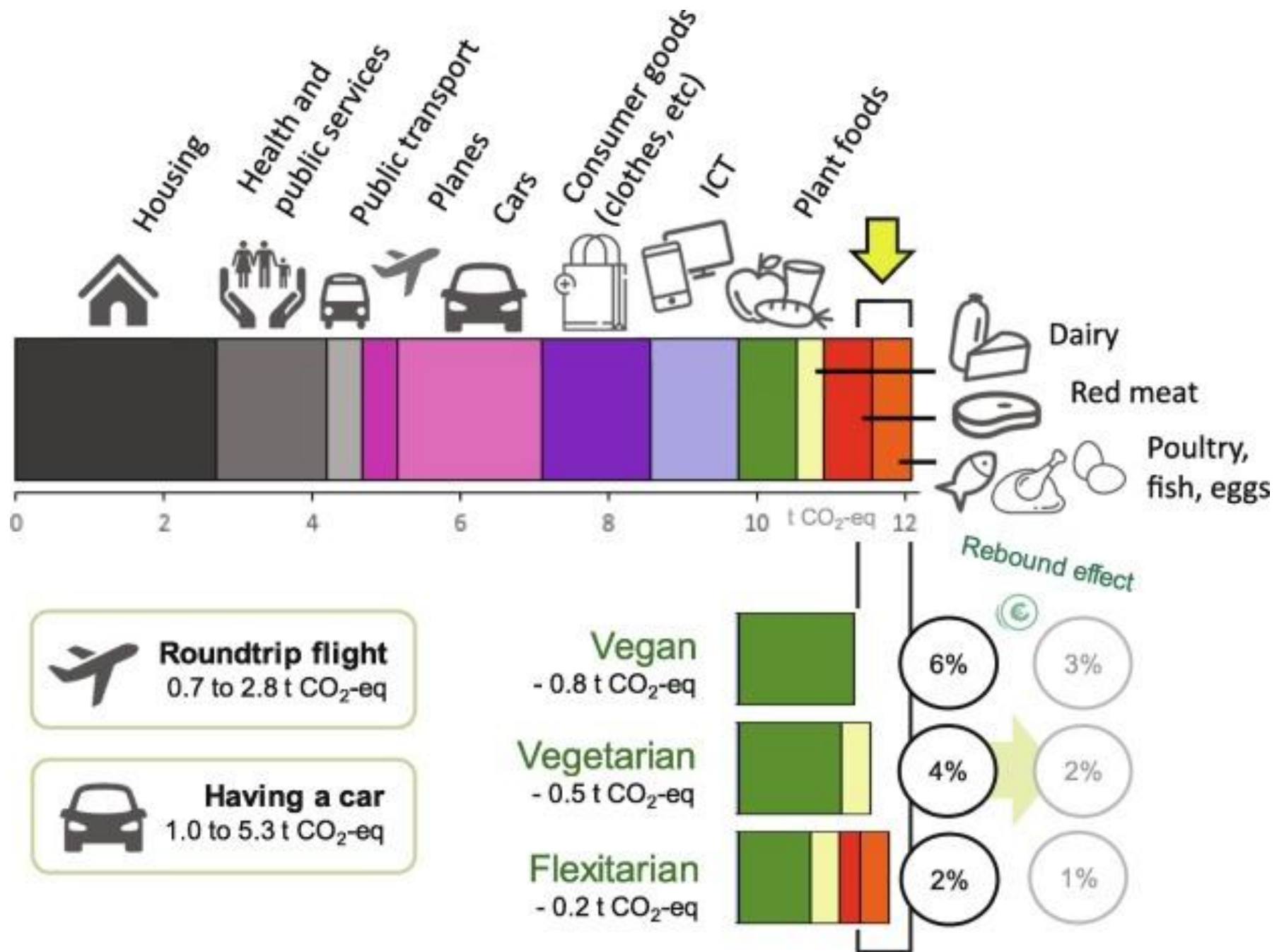


What are the top sources of commonly lacking micronutrients?

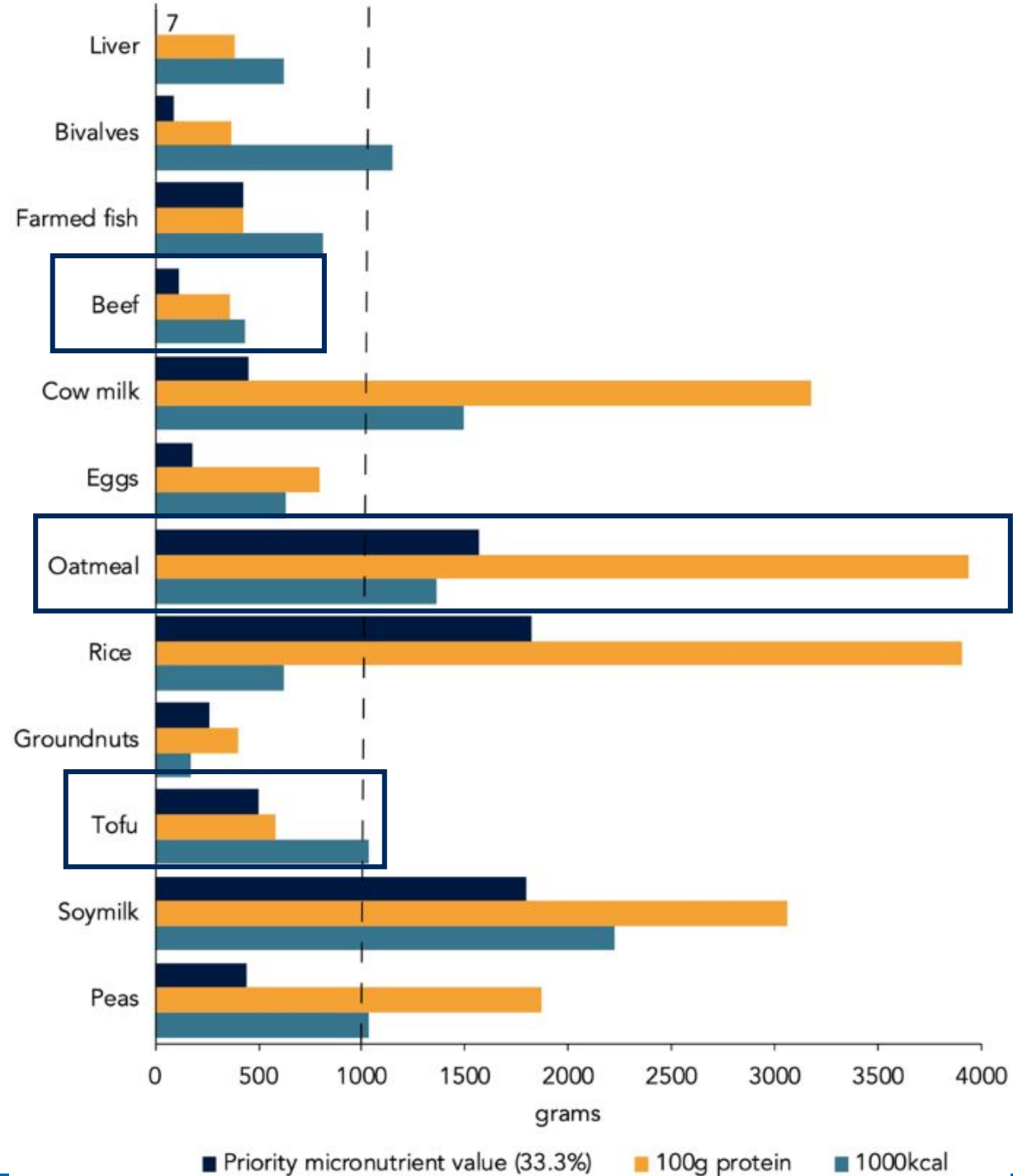
Calories and grams needed to provide an average of one-third of recommended intakes of vitamin A, folate, vitamin B₁₂, calcium, iron, and zinc for women 15–49 years of age



Impact on the Environment



Estimated Environmental Impacts Depend on the Nutritional Metric





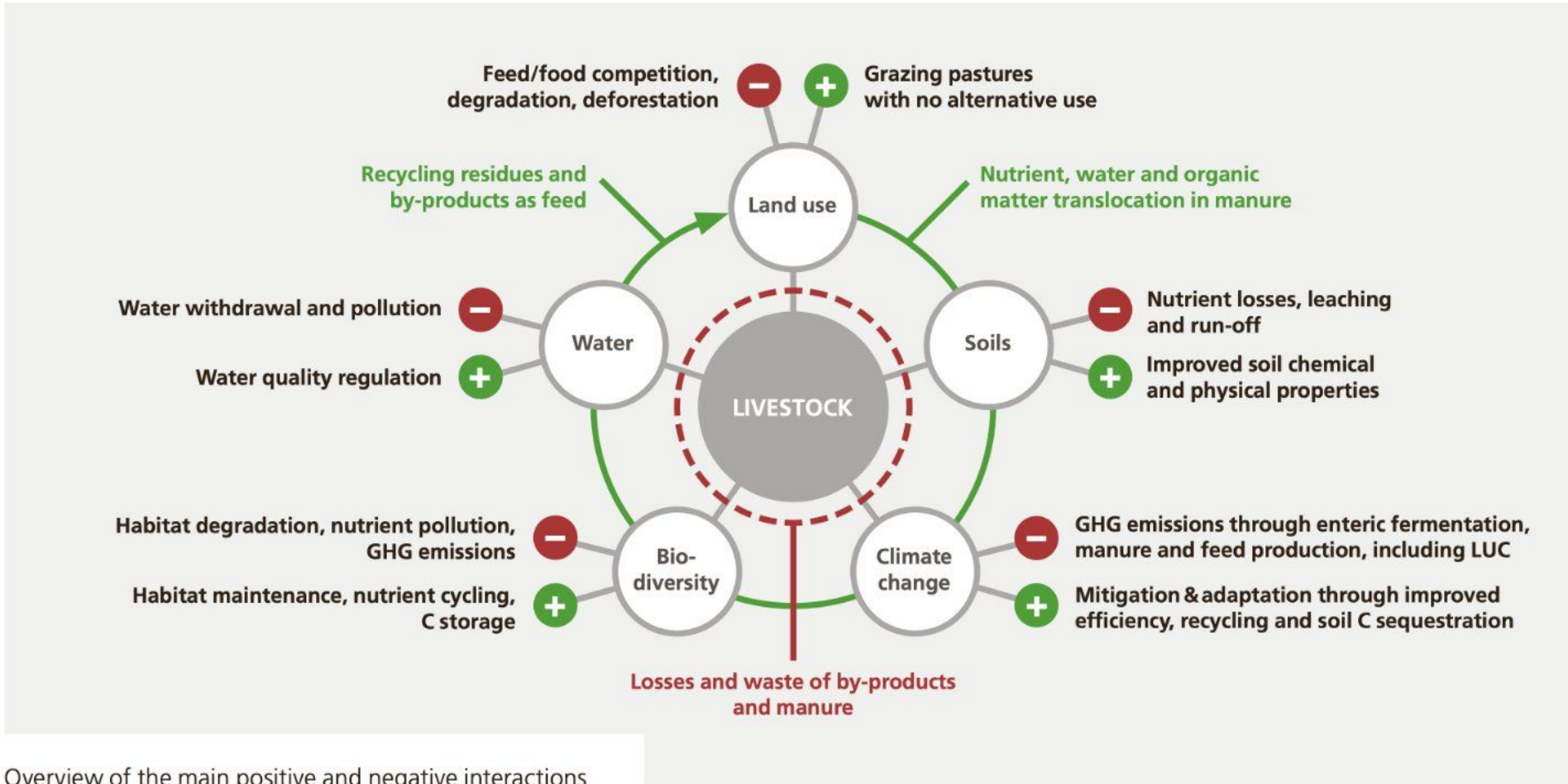
Highest Footprint

Rank

	Land Use footprint (m ² *yr to obtain PMV)	Carbon footprint (kg CO ₂ eq to obtain PMV)	Freshwater withdrawals (L to obtain PMV)	Acidification potential (g SO ₂ eq to obtain PMV)	Eutrophication potential (g PO ₄ ³⁻ eq to obtain PMV)
1	Olive Oil	Palm Oil	Olive Oil	Olive Oil	Olive Oil
2	Lamb & Mutton	Olive Oil	Rice	Palm Oil	Farmed Fish
3	Dark Chocolate	Dark Chocolate	Nuts	Poultry	Palm Oil
4	Beef	Beef	Farmed Fish	Pork	Crustaceans (farmed)
5	Palm Oil	Crustaceans (farmed)	Apples	Beef	Dark Chocolate
6	Cheese	Poultry	Berries & Grapes	Berries & Grapes	Beef
7	Poultry	Farmed Fish	Crustaceans (farmed)	Tomatoes	Rice
8	Bananas	Lamb & Mutton	Cheese	Crustaceans (farmed)	Poultry
9	Berries & Grapes	Rice	Tomatoes	Rice	Pork
10	Pork	Pork	Groundnuts	Dark Chocolate	Berries & Grapes
11	Cow milk	Cassava	Pork	Farmed Fish	Tomatoes
12	Cassava	Berries & Grapes	Bananas	Bananas	Lamb & Mutton
13	Nuts	Tomatoes	Cow milk	Apples	Cheese
14	Oats (oatmeal)	Bananas	Poultry	Cheese	Bananas
15	Apples	Cheese	Wheat & Rye (Bread)	Lamb & Mutton	Apples
16	Farmed Fish	Apples	Dark Chocolate	Nuts	Brassicas
17	Groundnuts	Soy milk	Oats (oatmeal)	Brassicas	Nuts
18	Other Pulses	Cow milk	Beef	Eggs	Cow milk
19	Rice	Tofu	Lamb & Mutton	Cow milk	Oats (oatmeal)
20	Citrus Fruit	Oats (oatmeal)	Citrus Fruit	Citrus Fruit	Citrus Fruit
21	Tofu	Other Fruits	Brassicas	Cassava	Eggs
22	Wheat & Rye (Bread)	Eggs	Other Fruits	Groundnuts	Groundnuts
23	Eggs	Groundnuts	Eggs	Other Fruits	Potatoes
24	Soy milk	Citrus Fruit	Tofu	Wheat & Rye (Bread)	Tofu
25	Tomatoes	Brassicas	Other Pulses	Oats (oatmeal)	Onions & Leeks
26	Liver	Wheat & Rye (Bread)	Other Vegetables	Soy milk	Wheat & Rye (Bread)
27	Peas	Potatoes	Potatoes	Other Vegetables	Other Pulses
28	Potatoes	Root Vegetables	Maize (Meal)	Potatoes	Other Fruits
29	Other Fruits	Onions & Leeks	Soy milk	Other Pulses	Soy milk
30	Brassicas	Maize (Meal)	Peas	Onions & Leeks	Root Vegetables
31	Maize (Meal)	Other Vegetables	Root Vegetables	Tofu	Cassava
32	Crustaceans (farmed)	Other Pulses	Palm Oil	Root Vegetables	Other Vegetables
33	Onions & Leeks	Liver	Onions & Leeks	Maize (Meal)	Liver
34	Root Vegetables	Nuts	Liver	Liver	Maize (Meal)
35	Other Vegetables	Peas	Cassava	Peas	Peas

Lowest Footprint

Livestock can have positive or negative environmental impact: **Circularity** can enhance the positive



Overview of the main positive and negative interactions between livestock farming and the environment. Circular management can help reinforce the positive impacts.

Environmental Improvements Across Animal Proteins

In the past six decades, pork production has improved by using¹:



75%
less land



25%
less water



7%
less energy



8%
fewer carbon emissions

Thanks to their continuous efforts, making a gallon of milk now* requires:

90%
less land

63%
smaller carbon footprint

65%
less water

*vs. 70 years ago

Data released by the Environmental Protection Agency in April 2021 attributes only 10% of U.S. greenhouse gas (GHG) emissions to agriculture, of which, the pork industry is responsible for about 4%.²



1 A Retrospective Assessment of U.S. Pork Production: 1960 to 2015, Univ. of Arkansas, National Pork Board, 2018.

2 United States Environmental Protection Agency. 2019. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019, Chapter 5. <https://www.epa.gov/sites/default/files/2021-04/documents/us-ghg-inventory-2021-chapter-5-agriculture.pdf>.

<https://blog.usdec.org/usdairyexporter/visual-tools-to-tell-the-u.s.-dairy-sustainability-story>

Summary

1. Americans' food choices related to animal proteins is largely driven by price, taste/texture and nutritional contributions to health.



Summary

2. Animal proteins play critical roles in key life stages, such as times during growth and development, reproduction and aging. Nutrients obtained from animal source foods are nutrient-dense and some nutrients are more bioavailable.





Summary

3. Animal source foods continue to get a bad reputation, but when looking at consumption quantity, there is no significant increase in risk.



Summary

4. Sustainable nutrition should include factors such as nutrient quality, affordability, environmental impact and cultural/social acceptability. When factoring these 4 constructs, pork plays a key role in sustainable nutrition.

Thank you!

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