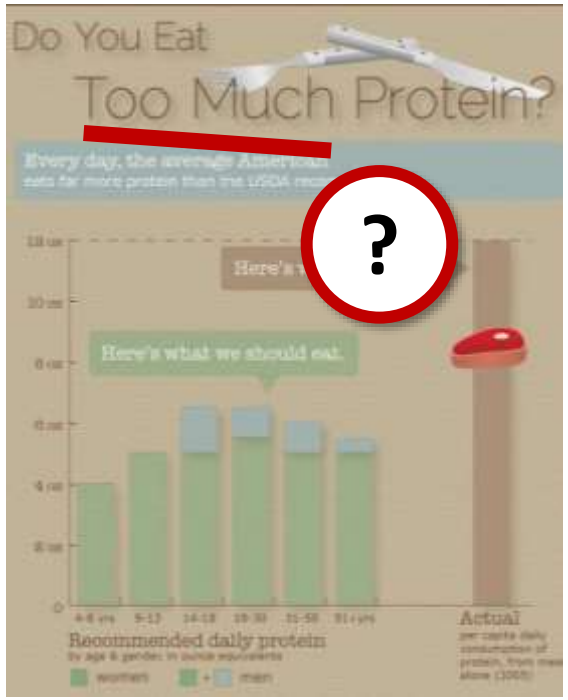
Threats and Opportunities for Unlocking Protein's Potential for Human and Animal Health

Are we eating *too much* protein? Should we *transition* - quid "animal protein"?



VRIJE UNIVERSITEIT BRUSSEL

Research Group of Industrial Microbiology and Food Biotechnology

Prof. Dr. ir. Luc De Vuyst
Prof. Dr. ir. Frédéric Leroy
Prof. Dr. Stefan Weckx

Prof. dr. ir. Frédéric LEROY

https://aleph-2020.blogspot.com

Animal source foods in ethical, sustainable & healthy diets

A dynamic white paper - #ALEPH2020

Health

Animal source foods (ASFs) are evolutionary foods and provide key nutrients. There is no reason to eliminate their consumption from a health perspective, well on the contrary. People who nonetheless decide to do so on ethical or environmental grounds should keep in mind that the robustness of restrictive diets depends on knowledge, resources, and careful supplementation. Although it needs to be acknowledged that current omnivore diets are often not well-formulated either, taking out some of the most nutrient-rich and species-adapted foods is an additional barrier to achieving adequate essential nutrition in an already problematic foodscape. Moreover, restricting or eliminating ASFs may not be suitable for everyone, potentially causing damage in the more vulnerable parts of the population, in particular the young, elderly, and metabolically challenged.

Adequate essential nutrition

- Humans are physiologically adapted to ASFs
- Nutrients are not always easily obtained from plants
- Special needs of vulnerable populations are met with ASFs
- Restricting ASFs may put the young at risk

The evidence to promote heavy restriction or avoidance of ASF is insufficient

- ASFs: the health controversy
- Observational evidence does not necessarily imply causation
- Intervention studies have not shown detrimental effects
- Biochemical mechanisms are unconvincing

Perspectives in the era of nutritionism

- Redefining healthy diets?

“Too much?” (cf. RDA 0.8 g/kg/d)

- Not met by substantial parts of the population

- Minimum value (~ deficiency, loss of lean body mass, young adults)
- Not an *optimal* one for entire population (muscle, pregnancy, lactation, healthy aging, acute/chronic disease: 1.2-2.2 g/kg/d)
- Acceptable macronutrient distribution range: 10-35% kcal
  upper range brings benefits (cf. ancestral-type diets, 19-35%)

“Animal protein”

- Not all protein is equal: anabolic response, bioavailability (EAAs and digestibility; structural, fibre, anti-nutritional factors)
- Plant strategies: AA fortification, ingestion of multiple sources, or higher intake (also: often 2-3x kcal intake, even with beans/nuts)

- Misleading perspective: much more than “protein” (vitamins, minerals, + many others: creatine, taurine, choline, DHA, carnosine, …)

- “Good source of protein”?
- Tolerance, allergies, taste, culinary skills, …?

Burd et al. 2019 Sports Medicine

Table 2 **Impact of using either the protein digestibility corrected amino acid score or digestible indispensable amino acid score for determining protein content claims for nonanimal foods identified as protein foods or meat alternatives within US national dietary standards**

Protein food categories (NDB)[a]	RACC (g)[b]	Application of PDCAAS method			Application of DIAAS method		
		PDCAAS	Corrected protein content in RACC (g)[c] (%DRV)[d]	Permitted protein claim[e]	DIAAS[f]	Crude protein content in RACC (g)[g] (%DRV)[d]	Permitted protein claim[h]
Nuts and seeds							
Almonds (12 061)	30 g	39	2.5 (5.0)	No claim	40	6.3 (12.7)	No claim
Sunflower seeds (12 036)	30 g	66	4.1 (8.2)	No claim	67	6.2 (12.5)	No claim
Peanut butter (16 167)	32 g	45	3.2 (6.3)	No claim	46	7.0 (14.0)	No claim
Legumes/pulses[i]							
Navy beans	35 g dry	67	5.7 (11.5)	Good source	51	8.6 (17.2)	No claim
Whole green lentils	35 g dry	63	5.8 (11.6)	Good source	65	9.2 (18.4)	No claim
Split red lentils	35 g dry	54	5.6 (11.2)	Good source	50	10.3 (20.7)	No claim
Split yellow peas	35 g dry	64	5.7 (11.4)	Good source	73	8.8 (17.7)	No claim
Chickpeas (16 057)	35 g dry	74	5.9 (11.8)	Good source	83	7.7 (15.3)	Good source
Soy products							
Tofu (16 426)	85 g	56	8.22 (16.4)	Good source	52	14.7 (29.4)	No claim

Abbreviations: DIAAS, digestible indispensable amino acid score; DRV, daily reference value; NDB, USDA nutrient database; PDCAAS, protein digestibility-corrected amino acid score; RACC, reference amount customarily consumed.

[a]NDB is the Nutrient Database Number from the USDA Nutrient Database USDA National Nutrient Database for Standard Reference: Release 28. http://www.ars.usda.gov/Services/docs.htm?docid=8964. Accessed August 12, 2016.

[b]RACC from FDA: 21CFR101.12.[2]

[c]Corrected protein content = crude protein content in RACC × PDCAAS.

[d]Values in parentheses reflect % DRV, where the DRV for protein = 50 g[2]

[e]5–9.9 g = good source; ≥10 g = excellent source.[2]

[f]DIAAS calculated using available digestibility coefficients (ileal or fecal) or using estimates of 0.85.

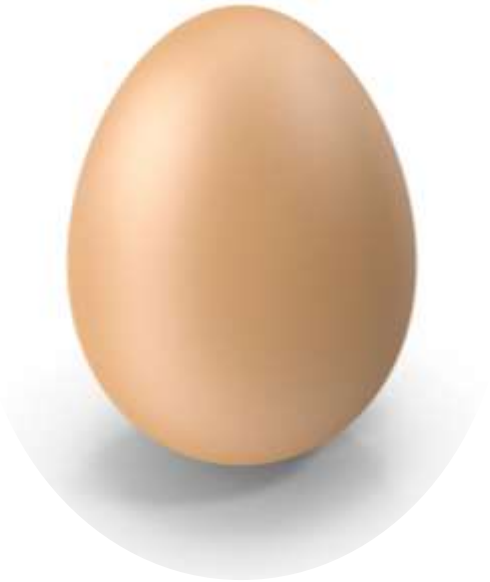
[g]Crude protein content per RACC, based on proposed approach in Food and Agriculture Organization of the United Nations 2013 report.[6]

[h]Claim based on both quantity (if crude protein, 5–9.9 g = good source if the DIAAS is >75; ≥10 g = excellent source only if the DIAAS is ≥100.[6]

[i]Data from pulses, unless noted, are derived from the author's (J.D.H.) laboratory (unpublished data).

Soy = 0.8-0.9
Legumes = 0.6
Cereals = 0.3-0.5
Animal-derived ≥1

Food.



Solid nutrition,
in a flimsy shell.

The future of food?

Water, Mung Bean Protein Isolate, Expeller-Pressed Canola Oil, Contains less than 2% of Dehydrated Onion, Gellan Gum, Natural Carrot Extractives (color), Natural Flavors, Natural Turmeric Extractives (color), Potassium Citrate, Salt, Soy Lecithin, Sugar, Tapioca Syrup, Tetrasodium Pyrophosphate, Transglutaminase, Nisin (preservative). (Contains soy.)

Flimsy nutrition,
in a solid bottle.

Essential amino acids: master regulators of nutrition and environmental footprint?

Paolo Tessari, Anna Lante & Giuliano Mosca

Scientific Reports 6, Article number: 26074 (2016) Download Citation

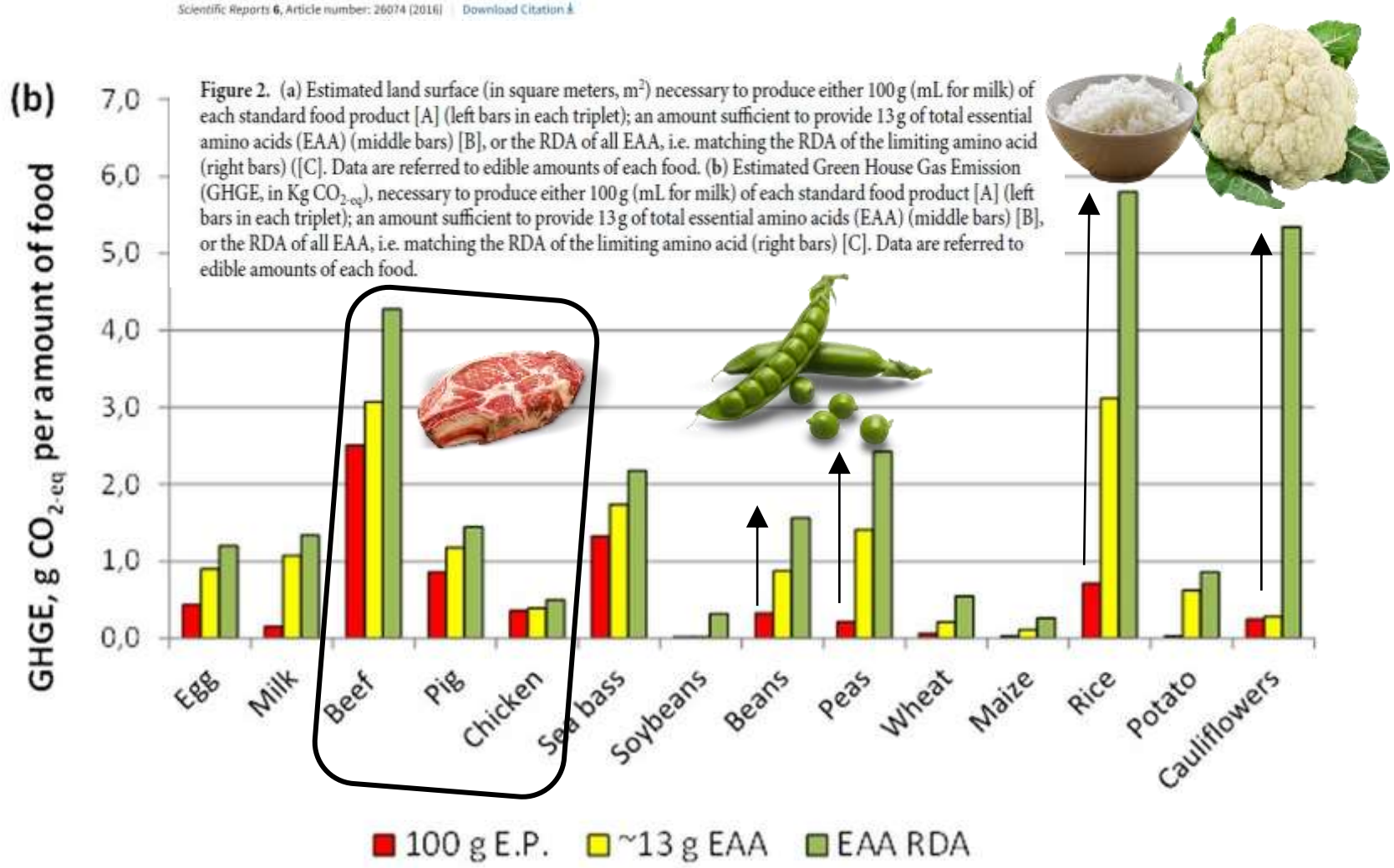
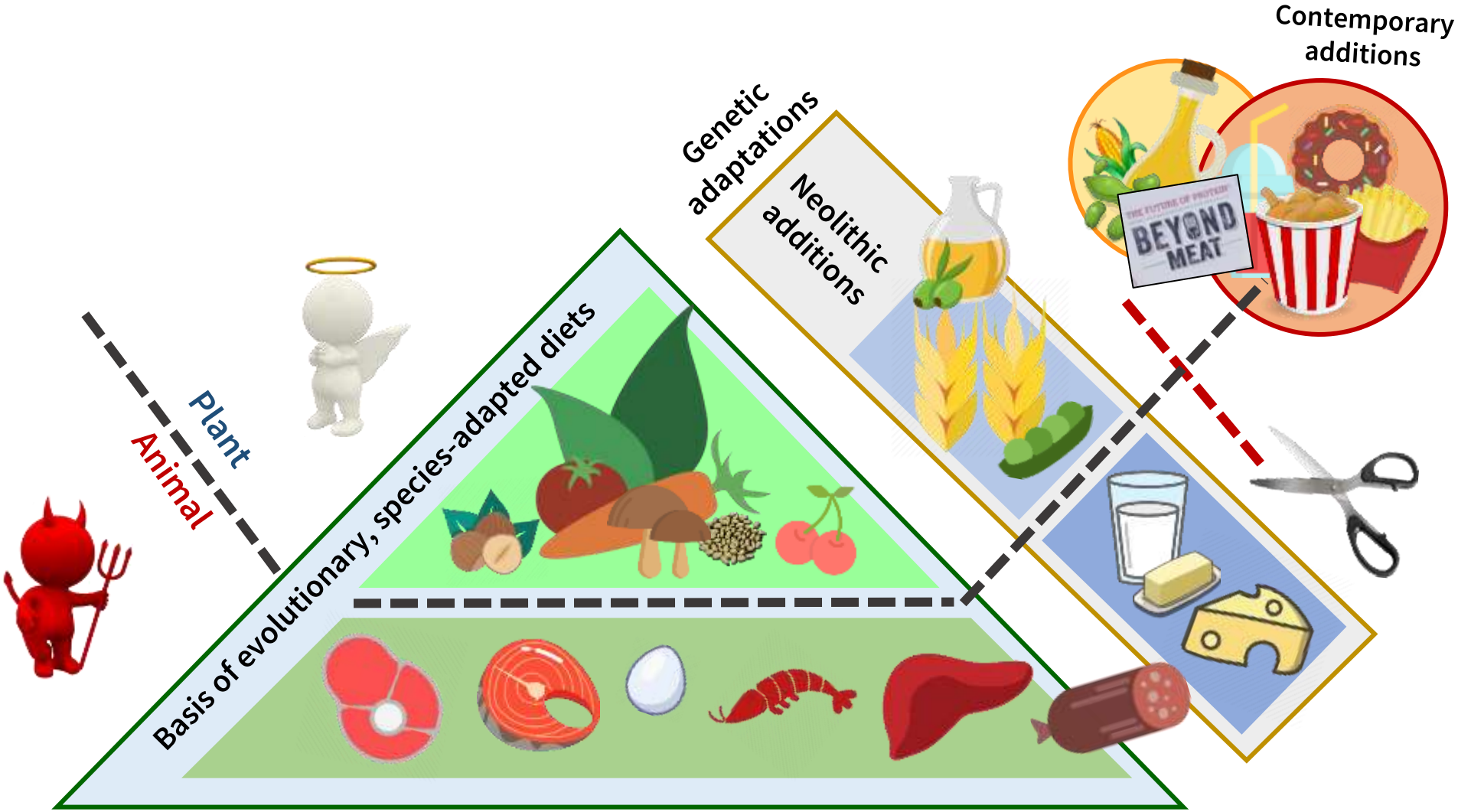


Figure 2. (a) Estimated land surface (in square meters, m^2) necessary to produce either 100 g (mL for milk) of each standard food product [A] (left bars in each triplet); an amount sufficient to provide 13 g of total essential amino acids (EAA) (middle bars) [B], or the RDA of all EAA, i.e. matching the RDA of the limiting amino acid (right bars) ([C]. Data are referred to edible amounts of each food. (b) Estimated Green House Gas Emission (GHGE, in Kg $CO_{2\text{-eq}}$), necessary to produce either 100 g (mL for milk) of each standard food product [A] (left bars in each triplet); an amount sufficient to provide 13 g of total essential amino acids (EAA) (middle bars) [B], or the RDA of all EAA, i.e. matching the RDA of the limiting amino acid (right bars) [C]. Data are referred to edible amounts of each food.


Contemporary additions
Genetic adaptations
Neolithic additions
Basis of evolutionary, species-adapted diets
Plant
Animal
BEYOND MEAT