Modelling the contribution of meat to global nutrition

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Introduction: An increasing global population requires increasing food availability. However, it is essential that nutrient dense foods are prioritised for the feeding of large populations, to avoid micronutrient deficiency and overnutrition. Meat is recognised as a nutrient dense food, particularly notable for its high-quality protein content, and high levels of B vitamins and certain minerals. However, it is not well known how important meat nutrition is currently in nourishing the global population.

Materials and methods: The DELTA Model (version 1.3)[1] was used to calculate the contribution of meat to the global availability of 29 essential nutrients. This model utilises global food production and use data, coupled with data for food waste, food nutrient compositions and nutrient bioavailability to calculate the total amount of each nutrient available for consumption by the global population.

Results: Around 333 million tonnes of meat were produced globally in 2018. Around 316 million tonnes of this (95%) was available as food, after consideration of non-food uses, supply chain and in-home waste. This value constitutes approximately 7% of total food mass.

The contribution of meat to nutrition is disproportionately higher than this contribution to food mass. For the macronutrients, meat is responsible for 11% of global food energy availability, 29% of dietary fat and 21% of protein. For the micronutrients, meat's most notable contributions to global availability are for the vitamins: A (24%), B1 and B2 (15% each), B5 (10%), B6 (13%) and B12 (56%). Meat also makes substantial contributions to the global availability of several minerals: zinc (19%), selenium (18%), iron (13%), phosphorous (11%), and copper (10%).

When considering protein, it is important to evaluate meat's contribution to bioavailable indispensable amino acids (IAA), a quantity calculated by the DELTA Model. Meat is responsible for 19-32% of the global availability of the IAA included in the model. Importantly, meat delivers 32% of global bioavailable lysine, often the limiting amino acid in the human diet.

Part of the reason for meat's high contribution to the IAA is the high bioavailability of these nutrients in meat. The DELTA Model utilises digestibility coefficients from the DIAAS protein quality scoring system, for which meat products have coefficients between 0.83 and 1, indicating that nearly all IAA content can be utilised by the consumer.

The DELTA Model also allows interrogation of the data at the resolution of different meat types. Of the total meat available as food in 2018, 26% was ruminant meat, 37% was poultry meat, and 37% was other meat (largely pigmeat). As a result, the other meat category was largest contributor to all studied nutrients except zinc (greater contribution from ruminant meat).

Conclusions: As should be expected, meat is not a good source of all required nutrients, making negligible or no contribution to carbohydrate, fibre, vitamin C and vitamin E availability. However, the high contribution of meat to the global availability of many nutrients emphasises its important place in delivering nutrition to the current global population. This quantification of the importance of meat to current global nutrition demonstrates the requirement for the high valuation of this and other nutrient dense foods when considering future food systems.

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Literature:

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