ANIMAL-SOURCE FOODS FOR HUMAN AND PLANETARY HEALTH

GAIN'S POSITION

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ABOUT GAIN

The Global Alliance for Improved Nutrition (GAIN) is a Swiss-based foundation launched at the UN in 2002 to tackle the human suffering caused by malnutrition. Working with governments, businesses and civil society, we aim to transform food systems so that they deliver more nutritious food for all people, especially the most vulnerable.

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GAIN BRIEFING PAPER SERIES

GAIN Briefing Notes provide essential information in a succinct, accessible form to support informed decision making by stakeholders in the food system to improve the consumption of nutritious, safe food for all people, especially the most vulnerable.

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OBJECTIVE

Animal-source foods (ASF) have long been important components of human diets, providing essential macro- and micronutrients. However, ASF production has increasingly been scrutinised as a driver of negative global environmental change, including climate change. GAIN works to improve nutrition by increasing the consumption of nutritious and safe food by all people, especially those most vulnerable to all forms of malnutrition. At the same time, we are committed to supporting environmental sustainability, within our own programmes and in the global food system. As such, it is important that we have a clear position on the role of animal-source foods in sustainably improving nutrition globally. This paper briefly lays out this position.

There are many complexities to this issue, including the role of animal production in livelihoods, the differences between different types of ASF production systems in different contexts (including differences in the quality of land used for production), the importance of considering global equity, and large gaps in existing knowledge. These are not addressed here but will be considered in a more detailed GAIN Discussion Paper.

KEY MESSAGES

- Animal-source foods (ASF) – including fish, meat, eggs, and dairy products – can be an important component of nutritious diets.
- ASF play an important role in reducing the risk of undernutrition among vulnerable groups in resource-poor settings, especially for young children.
- High consumption of processed red meats has negative health consequences. The evidence for negative health consequences of unprocessed red meat is mixed, but moderation among high consumers would likely bring health benefits. There is little evidence that consumption of other non-red meat ASF, such as fish, poultry, eggs and dairy, has negative health consequences. At the same time, many highly processed foods are fully plant based and should be excluded in language related to the healthfulness of plant-based diets.
- Many types of ASF production can have a negative impact on the environment, but more sustainable production of ASF is possible and needs to be further explored in low- and middle-income countries (LMICs).
- Most healthy adults can meet their nutrient requirements from well-planned diets based on plant-based foods; for children and pregnant women, requirements for several nutrients are more difficult to meet without the inclusion of ASF or appropriate fortified foods.
- Most low-income consumers in LMICs would benefit from sustainably increasing consumption of unprocessed and minimally processed ASF to provide the nutrients needed for better health and development.

NUTRITIONAL CONTENT OF ANIMAL-SOURCE FOODS

Animal-source foods (ASF) – including fish, meat, eggs, and dairy – can be an important component of nutritious diets. ASF are typically energy and nutrient dense, packing large amounts of multiple nutrients into small volumes (1). Whilst plant-source foods (PSF) – fruits, vegetables, grains, roots, tubers, legumes, and nuts/seeds – contain many of these nutrients, the concentration and bioavailability (i.e., ease with which nutrients can be used by the body) is often lower. Therefore, larger quantities of food may be required to meet nutrient needs. This can be particularly problematic for small children, as detailed in the next section. Furthermore, ASF contain essential micronutrients that are not found in PSF, for example vitamins B_{12} and D (2). Other micronutrients, like iron, zinc, calcium, and vitamin A, are present in both ASF and PSF but are more readily absorbed and used by humans when derived from ASF (1,2). Consumption of ASF can also enhance absorption of nutrients from PSF (3). Finally, most ASF contain 'complete' or high-quality proteins, which contain all nine essential amino acids necessary in the human diet (1). Diets without ASF must typically include a wider variety of foods and combine varying food types to provide all amino acids (4). Whilst it is possible to do this, affordability, knowledge, and other constraints may make it difficult, particularly in low-resource settings. Generally, diets in low- and middle-income countries (LMICs), and even in low-income populations in high-income countries, tend to be low in iron, vitamin A, zinc, calcium, high-quality protein, and several other nutrients (2,5,6).

IMPORTANCE FOR VULNERABLE GROUPS

ASF can be particularly important for reducing undernutrition among vulnerable groups in resource-poor settings. Infants, young children, and adolescents are going through periods of physiological change and accelerated growth; pregnant and lactating women have higher nutrient requirements due to foetal growth and milk production (1). As such, these groups are particularly vulnerable to nutrient deficiencies and associated negative health outcomes, such as anaemia, poor brain development, and poor growth, if key micronutrients are insufficiently consumed (1,2). Obtaining adequate quality protein and micronutrients from PSF can be particularly challenging for infants and young children, who have small stomachs, as larger volumes are typically required. Since ASF tend to be dense in many nutrients, smaller amounts can be eaten to meet requirements. For example, about 50 g of chicken liver provides the recommended daily intake of iron, vitamin A, zinc, vitamin B_{12}, and folate from complementary foods for breastfeeding children ages 6-23 months (7,8).

ASF are thus ideal components of complementary foods (i.e., foods to be provided in addition to breastmilk beginning at 6 months of age) (9). Observational studies have found significant associations between ASF consumption and reduced odds of child stunting (e.g., (10–12), and some randomised controlled trials have demonstrated that ASF consumption can improve micronutrient status, growth, and/or cognitive performance (13,14).[1] Recent

[1] Another trial was unable to replicate this result (15), although this may have been because of the existing high consumption of ASF and high burden of infection in the study population.

systematic reviews, however, conclude that evidence is currently insufficient to draw a clear conclusion about the effects of ASF on young children's growth or development (16–18).

NEGATIVE HEALTH IMPLICATIONS OF ASF

High consumption of processed red meat is harmful, particularly in populations with a high burden of overweight/obesity or in the context of an unbalanced diet. High intakes of processed red meat are associated with increased risk for chronic diseases, such as heart disease, stroke, diabetes, and cancer (19–22). The evidence of health risk associated with intake of unprocessed or minimally processed red meat is mixed, but intake beyond a small to moderate amount likely contributes to risk for chronic diseases (19–23). Although single dietary components common in ASF, namely saturated fat and cholesterol, have been historically portrayed as major contributors to this chronic disease risk, recent evidence suggests their effects may be relatively small or neutral, and other ingredients added to processed meats particularly, like sodium and preservatives, may be more harmful (24). There is little evidence of health risk associated with unprocessed or minimally processed ASF other than red meat, such as poultry, fish, eggs, and dairy (25–30).

ASF consumption is currently not considered a primary contributor to the diet-driven disease burden in LMICs, at least in part because of low levels of consumption, particularly of highly processed varieties (31). Other factors, including low intake of beneficial PSF like fruit and vegetables, may be a major contributor (31–34). Similarly, highly processed foods, many of which are purely plant-based (such as sugar-sweetened beverages, fast foods, and highly processed snack foods that contain high quantities of salt, trans-fat, refined flours, sugars, and oils) may be more detrimental (24,35,36). In this context, increased consumption of certain ASF, such as fatty fish that is rich in protein, several micronutrients, and omega-3 fats, may reduce undernutrition and risk of chronic diseases simultaneously (37,38).

Considering this, populations that consume high amounts of red meat, particularly processed red meat, would benefit from decreased consumption of those ASF to improve health. Among those vulnerable to undernutrition in LMIC settings, the contribution of unprocessed or minimally processed ASF to improve nutrient intake likely more than offsets any health-related risks (2).

ASF AND THE ENVIRONMENT

ASF production can negatively impact the environment. The production of most ASF consumes more resources and produces more greenhouse gas emissions per unit of energy than the production of PSF (20,21), largely due to the production of inputs, such as feed. ASF production, as typically practiced, is the main source of global pollution of methane, a potent greenhouse gas, and also can have detrimental effects on biodiversity and ecosystems (21). Across all ASF, the amount of resources used depends on the production system, value chain, and setting in question. In general, the production of beef tends to be the greatest user of land and energy, followed by pork, poultry, eggs, and milk (39). The environmental impact of fish depends heavily on the production system and type of impact examined but is generally near the low end of the range among ASF (40). However, many fish stocks are

being depleted due to unsustainable practices, with negative consequences for ecosystems (41,42). Better agricultural practices can reduce the environmental burden of ASF production (43), but (at least given current technological options) only to a limited extent. To date, most research on the environmental impacts of ASF production has focused on production methods used in high-income countries; evidence from LMIC settings is scarce.

Whilst the environmental footprint of global food production needs to be urgently reduced, equity dictates that the differentiated responsibility for global environmental problems should be considered when determining the role LMICs (where current consumption levels are very low, (44)) should play in such efforts. Such analysis should also account for the important positive contributions livestock production systems make to both ecosystems and livelihoods (44).

DIETS BASED ON PLANT-SOURCE FOODS

Most healthy adults can meet their nutrient requirements from well-planned diets based on plant-source foods. Diets that provide balanced combinations of PSF, such as whole grains and legumes, can meet protein requirements of adults in a manner equivalent in quality to ASF (4). Vegetarian diets that include eggs and dairy can also provide adequate micronutrients for adults (20).[2] Such diets may have benefits for the environment (45,46) and potentially also human health (47) in settings where they are feasible and the needed diversity of PSF is accessible year-round. Unfortunately, this is not the case for many of those most vulnerable to undernutrition in the LMICs where GAIN works. Accessibility of nutrient-dense PSF is often limited in such settings, particularly in forms suitable for young children. Ensuring nutritionally adequate PSF diets would require careful planning, improved food fortification (or supplementation), and increased production of high-quality PSF (48). Furthermore, some caution related to 'plant-based' foods is required. Many highly processed foods are fully plant-based (e.g., sugar-sweetened beverages and highly processed snack foods) yet have been associated with poor health outcomes (24,35). Language defining healthy plant-based diets should thus exclude such foods.

CONCLUSION: GAIN'S POSITON

In sum, given the growing burden of noncommunicable diseases and the global imperative to reduce environmental impacts of the food system, consumption of red meat, and particularly processed red meat should be reduced where it is high. Small to moderate amounts of unprocessed red meat and other non-red meat ASFs are, however, an important source of nutrients, and their reduction should not be done at the expense of increasing the risk of undernutrition among the most vulnerable. Efforts are thus needed to ensure these ASF can be sustainably produced at sufficient scale. Given wide variation in nutritional status, dietary patterns, agroecosystems and land quality, and environmental footprints across and within countries, locally specific analysis is needed to determine which policies and programmes are needed to minimise health and environmental risks whilst promoting nutrient-rich diets.

[2] Exclusively vegan diets would need to include vitamin B12 supplements or vitamin B12-fortified foods.

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