



COMMITTEE ON AGRICULTURE

SUB-COMMITTEE ON LIVESTOCK

First Session

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Contribution of livestock to food security, sustainable agrifood systems, nutrition and healthy diets

Executive Summary

Malnutrition, in all its forms, is a persistent and increasing global concern. Humans have specific nutrient demands at different stages of their life course. Malnutrition is the single largest contributor to disease in the world and leads to early death.

Terrestrial animal source food (TASF) is nutrient-dense and provides energy and many essential nutrients such as proteins, fatty-acids and micronutrients. Livestock species and breeds are adapted to a wide range of environments, enabling the sector to contribute significantly to the eradication of hunger and malnutrition, even in areas unsuitable for crop production.

At its 27th Session in October 2020, the Committee on Agriculture (COAG) requested the Food and Agriculture Organization of the United Nations (FAO) “to produce a comprehensive, science and evidence-based global assessment of the contribution of livestock to food security, sustainable food systems, nutrition and healthy diets” (referred to as the Assessment).¹

This document provides an overview of the approach, scope, content and timeline of the Assessment. It also describes stakeholder involvement in the Assessment and resource requirements.

The Assessment follows an agrifood systems approach and applies a One Health perspective to assess sustainability in the three dimensions linked to the 2030 Agenda for Sustainable Development. It will consist of four component documents that will be developed over a period of four years (2021–2024), resulting in a synthesis document.

¹ FAO. 2020. *Report of the 27th session of the Committee on Agriculture (28 September – 2 October 2020)*. Rome, FAO. (also available at <https://www.fao.org/3/ne021en/ne021en.pdf>).

Documents can be consulted at www.fao.org.

Section VI shares key findings of the draft “*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*”.

Suggested action by the Sub-Committee

The Sub-Committee is invited to recommend COAG to:

- welcome the inclusive process of the first component² and invites FAO to continue preparing the Assessment with a view of presenting the remaining three component documents³ to subsequent sessions of the Sub-Committee.
- invite Members to provide comments on the first draft component document.
- encourage FAO Members to consider the impact of livestock policies, programmes and legislative frameworks on nutrition outcomes and to update national food-based dietary guidelines so that they adequately consider terrestrial animal source food and specific nutrient requirements during the life course of humans.
- further encourage Members and other resource partners to financially support the preparation of the Assessment.

Queries on the substantive content of the document may be addressed to:

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I. Introduction

1. Malnutrition is a persistent and increasing global issue. It takes many different forms, including: hunger, micronutrient deficiencies and over nutrition (overweight and obesity), as well as being the single largest contributor to disease in the world, affecting one in three people. Poor quality diets are the leading cause of disease and death, and are responsible for 22 percent of premature deaths among adults worldwide.⁴

2. One tenth of the global population is affected by undernutrition, with three billion adults and children unable to afford healthy diets.⁵ Micronutrient deficiency or “hidden hunger” affects more than

² *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 (draft)*, <https://www.fao.org/3/cb8424en/cb8424en.pdf>.

³ Document 2: “Factors determining supply, demand and consumption of terrestrial animal source food – historical analysis and foresight”; document 3: “Contribution of the livestock sector to food security and sustainable agrifood systems – benefits, synergies and trade-offs”; and document 4: “Options to sustainably change the livestock sector to better contribute to food security, healthy diets and nutrition”.

⁴ Afshin, A., Sur, P.J., Fay, K.A., Cornaby, L., Ferrara, G., Salama, J.S., Mullany, E.C., *et al.* 2019. Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, 393(10184): 1958–1972. [https://doi.org/10.1016/S0140-6736\(19\)30041-8](https://doi.org/10.1016/S0140-6736(19)30041-8)

⁵ FAO. 2017. *The future of food and agriculture – Trends and challenges*. Rome, FAO. (also available at

two billion people worldwide. Nearly a third of women of reproductive age suffer from anaemia. Different forms of malnutrition can coexist in the same country, community, household and even the same person, and no country is without malnutrition.

3. Humans have specific nutrient demands at critical stages of their life course. For example, pregnant and breastfeeding women, infants, children and adolescents have higher demands per kilogram body weight for most, but not all, essential nutrients than adult men, non-pregnant and non-breastfeeding women or the elderly. Malnutrition in early childhood can affect the child's growth and physical and intellectual development, labour productivity during adulthood and even lead to increased disability and a lower lifespan. While the prevention of malnutrition is critical for a woman's own well-being, a child's nutritional status is closely linked to the nutritional status of their mother before, during and after pregnancy. Poor maternal nutrition impairs fetal development and contributes to low birthweight and subsequent child malnutrition.

4. TASF is nutrient-dense and provides energy and many essential nutrients such as proteins, fatty-acids and micronutrients.⁶ Livestock species and breeds are adapted to a wide range of environments, enabling the sector to contribute significantly to the eradication of hunger and malnutrition, even in areas unsuitable for crop production.

5. With 811 million people facing hunger and nearly one in three people in the world affected by moderate or severe food insecurity in 2020,⁷ it is important to consider how agrifood systems contribute to food security, healthy diets and improved nutrition in different contexts. Livestock-derived food products contribute 33 percent of protein and 17 percent of calorie intake of diets,⁸ with uneven contribution among regions, gender and income levels. At the same time, food safety must also be ensured everywhere.

6. At its 27th Session in October 2020, the Committee on Agriculture (COAG) requested the Food and Agriculture Organization of the United Nations (FAO) "to produce a comprehensive, science and evidence-based global assessment of the contribution of livestock to food security, sustainable food systems, nutrition and healthy diets" (the Assessment).⁹

II. Approach, scope, content and timeline of the Assessment

7. The Assessment has been planned to apply an agrifood systems approach (see Figure 1) and a One Health perspective. This is intended to provide balanced and holistic guidance and to support the sustainable transformation of the livestock sector to best contribute to the 2030 Agenda for Sustainable Development.

<https://www.fao.org/3/i6583e/i6583e.pdf>).

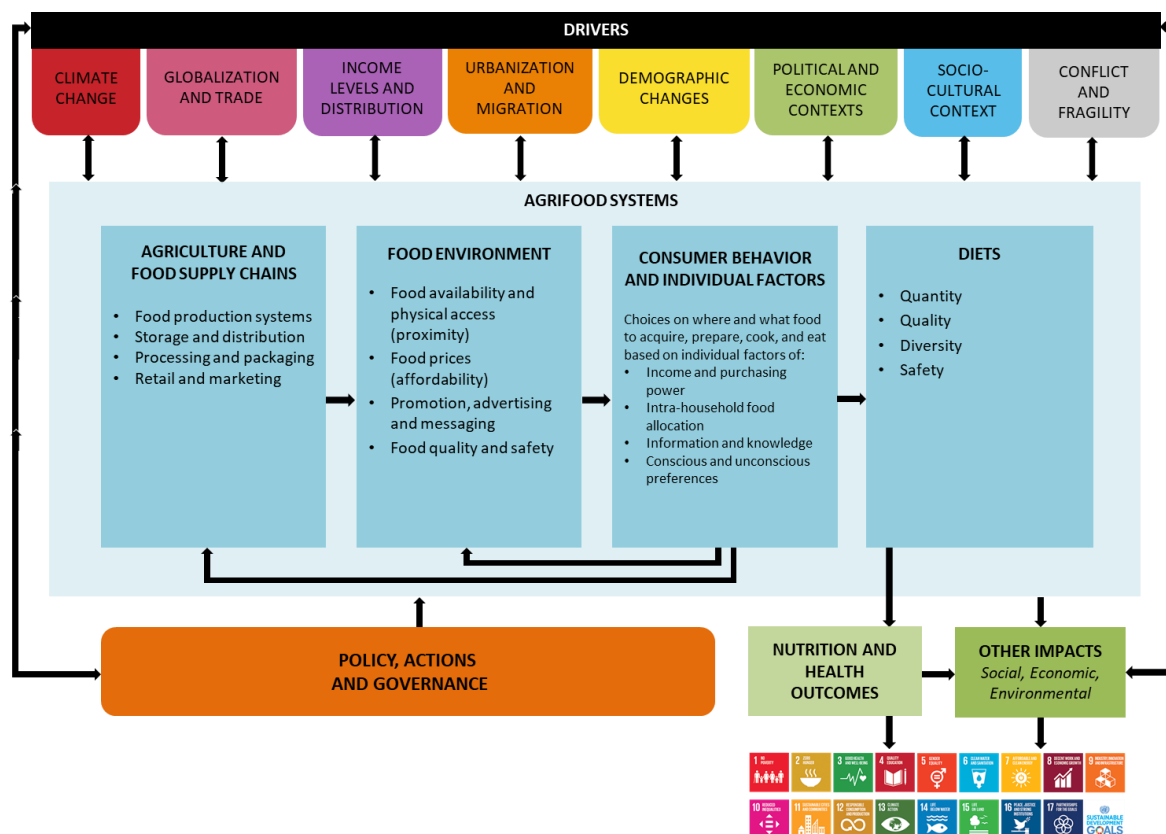
⁶ FAO. 2018. *World Livestock: Transforming the livestock sector through the Sustainable Development Goals*. Rome, FAO. 220 pp. (also available at <https://doi.org/10.4060/ca1201en>).

⁷ FAO, IFAD, UNICEF, WFP & WHO. 2021. *The State of Food Security and Nutrition in the World 2021. Transforming food systems for food security, improved nutrition and affordable healthy diets for all*. Rome, FAO. 240 pp. (also available at <https://doi.org/10.4060/cb4474en>).

⁸ FAO. 2018. *World Livestock: Transforming the livestock sector through the Sustainable Development Goals*. Rome, FAO. 220 pp. (also available at <https://doi.org/10.4060/ca1201en>).

⁹ FAO. 2020. *Report of the 27th session of the Committee on Agriculture (28 September–2 October 2020)*. Rome, FAO. (also available at <https://www.fao.org/3/ne021en/ne021en.pdf>).

Figure 1. Agrifood systems for healthy diets¹⁰



8. To ensure a comprehensive and global analysis, the Assessment will cover all major sources of food from terrestrial animal species (mammalian, avian, insect) of regional or global importance from all livestock systems including: integrated plant-animal production systems; specialized livestock production systems; and grazing systems and pastoralism. While the Assessment will focus on livestock systems, it will also cover hunting for meat and wildlife farming focused on the production of food, although analysis of the latter is limited by scarce data.

9. The Assessment will be based on a broad review of existing evidence (scientific publications and databases) on the linkages between livestock, agrifood systems, food security, healthy diets and nutrition. Focus will be given to the challenges and opportunities of ensuring healthy diets for all – including through adequate dietary diversity – in different socio-economic contexts and livelihoods. Following the agrifood systems approach as presented in Figure 1, sustainability will be assessed covering its three dimensions linked to the 2030 Agenda, where adequate. Research, data and policy gaps will be identified and uncertainties will be acknowledged where they exist. Different impact pathways have been identified from livestock to human nutrition and the Assessment will consider the different drivers, gaps and barriers that influence the supply, demand and consumption of TASF.¹¹

¹⁰ FAO. 2021. Vision and Strategy for FAO's Work in Nutrition. PC 130/5 Rev.1.

<https://www.fao.org/3/ne853en/ne853en.pdf>; FAO. 2021. Report of the Council of FAO. CL 166/REP. para 24b. <https://www.fao.org/3/nf693en/nf693en.pdf>

¹¹ Dominguez-Salas, P., Kauffmann, D., Breyne, C. & Alarcon, P. 2019. Leveraging human nutrition through livestock interventions: perceptions, knowledge, barriers and opportunities in the Sahel. *Food Security*, 11(4): 777–796. <https://doi.org/10.1007/s12571-019-00957-4>

10. Based on the prevalence of hunger and malnutrition, specific focus will be given to vulnerable groups and the Assessment will take a life course approach, highlighting specific issues of different groups, including indigenous peoples.

11. The Assessment will be developed based on four component documents with the following working titles:

- Document 1: 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.
- Document 2: Factors determining supply, demand and consumption of terrestrial animal source food – historical analysis and foresight.
- Document 3: Contribution of the livestock sector to food security and sustainable agrifood systems – benefits, synergies and trade-offs.
- Document 4: Options to sustainably change the livestock sector to better contribute to food security, healthy diets and nutrition.

Based on the four component documents, a synthesis will be prepared for potential publication. These documents and their synthesis will systematically cover all elements presented in the conceptual agrifood systems framework (Figure 1).

12. FAO aims to prepare the four component documents, constituting the main parts of the Assessment, between 2021 and 2024. Document 1 has been drafted and its main findings are summarized below. Documents 2, 3 and 4 are planned, subject to the availability of funding, to be presented to subsequent sessions of this Sub-Committee.

III. Stakeholder involvement

13. The process leading to the Assessment is being coordinated by FAO's Animal Production and Health Division in close cooperation with the Food and Nutrition Division. Due to the highly multidisciplinary nature of the Assessment, a wide range of technical units and offices have been invited to participate. The nominated focal points contribute to the process by reviewing the overall concept note for the Assessment, as well as the outlines and draft sections of the documents.

14. The approach, scope and timeline were welcomed by the COAG 28 Bureau.

15. Based on the stakeholder mapping, a list of potential contributors (comprising 130 experts in November 2021) has been established and is constantly being expanded. It includes high-level experts who are focusing their research on livestock or TASF and their contribution to food security, sustainable agrifood systems, nutrition and healthy diets, as well as government representatives, United Nations organizations, World Organisation for Animal Health (OIE), CGIAR centres, the , relevant high-level initiatives (including the Healthy Diets from Sustainable Food Systems Initiative, Sustainable Nutrition Initiative, Feed the Future Innovation Lab for Livestock Systems and Global Initiative for Sustainable Eggs), private sector and civil society organizations.

16. A webinar was held in June 2021 to raise awareness for the Assessment and engage potential stakeholders. The event attracted more than 200 participants from 72 countries from all regions, of which 25 percent were academics, 34 percent were from United Nations organizations and 15 percent and 14 percent were from the private sector and civil society organizations, respectively. The participants had a wide range of academic backgrounds and experience ranging from livestock and veterinary science (46 percent), human nutrition (15 percent), economics (15 percent), social science (12 percent), food safety (5 percent) and human health (1 percent).

17. A multidisciplinary Scientific Advisory Committee was established to guide the process and the preparation of the Assessment. Following a call for applications sent to all registrants to the

webinar and potential contributors (some 500 addresses),¹² 70 applications were received and thoroughly screened. The nomination of 23 members was based on scientific excellence and independence, stakeholder representation, geographic representation and coverage of all required disciplines and areas of expertise. The resulting Scientific Advisory Committee consists of 10 women and 13 men with work experience covering all geographic regions. Stakeholder representation includes civil society, the private sector, one multi-stakeholder partnership (Global Agenda for Sustainable Livestock – GASL), the International Livestock Research Institute (ILRI) and the World Health Organization (WHO).

18. Both the Scientific Advisory Committee and the potential contributors (including focal points from FAO units) will be engaged in reviewing outlines and drafts of each of the four documents. In addition, virtual meetings will be held with members of the Scientific Advisory Committee to discuss both outlines and full draft documents, covering any open issues and providing guidance for revision of the documents.

IV. Required resources

19. Adequate financial and human resources are necessary to ensure that the preparation of the Assessment can be achieved within the proposed time frame. It is proposed that the work will be covered by reallocation of staff responsibilities under FAO's Regular Programme of Work and Budget, within existing resources, and by utilizing secondments and raising extrabudgetary funds, as indicated in Table 1. The main roles and areas of work include:

- a coordinator and a co-leader, who will provide overall coordination for the process outlined in this document and oversee constant two-way communication with stakeholders;
- a dedicated multidisciplinary core team, which will support the preparation of the documents, including literature review, analysis of data and information, presentation of results and the preparation of outlines, drafts, revised and final sections of the four documents and the synthesis.

20. The Government of France has kindly supported the process by seconding one staff member for the duration of the process. The secondee commenced working with the team in June 2021. ILRI also supported the preparation of component document 1 by providing in-kind contribution. In addition, the Governments of France, Germany, Ireland and Switzerland are financially supporting the preparation of the Assessment. While the required extrabudgetary funds for the preparation of component documents 1 and 2 have been secured, a funding gap of USD 175 000 remains to complete the process.

¹² FAO. 2021. Assessing the contribution of livestock to food security, sustainable food systems, nutrition and healthy diets: Terms of Reference of the Scientific Advisory Committee. Rome, FAO. (also available at <https://www.fao.org/3/cb5365en/cb5365en.pdf>).

Table 1. Proposed outputs/core activities and budget for developing the Assessment (in USD 1 000)

	RP ¹³	EB ¹⁴	Total
Preparation of component document 1	151	110	261
Preparation of component document 2	100	54	154
Preparation of component document 3	64	54	118
Preparation of component document 4	170	50	220
Preparation and publication of the synthesis document	90	61	151
Launch the Assessment (communication strategy)	28	10	39
Total	603	339	943

V. Progress to date

21. Following the appointment of the coordinator and co-leader of the Assessment from staff of the Animal Production and Health Division and the Food and Nutrition Division, the process, scope, budget, timeline and work plan have been established.

22. The outline for component document 1, “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”, has been developed and revised, based on comments received during a consultation process engaging both the Scientific Advisory Committee and the potential contributors. An electronic survey resulted in contributions from 20 members of the Scientific Advisory Committee and 69 further contributors (based on an invitation to more than 400 experts and other stakeholders, including focal points from other FAO units and offices). The survey focused on the document’s structure, flow, titles and annotations, consulting on their logic, clarity and comprehensiveness. Survey respondents also provided preliminary lists of gaps in research, and policy and legal frameworks.

23. A virtual meeting of the Scientific Advisory Committee and FAO’s core team discussed the revised outline and clarified open issues.

VI. 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 first results

24. Component document 1 of the Assessment describes the world nutrition situation, dietary patterns and food systems in relation to TASF. It comprehensively analyses nutrients in TASF and their importance in human nutrition, along with their effects on human health over life courses. Related policies, legal issues and regulations are analysed where adequate. The key findings are based on the review of 123 food-based dietary guidelines (FBDGs) from 94 countries, 79 policy documents from 60 countries relating to non-communicable diseases (NCDs) and legislation, policies and programmes related to both food and agriculture and nutrition (35 documents). A specific section focuses on food safety and food-borne diseases related to TASF, from producer to consumer. The document concludes by introducing emerging topics.

25. Key findings:

- TASF within adequate dietary patterns can make vital contributions to meeting the Global nutrition targets 2025 endorsed by the World Health Assembly and the Sustainable Development Goals (SDGs) that aim to reduce: stunting among children under five years; low

¹³ Estimated Regular Programme contribution to the preparation process and the Assessment, mainly covering salaries for Professional and General Service staff.

¹⁴ The budget does not include a staff seconded by the Government of France.

birthweight; anaemia in women of reproductive age (15–49 years); overweight among children under five years; and obesity and diet-related NCDs in adults.¹⁵

Nutrient and bioactive composition and value of TASF

- TASF provide high-quality proteins compared with other foods, with some nuanced differences in digestibility. Specific amino acids and bioactive factors with roles in human health may only be found in TASF (i.e. carnitine, creatine, taurine, hydroxyproline and anserine). Long-chain fatty acids and the ratios of essential fatty acids found in TASF are important for cognition, particularly across the human life course.
- Iron and zinc are bound in more bioavailable compounds in meat and are more easily digested than compounds found in plant-based foods. Milk is well recognized for its concentration and bioavailability of calcium among other nutrients. Eggs are highly concentrated in choline and some long-chain fatty acids. Generally, TASF are also a rich source of selenium, vitamin B12 and choline. Consumption of TASF has been shown to counteract effects of anti-nutrients in plant-based foods.
- Nutrition quality (especially the fat composition) of TASF can be influenced in order of priority by choice of animal species and feeding system, followed by breed and production environment.

Effects of TASF on nutrition and health in the human life course

- Dietary intakes of TASF can affect nutrition (nutrient status, anthropometry), health (infectious disease, chronic disease, bone health) and cognition (development, neuroprotection, neurological disease prevention).
- Across all life course phases – which include women during pregnancy and when breastfeeding, infants and young children, school-age children and adolescents, adults and older adults – the concentration of evidence comes from trials assessing milk and dairy products. Beef and eggs follow in terms of availability of evidence, with fewer studies available on pig and poultry meat, meat from wild animals, insects and meat from other minor species. In sum, the evidence suggests beneficial effects of TASF intakes at appropriate levels for several health outcomes, and non-significant increases in chronic diseases, among apparently healthy individuals. A robust evidence base shows that milk and dairy consumption during pregnancy was found to increase infant weight at birth and may also increase birth length and fetal head circumference. Among infants and young children, eggs, milk and meat consumption has been studied with mixed findings depending on overall diet and environmental exposures. Evidence for school-age children and adolescents consuming milk and dairy products show positive effects for increased height and reduced adiposity, overweight and obesity. Beef consumption in this life course phase has been shown to improve cognitive outcomes.
- In adults, findings largely point to positive effects from milk and dairy products (such as yogurt) for reducing risks for all-cause mortality, hypertension, stroke, type 2 diabetes, colorectal cancer, breast cancer, obesity, osteoporosis and fractures. Relatively robust evidence shows that egg consumption among adults does not increase risks for stroke or coronary heart disease. Compelling evidence suggests that in adults meat intake between 85–300 g/day can protect against iron deficiency. Poultry meat has not been studied as much as beef, but findings suggest non-significant effects on stroke risk with subgroup analysis suggesting a protective effect in women.
- The evidence base for red meat consumption in adults has been thoroughly assessed by the Global Burden of Disease Study,¹⁶ showing some increased risk of chronic disease associated

¹⁵ WHO. 2014. *Global nutrition targets 2025: Policy brief series (WHO/NMH/NHD/14.2)*. Geneva, WHO. (also available at https://apps.who.int/iris/bitstream/handle/10665/149018/WHO_NMH_NHD_14.2_eng.pdf).

¹⁶ Afshin, A., Sur, P.J., Fay, K.A., Cornaby, L., Ferrara, G., Salama, J.S., Mullany, E.C., *et al.* 2019. Health

with 23 g (18–27 g) per day of red meat, and 2 g (0–4 g) per day of processed meats. However, other studies have shown non-significant effects of beef on chronic disease biomarkers.¹⁷

- Significant gaps remain in the evidence base for the elderly. Preliminary evidence, however, suggests the potential for milk and dairy products and possibly other TASF in mitigating impacts on sarcopenia, fractures, frailty, dementia and Alzheimer’s disease.

Food safety and food-borne issues of TASF

- One third of the food-borne disease burden is associated with the consumption of contaminated TASF, mainly linked with bacterial causes and diarrhoea. While evidence on food-borne disease hazards and health outcomes as well as risk analysis methods are well documented, knowledge of the national burden (incidence and severity) is lacking. For example, main transmission routes along the value chain are crucial to target national policies, but are not well understood.
- Changing agricultural practices, especially related to the intensification of livestock production and inputs use, lengthening and broadening of value chains and shifts towards consumption of processed food, contribute to increasing exposure to food-borne disease hazards. Antimicrobial resistance presents additional challenges beyond nutrition and food safety.
- Food safety burdens must be alleviated by enhanced sanitation and mitigated health risks at the interfaces between animals, humans and the environment through a One Health approach. Strengthening national food control systems is key to ensuring food safety for better health and nutritional outcomes.

Policies, legislation and regulations

- Most recommendations are for TASF in general, followed by recommendations on meat, milk and dairy products and eggs. There is significantly less coverage on offal, poultry, pig meat, meat from wild animals and insects.
- Most recommendations are linked to human micronutrient needs and NCDs and targeted to the entire population. Micronutrient-related recommendations tend to be more detailed compared with NCD-related recommendations, providing quantitative indications in terms of daily or weekly TASF intake. Most recommendations do not consider the implications of under- and overconsumption of TASF, a pertinent gap given the coexistence of micronutrient deficiencies with both underweight, overweight, obesity and NCDs.
- In total, there were 378 recommendations that follow a life course approach, 282 in FBDGs, irrespective of the income class of the countries. While the recommendations in the FBDG of high-income countries were more detailed, overall, there was a good distribution of both qualitative and quantitative recommendations.
- Environmental sustainability considerations were only included in documents from eight middle-high-income countries and mostly provided qualitative recommendations. Animal welfare was only mentioned in the FBDG of Denmark and Sweden, with a specific reference to animal welfare labels to inform consumers.

effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, 393(10184): 1958–1972. [https://doi.org/10.1016/S0140-6736\(19\)30041-8](https://doi.org/10.1016/S0140-6736(19)30041-8)

¹⁷ It should be noted that the scope of this first component document was to assess the contribution of TASF at appropriate levels among apparently healthy individuals and not to assess risks associated with overconsumption and/or among individuals suffering from medical conditions.

26. In conclusion, these first findings of the Assessment reveal some preliminary gaps in the evidence and in the policy as summarized below:

- A deeper understanding is required of the interactions of TASF nutrients and bioactive compounds in dietary patterns to further characterize the role of TASF in terms of nutrition, health and cognitive outcomes over humans' life course.
- There is still a gap in the literature on the frequency and quantity of TASF in healthy diets for several life course phases. It appears that a significant part of the current evidence was generated in response to questions largely focused on the potential of TASF, especially red meat, milk and dairy products, to increase the risk of NCDs. There are significantly less studies on the effects of meat from pigs, poultry, goats, sheep, wild animals and insects.
- While this is beyond the scope of the Assessment, additional evidence may be merited for examining TASF in unhealthy populations (diabetic, overweight and obese) given the high prevalence of these medical conditions.
- National FBDGs should be updated to adequately consider TASF and specific nutrient requirements during the life course where not yet considered. Recommendations should consider the implications of under- and overconsumption of TASF given the increasing coexistence of micronutrient deficiencies and chronic disease.
- National FBDG should be used to better inform livestock policies, programmes and legislative frameworks on nutrition outcomes.