

# FAO

Food and Agriculture Organization



**TORONTO MODEL UNITED NATIONS**  
Specialized Committee Background Guide

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## Director's Letter

Dear Delegates,

Welcome to the Food and Agriculture Organization of the United Nations! We speak for the entire team when we say how excited we are for this committee. Before getting into all the statistical aspects of the committee, we would like to express our gratitude for having the opportunity to be your directors. We had an absolute blast in deciding topics and creating a background guide that discusses a wide range of topics.

Truth be told, this committee took a lot of time to plan, from coming up with engaging topics, to even choosing the committee itself, it definitely took some effort. We are more than excited to see all of the innovative solutions and resolution papers you delegates come up with. Though many of the issues discussed in the committee seem straightforward at first glance, we worked hard to incorporate a variety of perspectives and bring forth a plethora of debates in this committee.

This committee will allow you to use external research, as well as their own moral values to decide the ethics within sustainability. As delegates of this committee, you will need to use quick thinking, as well as your own creativity skills to decide on effective methods in combating food insecurity and the ethical concerns within livestock. Throughout this committee, expect to discuss issues economically, socially, and politically, and keep your eyes open to various perspectives. It is important to note that though this background guide entails most of the information required for this committee, it is recommended that delegates take the time to conduct external research. It is up to you to learn more about your country's stance on these issues and develop a strong case for your country's opinion.

Nonetheless, good luck delegates! Whether this is your first conference, or you are an experienced delegate, we are more than sure that this committee will be memorable for you. We truly look forward to seeing everyone in TMUN 2025! If you have any questions or concerns regarding the committee, please do not hesitate to reach out at any time.

Sincerely,

Risha Kansara and Mazhar Atassi

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## **Disclaimer**

This being a committee of the FAO dealing with critical issues like food insecurity in developing nations, many of the subtopics discussed involve sensitive and distressing realities. These may be on issues of malnutrition, poverty, hunger, environmental degradation, economic disparities, and disastrous results stemming from conflict and displacement.

The committee will be solution-oriented and long-term strategy-oriented, keeping the discourse constructive and respectful. It is a committee that is usually based on technical and scientific ideas; therefore it will entail sustainable agriculture, climate-smart practices, and methods of food distribution.

This committee is also meant to be a productive and respectful environment that will make the experience of each participant not only enjoyable but also effective. Delegates are encouraged, given the nature of these issues, to show sensitivity and respect while discussing these topics, for behind every statistic and every line of policy lies a human component. It will be a place to think deeply, solve problems, and collaborate with others; it is everyone's responsibility to ensure this committee stays productive and respectful during the sessions.

## Committee Introduction

The Food and Agriculture Organization of the United Nations is the specialized agency with the mandate to lead the battle against hunger and malnutrition and, through this, to ensure food for all. Since its founding in 1945, FAO has been a key driver of international agriculture, food systems, and rural development policy, working regularly with governments, NGOs, and other international organizations to make food systems throughout the world more productive, equitable, and sustainable.<sup>1</sup> The general mandate of the FAO is the eradication of hunger, food security, improvement of nutrition, and fostering sustainable agriculture that helps improve the livelihoods of all people, both in the developed and developing worlds. Members of this committee will discuss food insecurity in developing countries - a trend that is worsened by poverty, war, weather changes, and unequal distribution of resources.<sup>2</sup>

Food insecurity is, to this day, one of the largest challenges globally. An estimated 750 million people went hungry owing to severe food insecurity in 2022.<sup>3</sup> This number keeps growing, with worsening geopolitical instability and climate shocks. Such a trend underlines the urgent need for actions toward attending to the very roots of hunger and ensuring access to vulnerable populations in developing countries to sufficient, nutritious, and affordable food. The FAO, therefore, has an important role in the coordination of the efforts in the attainment of United Nations Sustainable Development Goals (SDGs), particularly SDG 2-zero hunger and SDG 13, Climate Action, which will go a long way in helping to reduce food insecurity with sustainable agricultural practices.<sup>4</sup>

It is not solely a problem of the availability of food, but it encompasses access, utilization, and stability. While in some parts of the world, conflicts and or economic instabilities reduce food supply; in other parts of the world which may have food, there is under-nutrition.<sup>5</sup> The FAO is trying to solve the many-sided challenges by creating solutions that are integrated into the spheres of rural development, agricultural productivity, and climate resilience. Global food systems will see changes by 2029 due to technologies and increased momentum because of climate change.<sup>6</sup> The job it has done has never been so crucial, in particular, for the developing world, which faces the highest level of risks while being incompetent in reducing its impacts.

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<sup>1</sup> Food and Agriculture Organization of the United Nations. (n.d.). About FAO: History and Mission. Retrieved from <https://www.fao.org/about/en/>

<sup>2</sup> Food and Agriculture Organization of the United Nations. (n.d.). Hunger and Food Security: Issues and Challenges. Retrieved from <https://www.fao.org/hunger/en/>

<sup>3</sup> Food and Agriculture Organization of the United Nations. (2022). *State of Food Security and Nutrition in the World 2022*. Retrieved from <https://www.fao.org/publications/sofi/2022/en/>

<sup>4</sup> United Nations. (n.d.). Sustainable Development Goals: Goal 2—Zero Hunger. Retrieved from <https://sdgs.un.org/goals/goal2>

<sup>5</sup> Food and Agriculture Organization of the United Nations. (n.d.). *Food Systems: Challenges and Opportunities*. Retrieved from <https://www.fao.org/food-systems/en/>

<sup>6</sup> Organisation for Economic Co-operation and Development. (2019). *The Future of Food and Agriculture: Trends and Challenges*. Retrieved from <https://www.oecd.org/agriculture/food-systems/>

## Topic A: Combating Food Insecurity in Developing Nations

### Introduction

Food security is a multilayered crisis affecting millions of people worldwide, although the most gruesome conditions can be found in developing nations. These result from systemic poverty coupled with infrastructural inadequacy, political instability, and climate change. According to the Food and Agriculture Organization of the United Nations, an estimated 828 million people in 2022 were struggling with chronic undernourishment—the quite natural consequence of the rising rate of the crisis.<sup>7</sup> Though world efforts are realizing partial success on many fronts, hunger is being felt more heavily in sub-Saharan and South Asia. Food insecurity, therefore, cannot be dealt with only by increasing food production but also calls for a holistic understanding of its root cause through the instruction of sustainable and equitable solutions.

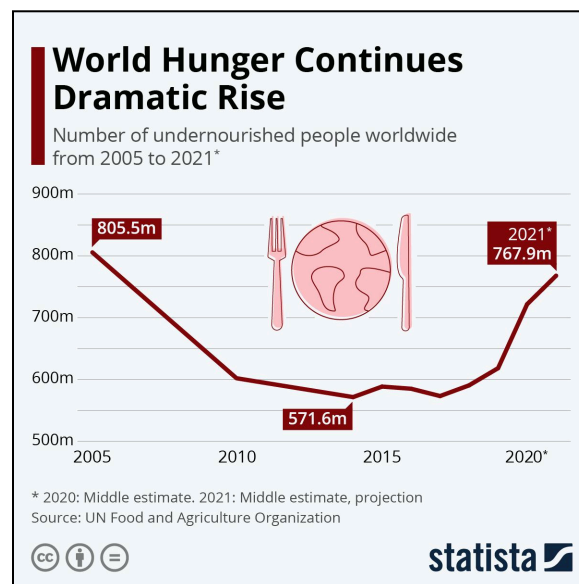


Figure 1: Global Hunger Trends 2005-2021.

FAO, established in 1945, leads the fight globally to reduce hunger and malnutrition.<sup>8</sup> The FAO is thus the United Nations specialized agency in charge of food and agriculture. It advances those strategies that contribute to long-term food security in an ecologically sustainable manner by developing resilient food systems. Members who participate in the Food and Agriculture Committee have to discuss such complex problems and put forward solutions facing pressing humanitarian needs as well as deeper structural factors that cause food scarcity. What that requires is multilevel answers, including linking climate resilience to economic empowerment through international cooperation.

<sup>7</sup> Food and Agriculture Organization of the United Nations. (n.d.-a). *State of food security and nutrition in the world 2022*. <https://openknowledge.fao.org/server/api/core/bitstreams/67b1e9c7-1a7f-4dc6-a19e-f6472a4ea83a/content>

<sup>8</sup> Food and Agriculture Organization of the United Nations. (n.d.-b). *About FAO: Our history*. <https://www.fao.org/about/history/en/>

### The Web of Problems

There are so many interlinked reasons leading to food insecurity—poverty-driven, related to the reduction of capacity to acquire, access, or afford the appropriate type of food.<sup>9</sup> The family livelihood system is in general heavily dependent on subsistence agriculture in these countries, extremely exposed to economic and environmental shock. This would mean that in the absence of any modern input availability of agriculture, credit, and insurance, farmers cannot improve their productivity or recover from losses arising out of natural disasters. Resources and opportunities accumulate among a few elites, leaving the rural community impoverished and marginalized.

Yet, climate change confuses that picture: rising temperatures, changes in rainfall patterns, and extreme weather conditions have continued to wreak havoc on traditional means of agriculture.<sup>10</sup> Unpredictable weather has brought crop failure, loss of livestock, and food insecurity in areas that depend upon seasonal rains for crops, such as the Sahel. Drought in East Africa, for instance, poses the risk of starvation for millions in that region, just as flooding in South Asia uproots whole communities and washes away farmland and sources of livelihood. Food security continues to be one of the aspects being exacerbated by climate change, for which urgent adaptation measures are needed. It will be important as partners to think about how conservation agriculture and drought-resistant seeds can be implemented on a larger scale.

Still, huge and equally contributing reasons for food insecurity are political instability and conflict. Wars and civil strife disrupt the production and flow of food supplies, dislocate populations, and block humanitarian intervention.<sup>11</sup> In countries like Yemen and Syria, wars have produced devastating food crises, making millions dependent upon international food aid to survive. In non-conflict areas, however, political instability undermines food security when it rules out effective agricultural governance or investment. Corruption and general institutional weakness are very common forms of incompetence leading to mismanaged resources and a lack of infrastructure that would otherwise be available to foster stable food production in rural areas.<sup>12</sup> A discussion about balancing peacebuilding and political stability with the issue of not compromising food systems because of conflict is expected.

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<sup>9</sup> Food and Agriculture Organization of the United Nations. (n.d.-c). *The role of smallholders in global food security*. <https://www.fao.org/family-farming/en/>

<sup>10</sup> Intergovernmental Panel on Climate Change. (2022). *Climate change and food security: A global perspective*. <https://www.ipcc.ch/>

<sup>11</sup> United Nations Development Programme. (n.d.). *Climate change and its impact on food systems*. <https://www.undp.org/>

<sup>12</sup> United Nations High Commissioner for Refugees. (2022). *Global trends: Forced displacement in 2022*. <https://www.unhcr.org/globaltrends.html>

### Climate Change - Inescapable Reality for Farmers

Climate change is among the most critical current threats to food security across the world, and especially to developing countries. Deteriorating livelihoods due to the increase in temperature, changes in weather patterns, and a general increase in aspects of natural disasters threaten to make agricultural success null.<sup>13</sup> Yet in other places, it is now too hot, or the rainfall has changed so much that crops that used to grow in an area no longer can. Staple crops—those providing the bulk of a population's consumed calories—are showing lower yields in many developing countries, like maize, rice, and wheat.<sup>14</sup> Loss of biodiversity, soil degradation, and desertification add to agriculture's burden. The smallholder farmer population continues to be the backbone of regional food security worldwide.

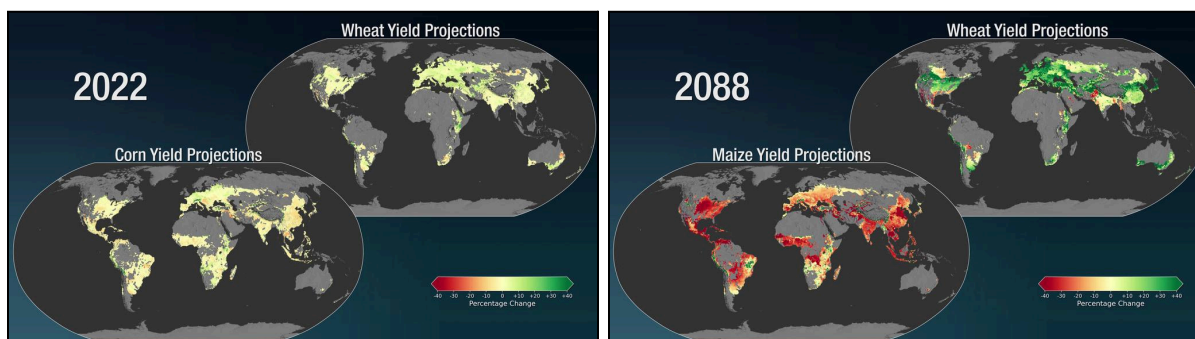


Figure 2: Impact of Climate Change on Staple Crop Yields.

Smallholder farmers are very vulnerable to natural climate variability and future climate change. Most often, they lack the technology, resources, and knowledge to handle natural climate variability and future climate change.<sup>15</sup> Agroforestry, integrated pest management, and sustainable irrigation techniques are some of the innovative measures that have shown potential in offsetting climate risk but face constrained funding and institutional support for scaling up.

Climate change threatens fisheries and marine ecosystems that supply not only food but also a source of revenue for communities along coastlines.<sup>16</sup> Ocean acidification and warming waters have seriously reduced fish stocks, and these changes, combined with overfishing, may threaten the livelihoods of millions. Other solutions include sustainable fishery management and the development of aquaculture, but all these need increased research investment to establish regulatory frameworks to enforce legislation. The challenge will be great for the delegates in suggesting strategies that balance conservation with the economic needs of communities surviving on those very natural resources.

<sup>13</sup> Transparency International. (2021). *Corruption and food security*. <https://www.transparency.org/en/thematic-areas/agriculture-food-security>

<sup>14</sup> World Resources Institute. (2019). *Creating a sustainable food future*. <https://www.wri.org/research/creating-sustainable-food-future>

<sup>15</sup> Food and Agriculture Organization of the United Nations. (2021). *The Role of Smallholders in Global Food Security*. Retrieved from <https://www.fao.org/publications/en/>

<sup>16</sup> United Nations Environment Programme. (2021). *Marine Ecosystems Under Threat*. Retrieved from <https://www.unep.org/resources/report>



### Economic Inequality and Accessibility of Resources

Food insecurity is a very real cause and consequence of poverty. In poor countries, the large majority of families manage on less than \$1.90 a day, a paltry sum for anyone to afford a nutritionally adequate diet.<sup>17</sup> People are caught in a trap: because they don't have economic opportunities, they can't pull themselves out of poverty and invest in better food, education, or health care. Many people in those countries are farmers; they are still alone, as they long have been, without access to markets, credit, or farming expertise.<sup>18</sup> The inability to enhance productivity has them all trapped in subsistence farming and unable to resist any economic or environmental shock.

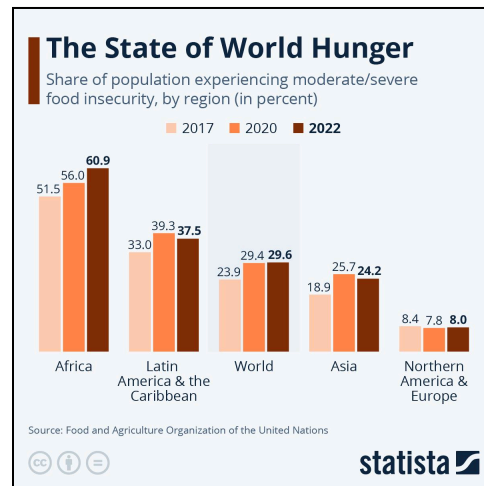


Figure 3: The Relationship Between the Levels of Poverty and Food Insecurity in Developing Countries.

This is further manifested in the context of gender disparity, whereby women, who comprise almost half the agricultural workforce in developing countries, have relatively limited access to land, credit, and education compared to men.<sup>19</sup> Women's empowerment through the addressing of these gender gaps becomes of prime importance for better food security. It has been documented that with equal access to resources, women farmers can increase agricultural productivity by upwards of 30% to alleviate hunger.<sup>20</sup> This places the delegates in a questioning position about how such policies can be integrated into the greater strategy for food security.

This also includes the distribution and access to resources such as land and water. Insecurity in land tenure prevents farmers from investing in the long term in their land, while competition for limited water supplies is often a source of conflict. In light of these facts, land reform and water management policies have to be carefully designed to balance considerations of equity and sustainability. Modern infrastructure deficits in roads, storage, and irrigation further heighten food insecurity due to increased loss and reduced market access. There must be a system to mobilize investment in infrastructure and draft policies that will truly enable local communities.

<sup>17</sup> World Bank. (2022). Global Poverty Overview 2022. Retrieved from <https://www.worldbank.org/en/topic/poverty/overview>

<sup>18</sup> International Fund for Agricultural Development. (n.d.). *Investing in Rural Communities*. Retrieved from <https://www.ifad.org/en/>

<sup>19</sup> UN Women. (n.d.). Gender Equality in Agriculture. Retrieved from <https://www.unwomen.org/en>

<sup>20</sup> Food and Agriculture Organization of the United Nations. (n.d.). Closing the Gender Gap in Agriculture. Retrieved from <https://www.fao.org/publications/en/>

### Infrastructure and Technological Gaps

Infrastructure as it pertains to food security cannot be underscored enough. Poor infrastructure in developing nations often means high post-harvest losses, wherein perishable foods, for example, spoil before finally reaching the markets.<sup>21</sup> This not only wastes valuable food but also cuts down the income coming from farmers, hence extending the chains of poverty. Food access and affordability obviously depend on good transportation networks, cold storage, and efficient supply chains underpinning the food systems.<sup>22</sup> Of course, investing in infrastructure will also bring in jobs and economic development, but they are often capital- and politically-intensive.

Technological change offers immense possibilities for transforming agriculture in developing countries. For instance, mobile technology can provide current weather forecasts, market information, and agricultural advisory services that might guide farmers in making decisions.<sup>23</sup> Drones and satellite imagery could be used in monitoring crop health, optimizing irrigation, and averting pest infestation. However, the digital divide remains a challenge since most rural areas lack access to the internet and means of acquiring the necessary skills for the use of modern technologies.<sup>24</sup>

Other emergent technologies that may help in contributing toward finding solutions include precision agriculture and biotechnology, which will raise productivity and build resilience. Precision agriculture makes use of data and analytics to optimize resource utilization, while genetically modified crops assure higher yields with resistance to pests and diseases. These technologies have been contentious, however, and their deployment in countries of the South may well face regulatory, cultural, and ethical barriers. This debate discusses weighing benefits against risks: how to devise the frameworks which will allow these technologies to be deployed in safety and equity.

### International Cooperation

Food insecurity is a problem of the world that needs an integrated response on an international plane. The roles played by organizations such as the FAO, WFP, and IFAD in emergency food aid and support for development projects are quite important. These need to be complemented by longer-term strategies that involve building resilience among food systems. For that, international trade policy, climate agreement, and development assistance must be oriented toward food security, especially the most vulnerable sections.<sup>25</sup>

The developed countries' role is critical due to their possession of financial resources and technology needed to advance food security. At the same time, there must be empowerment for developing nations to take control of their food systems, with support provided by the global community. South-South cooperation was starting to provide good prospects for the possible

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<sup>21</sup> Food and Agriculture Organization of the United Nations. (n.d.). Reducing Post-Harvest Losses in Developing Nations. Retrieved from <https://www.fao.org/post-harvest-loss/en/>

<sup>22</sup> World Bank. (n.d.). Infrastructure Development for Food Security. Retrieved from <https://www.worldbank.org/en/topic/agriculture/overview>

<sup>23</sup> CGIAR. (n.d.). Digital Solutions for Agriculture. Retrieved from <https://www.cgiar.org/research/digital-agriculture/>

<sup>24</sup> International Telecommunication Union. (n.d.). Bridging the Digital Divide in Rural Areas. Retrieved from <https://www.itu.int/en/Pages/default.aspx>

<sup>25</sup> Food and Agriculture Organization of the United Nations. (n.d.). South-South and Triangular Cooperation: A Key Driver for Food Security. Retrieved from <https://www.fao.org/south-south-cooperation/en/>

solution of the problem where food security is concerned. It is in this regard, for instance, that Brazil's nutrition-enhancing hunger reduction programs can act as models for the whole world. The desirable attitude would be that the delegates reflect on how knowledge could be shared and partnerships established to stimulate innovation and self-reliance.<sup>26</sup>

### Case Study: Ethiopia's Journey to Food Security

Efforts by Ethiopia in fighting food insecurity bear useful lessons to the global community. Despite being one of the most drought-prone countries in Africa, Ethiopia has taken impressive strides under programs such as the PSNP. The latter is a government program that gives food or cash to poor households in exchange for work on community projects, usually building irrigation systems or planting trees. An approach like this will not only answer the immediate food needs but also help build infrastructure that benefits the community in the long run.<sup>27</sup> It has further sought to enhance the practices through agricultural research and extension services, improved seed technology, as well as facilitating sustainable farming methods. Challenges still persist, especially in reaching remote areas and the many problems caused by climate change. Ethiopia therefore seeks to bind together social safety nets with development programs.<sup>28</sup>

### Sustainable Agricultural Practices:

Ensuring Resilience in the Long Run Sustainable agriculture helps achieve food security without sacrificing the environment. It involves practices such as crop rotation and agroforestry that improve soil health or completely organic farming. This increases the reduction in the use of chemical input and increases biodiversity. Conservation agriculture encompasses reduced or no soil disturbance, retaining crop residues as mulch, improving yields, and increasing resilience to weather variability associated with climate change.<sup>29</sup> Water-saving practices, such as rainwater harvesting and drip irrigation, also become important in countries with limited water resources.<sup>30</sup>

However, these need commitment from governments, NGOs, and the private sector for their implementation. The farmers need training, resources, and economic incentives to introduce methods that are sustainable. The policies have to be framed in a manner so that sustainability is not sought at the cost of economic growth.<sup>31</sup> For instance, promoting organic farming can raise the cost of production and thereby decrease the affordability of food for low-income earning families. The need is to strike a balance between environment conservation and the availability of affordable and accessible food.<sup>32</sup>

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<sup>26</sup> United Nations World Food Programme. (n.d.). *Ethiopia: Addressing Food Insecurity and Climate Shocks*.

Retrieved from <https://www.wfp.org/countries/ethiopia>

<sup>27</sup> Food and Agriculture Organization of the United Nations. (2020). *Ethiopia's Productive Safety Net Programme: A Case Study*. Retrieved from <https://www.fao.org/ethiopia/resources/case-studies/psnp/en/>

<sup>28</sup> CGIAR. (n.d.). The Role of Sustainable Agricultural Practices in Food Security. Retrieved from <https://www.cgiar.org/impact/sustainable-agriculture/>

<sup>29</sup> World Resources Institute. (2021). Conservation Agriculture: Pathways to Resilience. Retrieved from <https://www.wri.org/publication/conservation-agriculture>

<sup>30</sup> United Nations Environment Programme. (n.d.). Water-Saving Practices and Technologies for Arid Regions. Retrieved from <https://www.unep.org/resources/water-saving>

<sup>31</sup> International Fund for Agricultural Development. (n.d.). *Investing in Smallholder Farmers for Sustainability*. Retrieved from <https://www.ifad.org/en/>

<sup>32</sup> Food and Agriculture Organization of the United Nations. (n.d.). Balancing Sustainability and Food Affordability: A Policy Framework. Retrieved from <https://www.fao.org/policy-support/tools-and-publications>

Questions to Consider

1. How will international cooperation be mobilized toward the root causes of food insecurity and not just be a palliative solution?
2. What is the private sector's contribution to infrastructure and technological advancement concerning agriculture, and what is done to achieve accountability?
3. How can food be better distributed, especially to those far-flung and strife-ridden areas?
4. Is there a general paradigm that inspires sustainable agriculture, or should every country seek its solution in its peculiar context?
5. How would land and water rights be secured for marginalized communities, and what are the mechanisms for not being exploited?
6. How will innovations like GM crops or precision agriculture be introduced safely and equitably in developing countries?
7. How does humanitarian assistance contribute to longer-term development in such a way that resilience and self-reliance are enhanced in vulnerable communities?

## Topic B: Improving Ethical Livestock Management Practices

### Introduction

The Food and Agriculture Organization of the United Nations is convened to address concerns within the livestock management interface. Livestock will always remain an important component of global agriculture. Since 1995, meat production has increased by 200%, particularly in developing countries.<sup>33</sup> Moreover, livestock accords to more rather than solely food production, being a major contributor to the production of skins, fibres, manure, and capital accumulation. While livestock remains impartial toward the development of our society, a lack of management can often come with severe consequences for the quality of production, as well as rising concerns for the environment and the well-being of animals. Understanding the responsibility nations have towards the implications of livestock management is crucial for the FAO. Members within the FAO will be taking into consideration the need for sustainable development in agriculture, while acknowledging livestock's contribution towards food security, malnutrition poverty alleviation, and economic growth.

### Livestock Production in Developing Countries

Recognizing the differences between animal production in different countries is crucial to understanding the methods in which states operate their management facilities, as well as the importance of livestock in different environments. Livestock itself contributes to approximately 40% of total agricultural output in developed countries and 20% in developing ones, supporting 1.3 billion people globally. Additionally, the quick health benefits livestock contains, make it ideal for daily consumption, with 34% of the worldwide food protein supply coming from livestock.<sup>34</sup>

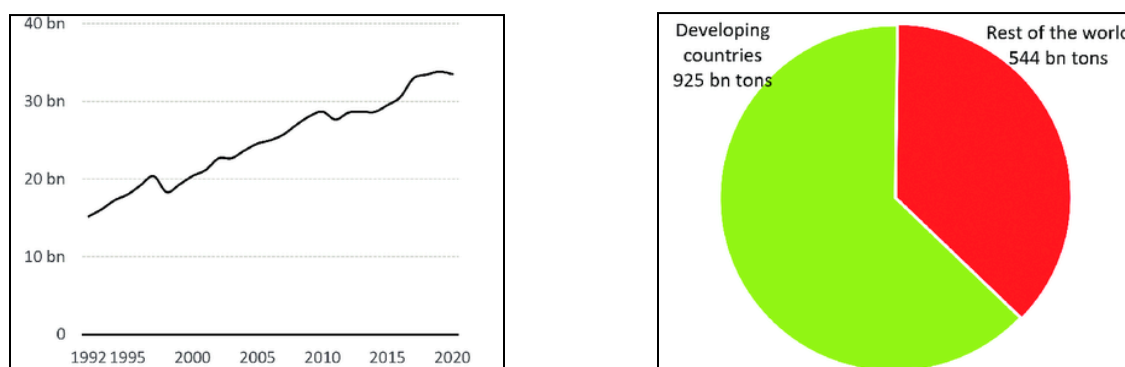


Figure 4: (a) Livestock counts in developing countries, measured as the number of live animals  
(b) Total production volumes of animal-source foods in 2020.

<sup>33</sup> Food and Agriculture Organization of the United Nations. (n.d.). *Livestock and the environment*. PRD-LivestockEnv. <https://www.fao.org/livestock-environment/en>

<sup>34</sup> Food and Agriculture Organization of the United Nations. (n.d.-a). *Animal Production*. AnimalProduction. <https://www.fao.org/animal-production/en>

Meat production specifically plays a significant role in developing countries, helping to build economies through income and employment. In some countries, livestock production can represent up to one-third of national socioeconomic production. Over the years, meat production in developing nations has continued to increase. Serving as an easy source of nutrients, meat is a household staple in rural communities. Animal products have several advantages to crops, primarily due to the fact that they can be produced year-round, rather than being seasonally harvested. Additionally, both dairy and meat can be preserved, whereas produce such as fruits and vegetables tend to rot over time.<sup>35</sup> However, animal products remain costly despite their benefits on health and efficiency. Thus the nature and management practices prevalent in developing nations often lack substantial resources. While manures from ruminant systems can be valuable in providing nutrients to other crops, large concentrations of animals can impact nearby communities, and pollute water sources.<sup>36</sup> Though many of these problems can exist in developed countries as well, developing countries remain the primary producers of animal products.<sup>37</sup>

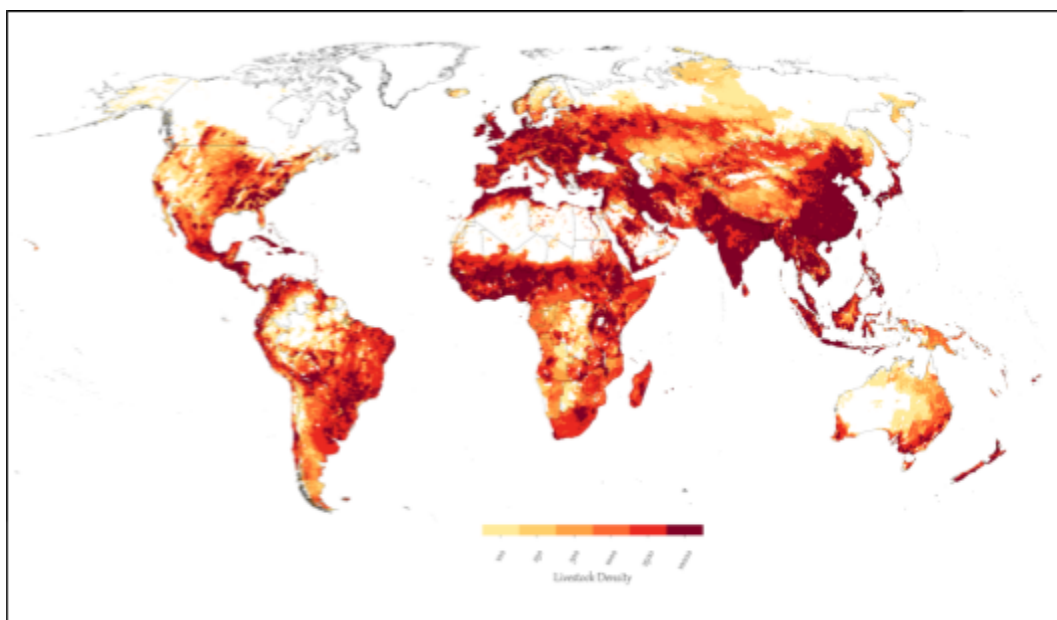


Figure 5: Livestock Density in 2010 globally.

<sup>35</sup> Food and Agriculture Organization of the United Nations. (2024). *Food for all - World food summit - Agricultural machinery worldwide*. Fao.org. <https://www.fao.org/4/x0262e/x0262e13.htm>

<sup>36</sup> Herrero, M., Grace, D., Njuki, J., Johnson, N., Enahoro, D., Silvestri, S., & Rufino, M. C. (2013). The roles of livestock in developing countries. *Animal : An International Journal of Animal Bioscience*, 7 Suppl 1, 3–18. <https://doi.org/10.1017/S1751731112001954>

<sup>37</sup> Parlasca, M., Knöbelsdorfer, I., Alemayehu, G., & Doyle, R. (2023). How and why animal welfare concerns evolve in developing countries. *Animal Frontiers*, 13(1), 26–33. <https://doi.org/10.1093/af/vfac082>

### Ethics of Farm Animal Welfare

The meaning of the phrase “animal welfare” has changed from time to time, the interpretation has evolved to be shaped by cultural, social, economic, ethical, religious, and political aspects. Though the definition of animal welfare varies globally, there are three main pillars regarding animal welfare: animal health, natural living, as well as the affective states. Although it is imperative to accommodate for animal wellbeing, livestock production is a major source of income for producers and states. The incentive to reach high-profit margins and meet the growing demands for livestock often impairs the need for animal welfare, contributing to over 40% of the global agricultural GDP.<sup>38</sup>

Animal health is largely dependent on the production facility itself, as well as the regulations instilled by the state. However, there is a growing recognition regarding industrial livestock production, particularly within the stressful conditions animals withhold to. Large animals are often kept in small, crowded areas with minimal movement, leading to emergence, and easy transmission of disease, many of which may be zoonotic. Approximately 60% of all known human infectious disease agents are caused by animals. Emerging viruses and diseases are also found to be zoonotic as a result of poor animal health.<sup>39</sup> The huge demand for livestock and global trend in large-scale industrial production not only puts animal health at risk but the consumer as well.<sup>40</sup> Diseases triggered by infections can cause illness, disability, and death in humans, as well as morbidity and mortality in animals.

Moreover, these facilities rarely accommodate the well-being of animals and rather focus on rapid weight gain and productivity, which are suitable for effective production. Poor production and handling practices persist in livestock production due to lack of accountability, and failure to assess chronic problems. Overloading of trucks and rough handling leads to bruises on livestock, where producers are not held financially accountable for the bruises.<sup>41</sup> Monogastric animals are found to be bred indoors with bare room to express natural behaviours. Other animals, such as cattle, spend the majority of their life being fattened to reach market weights and be highly profitable. These environments instil physiological and mental stress onto livestock in order to meet profit margins. Though these conditions are largely found within developing states in an effort to maximize income, developed states also struggle to prioritize animal welfare.<sup>42</sup>

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<sup>38</sup> Schneider, F., & Tarawali, S. (2021). Sustainable Development Goals and livestock systems Animal health -Animal health system -Climate -Economic growth -Food and nutrition security -Global Agenda for Sustainable Livestock -Human health -Livelihoods - Livestock system -Natural resource use -SDGs -Sustainable Development Goal. *Rev. Sci. Tech. Off. Int. Epiz*, 40(2), 585–595. <https://doi.org/10.20506/rst.40.2.3247>

<sup>39</sup> Ghai, R., & Behraves, C. B. (2024). *Zoonoses—The One Health Approach | CDC Yellow Book 2024*. Wwwwnc.cdc.gov. <https://wwwnc.cdc.gov/travel/yellowbook/2024/environmental-hazards-risks/zoonoses-one-health-approach->

<sup>40</sup> Stevenson, P. (2023). Links between industrial livestock production, disease including zoonoses and antimicrobial resistance. *Animal Research and One Health*, 1(1), 137–144. <https://doi.org/10.1002/aro2.19>

<sup>41</sup> Grandin, T. (2018). Welfare Problems in Cattle, Pigs, and Sheep that Persist Even Though Scientific Research Clearly Shows How to Prevent Them. *Animals*, 8(7), 124. <https://doi.org/10.3390/ani8070124>

<sup>42</sup> Hayek, M. N. (2022). The infectious disease trap of animal agriculture. *Science Advances*, 8(44). <https://doi.org/10.1126/sciadv.add6681>

### Environmental Impact of Livestock Production

Processing one pound of beef itself can use up to 2500 gallons of water, not to mention the amount of fossil fuels consumed in the process. Raising livestock generates approximately 15% of total global greenhouse gas emissions, using up to 70% of agricultural land. The livestock industry releases 7516 million tons of carbon dioxide into the atmosphere every year, directly contributing to the rise in global warming, as well as being the second-largest polluter.<sup>43</sup>

Most emissions related to the livestock industry are in the form of carbon dioxide, nitrous oxide, methane, and ammonia. Colourless, odourless and invisible to the naked eye, methane is a powerful greenhouse gas that contributes to more than 25% of global warming.<sup>44</sup> Domestic animals naturally release enteric methane, with almost 600 million tonnes of methane emitted in the atmosphere from livestock, with cows producing up to 220 pounds of methane, indefinitely warming the atmosphere.<sup>45</sup> Cattle are considered to be ruminant animals due to their digestive system, allowing them to digest food more effectively. Part of the digestive system in cattle enables them to ferment their feed, producing methane in the process, which is then released by belching. Though the release of methane is a natural process that cannot necessarily be interfered with, it can be controlled through their diet.<sup>46</sup>

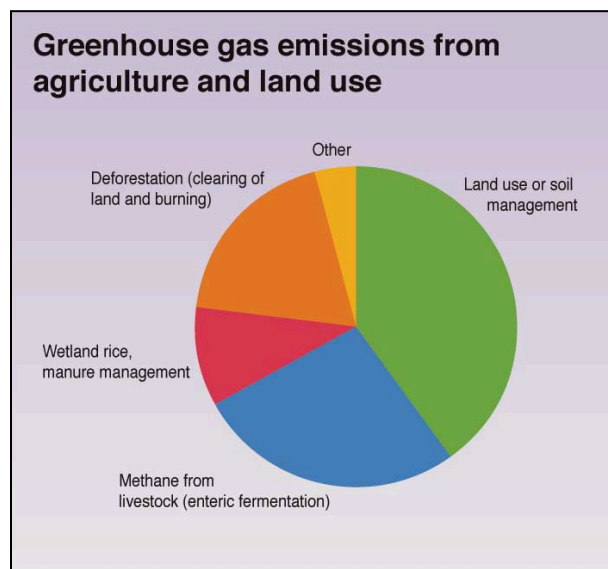


Figure 6: Greenhouse gas emissions from agriculture and land use

<sup>43</sup> Conzachi, K. (2022, March 15). *It May Be Uncomfortable, But We Need to Talk About It: The Animal Agriculture Industry and Zero Waste*. Environmental Center; University of Colorado Boulder. <https://www.colorado.edu/center/2022/03/15/it-may-be-uncomfortable-we-need-talk-about-it-animal-agriculture-industry-and-zero-waste>

<sup>44</sup> UNEP. (2022, October 18). *What's the deal with methane?* UNEP. <https://www.unep.org/news-and-stories/video/whats-deal-methane>

<sup>45</sup> Quinton, A. (2019, June 27). *Cows and Climate Change*. UC Davis. <https://www.ucdavis.edu/food/news/making-cattle-more-sustainable>

<sup>46</sup> UC Davis. (2019, October 23). *How Do Cattle Produce Methane?* CLEAR Center. <https://clear.ucdavis.edu/explainers/how-do-cows-produce-methane>



While not all livestock impacts the environment in the same way, the production of animal products also requires extensive land. Livestock farms and production sites cover one-third of the world's total land and more than two-thirds of total agricultural land. The lack of land and the increasing demand for animal products have led to great amounts of deforestation. Forest clearing is needed to create feed for the animals with 40% of harvested crops in the world used as food for animals in the livestock industry. Though large amounts of land are required in the livestock industry, forest clearing ultimately impacts wildlife, as well as humans. Deforestation has led to approximately 137 species of plants, animals and insects being lost daily.<sup>47</sup> The production of animal food products is also the greatest agricultural cause of water pollution. Water pollution in livestock is caused by animal excreta, antibiotics and hormones, fertilizers and pesticides, as well as rainfall runoff from pasture. Especially in developing countries, livestock production can affect local populations from biodiversity loss, nearby pollutants, soil degradation, as well as livestock waste.

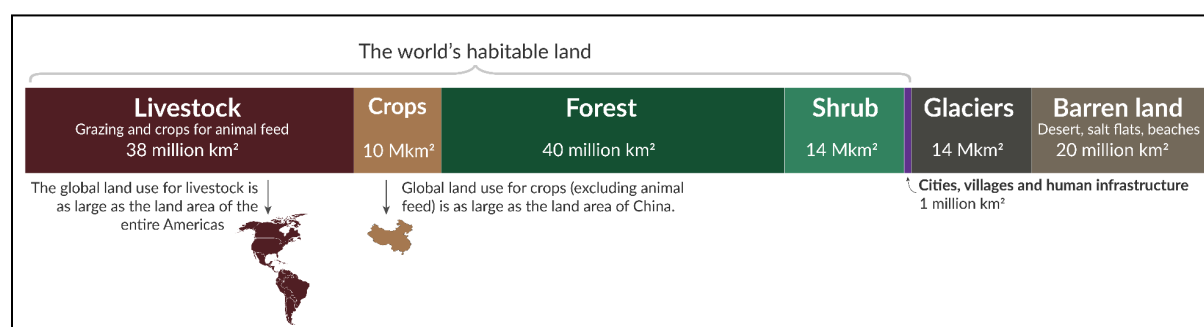


Figure 7: Land use globally

### Economic Implications within the Livestock Industry

The relationship between the production of livestock and economic development is complex and works both ways. For many states, livestock contributes to the income and employment of workers. However, some parts of livestock production can also slow down economic development by environmental degradation and the increased risk of disease.

Livestock plays a significant role in reducing poverty in rural communities, where farmers can easily create high-value products through the livestock industry. The sale of milk, eggs, and meat, as well as wool, hides and skins, is usually the primary income for many homes in developing countries. Livestock is also used to accumulate and store wealth in pastoral communities, with many investors purchasing agricultural inputs to pay for expenses and invest in other items. Animal-source foods are also affordable and accessible, making them ideal for maintaining a healthy and productive population. In the future, improved nutrition and

<sup>47</sup> Dopelt, K., Radon, P., & Davidovitch, N. (2019). Environmental Effects of the Livestock Industry: The Relationship between Knowledge, Attitudes, and Behavior among Students in Israel. *International Journal of Environmental Research and Public Health*, 16(8), 1359. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6518108/>

well-being of citizens, especially children, can equate to higher lifetime wage earnings and increased household assets, with a study stating that improved child nutrition can increase the adult wage by 46%.<sup>48</sup> The livestock sector reaches beyond the farm and extends to many other industries as well. Agricultural inputs such as breeding services, equipment and machinery, banks and insurance companies are also benefited from livestock production. The dairy sector itself employs 3 million workers or approximately 15% of the labour force in Kenya.<sup>49</sup>

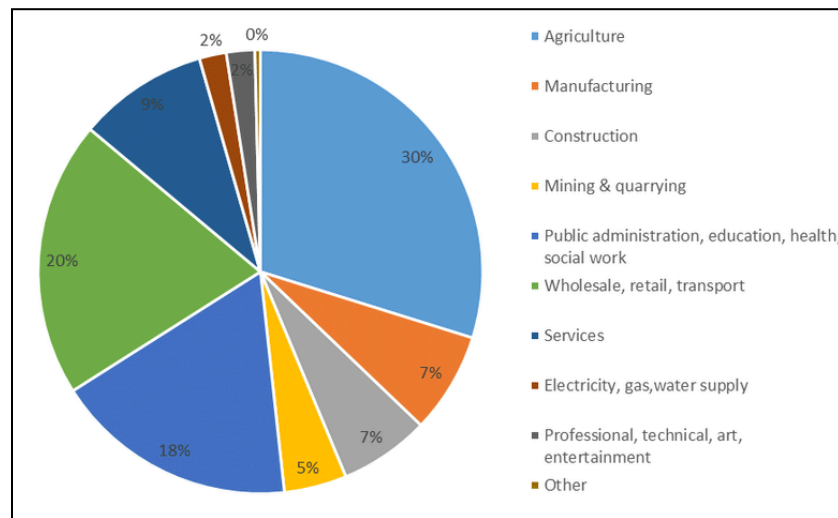


Figure 8: Employment globally by sector

Apart from the workforce, meat consumption is also a crucial aspect of a state's economy. Restaurants known for selling meat products, significantly impact the economy, generating over \$570 billion in revenue for the United States alone.<sup>50</sup> However, taking into consideration the environmental impact of meat production, a shift away from meat can save a country's economy \$180 billion and \$250 billion if people stop eating meat altogether.<sup>51</sup> Often associated with zoonoses, livestock can cause severe economic harm. Overconsumption of animal-sourced foods can cause health problems for citizens in the future. Although the limitations of livestock production are clear, meeting global demands for employment and meat consumption still remains an issue. The demand for animal-sourced foods differs from each state, however, it is imperative that meat and dairy are essential to achieve an easy, balanced diet. Through many consensus, projections show that the demand for animal-source foods will increase substantially, especially in Africa and Asia.

<sup>48</sup> Baltenweck, I., Enahoro, D., Frija, A., & Tarawali, S. (2020). Why Is Production of Animal Source Foods Important for Economic Development in Africa and Asia? *Animal Frontiers*, 10(4), 22–29. <https://doi.org/10.1093/af/vfaa036>

<sup>49</sup> Dairy-admin. (2021). *Homepage*. Kenya Dairy Board. <https://www.kdb.go.ke/>

<sup>50</sup> Sena, M. (2020). *Fast Food Industry Analysis 2020 - Cost & Trends*. Franchisehelp.com.

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<sup>51</sup> Rosenfeld, J. (2021, April 2). *The Economic and Environmental Costs of Eating Meat*. Yahoo Finance. <https://finance.yahoo.com/news/economic-environmental-costs-eating-meat-150000660.html>

Questions to Consider

1. What improvements can be made to livestock production methods in developing countries?
2. How can sustainable livestock farming practices be promoted and adopted on a global scale to reduce the environmental impact?
3. Should animal welfare be a priority for livestock production, are the current methods morally acceptable?
4. What policies are already in place or can be enacted to mitigate greenhouse gas emissions from livestock?
5. What role can alternate protein sources play on an economic scale?
6. How can livestock production meet the needs of an ever-increasing demand?

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