agriculture

MDPI

Editorial

'Growing' Insecurity in Agricultural Food Chains: An Editorial Commentary

Martin Caraher [1,*], Cristina Santini [2] and Alessio Cavicchi [3]

[1] Centre for Food Policy, School of Health and Psychological Sciences, City, Northampton Square, University of London, London ECIV OHB, UK
[2] Faculty of Agriculture, Università Telematica San Raffaele, Via Val Cannuta 247, 00166 Rome, Italy
[3] Agribusiness, Rural Development and Branding Department of Agriculture, Food and Environment, University of Pisa, Via del Borghetto, 8056124 Pisa, Italy
* Correspondence: m.caraher@city.ac.uk; Tel.: +44-02089320646

This Special Edition of Agriculture on The Role of Agriculture in Addressing Food Security, Ecological Sustainability and Quality of Food has seven articles ranging from technological solutions, the importance of quality standards as a means to addressing global trade and farm incomes, through to those with a focus on sustainable development partnerships, and at the micro level, the importance of self-help through home gardening in Vietnam. See Table 1 for a summary of the articles and their focus [1–7]. Agriculture is key to human survival, yet its continued development poses many challenges. The global agrifood supply chain is, for some, a miracle of modern ingenuity and technology, delivering food to many and working along complex food supply lines. However, this contains tensions between growers and buyers in the food chain such as health versus ecological stresses. Agriculture faces many challenges and opportunities; as a primary producer, it is subject to the power of major global retailers, fast-food companies, and ultimately consumer preferences. Sectors of agriculture, particularly livestock, are major contributors to greenhouse gas emissions and face future challenges to reduce their environmental impact.

The seven articles in the Special Edition have clear contributions to food insecurity and improved nutrition status but that they lack a focus on how technologies may contribute to greater gaps in inequality [1–7]. Two of the articles address the issue of economic and local supply chains [1,2] and yet others address how to improve nutrition through agricultural innovation and technology improvements [4–7].

The seven articles in this Special Edition can help contribute to the alleviation of food insecurity, but they cannot on their own address the food insecurity in the food chain without a commitment to equity. Equity is discussed in terms of access to capital and new technologies, fair prices for production [1,2], gender equity and food policies that are beneficial for human health and the eco-system. Otherwise, there is the danger of rising inequality with only medium- and large-scale producers making use of investment opportunities and new technologies [1]. A portfolio of pro-poor policies and investments are needed to stimulate small- and medium-scale agriculture as part of a broader focus on rural development to address persistent poverty and hunger. It needs to be remembered that the majority of the world's farms are small and medium sized. For example, Sub-Saharan Africa farms account for 53% of total employment and food security, and poverty reduction is correlated with agricultural production. Small farms (i.e., those of less than two hectares) are critical to ensuring food security as they produce approximately one-third of the world's food, and supply chains are more likely to be locally based [8,9]. Globally, in local markets in developing and emerging economies, smallholder farms will remain an important source of food and income, and a social

Citation: Caraher, M.; Santini, C.; Cavicchi, A. 'Growing' Insecurity in Agricultural Food Chains: An Editorial Commentary. *Agriculture* **2023**, *13*, 460. https://doi.org/10.3390/agriculture13020460

Received: 12 February 2023
Accepted: 13 February 2023
Published: 15 February 2023

safety net in the absence of alternative livelihood security and poor universal social welfare programs [10]. The foregoing is the context within which articles in this Special Edition need to be located to ensure the dissemination of technology or information to small operators. Individually, they are important, but together under a common framework of food policy, they can be more than "the sum of their parts".

Table 1. Summary of the seven articles included in this Special Edition and their contributions to equity in the food system.

Article	Focus	Equity Outcome/Gap
Universities and Wineries: Supporting Sustainable Development in Disadvantaged Rural Areas [1]	A case study of developing sustainable circular economies thorough partnerships between universities and vignerons in derived rural areas, focusing on small producers.	Addresses food insecurity through partnerships which result in increased income for growers and deprived rural areas.
Supporting Sustainable Development in Disadvantaged Rural Areas as ways to address food insecurity through to the micro level of self-help through home gardening in Vietnam [2].	Using home gardens to cushion food insecurity and other SDGs.	Current government targets place emphasis on income generation with indicators stipulating 50–80% of total income from home gardens, which should come from the main product. Policy targets should extend beyond income generation and strengthen coordination among state departments.
Understanding the Importance of International Quality Standards Regarding Global Trade in Food and Agricultural Products: Analysis of the German Media) through to those with a focus on sustainable development partnerships [3].	In a globalized food chain, quality food standards and control procedures can impact on public and media perceptions, resulting in increased or decreased purchases.	Interrelations between quality standards in the agrifood sector and global trade were not presented in depth. Media coverage did not present sufficient detail to enable consumers to classify the actual changes or risks in the agrifood sector. The links of these changes to free trade agreements were not adequately reported on.
Selenium Biofortification of Wheat as a Strategy to Improve Human Nutrition [4].	Using biofortification to improve nutritional outcomes linked to selenium deficiencies in the diet	The greatest increase in selenium content in grain is achieved with soil and foliar fertilization combined. This contributes to increased levels of selenium, a necessary nutrient important for human health.

Content of Amino Acids in Maize and Yellow Lupine after Fluorine Application to Soil [5]	Improving nutritional outcomes through identification of fluorine contaminated soils.	Fluorine contamination of soils can affect the quality of the obtained yields, affecting the amino acid composition of protein. It can also be a cause of reductions in nutrition and the feed value of agricultural yields.
Revealing a Significant Latent Loss of Dry Matter in Rice Based on Accurate Measurement of Grain Growth Curve); the importance of quality standards as means to addressing global trade and farm incomes [6].	Identifying the optimal time to harvest rice resulted in less crop loss.	Delayed harvest contributes to yield losses and economic losses as well as increasing post-harvest grain loss and rice seed shattering loss. Helping to improve food loss in rice contributes to increased farm incomes.
Effects of Main Meteorological Indicators on Eating Quality of Rice in Lower Reaches of the Huai River [7]	Identifying the primary meteorological factors (rainfall, humidity, and temperature) affecting the eating quality o of rice. Then, identifying from this the best types and planting times for optimal yield.	Increases in yield contributes to higher incomes for rice growers. Better rice quality contributes to better nutritional status.

As calls for the Special Edition were launched, COVID-19 was emerging as a problem, and the call requested articles that were dealing with the impact of the pandemic on food security. As the world came to grips with COVID-19 and its aftermath, another series of socio-political and climate crises emerged to add to the impact of COVID-19 lockdowns and controls. While the reasons are complex and multifaceted, the COVID-19 lockdowns laid bare the flaws in both the food and food welfare systems of many countries. Now combined with climate emergencies (flooding, drought, bushfires), the war in Ukraine, rising inflation, and food prices, these already flawed food systems are struggling to cope. Reports from the Food and Agricultural Organization of the United Nations and other agencies identified 20 hunger hotspots where hunger was expected to deteriorate further [11,12]. 'Hunger Hotspots' included Ethiopia, Nigeria, South Sudan, Yemen, Afghanistan, and Somalia. The Democratic Republic of the Congo, Haiti, the Sahel region, the Sudan, and Syria have also been identified as countries with deteriorating conditions—with Kenya as a new entry to the list.

The war in Ukraine has wider ramifications for agricultural supply chains [13]. Russia and Ukraine account for nearly 30% of global grain production. Russian control of oil and gas, especially in Europe, has resulted in increases in the cost of agricultural inputs and processes. The loss of grain harvest in Russia and Ukraine will have major impacts on countries in North Africa, who traditionally import a considerable amount of grain from the area; this will result in higher prices for grain (and bread) as alternative supply sources and chains are sought. The global situation has accelerated the changes that the agrifood system was experiencing, and has amplified problems already occurring.

In the face of these global factors, China, India, Singapore, and other countries are attempting to build up short- and long-term self-sufficiency via technological developments, food tariffs, and by limiting the exports of key food commodities. One

consequence of this drive for self-sufficiency has resulted in global shortages of uric acid, of which is necessary for fertilizer production, thus driving the price of fertilizers to an all-time high, with the price tripling within the space of a year. The global food system is complex and many of its adherents point to its efficiency and inter-relationships with other industries; an example is the 'Haber-Bosch' process—this involves chemical firms making ammonia which goes towards the production of fertilisers; by-products of the process then are used in other fertiliser productions as well as for inclusion in disinfectants, diesel exhaust fluid, and carbon dioxide. The latter is used in the food industry for stunning pigs and chickens, for fizzy drinks as well as a preservative in some bagged food products. The rise in energy prices has resulted in some factories involved in the process shutting down or cutting back production. Thus, fertiliser is in short supply, prices have risen, and farmers are using less, resulting in smaller yields; this all contributes to food price increases for the customer and increased levels of food insecurity. The lack of urea in Europe has resulted in food prices rising because of a lack of fertilizer (urea is an important part and contains phosphate which is necessary for fertilizer production). Rising prices of fertiliser and reduced availability can result in farmers buying less and adding less fertiliser to growing crops. Thus, for Brazil, the world's biggest soybean producer, a 20% cut in potash use could bring a 14% drop in yields. In Costa Rica, a coffee cooperative representing 1200 small producers could see output falling as much as 15% next year if the farmers miss even one-third of the normal application of fertilizer. In West Africa, falling fertilizer use will shrink this year's rice and corn harvest by a third. This will result in lower income against a backdrop of rising inflation and higher prices for goods and services.

There is currently a gap in research on how such global developments can be regulated and contribute to alleviating food insecurity. Thus, the SDGs offer a framework that links health and ecological concerns in order to develop a set of indicators that link these two areas [14]. The development of a global monitoring system is key to addressing the SDGs [15]. Thus, it is similar to what Bill Gates advocates for communicable disease monitoring, but it is one that monitors the production and flows of food globally and helps ensure that the various issues, some of which are raised in this Special Edition, are co-ordinated to deliver on reductions in food insecurity [16]. The contributions to this Special Edition have the potential to contribute to alleviations in food insecurity but require to be located within an over-arching policy framework.

Author Contributions: All authors contributed to the editorial equally. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Acknowledgments: To the seven contributors to the Special Edition who have shed light on areas previously not considered in food security.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Aleffi, C.; Tomasi, S.; Ferrara, C.; Santini, C.; Paviotti, G.; Baldoni, F.; Cavicchi, A. Universities and Wineries: Supporting Sustainable Development in Disadvantaged Rural Areas. *Agriculture* **2020**, *10*, 378. https://doi.org/10.3390/agriculture10090378.
2. Mulia, R.; Le, T.T.; Tran, N.D.; Simelton, E. Policy Support for Home Gardens in Vietnam Can Link to Sustainable Development Goals. *Agriculture* **2022**, *12*, 253. https://doi.org/10.3390/agriculture12020253.
3. Pietrzyck, K.; Berke, N.; Wendel, V.; Steinhoff-Wagner, J.; Jarzębowski, S.; Petersen, B. Understanding the Importance of International Quality Standards Regarding Global Trade in Food and Agricultural Products: Analysis of the German Media. *Agriculture* **2021**, *11*, 328. https://doi.org/10.3390/agriculture11040328.

4. Radawiec, A.; Szulc, W.; Rutkowska, B. Selenium Biofortification of Wheat as a Strategy to Improve Human Nutrition. *Agriculture* **2021**, *11*, 144. https://doi.org/10.3390/agriculture11020144
5. Szostek, R.; Ciećko, Z.; Rolka, E.; Wyszkowski, M. Content of Amino Acids in Maize and Yellow Lupine after Fluorine Application to Soil. *Agriculture* **2021**, *11*, 1120. https://doi.org/10.3390/agriculture11111120.
6. Wang, Y.; Wu, W.; Wu, Z.; Zhang, N.; Li, S.; Meng, X. Revealing a Significant Latent Loss of Dry Matter in Rice Based on Accurate Measurement of Grain Growth Curve. *Agriculture* **2022**, *12*, 465. https://doi.org/10.3390/agriculture12040465.
7. Zhou, N.; Shi, Q.; Wei, H.; Zhang, H. Effects of Main Meteorological Indicators on Eating Quality of Rice in Lower Reaches of the Huai River. *Agriculture* **2021**, *11*, 618. https://doi.org/10.3390/agriculture11070618.
8. Lowder, S.K.; Sánchez, M.V.; Bertini, R. Which farms feed the world and has farmland become more concentrated? *World Dev.* **2021**, *142*, 105455. https://doi.org/10.1016/j.worlddev.2021.105455
9. Giller, K.E.; Delaune, T.; Silva, J.V.; Descheemaeker, K.; van de Ven, G.; Schut, A.G.; van Wijk, M.; Hammond, J.; Hochman, Z.; Taulya, G.; et al. The future of farming: Who will produce our food? *Food Secur.* **2021**, *13*, 1073–1099. https://doi.org/10.1007/s12571-021-01184-6.
10. The World Bank. Brief: Food Security and COVID-19 (Updated 5th February, 2021). The World Bank. 2021. Available online: https://www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19#:~:text=In%20November%202020%2C%20the%20U.N.,insecure%20people%20in%20the%20world (accessed on).
11. Food and Agriculture Organization of the United Nations. And World Food Programme, Hunger Hotspots: FAO-WFP Early Warnings on Acute Food Insecurity. FAO. 2022. Available online: https://docs.wfp.org/api/documents/WFP-0000139904/download/?_ga=2.123992330.1057690076.1662638953-429207200.1662638953,. (accessed on 14 February 2023).
12. FAO; IFAD; UNICEF; WFP; WHO. *The State of Food Security and Nutrition in the World 2022; Repurposing Food and Agricultural Policies to Make Healthy Diets More Affordable*; FAO: Rome, Italy, 2022. https://doi.org/10.4060/cc0639en.
13. Lang, T.; McKee, M. The reinvasion of Ukraine threatens global food supplies. *BMJ* **2022**, *376*, o676. https://doi.org/10.1136/bmj.o676.
14. Biermann, F.; Kanie, N.; Kim, R.E. Global governance by goal-setting: the novel approach of the UN Sustainable Development Goals. *Curr. Opin. Environ. Sustain.* **2017,** *26–27*, 26–31. https://doi.org/10.1016/j.cosust.2017.01.010.
15. OECD. *The Short and Winding Road to 2030: Measuring Distance to the SDG Targets*; OECD Publishing: Paris, France, 2022. https://doi.org/10.1787/af4b630d-en.
16. Gates, B. *How to Prevent the Next Pandemic*; Allen Lane: London, UK, 2022.