

# The Future of Animal Feed: References

Makkar, H. P. S. (2018). Feed demand landscape and implications of food-not feed strategy for food security and climate change. *Animal*, 12(8), 1744-1754.

<https://doi.org/10.1017/S175173111700324X>

Gurgel, A. C., Reilly, J., & Blanc, E. (2021). Challenges in simulating economic effects of climate change on global agricultural markets. *Climatic Change*, 166(3), 1-21.

<https://doi.org/10.1007/s10584-021-03119-8>

Food and Agriculture Organization (FAO). (2019). *Global Food Outlook November 2019 / FAO forecast*. Available at: <http://www.fao.org/news/story/en/item/1247138/icode/>. Accessed on 15 December 2021.

Food and Agriculture Organization (FAO). (2018). *World Livestock: Transforming the livestock sector through the Sustainable Development Goals*. Rome. 222 pp.

<https://doi.org/10.4060/ca1201en>

Food and Agriculture Organization (FAO). (2017). *Animal Production and Health Division and the Livestock Environmental Assessment and Performance Partnership (LEAP)*. Available at:

<http://www.fao.org/partnerships/leap/en/>. Accessed on 15 December 2021

Semper-Pascual, A., Decarre, J., Baumann, M., Busso, J. M., Camino, M., Gómez-Valencia, B., & Kuemmerle, T. (2019). Biodiversity loss in deforestation frontiers: linking occupancy modelling and physiological stress indicators to understand local extinctions. *Biological Conservation*, 236, 281-288. <https://doi.org/10.1016/j.biocon.2019.05.050>

Adam, M. G., Tran, P. T., Bolan, N., & Balasubramanian, R. (2021). Biomass burning-derived airborne particulate matter in Southeast Asia: A critical review. *Journal of Hazardous Materials*, 407, 124760. <https://doi.org/10.1016/j.jhazmat.2020.124760>

Andretta, I., Hickmann, F. M., Remus, A., Franceschi, C. H., Mariani, A. B., Orso, C., Kipper, M., Létourneau-Montminy, M. P., & Pomar, C. (2021). Environmental Impacts of Pig and Poultry Production: Insights From a Systematic Review. *Frontiers in Veterinary Science*, 1232.

<https://doi.org/10.3389/fvets.2021.750733>

van Huis, A., & Oonincx, D. G. (2017). The environmental sustainability of insects as food and feed. A review. *Agronomy for Sustainable Development*, 37(5), 1-14.

<https://doi.org/10.1007/s13593-017-0452-8>

van Hal, O., Weijenberg, A. A. A., De Boer, I. J. M., & Van Zanten, H. H. E. (2019). Accounting for feed-food competition in environmental impact assessment: Towards a resource efficient food-system. *Journal of Cleaner Production*, 240, 118241.

<https://doi.org/10.1016/j.jclepro.2019.118241>

Te Pas, M. F., Veldkamp, T., de Haas, Y., Bannink, A., & Ellen, E. D. (2021). Adaptation of livestock to new diets using feed components without competition with human edible protein sources—a review of the possibilities and recommendations. *Animals*, 11(8), 2293.

<https://doi.org/10.3390/ani11082293>

Muscat, A., de Olde, E. M., de Boer, I. J., & Ripoll-Bosch, R. (2020). The battle for biomass: A systematic review of food-feed-fuel competition. *Global Food Security*, 25, 100330. <https://doi.org/10.1016/j.gfs.2019.100330>

Watson, C. A., Reckling, M., Preissel, S., Bachinger, J., Bergkvist, G., Kuhlman, T., Lindström, K., Nemecek, T., Topp, C. F. E., Vanhatalo, A., Zander, P., Murphy-Bokern, D., & Stoddard, F. L. (2017). Grain legume production and use in European agricultural systems. *Advances in Agronomy*, 144, 235-303. <https://doi.org/10.1016/bs.agron.2017.03.003>

Sherasia, P. L., Garg, M. R., & Bhanderi, B. M. (2018). *Pulses and their by-products as animal feed*. United Nations. Rome. 222 pp. ISBN: 978-92-5-109915-5

So?ta, M., Rekiel, A., & Batorska, M. (2019). Use of duckweed (Lemna L.) in sustainable livestock production and aquaculture—a review. *Annals of Animal Science*, 19(2), 257-271. <https://doi.org/10.2478/aoas-2018-0048>

Costa, M., Cardoso, C., Afonso, C., Bandarra, N. M., & Prates, J. A. (2021). Current knowledge and future perspectives of the use of seaweeds for livestock production and meat quality: a systematic review. *Journal of Animal Physiology and Animal Nutrition*, 105(6), 1075-1102. <https://doi.org/10.1111/jpn.13509>

Duarte, C. M., Bruhn, A., & Krause-Jensen, D. (2021). A seaweed aquaculture imperative to meet global sustainability targets. *Nature Sustainability*, 1-9. <https://doi.org/10.1038/s41893-021-00773-9>

Bartelme, R. P., Oyserman, B. O., Blom, J. E., Sepulveda-Villet, O. J., & Newton, R. J. (2018). Stripping away the soil: plant growth promoting microbiology opportunities in aquaponics. *Frontiers in Microbiology*, 9, 8. <https://doi.org/10.3389/fmicb.2018.00008>

van Eenennaam, A. L., & Young, A. E. (2014). Prevalence and impacts of genetically engineered feedstuffs on livestock populations. *Journal of Animal Science*, 92(10), 4255-4278. <https://doi.org/10.2527/jas.2014-8124>

Flachowsky, G., Chesson, A., & Aulrich, K. (2005). Animal nutrition with feeds from genetically modified plants. *Archives of Animal Nutrition*, 59(1), 1-40. <https://doi.org/10.1080/17450390512331342368>

Eriksson, M., Ghosh, R., Hansson, E., Basnet, S., & Lagerkvist, C. J. (2018). Environmental consequences of introducing genetically modified soy feed in Sweden. *Journal of Cleaner Production*, 176, 46-53. <https://doi.org/10.1016/j.jclepro.2017.12.113>

Gocht, A., Consmüller, N., Thom, F., & Grethe, H. (2021). Economic and environmental consequences of the ECJ genome editing judgment in agriculture. *Agronomy*, 11(6), 1212. <https://doi.org/10.3390/agronomy11061212>

Jones, S. W., Karpol, A., Friedman, S., Maru, B. T., & Tracy, B. P. (2020). Recent advances in single cell protein use as a feed ingredient in aquaculture. *Current Opinion in Biotechnology*, 61, 189-197. <https://doi.org/10.1016/j.copbio.2019.12.026>

Tropea, A., Ferracane, A., Albergamo, A., Potorti, A. G., Lo Turco, V., & Di Bella, G. (2022). Single cell protein production through multi food-waste substrate fermentation. *Fermentation*, 8 (3), 91. <https://doi.org/10.3390/fermentation8030091>

Puyol, D., Batstone, D. J., Hülsen, T., Astals, S., Peces, M., & Krömer, J. O. (2017). Resource

recovery from wastewater by biological technologies: opportunities, challenges, and prospects. *Frontiers in Microbiology*, 7, 2106. <https://doi.org/10.3389/fmicb.2016.02106>

Ritala, A., Häkkinen, S. T., Toivari, M., & Wiebe, M. G. (2017). Single cell protein—state-of-the-art, industrial landscape and patents 2001–2016. *Frontiers in Microbiology*, 8, 2009. <https://doi.org/10.3389/fmicb.2017.02009>

Nyyssölä, A., Suhonen, A., Ritala, A., & Oksman-Caldentey, K. M. (2022). The role of single cell protein in cellular agriculture. *Current Opinion in Biotechnology*, 75, 102686. <https://doi.org/10.1016/j.copbio.2022.102686>

Stephens, N., & Ellis, M. (2020). Cellular agriculture in the UK: a review. *Wellcome Open Research*, 5. <https://doi.org/10.12688/wellcomeopenres.15685.2>

Mattick, C. S. (2018). Cellular agriculture: the coming revolution in food production. *Bulletin of the Atomic Scientists*, 74(1), 32-35. <https://doi.org/10.1080/00963402.2017.1413059>

Hardy, R. W., Patro, B., Pujol-Baxley, C., Marx, C. J., & Feinberg, L. (2018). Partial replacement of soybean meal with *Methylobacterium extorquens* single-cell protein in feeds for rainbow trout (*Oncorhynchus mykiss* Walbaum). *Aquaculture Research*, 49(6), 2218-2224. <https://doi.org/10.1111/are.13678>

Glencross, B. D., Huyben, D., & Schrama, J. W. (2020). The application of single-cell ingredients in aquaculture feeds—a review. *Fishes*, 5(3), 22. <https://doi.org/10.3390/fishes5030022>

Pignolet, O., Jubeau, S., Vaca-Garcia, C., & Michaud, P. (2013). Highly valuable microalgae: biochemical and topological aspects. *Journal of Industrial Microbiology and Biotechnology*, 40(8), 781-796. <https://doi.org/10.1007/s10295-013-1281-7>

Helliwell, R., & Burton, R. J. (2021). The promised land? Exploring the future visions and narrative silences of cellular agriculture in news and industry media. *Journal of Rural Studies*, 84, 180-191. <https://doi.org/10.1016/j.jrurstud.2021.04.002>

Bapat, S., Koranne, V., Shakelly, N., Huang, A., Sealy, M., Sutherland, J. W., Rajurkar, K. P., & Malshe, A. P. (2021). Cellular agriculture: An outlook on smart and resilient food agriculture manufacturing. *ASTM Smart and Sustainable Manufacturing Systems*. <https://doi.org/10.1520/SSMS20210020>

Eibl, R., Senn, Y., Gubser, G., Jossen, V., van den Bos, C., & Eibl, D. (2021). Cellular agriculture: Opportunities and challenges. *Annual Review of Food Science and Technology*, 12, 51-73. <https://doi.org/10.1146/annurev-food-063020-123940>

Odegard, I., & Sinke, P. (2021). *LCA of cultivated meat. Future projections for different scenarios*. CE Delft, February, 22-55. Available at <https://cedelft.eu/publications/tea-of-cultivated-meat/>

Saavoss, M. (2019). How might cellular agriculture impact the livestock, dairy, and poultry industries?. *Choices*, 34(1), 1-6. <https://www.jstor.org/stable/26758666>

Gasteratos, K. (2019). *90 Reasons to consider cellular agriculture*. Available at <https://dash.harvard.edu/handle/1/38573490>

Behm, K., Nappa, M., Aro, N., Welman, A., Ledgard, S., Suomalainen, M., & Hill, J. (2022). Comparison of carbon footprint and water scarcity footprint of milk protein produced by cellular agriculture and the dairy industry. *The International Journal of Life Cycle Assessment*, 27, 1017-

1034. <https://doi.org/10.1007/s11367-022-02087-0>

Moritz, J., Tuomisto, H. L., & Rynänen, T. (2022). The transformative innovation potential of cellular agriculture: Political and policy stakeholders' perceptions of cultured meat in Germany. *Journal of Rural Studies*, 89, 54-65. <https://doi.org/10.1016/j.jrurstud.2021.11.018>

Teng, T. S., Chin, Y. L., Chai, K. F., & Chen, W. N. (2021). Fermentation for future food systems: Precision fermentation can complement the scope and applications of traditional fermentation. *EMBO reports*, 22(5), e52680. <https://doi.org/10.15252/embr.202152680>

Mainardes, G. A., & DeVries, T. J. (2016). Effect of social feeding environment on the feeding behaviour of dairy cows and their willingness to consume a novel feed. *Applied Animal Behaviour Science*, 185, 23-29. <https://doi.org/10.1016/j.applanim.2016.10.002>

Kuhad, R. C., Singh, A., Tripathi, K. K., Saxena, R. K., & Eriksson, K. E. L. (1997). Microorganisms as an alternative source of protein. *Nutrition reviews*, 55(3), 65-75. <https://doi.org/10.1111/j.1753-4887.1997.tb01599.x>

Williams, R. A. (2021). Opportunities and challenges for the introduction of new food proteins. *Annual Review of Food Science and Technology*, 12, 75-91. <https://doi.org/10.1146/annurev-food-061220-012838>

Zollman Thomas, O., & Bryant, C. (2021). Don't Have a Cow, Man: Consumer Acceptance of Animal-Free Dairy Products in Five Countries. *Frontiers in Sustainable Food Systems*, 223. <https://doi.org/10.3389/fsufs.2021.678491>

Tavill, G. (2020). Industry challenges and approaches to food waste. *Physiology & behavior*, 223, 112993. <https://doi.org/10.1016/j.physbeh.2020.112993>

Dou, Z., Toth, J. D., & Westendorf, M. L. (2018). Food waste for livestock feeding: Feasibility, safety, and sustainability implications. *Global food security*, 17, 154-161. <https://doi.org/10.1016/j.gfs.2017.12.003>

Luciano, A., Tretola, M., Ottoboni, M., Baldi, A., Cattaneo, D., & Pinotti, L. (2020). Potentials and challenges of former food products (food leftover) as alternative feed ingredients. *Animals*, 10(1), 125. <https://doi.org/10.3390/ani10010125>

Pinotti, L., Luciano, A., Ottoboni, M., Manoni, M., Ferrari, L., Marchis, D., & Tretola, M. (2021). Recycling food leftovers in feed as opportunity to increase the sustainability of livestock production. *Journal of Cleaner Production*, 294, 126290. <https://doi.org/10.1016/j.jclepro.2021.126290>

Rajeh, C., Saoud, I. P., Kharroubi, S., Naalbandian, S., & Abiad, M. G. (2021). Food loss and food waste recovery as animal feed: a systematic review. *Journal of Material Cycles and Waste Management*, 23, 1–17. <https://doi.org/10.1007/s10163-020-01102-6>

European Commission. (2015a). *Closing the Loop-An EU Action Plan for the Circular Economy*. Brussels: European Commission. Available at <https://www.eea.europa.eu/policy-documents/com-2015-0614-final>

Popescu, M. F. (2019). *Is Circular Economy Going to Reduce Waste and Create Jobs in the European Union?*. Economic and Social Development: Book of Proceedings, 398-406.

Jagtap, S., Garcia-Garcia, G., Duong, L., Swainson, M., & Martindale, W. (2021). Codesign of food system and circular economy approaches for the development of livestock feeds from insect

larvae. *Foods*, 10(8), 1701. <https://doi.org/10.3390/foods10081701>

Zhu, Q., Jia, R., & Lin, X. (2019). Building sustainable circular agriculture in China: economic viability and entrepreneurship. *Management Decision*, 57(4), 1108-1122. <https://doi.org/10.1108/MD-06-2018-0639>

Salami, S. A., Luciano, G., O'Grady, M. N., Biondi, L., Newbold, C. J., Kerry, J. P., & Priolo, A. (2019). Sustainability of feeding plant by-products: A review of the implications for ruminant meat production. *Animal Feed Science and Technology*, 251, 37-55. <https://doi.org/10.1016/j.anifeedsci.2019.02.006>

Li, Y., Zhang, G. N., Xu, H. J., Zhou, S., Dou, X. J., Lin, C., Xing-Yi, Z., Hong-Bo, Z., & Zhang, Y. G. (2019). Effects of replacing alfalfa hay with *Moringa oleifera* leaves and peduncles on intake, digestibility, and rumen fermentation in dairy cows. *Livestock Science*, 220, 211-216. <https://doi.org/10.1016/j.livsci.2019.01.005>

WRAP. (2016). *Using surplus food in animal feed*. Available at: <https://wrap.org.uk/resources/tool/using-surplus-food-animal-feed>. Accessed on 1 March 2022.

Tallentire, C. W., Mackenzie, S. G., & Kyriazakis, I. (2018). Can novel ingredients replace soybeans and reduce the environmental burdens of European livestock systems in the future?. *Journal of Cleaner Production*, 187, 338-347. <https://doi.org/10.1016/j.jclepro.2018.03.212>

de Souza, N. R. D., Junqueira, T. L., & Cavalett, O. (2021). Opportunities and challenges for bioenergy-livestock integrated systems in Brazil. *Industrial Crops and Products*, 173, 114091. <https://doi.org/10.1016/j.indcrop.2021.114091>

Stadtlander, T., Förster, S., Rosskoth, D., & Leiber, F. (2019). Slurry-grown duckweed (*Spirodela polyrrhiza*) as a means to recycle nitrogen into feed for rainbow trout fry. *Journal of Cleaner Production*, 228, 86-93. <https://doi.org/10.1016/j.jclepro.2019.04.196>

So?ta, M., ?ozicki, A., Szyma?ska, M., Sosulski, T., Szara, E., W?s, A., van Puijssen, G. W. P., & Cornelissen, R. L. (2020). Duckweed from a Biorefinery System: Nutrient Recovery Efficiency and Forage Value. *Energies*, 13(20), 5261. <https://doi.org/10.3390/en13205261>

Lasekan, A., Bakar, F. A., & Hashim, D. (2013). Potential of chicken by-products as sources of useful biological resources. *Waste Management*, 33(3), 552-565. <https://doi.org/10.1016/j.wasman.2012.08.001>

DiGiacomo, K., & Leury, B. J. (2019). Insect meal: a future source of protein feed for pigs?. *Animal*, 13(12), 3022-3030. <https://doi.org/10.1017/S1751731119001873>

Woodgate, S. L., & Wilkinson, R. G. (2021). The role of rendering in relation to the bovine spongiform encephalopathy epidemic, the development of EU animal by-product legislation and the reintroduction of rendered products into animal feeds. *Annals of Applied Biology*, 178(3), 430-441. <https://doi.org/10.1111/aab.12676>

EFSA Panel on Biological Hazards (BIOHAZ). (2011). Scientific Opinion on the revision of the quantitative risk assessment (QRA) of the BSE risk posed by processed animal proteins (PAPs). *EFSA Journal*, 9(1), 1947. Available at <https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2011.1947>

Lecrenier, M. C., Veys, P., Fumie?re, O., Berben, G., Saegerman, C., & Baeten, V. (2020).



Official feed control linked to the detection of animal byproducts: Past, present, and future.

*Journal of Agricultural and Food Chemistry*, 68(31), 8093-8103.

<https://doi.org/10.1021/acs.jafc.0c02718>

van der Fels-Klerx, H. J., Camenzuli, L., Belluco, S., Meijer, N., & Ricci, A. (2018). Food safety issues related to uses of insects for feeds and foods. *Comprehensive Reviews in Food Science and Food Safety*, 17(5), 1172-1183. <https://doi.org/10.1111/1541-4337.12385>

Ribeiro, J. C., Sousa-Pinto, B., Fonseca, J., Fonseca, S. C., & Cunha, L. M. (2021). Edible insects and food safety: allergy. *Journal of Insects as Food and Feed*, 7(5), 833-847.

<https://doi.org/10.3920/JIFF2020.0065>

Meyer, A. M., Meijer, N., Hoek-Van den Hil, E. F., & Van der Fels-Klerx, H. J. (2021). Chemical food safety hazards of insects reared for food and feed. *Journal of Insects as Food and Feed*, 7(5), 823-831. <https://doi.org/10.3920/JIFF2020.0085>

German Federal Institute for Risk Assessment (BfR), National Reference Laboratory for Animal protein in Feed, NRL-AP, Garino, C., Zagon, J., & Braeuning, A. (2019). Insects in food and feed—allergenicity risk assessment and analytical detection. *EFSA Journal*, 17, e170907.

<https://doi.org/10.2903/j.efsa.2019.e170907>

'Commission Regulation (EU) 2021/1372. (17 August 2021). Amending Annex IV to Regulation (EC) No 999/2001 of the European Parliament and of the Council as regards the prohibition to feed non-ruminant farmed animals, other than fur animals, with protein derived from animal.' *Official Journal L295(64)*. Available at: <https://eur-lex.europa.eu/oj/direct-access.html>. Accessed on 15 December 2021

Ricci, A., Allende, A., Bolton, D., Chemaly, M., Davies, R., Escámez, P. S. F., Gironés, R., Herman, L., Koutsoumanis, K., Lindqvist, R., Nørrung, B., Robertson, L., Ru, G., Sanaa, M., Skandamis, P., Snary, E., Speybroeck, N., Ter Kuile, B., Threlfall, J., Wahlström, H., Adkin, A., Greiner, M., Marchis, D., Prado, M., Da Silva Felicio, T., Ortiz-Pelaez, A., & Simmons, M. (2018). Updated quantitative risk assessment (QRA) of the BSE risk posed by processed animal protein (PAP). *EFSA Journal*, 16(7), e05314. <https://doi.org/10.2903/j.efsa.2018.5314>

Madau, F. A., Arru, B., Furesi, R., & Pulina, P. (2020). Insect farming for feed and food production from a circular business model perspective. *Sustainability*, 12(13), 5418.

<https://doi.org/10.3390/su12135418>

Manceron, S., Ben Ari, T., & Dumas, P. (2014). Feeding proteins to livestock: Global land use and food vs. feed competition. *Oilseeds and fats, Crops and Lipids*, 21(4), D408.

<https://doi.org/10.1051/ocl/2014020>

Kim, S. W., Less, J. F., Wang, L., Yan, T., Kiron, V., Kaushik, S. J., & Lei, X. G. (2019). Meeting global feed protein demand: challenge, opportunity, and strategy. *Annual Review of Animal Biosciences*, 7, 221-243. <https://doi.org/10.1146/annurev-animal-030117-014838>

van Huis, A., Rumpold, B. A., Van der Fels-Klerx, H. J., & Tomberlin, J. K. (2021). Advancing edible insects as food and feed in a circular economy. *Journal of Insects as Food and Feed*, 7(5), 935-948. <https://doi.org/10.3920/JIFF2021.x005>

Winkler, K., Fuchs, R., Rounsevell, M., & Herold, M. (2021). Global land use changes are four times greater than previously estimated. *Nature Communications*, 12(1), 1-10.

<https://doi.org/10.1038/s41467-021-22702-2>

Song, X. P., Hansen, M. C., Potapov, P., Adusei, B., Pickering, J., Adami, M., Lima, A., Zalles, V., Stehman, S. V., Di Bella, C. M., Conde, M. C., Copati, E. J., Fernandes, L. B., Hernandez-Serna, A., Jantz, S. M., Pickens, A. H., Turubanova, S., & Tyukavina, A. (2021). Massive soybean expansion in South America since 2000 and implications for conservation. *Nature Sustainability*, 4(9), 784-792. <https://doi.org/10.1038/s41893-021-00729-z>

Kastens, J. H., Brown, J. C., Coutinho, A. C., Bishop, C. R., & Esquerdo, J. C. D. (2017). Soy moratorium impacts on soybean and deforestation dynamics in Mato Grosso, Brazil. *PLoS one*, 12(4), e0176168. <https://doi.org/10.1371/journal.pone.0176168>

Lathuilliere, M. J., Miranda, E. J., Bulle, C., Couto, E. G., & Johnson, M. S. (2017). Land occupation and transformation impacts of soybean production in Southern Amazonia, Brazil. *Journal of Cleaner Production*, 149, 680-689. <https://doi.org/10.1016/j.jclepro.2017.02.120>

Paiva, P. F. P. R., de Lourdes Pinheiro Ruivo, M., da Silva Júnior, O. M., de Nazaré Martins Maciel, M., Braga, T. G. M., de Andrade, M. M. N., dos Santos Junior, P. C., da Rocha, E. S., de Freitas, T. P. M., da Silva Leite, T. V., Gama, L. H. O. M., de Sousa Santos, L., da Silva, M. G., Silva, E. R. R., & Ferreira, B. M. (2020). Deforestation in protect areas in the Amazon: a threat to biodiversity. *Biodiversity and Conservation*, 29(1), 19-38. <https://doi.org/10.1007/s10531-019-01867-9>

Cordeiro, M. R., Rotz, A., Kroebe, R., Beauchemin, K. A., Hunt, D., Bittman, S., Koenig, K. M., & McKenzie, D. B. (2019). Prospects of forage production in northern regions under climate and land-use changes: a case-study of a dairy farm in Newfoundland, Canada. *Agronomy*, 9(1), 31. <https://doi.org/10.3390/agronomy9010031>

Alig, R. J., & Ahearn, M. C. (2017). *Effects of policy and technological change on land use. In Economics of Rural Land-use Change* (pp. 43-56). Routledge. eBook ISBN: 9781315257020

Øverland, M., Mydland, L. T., & Skrede, A. (2019). Marine macroalgae as sources of protein and bioactive compounds in feed for monogastric animals. *Journal of the Science of Food and Agriculture*, 99(1), 13-24. <https://doi.org/10.1002/jsfa.9143>

Koesling, M., Kvadsheim, N. P., Halfdanarson, J., Emblemsvåg, J., & Rebours, C. (2021). Environmental impacts of protein-production from farmed seaweed: comparison of possible scenarios in Norway. *Journal of Cleaner Production*, 307, 127301. <https://doi.org/10.1016/j.jclepro.2021.127301>

Food and Agriculture Organization of the United Nations. (2013). *Food waste footprint: Impacts on natural resources: Summary report*. FAO. Available at <https://www.fao.org/3/i3347e/i3347e.pdf>

Tonini, D., Albizzati, P. F., & Astrup, T. F. (2018). Environmental impacts of food waste: Learnings and challenges from a case study on UK. *Waste Management*, 76, 744-766. <https://doi.org/10.1016/j.wasman.2018.03.032>

Schader, C., Muller, A., Scialabba, N. E. H., Hecht, J., Isensee, A., Erb, K. H., Smith, P., Makkar, H. P. S., Klocke, P., Leiber, F., Schwegler, P., Stolze, M., & Niggli, U. (2015). Impacts of feeding less food-competing feedstuffs to livestock on global food system sustainability. *Journal of the Royal Society Interface*, 12(113), 20150891. <https://doi.org/10.1098/rsif.2015.0891>

Doi, H., & Mulia, R. N. (2021). Future Land Use for Insect Meat Production Among Countries: A Global Classification. *Frontiers in Nutrition*, 8, 661056. <https://doi.org/10.3389/fnut.2021.661056>

Shah, F., & Wu, W. (2019). Soil and crop management strategies to ensure higher crop productivity within sustainable environments. *Sustainability*, 11(5), 1485.  
<https://doi.org/10.3390/su11051485>

Johnson, M. G. (2018). *The role of soil management in sequestering soil carbon*. In *Soil Management and Greenhouse Effect* (pp. 351-364). CRC Press.

Olsson, L., Barbosa, H., Bhadwal, S., Cowie, A., Delusca, K., Flores-Renteria, D., Hermans, K., Jobbagy, E., Kurz, W., Li, D., Sonwa, D. J., Stringer, L. (2019). *Land Degradation*. In: *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems* [Shukla, P. R., Skea, J., Calvo Buendia, E., Masson-Delmotte, V., Pörtner, H. O., Roberts, D. C., Zhai, P., Slade, R., Connors, S., van Diemen, R., Ferrat, M., Haughey, E., Luz, S., Neogi, S., Pathak, M., Petzold, J., Portugal Pereira, J., Vyas, P., Huntley, E., Kissick, K., Belkacemi, M., & Malley, J. (eds.)]

Castanheira, É. G., & Freire, F. (2013). Greenhouse gas assessment of soybean production: implications of land use change and different cultivation systems. *Journal of Cleaner Production*, 54, 49-60. <https://doi.org/10.1016/j.jclepro.2013.05.026>

Hoang, N. T., & Kanemoto, K. (2021). Mapping the deforestation footprint of nations reveals growing threat to tropical forests. *Nature Ecology & Evolution*, 5(6), 845-853.  
<https://doi.org/10.1038/s41559-021-01417-z>

Tang, K. H. D., & Yap, P. S. (2020). *A Systematic Review of Slash-and-Burn Agriculture as an Obstacle to Future-Proofing Climate Change*. In *Proceedings of The International Conference on Climate Change* (Vol. 4, No. 1). <https://doi.org/10.17501/2513258X.2020.4101>

Hoffman, E., Cavigelli, M. A., Camargo, G., Ryan, M., Ackroyd, V. J., Richard, T. L., & Mirsky, S. (2018). Energy use and greenhouse gas emissions in organic and conventional grain crop production: accounting for nutrient inflows. *Agricultural Systems*, 162, 89-96.  
<https://doi.org/10.1016/j.agsy.2018.01.021>

Brookes, G., & Barfoot, P. (2020). *GM crops: global socio-economic and environmental impacts 1996–2018*. Available at: <https://www.pgeconomics.co.uk/pdf/globalimpactfinalreportJuly2020.pdf>. Accessed on 15 December 2021

Chen, P., Zhu, G., Kim, H. J., Brown, P. B., & Huang, J. Y. (2020). Comparative life cycle assessment of aquaponics and hydroponics in the Midwestern United States. *Journal of Cleaner Production*, 275, 122888. <https://doi.org/10.1016/j.jclepro.2020.122888>

Taelman, S. E., De Meester, S., Van Dijk, W., Da Silva, V., & Dewulf, J. (2015). Environmental sustainability analysis of a protein-rich livestock feed ingredient in The Netherlands: Microalgae production versus soybean import. *Resources, Conservation and Recycling*, 101, 61-72.  
<https://doi.org/10.1016/j.resconrec.2015.05.013>

Vandermeersch, T., Alvarenga, R. A. F., Ragaert, P., & Dewulf, J. (2014). Environmental sustainability assessment of food waste valorization options. *Resources, Conservation and Recycling*, 87, 57-64. <https://doi.org/10.1016/j.resconrec.2014.03.008>

van Zanten, H. H., Mollenhorst, H., Oonincx, D. G., Bikker, P., Meerburg, B. G., & de Boer, I. J. (2015). From environmental nuisance to environmental opportunity: housefly larvae convert waste to livestock feed. *Journal of Cleaner Production*, 102, 362-369.  
<https://doi.org/10.1016/j.jclepro.2015.04.106>



Wang, Y. S., & Shelomi, M. (2017). Review of black soldier fly (*Hermetia illucens*) as animal feed and human food. *Foods*, 6(10), 91. <https://doi.org/10.3390/foods6100091>

Bosch, G., Van Zanten, H. H. E., Zamprogna, A., Veenenbos, M., Meijer, N. P., Van der Fels-Klerx, H. J., & Van Loon, J. J. A. (2019). Conversion of organic resources by black soldier fly larvae: legislation, efficiency and environmental impact. *Journal of Cleaner Production*, 222, 355-363. <https://doi.org/10.1016/j.jclepro.2019.02.270>

Jansson, A., & Berggren, Å. (2015). *Insects as food-something for the future? A report from Future Agriculture*. Uppsala, Swedish University of Agricultural Sciences (SLU) Available at [https://pub.epsilon.slu.se/12935/7/jansson\\_a\\_berggren\\_a\\_151230.pdf](https://pub.epsilon.slu.se/12935/7/jansson_a_berggren_a_151230.pdf)

Lima, M., da Silva Junior, C. A., Rausch, L., Gibbs, H. K., & Johann, J. A. (2019). Demystifying sustainable soy in Brazil. *Land Use Policy*, 82, 349-352. <https://doi.org/10.1016/j.landusepol.2018.12.016>

Pacheco, F. A. L., Fernandes, L. F. S., Junior, R. F. V., Valera, C. A., & Pissarra, T. C. T. (2018). Land degradation: Multiple environmental consequences and routes to neutrality. *Current Opinion in Environmental Science & Health*, 5, 79-86. <https://doi.org/10.1016/j.coesh.2018.07.002>

Andow, D. A. (2003). UK farm-scale evaluations of transgenic herbicide-tolerant crops. *Nature Biotechnology*, 21(12), 1453-1454.

Tsatsakis, A. M., Nawaz, M. A., Kouretas, D., Balias, G., Savolainen, K., Tutelyan, V. A., Golokhvast, K. S., Lee, J. D., Yang, S. H., & Chung, G. (2017). Environmental impacts of genetically modified plants: a review. *Environmental Research*, 156, 818-833. <http://dx.doi.org/10.1016/j.envres.2017.03.011>

Schütte, G., Eckerstorfer, M., Rastelli, V., Reichenbecher, W., Restrepo-Vassalli, S., Ruohonen-Lehto, M., Wuest Saucy, A. G., & Mertens, M. (2017). Herbicide resistance and biodiversity: agronomic and environmental aspects of genetically modified herbicide-resistant plants. *Environmental Sciences Europe*, 29(1), 1-12. <https://doi.org/10.1186/s12302-016-0100-y>

Relyea, R. A. (2005). The impact of insecticides and herbicides on the biodiversity and productivity of aquatic communities. *Ecological applications*, 15(2), 618-627. <https://doi.org/10.1890/03-5342>

Food and Agriculture Organization (FAO). (2016a). *Environmental performance of animal feeds supply chains: Guidelines for assessment*. Livestock Environmental Assessment and Performance Partnership. FAO, Rome, Italy

Zortea, R. B., Maciel, V. G., & Passuello, A. (2018). Sustainability assessment of soybean production in Southern Brazil: A life cycle approach. *Sustainable Production and Consumption*, 13, 102-112. <https://doi.org/10.1016/j.spc.2017.11.002>

Paul, M. J., Nuccio, M. L., & Basu, S. S. (2018). Are GM crops for yield and resilience possible?. *Trends in Plant Science*, 23(1), 10-16. <https://doi.org/10.1016/j.tplants.2017.09.007>

Zheng, Y., Jin, R., Zhang, X., Wang, Q., & Wu, J. (2019). The considerable environmental benefits of seaweed aquaculture in China. *Stochastic Environmental Research and Risk Assessment*, 33(4), 1203-1221. <https://doi.org/10.1007/s00477-019-01685-z>

Gao, G., Gao, L., Jiang, M., Jian, A., & He, L. (2021). The potential of seaweed cultivation to achieve carbon neutrality and mitigate deoxygenation and eutrophication. *Environmental Research Letters*, 17(1), 014018. <https://doi.org/10.1088/1748-9326/ac3fd9>

- Salemdeeb, R., Zu Ermgassen, E. K., Kim, M. H., Balmford, A., & Al-Tabbaa, A. (2017). Environmental and health impacts of using food waste as animal feed: a comparative analysis of food waste management options. *Journal of Cleaner Production*, 140, 871-880. <https://doi.org/10.1016/j.jclepro.2016.05.049>
- Trabue, S. L., Kerr, B. J., Scoggin, K. D., Andersen, D., & Van Weelden, M. (2021). Swine diets impact manure characteristics and gas emissions: Part II protein source. *Science of The Total Environment*, 763, 144207.
- Elahi, U., Xu, C., Wang, J., Lin, J., Wu, S., Zhang, H., & Qi, G. (2022). Insect meal as a feed ingredient for poultry. *Animal Bioscience*, 35(2), 332-346. <https://doi.org/10.5713/ab.21.0435>
- Huygens, D., Orveillon, G., Lugato, E., Tavazzi, S., Comero, S., Jones, A., Gawlik, B., & Saveyn, H. (2020). *Technical proposals for the safe use of processed manure above the threshold established for Nitrate Vulnerable Zones by the Nitrates Directive (91/676/EEC)*. Publications Office of the European Union, Luxembourg.
- Mekonnen, M. M., & Hoekstra, A. Y. (2020). Sustainability of the blue water footprint of crops. *Advances in Water Resources*, 143, 103679. <https://doi.org/10.1016/j.advwatres.2020.103679>
- Mekonnen, M. M., & Hoekstra, A. Y. (2011). The green, blue and grey water footprint of crops and derived crop products. *Hydrology and Earth System Sciences*, 15(5), 1577-1600. <https://doi.org/10.5194/hess-15-1577-2011>
- Dinar, A., Tieu, A., & Huynh, H. (2019). Water scarcity impacts on global food production. *Global Food Security*, 23, 212-226. <https://doi.org/10.1016/j.gfs.2019.07.007>
- Kumar, K., Gambhir, G., Dass, A., Tripathi, A. K., Singh, A., Jha, A. K., Yadava, P., Choudhary, M., & Rakshit, S. (2020). Genetically modified crops: current status and future prospects. *Planta*, 251(91). <https://doi.org/10.1007/s00425-020-03372-8>
- Atzori, G., Nissim, W. G., Caparrotta, S., Santantoni, F., & Masi, E. (2019). Seawater and water footprint in different cropping systems: a chicory (*Cichorium intybus* L.) case study. *Agricultural Water Management*, 211, 172-177. <https://doi.org/10.1016/j.agwat.2018.09.040>
- Cifuentes-Torres, L., Mendoza-Espinosa, L. G., Correa-Reyes, G., & Daesslé, L. W. (2021). Hydroponics with wastewater: a review of trends and opportunities. *Water and Environment Journal*, 35(1), 166-180. <https://doi.org/10.1111/wej.12617>
- Campbell, I., Macleod, A., Sahlmann, C., Neves, L., Funderud, J., Øverland, M., Hughes, A. D., & Stanley, M. (2019). The environmental risks associated with the development of seaweed farming in Europe-prioritizing key knowledge gaps. *Frontiers in Marine Science*, 6, 107. <https://doi.org/10.3389/fmars.2019.00107>
- Santos, J. F. S., & Naval, L. P. (2020). Spatial and temporal dynamics of water footprint for soybean production in areas of recent agricultural expansion of the Brazilian savannah (Cerrado). *Journal of Cleaner Production*, 251, 119482. <https://doi.org/10.1016/j.jclepro.2019.119482>
- Zhao, X., Liao, X., Chen, B., Tillotson, M. R., Guo, W., & Li, Y. (2019). Accounting global grey water footprint from both consumption and production perspectives. *Journal of Cleaner Production*, 225, 963-971. <https://doi.org/10.1016/j.jclepro.2019.04.037>
- Malone, T. C., & Newton, A. (2020). The globalization of cultural eutrophication in the coastal ocean: causes and consequences. *Frontiers in Marine Science*, 7, 670. <https://doi.org/10.3389/fmars.2020.00670>

Food and Agriculture Organization (FAO). (2016b). Handbook on agricultural cost of production statistics: Guidelines for data collection, compilation and dissemination. FAO, Rome, Italy.

Oliveira, A. L. R. D., Filassi, M., Lopes, B. F. R., & Marsola, K. B. (2020). Logistical transportation routes optimization for Brazilian soybean: an application of the origin-destination matrix. *Ciência Rural*, 51. <http://doi.org/10.1590/0103-8478cr20190786>

Lo, B., Kasapis, S., & Farahnaky, A. (2021). Lupin protein: Isolation and techno-functional properties, a review. *Food Hydrocolloids*, 112, 106318. <https://doi.org/10.1016/j.foodhyd.2020.106318>

Popp, J., Harangi-Rákos, M., Gabnai, Z., Balogh, P., Antal, G., & Bai, A. (2016). Biofuels and their co-products as livestock feed: global economic and environmental implications. *Molecules*, 21(3), 285. <https://doi.org/10.3390/molecules21030285>

O'Malley, J., & Searle, S. (2021). "The Impact of the US Renewable Fuel Standard on Food and Feed Prices". Technical report, International Council on Clean Transportation. <https://theicct.org/sites/default/files/publications/RFS-and-feed-prices-jan2021.pdf>

van den Burg, S. W., van Duijn, A. P., Bartelings, H., van Krimpen, M. M., & Poelman, M. (2016). The economic feasibility of seaweed production in the North Sea. *Aquaculture Economics & Management*, 20(3), 235-252. <https://doi.org/10.1080/13657305.2016.1177859>

Emblemsvåg, J., Kvadsheim, N. P., Halfdanarson, J., Koesling, M., Nystrand, B. T., Sunde, J., & Rebour, C. (2020). Strategic considerations for establishing a large-scale seaweed industry based on fish feed application: a Norwegian case study. *Journal of Applied Phycology*, 32(6), 4159-4169. <https://doi.org/10.1007/s10811-020-02234-w>

Taghizadeh-Hesary, F., Rasoulinezhad, E., & Yoshino, N. (2019). Energy and food security: Linkages through price volatility. *Energy Policy*, 128, 796-806. <https://doi.org/10.1016/j.enpol.2018.12.043>

Punzi, M. T. (2019). The impact of energy price uncertainty on macroeconomic variables. *Energy Policy*, 129, 1306-1319. <https://doi.org/10.1016/j.enpol.2019.03.015>

Girma, F., & Gebremariam, B. (2018). Review on hydroponic feed value to livestock production. *Journal of Scientific and Innovative Research*, 7(4), 106-109.

Greenfeld, A., Becker, N., McIlwain, J., Fotedar, R., & Bornman, J. F. (2019). Economically viable aquaponics? Identifying the gap between potential and current uncertainties. *Reviews in Aquaculture*, 11(3), 848-862. <https://doi.org/10.1111/raq.12269>

Goddek, S., Delaide, B., Mankasingh, U., Ragnarsdottir, K. V., Jijakli, H., & Thorarinsdottir, R. (2015). Challenges of sustainable and commercial aquaponics. *Sustainability*, 7(4), 4199-4224. <https://doi.org/10.3390/su7044199>

Palm, H. W., Knaus, U., Appelbaum, S., Goddek, S., Strauch, S. M., Vermeulen, T., Jijakli, M. H., & Kotzen, B. (2018). Towards commercial aquaponics: a review of systems, designs, scales and nomenclature. *Aquaculture International*, 26(3), 813-842. <https://doi.org/10.1007/s10499-018-0249-z>

Arru, B., Furesi, R., Gasco, L., Madau, F. A., & Pulina, P. (2019). The introduction of insect meal into fish diet: The first economic analysis on European sea bass farming. *Sustainability*, 11(6), 1697. <https://doi.org/10.3390/su11061697>

WWF . (2021). The future of feed: a WWF roadmap to accelerating insect protein in UK feeds. Available at: <https://www.wwf.org.uk/sites/default/files/2021->

[06/The\\_future\\_of\\_feed\\_July\\_2021.pdf](#). Accessed on 15 December 2021

Chia, S. Y., Tanga, C. M., van Loon, J. J., & Dicke, M. (2019). Insects for sustainable animal feed: Inclusive business models involving smallholder farmers. *Current Opinion in Environmental Sustainability*, 41, 23-30. <https://doi.org/10.1016/j.cosust.2019.09.003>

Oonincx, D. G. A. B., & Finke, M. D. (2021). Nutritional value of insects and ways to manipulate their composition. *Journal of Insects as Food and Feed*, 7(5), 639-659. <https://doi.org/10.3920/JIFF2020.0050>

Pinotti, L., & Ottoboni, M. (2021). Substrate as insect feed for bio-mass production. *Journal of Insects as Food and Feed*, 7(5), 585-596. <https://doi.org/10.3920/JIFF2020.0110>

de Miranda, J. R., Granberg, F., Onorati, P., Jansson, A., & Berggren, Å. (2021). Virus prospecting in crickets—Discovery and strain divergence of a novel iflavivirus in wild and cultivated *Acheta domesticus*. *Viruses*, 13(3), 364. <https://doi.org/10.3390/v13030364>

Truzzi, C., Annibaldi, A., Girolametti, F., Giovannini, L., Riolo, P., Ruschioni, S., Olivotto, I., & Illuminati, S. (2020). A chemically safe way to produce insect biomass for possible application in feed and food production. *International journal of environmental research and public health*, 17(6), 2121. <https://doi.org/10.3390/ijerph17062121>

Ojha, S., Bußler, S., Psarianos, M., Rossi, G., & Schlüter, O. K. (2021). Edible insect processing pathways and implementation of emerging technologies. *Journal of Insects as Food and Feed*, 7(5), 877-900. <https://doi.org/10.3920/JIFF2020.0121>

Sindermann, D., Heidhues, J., Kirchner, S., Stadermann, N., & Kühl, A. (2021). Industrial processing technologies for insect larvae. *Journal of Insects as Food and Feed*, 7(5), 857-875. <https://doi.org/10.3920/JIFF2020.0103>

Lioutas, E. D., & Charatsari, C. (2021). Enhancing the ability of agriculture to cope with major crises or disasters: What the experience of COVID-19 teaches us. *Agricultural Systems*, 187, 103023. <https://doi.org/10.1016/j.agsy.2020.103023>

Rzymiski, P., Kulus, M., Jankowski, M., Dompe, C., Bryl, R., Petite, J. N., Kempisty, B., & Mozdziak, P. (2021). COVID-19 pandemic is a call to search for alternative protein sources as food and feed: A review of possibilities. *Nutrients*, 13(1), 150. <https://doi.org/10.3390/nu13010150>

Henry, R. (2020). Innovations in agriculture and food supply in response to the COVID-19 pandemic. *Molecular Plant*, 13(8), 1095. <https://doi.org/10.1016/j.molp.2020.07.011>

Choi, H. S., Jansson, T., Matthews, A., & Mittenzwei, K. (2021). European agriculture after Brexit: does anyone benefit from the divorce?. *Journal of Agricultural Economics*, 72(1), 3-24. <https://doi.org/10.1111/1477-9552.12396>

Yao, G., Zhang, X., Davidson, E. A., & Taheripour, F. (2021). The increasing global environmental consequences of a weakening US–China crop trade relationship. *Nature Food*, 2(8), 578-586. <https://doi.org/10.1038/s43016-021-00338-1>

Institute Du Porc (IFIP). (2022). Crise Russo-Ukrainienne : impacts sur les marchés des matières premières pour les filières animales. Available at: <https://ifip.asso.fr/crise-russo-ukrainienne-impacts-sur-les-marches-des-matieres-premieres-pour-les-filieres-animales/>. Accessed on 1 March 2022.

Food and Agriculture Organization Statistics Division (FAOSTAT). (2021). Available at: <https://www.fao.org/faostat/en/#home>. Accessed on 1 March 2022.

Gasco, L., Biasato, I., Dabbou, S., Schiavone, A., & Gai, F. (2019). Animals fed insect-based diets: State-of-the-art on digestibility, performance and product quality. *Animals*, 9(4), 170. <https://doi.org/10.3390/ani9040170>

Gasco, L., Finke, M., & Van Huis, A. (2018). Can diets containing insects promote animal health?. *Journal of Insects as Food and Feed*, 4(1), 1-4. <https://doi.org/10.3920/JIFF2018.x001>

Edwards 3rd, H. M., Douglas, M. W., Parsons, C. M., & Baker, D. H. (2000). Protein and energy evaluation of soybean meals processed from genetically modified high-protein soybeans. *Poultry Science*, 79(4), 525-527. <https://doi.org/10.1093/ps/79.4.525>

Sauvant, D., Perez, J. M., & Tran, G. (Eds.). (2004). *Tables of composition and nutritional value of feed materials: pigs, poultry, cattle, sheep, goats, rabbits, horses and fish*. Wageningen Academic Publishers.

Giraldo, P. A., Shinozuka, H., Spangenberg, G. C., Cogan, N. O., & Smith, K. F. (2019). Safety assessment of genetically modified feed: is there any difference from food?. *Frontiers in Plant Science*, 10, 1592. <https://doi.org/10.3389/fpls.2019.01592>

Coudert, E., Baéza, E., & Berri, C. (2020). Use of algae in poultry production: A review. *World's Poultry Science Journal*, 76(4), 767-786. <https://doi.org/10.1080/00439339.2020.1830012>

Morais, T., Inácio, A., Coutinho, T., Ministro, M., Cotas, J., Pereira, L., & Bahcevandziev, K. (2020). Seaweed potential in the animal feed: A review. *Journal of Marine Science and Engineering*, 8(8), 559. <https://doi.org/10.3390/jmse8080559>

So?ta, M., Rekiel, A., Wi?cek, J., Batorska, M., & Puppel, K. (2021). Alternative protein sources vs. GM soybean meal as feedstuff for pigs-meat quality and health-promoting indicators. *Animals*, 11(1), 177. <https://doi.org/10.3390/ani11010177>

EFSA Panel on Genetically Modified Organisms (GMO), Naegeli, H., Bresson, J. L., Dalmay, T., Dewhurst, I. C., Epstein, M. M., Firbank, L. G., Guerche, P., Hejatko, J., Moreno, F. J., Mullins, E., Nogué, F., Rostoks, N., Serrano, J. J. S., Savoini, G., Veromann, E., & Veronesi, F. (2020). Assessment of genetically modified soybean SYHT 0H2 for food and feed uses, import and processing, under Regulation (EC) No 1829/2003 (application EFSA?GMO?DE?2012?111). *EFSA Journal*, 18(1), e05946.

Buzoianu, S. G., Walsh, M. C., Rea, M. C., Cassidy, J. P., Ryan, T. P., Ross, R. P., Gardiner, G. E., & Lawlor, P. G. (2013). Transgenerational effects of feeding genetically modified maize to nulliparous sows and offspring on offspring growth and health. *Journal of Animal Science*, 91(1), 318-330. <https://doi.org/10.2527/jas.2012-5360>

Kebede, H., Liu, X., Jin, J., & Xing, F. (2020). Current status of major mycotoxins contamination in food and feed in Africa. *Food Control*, 110, 106975. <https://doi.org/10.1016/j.foodcont.2019.106975>

Conte, G., Fontanelli, M., Galli, F., Cotrozzi, L., Pagni, L., & Pellegrini, E. (2020). Mycotoxins in feed and food and the role of ozone in their detoxification and degradation: An update. *Toxins*, 12(8), 486. <https://doi.org/10.3390/toxins12080486>

Mahato, D. K., Devi, S., Pandhi, S., Sharma, B., Maurya, K. K., Mishra, S., Dhawan, K., Selvakumar, R., Kamle, M., Mishra, A. K., & Kumar, P. (2021). Occurrence, impact on agriculture, human health, and management strategies of zearalenone in food and feed: A review. *Toxins*, 13(2), 92. <https://doi.org/10.3390/toxins13020092>

Alshannaq, A. F., Gibbons, J. G., Lee, M. K., Han, K. H., Hong, S. B., & Yu, J. H. (2018). Controlling aflatoxin contamination and propagation of *Aspergillus flavus* by a soy-fermenting



Aspergillus oryzae strain. *Scientific Reports*, 8(1), 1-14. <https://doi.org/10.1038/s41598-018-35246-1>

Netherwood, T., Martín-Orúe, S. M., O'Donnell, A. G., Gockling, S., Graham, J., Mathers, J. C., & Gilbert, H. J. (2004). Assessing the survival of transgenic plant DNA in the human gastrointestinal tract. *Nature Biotechnology*, 22(2), 204-209. <https://doi.org/10.1038/nbt934>

Dona, A., & Arvanitoyannis, I. S. (2009). Health risks of genetically modified foods. *Critical Reviews in Food Science and Nutrition*, 49(2), 164-175. <https://doi.org/10.1080/10408390701855993>

Korwin-Kossakowska, A., Gralak, B., Faliszewska, G., & Karpiniak, E. (2020). The influence of GMO feed on ecosystem stability of the gastrointestinal tract in different species-a review. *Animal Science Papers & Reports*, 38(3).

Diaz-Llano, G., & Smith, T. K. (2006). Effects of feeding grains naturally contaminated with *Fusarium* mycotoxins with and without a polymeric glucomannan mycotoxin adsorbent on reproductive performance and serum chemistry of pregnant gilts. *Journal of Animal Science*, 84(9), 2361-2366. <https://doi.org/10.2527/jas.2006-213>

Dunn, E. S., Vicini, J. L., Glenn, K. C., Fleischer, D. M., & Greenhawt, M. J. (2017). The allergenicity of genetically modified foods from genetically engineered crops: A narrative and systematic review. *Annals of Allergy and Asthma Immunology*, 119(3), 2124-222.e3.

Dubois, A. E., Pagliarani, G., Brouwer, R. M., Kollen, B. J., Dragsted, L. O., Eriksen, F. D., Callesen, O., Gilissen, L. J. W. J., Krens, F. A., Visser, R. G. F., Smulders, M. J. M., Vlieg-Boerstra, B. J., Flokstra-de Blok, B. J., & Van De Weg, W. E. (2015). First successful reduction of clinical allergenicity of food by genetic modification: Mal d 1?silenced apples cause fewer allergy symptoms than the wild?type cultivar. *Allergy*, 70(11), 1406-1412. <https://doi.org/10.1111/all.12684>

Becton, L., Davis, P., Sundberg, P., & Wilkinson, L. (2022). Feed safety collaborations: Experiences, progress and challenges. *Transboundary and Emerging Diseases*, 69(1), 182-188. <https://doi.org/10.1111/tbed.14297>

Ráduly, Z., Price, R. G., Dockrell, M. E., Csernoch, L., & Pócsi, I. (2021). Urinary Biomarkers of Mycotoxin Induced Nephrotoxicity—Current Status and Expected Future Trends. *Toxins*, 13(12), 848. <https://doi.org/10.3390/toxins13120848>

Magnoli, A. P., Poloni, V. L., & Cavaglieri, L. (2019). Impact of mycotoxin contamination in the animal feed industry. *Current Opinion in Food Science*, 29, 99-108. <https://doi.org/10.1016/j.cofs.2019.08.009>

Santo, R. E., Kim, B. F., Goldman, S. E., Dutkiewicz, J., Biehl, E., Bloem, M. W., Neff, R. A., & Nachman, K. E. (2020). Considering plant-based meat substitutes and cell-based meats: a public health and food systems perspective. *Frontiers in Sustainable Food Systems*, 134. <https://doi.org/10.3389/fsufs.2020.00134>

Pinotti, L., Giromini, C., Ottoboni, M., Tretola, M., & Marchis, D. (2019). Insects and former foodstuffs for upgrading food waste biomasses/streams to feed ingredients for farm animals. *Animal*, 13(7), 1365-1375. <https://doi.org/10.1017/S1751731118003622>

Schrögel, P., & Wätjen, W. (2019). Insects for food and feed-safety aspects related to mycotoxins and metals. *Foods*, 8(8), 288. <https://doi.org/10.3390/foods8080288>

Smith, M., Love, D. C., Rochman, C. M., & Neff, R. A. (2018). Microplastics in seafood and the implications for human health. *Current Environmental Health Reports*, 5(3), 375-386.

<https://doi.org/10.1007/s40572-018-0206-z>

Prata, J. C., da Costa, J. P., Lopes, I., Duarte, A. C., & Rocha-Santos, T. (2020). Environmental exposure to microplastics: An overview on possible human health effects. *Science of the Total Environment*, 702, 134455. <https://doi.org/10.1016/j.scitotenv.2019.134455>

Krasucka, P., Bogusz, A., Baranowska-Wójcik, E., Czech, B., Sz wajgier, D., Rek, M., Ok, Y. S., & Oleszczuk, P. (2022). Digestion of plastics using in vitro human gastrointestinal tract and their potential to adsorb emerging organic pollutants. *Science of The Total Environment*, 843, 157108. <https://doi.org/10.1016/j.scitotenv.2022.157108>

Advisory Committee on Animal Feedingstuffs (ACAF) (2009). Potential for carry-over of allergens from animal feed into derived animal products. Available at:

[https://acaf.food.gov.uk/sites/default/files/mnt/drupal\\_data/sources/files/multimedia/pdfs/committee/acaf0904.pdf](https://acaf.food.gov.uk/sites/default/files/mnt/drupal_data/sources/files/multimedia/pdfs/committee/acaf0904.pdf)  
Accessed on 20 March 2022

Testa, M., Stillo, M., Maffei, G., Andriolo, V., Gardois, P., & Zotti, C. M. (2017). Ugly but tasty: A systematic review of possible human and animal health risks related to entomophagy. *Critical Reviews in Food Science and Nutrition*, 57(17), 3747-3759. <https://doi.org/10.1080/10408398.2016.1162766>

Bingemann, T. A., Santos, C. B., Russell, A. F., & Anagnostou, A. (2019). Lupin: An emerging food allergen in the United States. *Annals of Allergy, Asthma & Immunology*, 122(1), 8-10. <https://doi.org/10.1016/j.anai.2018.09.467>

Gultekin, F., Oner, M. E., Savas, H. B., & Dogan, B. (2020). Food additives and microbiota. *Northern clinics of Istanbul*, 7(2), 192. <https://doi.org/10.14744/nci.2019.92499>

Rinninella, E., Cintoni, M., Raoul, P., Gasbarrini, A., & Mele, M. C. (2020). Food additives, gut microbiota, and irritable Bowel syndrome: A hidden track. *International Journal of Environmental Research and Public Health*, 17(23), 8816. <https://doi.org/10.3390/ijerph17238816>

Saito, Y., Saito, H., & Sembokuya, Y. (2009). Consumer evaluations of pork from hogs raised on recycled food waste. *Agricultural Information Research*, 18(3), 152-161. <https://doi.org/10.3173/air.18.152>

Borrello, M., Caracciolo, F., Lombardi, A., Pascucci, S., & Cembalo, L. (2017). Consumers' perspective on circular economy strategy for reducing food waste. *Sustainability*, 9(1), 141. <https://doi.org/10.3390/su9010141>

Bhatt, S., Lee, J., Deutsch, J., Ayaz, H., Fulton, B., & Suri, R. (2018). From food waste to value? added surplus products (VASP): Consumer acceptance of a novel food product category. *Journal of Consumer Behaviour*, 17(1), 57-63. <https://doi.org/10.1002/cb.1689>

Mens, A., Cone, J., van den Borne, B., & Bosch, G. (2021). Capacities of animals to make agri-food systems more circular (No. 1323). Wageningen Livestock Research. Public Report 1323. Available at <https://library.wur.nl/WebQuery/wurpubs/fulltext/548324>

Westendorf, M. L. (Ed.). (2000). *Food waste to animal feed* (1st ed.). Ames: Iowa State University Press

Jayathilake, N., Aheeyar, M., & Drechsel, P. (2022). Food Waste to Livestock Feed: Prospects and Challenges for Swine Farming in Peri-urban Sri Lanka. *Circular Economy and Sustainability*, 1-15. <https://doi.org/10.1007/s43615-022-00168-8>

Swain, B. B., & Teufel, N. (2017). The impact of urbanisation on crop–livestock farming system: a comparative case study of India and Bangladesh. *Journal of Social and Economic Development*,

19(1), 161-180. <https://doi.org/10.1007/s40847-017-0038-y>

Marinoudi, V., Sørensen, C. G., Pearson, S., & Bochtis, D. (2019). Robotics and labour in agriculture. A context consideration. *Biosystems Engineering*, 184, 111-121. <https://doi.org/10.1016/j.biosystemseng.2019.06.013>

Elahi, E., Weijun, C., Zhang, H., & Abid, M. (2019). Use of artificial neural networks to rescue agrochemical-based health hazards: A resource optimisation method for cleaner crop production. *Journal of Cleaner Production*, 238, 117900. <https://doi.org/10.1016/j.jclepro.2019.117900>

Rukundo, E., Liu, S., Dong, Y., Rutebuka, E., Asamoah, E. F., Xu, J., & Wu, X. (2018). Spatio-temporal dynamics of critical ecosystem services in response to agricultural expansion in Rwanda, East Africa. *Ecological Indicators*, 89, 696-705. <https://doi.org/10.1016/j.ecolind.2018.02.032>

Flach, R., Abrahão, G., Bryant, B., Scarabello, M., Soterroni, A. C., Ramos, F. M., Valin, H., Obersteiner, M., & Cohn, A. S. (2021). Conserving the Cerrado and Amazon biomes of Brazil protects the soy economy from damaging warming. *World Development*, 146, 105582. <https://doi.org/10.1016/j.worlddev.2021.105582>

Weindl, I., Ost, M., Wiedmer, P., Schreiner, M., Neugart, S., Klopsch, R., Kühnhold, H., Kloas, W., Henkel, I. M., Schlüter, O., Bußler, S., Bellingrath-Kimura, S. D., Ma, H., Grune, T., Rolinski, S., & Klaus, S. (2020). Sustainable food protein supply reconciling human and ecosystem health: A Leibniz Position. *Global Food Security*, 25, 100367. <https://doi.org/10.1016/j.gfs.2020.100367>

Verbeke, W., Sprangers, T., De Clercq, P., De Smet, S., Sas, B., & Eeckhout, M. (2015). Insects in animal feed: Acceptance and its determinants among farmers, agriculture sector stakeholders and citizens. *Animal Feed Science and Technology*, 204, 72-87. <https://doi.org/10.1016/j.anifeedsci.2015.04.001>

Onwezen, M. C., Van den Puttelaar, J., Verain, M. C. D., & Veldkamp, T. (2019). Consumer acceptance of insects as food and feed: The relevance of affective factors. *Food Quality and Preference*, 77, 51-63. <https://doi.org/10.1016/j.foodqual.2019.04.011>

Altmann, B. A., Anders, S., Risius, A., & Mörlein, D. (2022). Information effects on consumer preferences for alternative animal feedstuffs. *Food Policy*, 106, 102192. <https://doi.org/10.1016/j.foodpol.2021.102192>

Khaemba, C. N., Kidoido, M. M., Owuor, G., & Tanga, C. M. (2022). Consumers' perception towards eggs from laying hens fed commercial black soldier fly (*Hermetia illucens*) larvae meal-based feeds. *Poultry Science*, 101(3), 101645. <https://doi.org/10.1016/j.psj.2021.101645>

Montgomery, H., Haughey, S. A., & Elliott, C. T. (2020). Recent food safety and fraud issues within the dairy supply chain (2015–2019). *Global Food Security*, 26, 100447. <https://doi.org/10.1016/j.gfs.2020.100447>

Schiffing, S., & Valantasis Kanellos, N. (2022). Five essential commodities that will be hit by war in Ukraine. *The Conversation*. <https://researchonline.ljmu.ac.uk/id/eprint/16422>

United States Department of Agriculture, Foreign Agricultural Service (USDA). (2022). Grain and Feed Update. Available at: <https://www.fas.usda.gov/>. Accessed on 1 March 2022.

Patterson, J., Schulz, K., Vervoort, J., Van Der Hel, S., Widerberg, O., Adler, C., Hurlbert, M., Anderton, K., Sethi, M., & Barau, A. (2017). Exploring the governance and politics of transformations towards sustainability. *Environmental Innovation and Societal Transitions*, 24, 1-16. <https://doi.org/10.1016/j.eist.2016.09.001>

- Green, A., Nemecek, T., Chaudhary, A., & Mathys, A. (2020). Assessing nutritional, health, and environmental sustainability dimensions of agri-food production. *Global Food Security*, 26, 100406. <https://doi.org/10.1016/j.gfs.2020.100406>
- Klapwijk, C. J., Van Wijk, M. T., Rosenstock, T. S., van Asten, P. J., Thornton, P. K., & Giller, K. E. (2014). Analysis of trade-offs in agricultural systems: current status and way forward. *Current Opinion in Environmental Sustainability*, 6, 110-115. <https://doi.org/10.1016/j.cosust.2013.11.012>
- Kanter, D. R., Musumba, M., Wood, S. L., Palm, C., Antle, J., Balvanera, P., Dale, V. H., Havlik, P., Kline, K. L., Scholes, R. J., Thornton, P., Tittone, P., & Andelman, S. (2018). Evaluating agricultural trade-offs in the age of sustainable development. *Agricultural Systems*, 163, 73-88. <https://doi.org/10.1016/j.agsy.2016.09.010>
- Rosenzweig, C. E., Antle, J., & Elliott, J. (2015). Assessing impacts of climate change on food security worldwide. *Eos*, 97. <https://doi.org/10.1029/2016EO047387>
- Nyström, M., Jouffray, J. B., Norström, A. V., Crona, B., Søgaaard Jørgensen, P., Carpenter, S. R., Bodin, Ö., Galaz, V., & Folke, C. (2019). Anatomy and resilience of the global production ecosystem. *Nature*, 575(7781), 98-108. <https://doi.org/10.1038/s41586-019-1712-3>
- Brick, C., Freeman, A. L., Wooding, S., Skylark, W. J., Marteau, T. M., & Spiegelhalter, D. J. (2018). Winners and losers: communicating the potential impacts of policies. *Palgrave Communications*, 4(1), 1-13. <https://doi.org/10.1057/s41599-018-0121-9>
- Journeault, M., Perron, A., & Vallières, L. (2021). The collaborative roles of stakeholders in supporting the adoption of sustainability in SMEs. *Journal of Environmental Management*, 287, 112349. <https://doi.org/10.1016/j.jenvman.2021.112349>
- United Nations Department of Economic and Social Affairs Sustainable Development (UNDESA). (2022). The 17 Sustainable Development Goals. Available at: <https://sdgs.un.org/goals>. Accessed on 10 February 2022
- FAO. (2013). Edible insects: Future prospects for food and feed security. Available at: <https://www.fao.org/3/i3253e/i3253e.pdf>. Accessed on 10 February 2022
- Makkar, H. P., Tran, G., Heuzé, V., & Ankers, P. (2014). State-of-the-art on use of insects as animal feed. *Animal Feed Science and Technology*, 197, 1-33. <https://doi.org/10.1016/j.anifeedsci.2014.07.008>
- Grant, W. (2016). The challenges facing UK farmers from Brexit. *EuroChoices*, 15(2), 11-16. <https://doi.org/10.1111/1746-692X.12127>
- Swinbank, A. (2017). World trade rules and the policy options for British agriculture post-Brexit. Briefing paper, 7, 12.
- Chang, W. W. (2018). Brexit and its economic consequences. *The world economy*, 41(9), 2349-2373. <https://doi.org/10.1111/twec.12685>
- Zupanec, M., Schafft, H. A., Lindemann, A. K., Pieper, R., & Mader, A. (2021). Critical factors for food safety in global commodity flows with a focus on logistics—A case study on Mycotoxin contamination of agri-bulk commodities. *Operations and Supply Chain Management: An International Journal*, 14(4), 545-563. <http://doi.org/10.31387/oscm0470323>
- Alava, J. J., Cheung, W. W., Ross, P. S., & Sumaila, U. R. (2017). Climate change—contaminant interactions in marine food webs: Toward a conceptual framework. *Global Change Biology*, 23(10), 3984-4001. <https://doi.org/10.1111/gcb.13667>

