

Profiting from harm¹:

Factory farms, animal feed and corporate responsibility

Executive summary

The current global food system is unsustainable – increasing demands for meat and the animal feed to produce that meat is putting immense pressure on the Earth’s ecosystems. It is causing the depletion and degradation of the natural environment.^{1,2} The global food system is responsible for a third of all greenhouse gas emissions³, 70% of freshwater consumption and a 60% decline in wildlife populations.⁴ The system is highly inefficient, contributing to significant social and economic impacts too. World hunger is increasing, and in 2020 more than 800 million people were undernourished while two billion people were overweight or obese.⁵

Every year, over 80 billion land animals are used in farming, and approximately seventy percent of these are trapped in intensive industrialised facilities known as factory farms, where they are raised for food.⁶ Without the largescale production of crops such as soy for animal feed, it wouldn’t be possible to produce billions of animals each year at the cheapest possible cost.

World Animal Protection is calling for a moratorium on factory farming to cap the growth of this problem and reduce the global consumption of soy for animal feed. Global diets need to shift to a predominantly plant-based food system that allows for arable land to be planted with crops for human consumption rather than animal consumption. It is imperative that farmed animals are in high welfare systems where their physical and behavioural needs are met.

This ‘Profiting from harm’ report from World Animal Protection describes the negative impacts of crops grown for feeding factory farmed pork and poultry. It explores the negative impacts across the whole system from farm to fork, examining the links between animal feed (soy) crops and industrial farming systems. The negative impacts across the supply chain are also explored; pesticide use, impacts on wildlife, communities, and the role of corporations driving the unsustainable production and consumption of the industry.

World Animal Protection will be investigating how:

- Soy is a key component of animal feed which is fed to factory farmed chickens and pigs.
- Major global and local stakeholders play key roles in the supply chain and value chain.
- Negative impacts are documented across the supply chain.
- Pesticides used for soy production inflict harm on wildlife and communities.

This series of reports demonstrates how corporations involved in intensive agricultural production of both crops and animals could play a major role in taking immediate action to avert future harms. These reports can be used by global stakeholders to initiate dialogue with corporations, identify problems and responsibilities, and develop a plan of action which addresses animal welfare, the overuse of pesticides, climate change, biodiversity conservation and the safety of workers.

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Introduction

Consumer demand for cheap food has driven the intensification of how we farm animals.⁶ The global food system has been following the 'cheaper food paradigm' to produce more food at low cost. Traditional farms have been largely replaced by intensive industrialised systems known as factory farms.⁷ Factory farms produce an increasing number of animals by intensification⁸ and are the largest source of animal cruelty in the world, confining animals in conditions that do not meet their physical or behavioural needs.⁹

The expansion and intensification of agriculture has been one of humanity's largest impacts on the environment, threatening the world's natural resources as natural habitats are converted to grow crops to produce feed for factory farmed animals. Of the land that is habitable on earth, half is used for agriculture.^{10,11,12} Farmed animals take up the biggest proportion of that (77%), encompassing grazing land for animals and arable land that is used for growing crops for animal feed.¹³

Factory farming is driving the destructive trade in animal feed production, causing animal suffering, habitat loss, climate change and human rights abuses, and compromising people's food security. It is also an inefficient use of the world's resources. Land that could be used to plant crops for human consumption is dedicated to growing feed for livestock. Despite livestock occupying most of the world's agricultural land, it only produces less than one-fifth of the world's calories and just over one-third of the world's total protein.^{10,14}

Soy, one of the main crops grown to feed factory farmed animals, is increasing at an unsustainable rate.^{15,16} The demand for soy crops was previously met by local producers however, due to increased consumption, there is now a reliance on global supply chains.¹⁷ Soy production has become one of the main drivers of commodity-driven forest loss, land use change, the reduction of natural habitats, and biodiversity loss. The expansion of soy plantations is pushing out Indigenous communities from their land, causing environmental damage through pollution and pesticide use, and impacting climate change.^{15,18}

Factory farms and animal suffering

Annually, billions of chickens, pigs and cows worldwide are condemned to lives of misery in factory farms – all to satisfy the growing demand for cheap meat.⁶ More than 72 billion chickens are reared and slaughtered for meat each year,¹⁹ and an estimated 600 million pigs are kept in intensive confined conditions where natural foraging and social behaviours are not possible.²⁰ Over two-thirds of these chickens are raised in intensive indoor systems, where each chicken is confined with up to 100,000 other animals and given less floor space than an A4 piece of paper.⁶

Intensively farmed animals are often low welfare, high productivity breeds. Chickens for example are bred to gain weight and grow fast which requires diets high in protein. Soy has become a key ingredient in livestock feed as it is a protein rich food, which supports the animals to 'fatten up' and grow quickly.

As leading pork producer and 2nd producer of poultry globally, China is the largest market for soy importing 60% of all soybeans grown worldwide.²¹ Across China, the intensification of farming activities has led to serious degradation and deterioration of agricultural land to the point at which they cannot be depended upon to support intensive agriculture in the near future. Consequently, there is a reliance on imports to support domestic production to meet the ever-increasing demand for feed.

The growing human population is putting unprecedented pressure on an already strained global food supply. By 2100, the global population is expected to reach 10.9 billion people.²² With an increasing population comes an increasing demand for food. As incomes rise and urbanisation increases, people's eating habits change and we are witnessing a rise in the number of people eating meat, dairy and processed food.²³ It is expected that the consumption of meat will grow by 12% between 2020 and 2029.²⁰

Continued population growth and changes in consumption behaviours – including shifts to meat-based diets in emerging economies – foreshadow more soy production, and an increase in the negative impacts the industry is having across its supply chain.^{20,24} International trade further exacerbates these problems, enabling the reallocation of crop production from resource-inefficient regions such as China to resource-efficient regions including Brazil²⁵ – with negative consequences for the environment.

Factory farming and destructive animal feed

Animal feed is big business. Approximately one third of the arable land around the world is used to produce animal feed for cruel factory farms.^{9,26} Production takes place in more than 130 countries, generates an estimated annual turnover of over 400 billion USD and has reached a scale of an estimated one billion tonnes annually.²⁷

Soy production is concentrated in South America and the USA.²⁸ More than 80% of the soy produced in Latin America goes to China where the largest number of farmed animals in the world are produced.²⁰ Brazil is the world's largest producer and among the world's top exporters of animal meat – particularly poultry and pork. Most of the soy produced in the USA goes to Europe.

In both Latin America and the USA, land that could be conserved for its rich biodiverse potential or used to grow crops to directly feed people is instead used to grow crops for animal feed. This is inherently inefficient and unsustainable compared with using land for crops to feed people directly. Growing and trading enough soy to keep billions of farmed animals alive is leading to a global catastrophe, contributing to the destruction of wild habitats and the suffering of wild animals, and additional environmental impacts such as a significant climate footprint, water use, soil degradation and pollution.^{15,18}

Brazil: Animal feed production powerhouse

South America is a major region of soy production. In 2019, Brazil became the world's top soybean producing country, surpassing the USA.²⁹ Other major regions of production in South America are Argentina, Paraguay and Bolivia. Together, these countries are responsible for 55% of global soy production.

JBS is the world's largest meat producing company and has significant control over operations in Brazil. Little attention has been paid to holding large integrated companies with huge profits – such as JBS – to account for the environmental crisis that their global operations are driving.



Figure 1. Trucks transporting soy along the muddy BR 163 road in Mato Grosso (credits: PARALAXIS/SHUTTERSTOCK)

With a company the size of JBS, their integrated operations from farmers, cooperatives, traders, crushers and mixers are complex. The onus of proving compliance to agreements like the Amazon Soy Moratorium and company commitments on subjects such as forests, climate change and labour remains the responsibility of the company. The Amazon Soy Moratorium, which was established in 2006, is a vital agreement to ensure that soy production in the Amazon region only occurs on existing agricultural land.⁷

Over the past 30 years, Brazil's soy production has increased sixfold, from 20 million tons per year to 125 million tons today.^{30,31} Most of the soy produced is exported to become feed for cattle, poultry and pigs. Mato Grosso is the largest soy producing state in Brazil and the world's biggest supplier of the grain. Nearly 33% of soy produced in Brazil is processed internally and converted to animal feed. 63% is exported (unprocessed), and almost all will be crushed and transformed into animal feed abroad. China is Brazil's largest soy customer.²² Only 4% of the soy produced is destined for human food.³⁰



Figure 2. Deforestation in Brazil: an aerial view of a large soy field eating into the tropical rainforest (credits: Frontpage/Shutterstock)

In Brazil, animal feed production is mostly concentrated in Mato Grosso, Rio Grande do Sul and Paraná (16.3 million tons). Expansion continues in the Centre-West of Brazil, with processing units being built across the area to be closer to the grain suppliers of soy and maize - another animal feed crop. Pork and chicken businesses are also migrating to the Cerrado region to be closer to the soy and corn areas. This is also because it is cheaper to transport the meat to retail outlets than to transport the soy and corn to animal farms.

The Cerrado is a global biodiversity hotspot and tropical savannah, the largest in South America.³² Located in the central portion of the South American continent it encompasses central Brazil, north-eastern Paraguay and eastern Bolivia. It is home to megafauna such as the jaguar, the giant anteater, the maned wolf, the greater rhea, and the giant armadillo, but the biggest stand-outs are the region's diverse plants and insects.³³

The Cerrado's biodiversity and ecosystem services are under threat as it has become the centre of the largest agribusiness expansion on earth. We are seeing a rapid decline in native vegetation and undisturbed areas as the land is being converted to agriculture, particularly the production of soybeans. Between 2000 and 2014 the soybean area increased by over 250%. Alarming, it is predicted that soy production will continue to increase, and the Cerrado will be the location of such expansion.³⁴ If the agribusiness keeps advancing at the current rate of expansion the Cerrado is predicted to collapse in less than 30 years.³⁵



Figure 3. Ariel view of a factory farm in Mato Grosso

China is Brazil's largest soy customer and is the largest soybean consumer country in the world.²⁸ With an import market worth 36.6 billion USD in 2017 alone, it is the greatest importer country by far. Almost two-thirds of all soybeans traded are destined for China.³⁰

Focus on JBS: The world's largest meat processing company

JBS, headquartered in Brazil, is the largest and most powerful meat processing company in the world.³⁶ It is estimated that JBS slaughters 1.3 million animals every single day.³⁷ This means the company bears responsibility for a significant proportion of the social and environmental costs associated with animal feed production and meat processing. JBS has more than 150 plants in 15 countries, including in South America, Europe and North America. JBS owns more animal feed mills in Brazil than any other country. Feed mills are where the animal ration is produced.

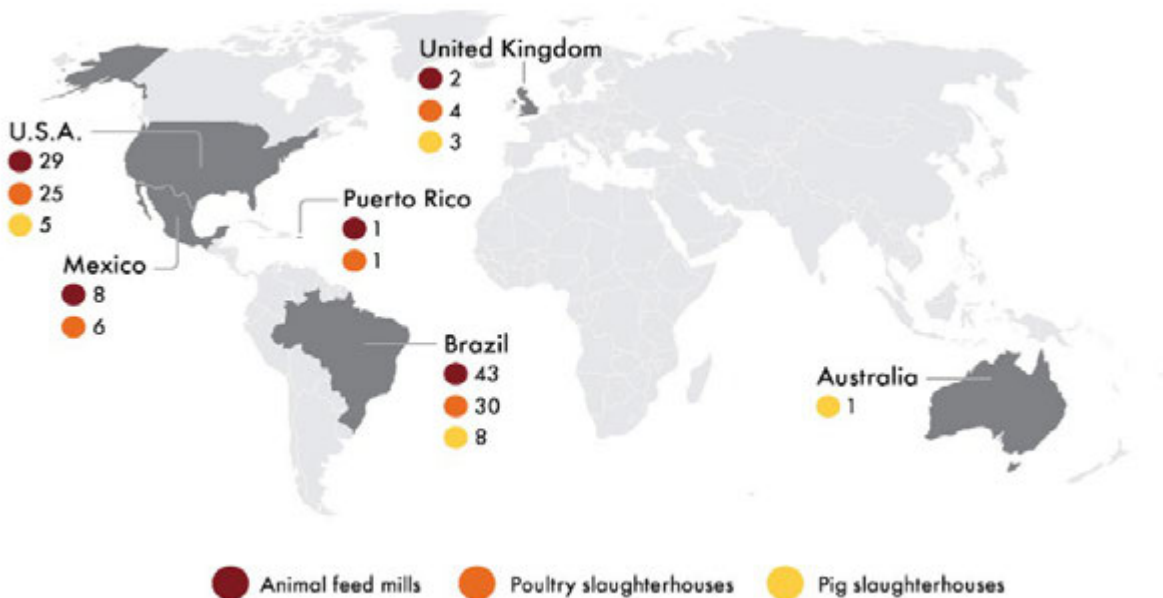


Figure 4. JBS' worldwide facilities - poultry, pig, and animal feed - The company's operations across the globe span 66 poultry slaughterhouses, 17 pig slaughterhouses and 83 animal feed mills.

In Brazil, JBS owns 43 animal feed mills, eight pig slaughterhouses and 30 poultry slaughterhouses. In feed mills, feed ingredients such as soybeans are ground and processed into a form that is suitable for animal consumption. Most of these are

in the southern states (Rio Grande do Sul, Santa Catarina and Paraná).³⁸ Some cities harbour both pig and poultry slaughterhouses and an animal feed mill. After Brazil, the United States is the country with the largest number of facilities of this kind.

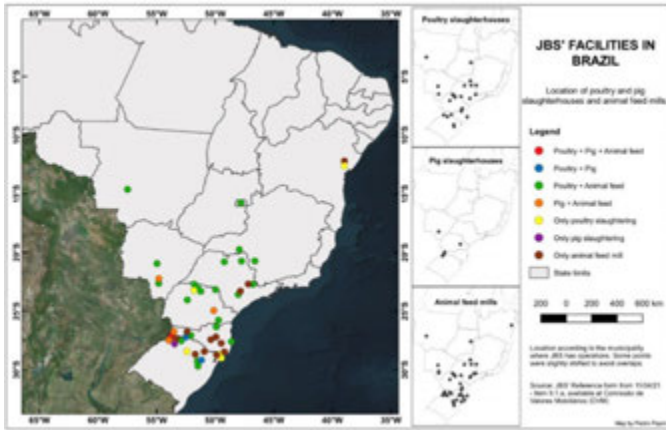


Figure 5. JBS' Facilities in Brazil

JBS business segments:

The company's global activities are divided into five business segments: Brazil, Seara, JBS USA Beef, JBS USA Pork, and Pilgrim's Pride Corporation.³⁸

JBS Brazil is the Brazilian beef production unit. There are 37 production units spread throughout Brazil's main cattle breeding regions. They have a daily slaughtering capacity of 33,000 animals.³⁹ JBS Brazil also produces leather and has the capacity to process 47 thousand hides per day in Brazil.

SEARA focuses on the production and export of chicken and pork. It is Brazil's second largest producer and exporter of chicken and pork with 30 poultry processing facilities and eight pig processing facilities. It processes 5.1 million birds per day and 25,000 pigs per day. This exceedingly large scale of production of pork and poultry contributes a substantial amount of greenhouse gases. Considering the number of birds and pigs slaughtered per day, one can only imagine the enormous volume of feeds required.

JBS USA is comprised of JBS Beef and JBS Pork. It is the largest beef company in the world and is focused on the production and distribution of meat and prepared foods in the United States, Canada, and Australia.

JBS USA Beef is engaged in the production and distribution of beef, lamb and prepared foods in the United States, Canada, and Australia. It produces 42,700 heads of cattle per day.

JBS USA PORK is the second largest fresh pork producer in the USA. The JBS USA Pork line is involved in the processing and distribution of pork. It produces 92,600 pigs per day.

PILGRIM'S PRIDE CORPORATION (PPC) is a global leader in chicken production and processing, operating in Brazil, the United States, Canada, Australia, the United Kingdom, France, Mexico, Argentina, and Paraguay, among others. There are 45 subsidiaries listed by Pilgrim's Pride.³² It produces 8.6 million birds per day and 10,100 pigs per day.

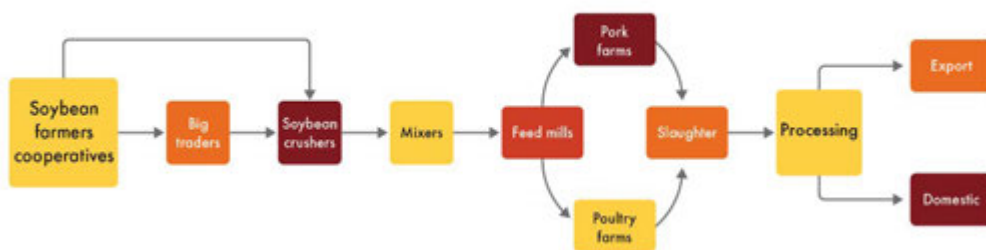


Figure 6. Standard soy production chain

JBS poultry production

Two business segments of JBS are responsible for producing and selling poultry: Seara Alimentos (JBS' poultry meat brand) which is located in Brazil, and Pilgrim's Pride Corporation which works across North America, Central America, and Europe. The poultry is produced by JBS' own farms and contracted family farm partners.³⁸

Pilgrim's Pride Corporation is one of the world's largest poultry producers. Pilgrim's is also the owner of Moy Park,⁴¹ a poultry and prepared foods company in the UK and Europe, and the owner of Pilgrim's UK (Tulip Limited),⁴² a pork and prepared foods company in the UK. Pilgrim's products are sold in more than 100 countries.

Seara has over 9,000 producers of poultry, turkey, and pigs across Brazil, divided between JBS-owned farms and farms of integrated producers.^{18,38} Integrated producers are those who receive all the production inputs from JBS (remedies, ration, etc) and then must sell the animals to the company when they are ready for slaughter.

JBS claims that slaughtered animals are fed only with 'feed formulated by the company itself' which includes 'soy, corn and other grains'.²² JBS states that it only buys soy from companies that have signed the Amazon Soy Moratorium - an extensive list which includes multinational giants like Cargill, Bunge, ADM and Cofco. While it claims to source soy in accordance with the Amazon Soy Moratorium, JBS has not signed the December 2019 open letter supporting the moratorium. Furthermore, the Cerrado region is currently not covered by the moratorium.⁴³ The private sector could play an important role in protecting areas across the Cerrado that are currently undisturbed by expanding the Soy Moratorium to include this biodiverse and sensitive region.⁴³

JBS pork production

In 2020, JBS' US-based business purchased more than 24.7 million pigs from approximately 630 family farmers for 3.3 billion USD to supply five US pork production facilities.⁴⁴ Pilgrim's UK sourced more than 2.3 million pigs from 850 family farm partners and paid them more than 432 million USD. In Australia, JBS purchased 36,000 pigs from 18 independent farmers for 7.4 million USD.⁴⁴

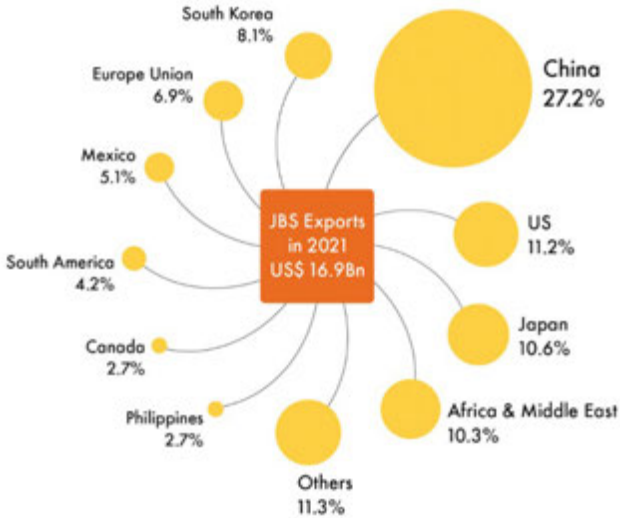


Figure 7. JBS exports by country in 2021

Conclusions

It is time to rethink the global food system. The solution to end the catastrophic impact animal feed production is having upon our planet is to end factory farming and stop their further development.

As the world's largest meat producer, JBS and the supermarkets and companies that they supply have a responsibility to ensure their operations do not contribute to negative environmental and social impacts. Soy supply chains are complex and obscure; however, the devastating impacts they are having are not. Natural ecosystems are being degraded and destroyed; water, land and protected ecosystems are being polluted; the health and livelihoods of rural communities are being put at risk all to perpetuate the suffering of billions of animals in factory farms. It is imperative that meaningful action is taken to ensure supply chains are free of harms to people and planet.

JBS claims to know which field its soy is coming from and that 'sustainability is the foundation of our business strategy' yet the company continues to be connected to deforestation and land clearance. It is vital that JBS is required to measure and disclose the risks and impacts of their operations on people and the planet - including climate and biodiversity risks and impacts. Only full supply chain transparency, and an open and comprehensive monitoring system can ensure JBS is operating in a sustainable way.

A transformation to a humane and sustainable food system is required now more than ever. First, a moratorium on new factory farms being built is needed to cap the growth of the problem. A fundamental shift is required in global diets to a predominantly plant-based food system that allows for arable land to be planted with crops for human consumption, not animal consumption. This would still allow a smaller number of farmed animals to be produced in genuinely humane and sustainable systems where they are treated well, and their feed requirements are met by local sources within circular agricultural systems, allowing the global trade in animal feed to be phased out.

World Animal Protection is calling for an end to cruel factory farming where dependence on large scale and unsustainable animal feed production supports the suffering of billions of factory farmed animals.



References

1. Consumption Behavior and Trends [Internet]. World Business Council for Sustainable Development (WBCSD). [cited 2022 Apr 21]. Available from: <https://www.wbcsd.org/eu47c>
2. Jurgilevich A, Birge T, Kentala-Lehtonen J, Korhonen-Kurki K, Pietikäinen J, Saikku L, et al. Transition towards Circular Economy in the Food System. *Sustainability*. 2016 Jan;8(1):69.
3. Including animal to plant protein shifts in climate change mitigation policy: a proposed three-step strategy: *Climate Policy: Vol 19, No 5* [Internet]. [cited 2022 Apr 21]. Available from: <https://www.tandfonline.com/doi/abs/10.1080/14693062.2018.1528965?journalCode=tcpo20>
4. Almond REA, Grooten M, Petersen T. Living Planet Report 2020: bending the curve of biodiversity loss [Internet]. 2020 [cited 2020 Sep 21]. Available from: <https://edepot.wur.nl/531235>
5. FAO I. The State of Food Security and Nutrition in the World 2021: Transforming food systems for food security, improved nutrition and affordable healthy diets for all [Internet]. Rome, Italy: FAO; 2021 [cited 2022 Apr 21]. 240 p. (The State of Food Security and Nutrition in the World (SOFI)). Available from: <https://www.fao.org/documents/card/en/c/cb4474en>
6. The rise of the 'megafarm': How British meat is made [Internet]. The Bureau of Investigative Journalism (en-GB). [cited 2022 Jan 10]. Available from: <https://www.thebureauinvestigates.com/stories/2017-07-17/megafarms-uk-intensive-farming-meat>
7. Amazon Soy Moratorium [Internet]. FAIRR. [cited 2022 Jan 10]. Available from: <https://www.fairr.org/engagements/amazon-soy-moratorium/>
8. The livestock revolution—a global veterinary mission - ScienceDirect [Internet]. [cited 2022 Mar 28]. Available from: <https://www.sciencedirect.com/science/article/abs/pii/S0304401704001943?via%3Dihub>
9. Steinfeld H, Gerber P, Wassenaar T, Castel V, Rosales M, de Haan C. Livestock's long shadow. 2006 [cited 2021 May 17]; Available from: <http://www.fao.org/3/a0701e/a0701e00.htm>
10. Half of the world's habitable land is used for agriculture [Internet]. Our World in Data. [cited 2022 Apr 11]. Available from: <https://ourworldindata.org/global-land-for-agriculture>
11. FAOSTAT [Internet]. [cited 2022 Apr 11]. Available from: <https://www.fao.org/faostat/en/#home>
12. Anthropogenic transformation of the biomes, 1700 to 2000 - Ellis - 2010 - Global Ecology and Biogeography - Wiley Online Library [Internet]. [cited 2022 Apr 11]. Available from: <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1466-8238.2010.00540.x>
13. Ritchie H, Roser M. Land Use. Our World in Data [Internet]. 2013 Nov 13 [cited 2022 Apr 11]; Available from: <https://ourworldindata.org/land-use>
14. Reducing food's environmental impacts through producers and consumers [Internet]. [cited 2022 Apr 11]. Available from: <https://www.science.org/doi/10.1126/science.aag0216>
15. Food system impacts on biodiversity loss [Internet]. Chatham House - International Affairs Think Tank. 2021 [cited 2021 May 17]. Available from: <https://www.chathamhouse.org/2021/02/food-system-impacts-biodiversity-loss>
16. The Future of Food and Farming: Challenges and choices for global sustainability - Welcome to Foresight For Development [Internet]. [cited 2022 Apr 22]. Available from: <https://www.foresightfordevelopment.org/sobipro/55/866-the-future-of-food-and-farming-challenges-and-choices-for-global-sustainability>
17. Gardner TA, Benzie M, Börner J, Dawkins E, Fick S, Garrett R, et al. Transparency and sustainability in global commodity supply chains. *World Development*. 2019 Sep 1;121:163–77.
18. Factory Farming: Assessing Investment Risks [Internet]. FAIRR. [cited 2022 Apr 21]. Available from: <https://www.fairr.org/article/factory-farming-assessing-investment-risks/>
19. FAOSTAT [Internet]. 2021 [cited 2021 Jun 22]. Available from: <http://www.fao.org/faostat/en/#data/QL>
20. Meat | OECD-FAO Agricultural Outlook 2020-2029 | OECD iLibrary [Internet]. 2021 [cited 2021 May 6]. Available from: <https://www.oecd-ilibrary.org/sites/29248f46-en/index.html?itemId=/content/component/29248f46-en#section-d1e19092>
21. Feed and Livestock in Brazil, China, EU Consume Most Cerrado Soy [Internet]. Chain Reaction Research. 2019 [cited 2022 Feb 14]. Available from: <https://chainreactionresearch.com/report/feed-and-livestock-in-brazil-china-eu-consume-most-cerrado-soy/>
22. United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019: Highlights (ST/ESA/SER.A/423).
23. Anderson K. Globalization's effects on world agricultural trade, 1960–2050. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 2010 Sep 27;365(1554):3007–21.

24. Cilluffo A, Ruiz NG. World's population is projected to nearly stop growing by the end of the century. Pew Research Center. 2019;
25. Yao G, Zhang X, Davidson EA, Taheripour F. The increasing global environmental consequences of a weakening US-China crop trade relationship. *Nat Food*. 2021 Aug;2(8):578-86.
26. Schader C, Muller A, Scialabba NEH, Hecht J, Isensee A, Erb KH, et al. Impacts of feeding less food-competing feedstuffs to livestock on global food system sustainability. *Journal of The Royal Society Interface*. 2015 Dec 6;12(113):20150891.
27. International Feed Industry Federation - Global Feed Statistics [Internet]. [cited 2022 Apr 22]. Available from: <https://ifif.org/global-feed/statistics/>
28. De Maria M, Robinson E, Kangile J, Kadigi R, Dreoni I, Couto M, et al. Global Soybean Trade - The Geopolitics of a Bean. 2020.
29. Crop Explorer - World Agricultural Production (WAP) Briefs - Brazil [Internet]. [cited 2022 Mar 28]. Available from: https://ipad.fas.usda.gov/cropexplorer/pecad_stories.aspx?regionid=br&ftype=prodbriefs
30. Demand for soy puts pressure on Pantanal, Brazil's largest wild wetland [Internet]. *Mongabay Environmental News*. 2021 [cited 2022 Jan 10]. Available from: <https://news.mongabay.com/2021/06/demand-for-soy-puts-pressure-on-pantanal-brazils-largest-wild-wetland/>
31. Ritchie H, Roser M. Forests and Deforestation. *Our World in Data* [Internet]. 2021 Feb 9 [cited 2022 Jan 17]; Available from: <https://ourworldindata.org/soy>
32. Ratter JA, Bridgewater S, Ribeiro JF. Analysis of the floristic composition of the Brazilian Cerrado vegetation iii: comparison of the woody vegetation of 376 AREAS. *Edinburgh Journal of Botany*. 2003 Mar;60(1):57-109.
33. Cerrado: Brazil's tropical woodland [Internet]. *Mongabay*. [cited 2022 Apr 22]. Available from: <https://rainforests.mongabay.com/cerrado/>
34. Cerrado: can the empire of soy coexist with savannah conservation? [Internet]. *Mongabay Environmental News*. 2018 [cited 2022 Apr 22]. Available from: <https://news.mongabay.com/2018/03/cerrado-can-the-empire-of-soy-coexist-with-savannah-conservation/>
35. Hofmann G, Cardoso M, Alves R, Weber E, Barbosa A, De Toledo P, et al. The Brazilian Cerrado is becoming hotter and drier. *Global change biology*. 2021 May 21;27.
36. Editorial R. JBSS3.SA - JBS SA Profile | Reuters [Internet]. [cited 2022 Feb 16]. Available from: <https://www.reuters.com/undefined>
37. JBS: The Brazilian butchers who took over the world [Internet]. *The Bureau of Investigative Journalism (en-GB)*. [cited 2022 May 3]. Available from: <https://www.thebureauinvestigates.com/stories/2019-07-02/jbs-brazilian-butchers-took-over-the-world>
38. Business Unit [Internet]. *JBS*. [cited 2022 Feb 16]. Available from: <https://ri.jbs.com.br/en/jbs/business-unit/>
39. JBS, Marfrig, and Minerva: Material Financial Risk from Deforestation in Beef Supply Chains [Internet]. *Chain Reaction Research*. 2020 [cited 2022 May 12]. Available from: <https://chainreactionresearch.com/report/jbs-marfrig-and-minerva-material-financial-risk-from-deforestation-in-beef-supply-chains/>
40. Copy of Pilgrims - Subsidiaries.xlsx [Internet]. *Google Docs*. [cited 2022 Feb 16]. Available from: https://docs.google.com/spreadsheets/d/1wRpcNmDG7DaZmcPuE-7yvxOHDaaw4rOt/edit?usp=embed_facebook
41. Moy Park - The European Food Company of Choice [Internet]. *Moy Park Ltd*. [cited 2022 Feb 16]. Available from: <https://moypark.com/>
42. Home [Internet]. *Pilgrim's*. [cited 2022 Feb 16]. Available from: <https://www.pilgrimsuk.com/>
43. Soterroni AC, Ramos FM, Mosnier A, Fargione J, Andrade PR, Baumgarten L, et al. Expanding the Soy Moratorium to Brazil's Cerrado. *Science Advances*. 5(7):eaav7336.
44. Pork Suppliers [Internet]. *JBS USA | Sustainability Report*. [cited 2022 Feb 16]. Available from: <https://sustainability.jbsfoodsgroup.com/chapters/suppliers/pork-suppliers/>