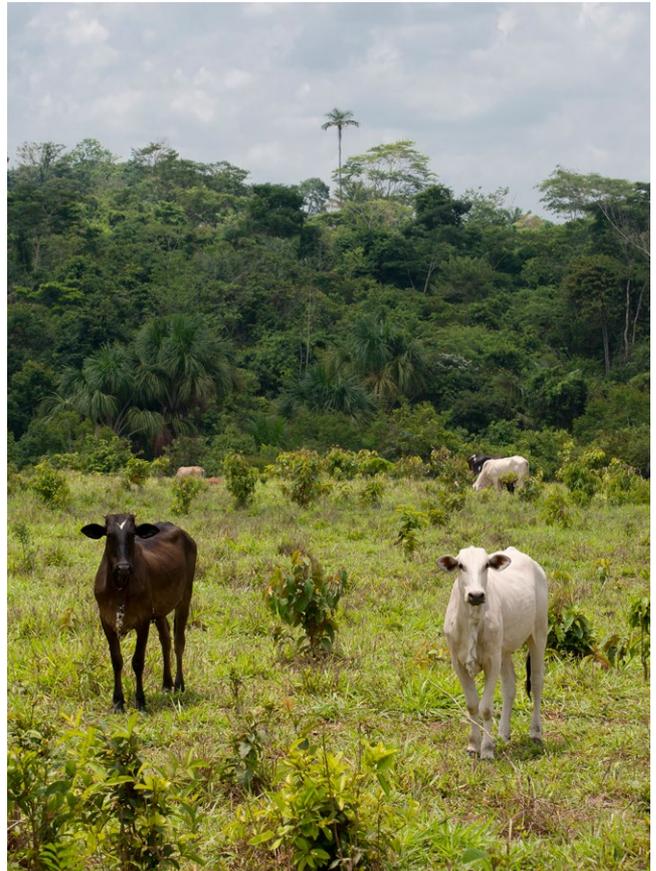


China's exposure to environmental risks from Brazilian beef imports

This briefing uses data on sourcing patterns of Brazilian beef to assess the Chinese market's exposure to deforestation and carbon emissions risk from cattle deforestation in production regions.

HIGHLIGHTS

- China's **beef imports** are growing as domestic production is outpaced by demand. Whilst pork remains the dominant meat in Chinese diets, accounting for two thirds of meat consumption, beef consumption is predicted to increase faster than pork in the coming decade¹.
- Beef exports from Brazil to China have grown rapidly over the last five years, **making Brazil a significant source of China's beef imports** (44% in 2019). Almost 70% of Brazilian beef destined for export to China comes from the Amazon and Cerrado regions where there is ongoing deforestation for cattle pasture expansion. Deforestation for cattle ranching is associated with a variety of environmental and social impacts including biodiversity loss, greenhouse gas emissions and slave labour.
- Analysis in this brief shows that the different sourcing patterns of trading companies, and of mainland China and the Hong Kong Special Administrative Region (SAR), result in **different levels of exposure** to environmental risks. In 2017, mainland China had just over half the deforestation risk/tonne of imports of the Hong Kong SAR.
- The risks associated with Brazil's beef exports to China are highly concentrated in a **small number of traders** and production regions. For example, in 2017, imports from just 25 Brazilian municipalities accounted for half of the associated CO₂ emissions risk from cattle deforestation embedded in China's imports of Brazilian beef.
- The concentration of these risks in a small number of traders and production regions provides **an opportunity** for Chinese buyers and the government to mitigate them — securing the resilience of an important food supply chain and supporting international climate and biodiversity goals.



CATTLE PASTURE IN THE AMAZON | PHOTO: EDSONGRANDISOL

INTRODUCTION

China is the second largest consumer of beef in the world after the United States (US) – although China’s consumption per capita is a fraction of that in the US². The devastating impact of African Swine Fever on China’s pork production in 2018 and 2019 and the resulting global increase in pork prices have added to China’s demand for beef³. In the longer-term, China’s latest Agricultural Outlook predicts that beef consumption will continue to grow over the coming decade, along with poultry and mutton. Whilst beef consumption is predicted to grow at a faster rate than pork consumption, pork will remain the most popular meat consumed in China – accounting for two thirds of total meat consumed⁴.

China is the third largest producer of beef globally⁵ and domestic production meets most of this demand⁶. However, limitations on arable land and water availability⁷ mean that its rising consumption relies on imports which are expected to increase by 6% per year over the next decade⁸. In 2019, China imported 20% of the beef it consumed — 1.66 million tonnes — making it the world’s largest importer of beef in 2019^{9,10}.

Brazil is China’s largest supplier of beef, providing nearly half of its total beef imports in 2019. Brazil’s beef exports to China have grown rapidly, increasing by 62% over the past five years¹¹. As such, beef imports from Brazil have significant economic value and relevance for China’s food security.

The analysis in this brief shows that nearly 70% of the beef imported to China from Brazil in 2017 was produced in the Amazon and Cerrado. These are important areas for biodiversity where cattle ranching for beef production has significant environmental and social impacts. The clearance of vegetation and forests has resulted in biodiversity loss and greenhouse gas emissions. In some places, land grabbing, the displacement of traditional and indigenous communities, and slave labour have been linked to cattle ranching^{12,13}.

Understanding and mitigating the risks linked to the beef trade present a leadership opportunity for China. Tropical deforestation accounts for 10% of human-induced greenhouse gas emissions worldwide¹⁴, and reducing deforestation and emissions from China’s beef imports can positively contribute towards international climate and biodiversity goals.

This brief uses data on sourcing patterns of Brazilian beef to mainland China and Hong Kong SAR to assess the Chinese market’s exposure to deforestation and carbon dioxide (CO₂) emissions risk from cattle deforestation in production regions. It quantifies the risks embedded in China’s imports and shows how they are concentrated in particular sourcing regions and suppliers. It also explores existing efforts by companies to manage these risks and some opportunities to mitigate them further.



BEEF CONSUMPTION IS INCREASING IN CHINA | PHOTO: NUTTAPON AVERUTTAMAN

BOX 1. WHAT IS TRASE?

Trase, an independent data-based supply chain initiative, maps the supply chains of Brazilian beef and live cattle exports from the municipalities where cattle are raised, via trading companies, through to the importing countries. This enables importing markets, like China, and downstream buyers to measure their exposure to environmental and social risks associated with their imports of Brazilian beef. Trase data on Brazilian beef covers exports in 2015 to 2017. Later this year, it will be extended to 2018 and 2019.

BRAZIL'S BEEF EXPORTS AND ASSOCIATED ENVIRONMENTAL RISKS

Brazil is the second largest producer of beef globally, and the world's largest exporter. In 2019, exports totalled 1.9 million tonnes – and accounted for approximately one fifth of total production. China was Brazil's largest export market in 2019 (Figure 1).

The production (and export) of Brazilian beef is linked to significant social and environmental impacts. Cattle pasture expansion is the largest driver of deforestation in both the Amazon and the Cerrado (a highly biodiverse

region of grasslands, wooded savannah and forests). This causes greenhouse gas emissions and biodiversity loss. Cattle ranching has also been linked to cases of slave labour and land conflicts^{15,16}.

Trase, an independent data-based supply chain initiative, maps Brazil's beef exports back to the municipality of origin by connecting exports to slaughterhouses and then using data on animal movements to identify the origin of cattle from each exporting slaughterhouse. By linking exports back to where the cattle were raised, Trase connects exports to social and environmental risks in these places.

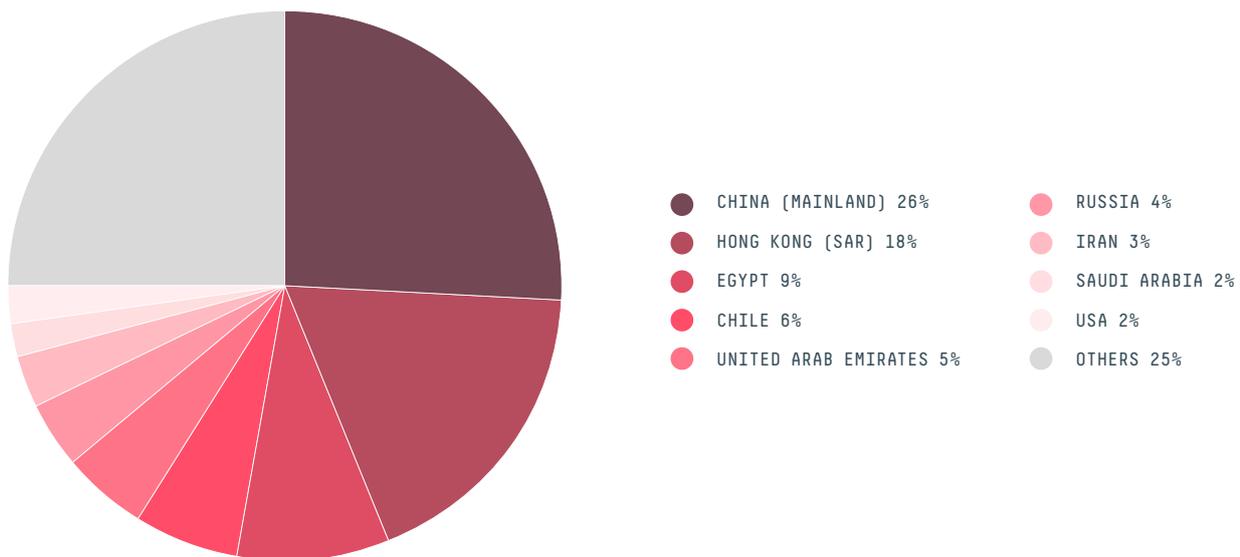


Figure 1. Brazilian beef export markets in 2019 (Brazilian Ministry of Industry, Foreign Trade and Services).

According to Trase estimates, Brazil’s 2.1 million tonnes of beef, offal and live cattle exports in 2017 were associated with 113,000 hectares of cattle deforestation risk (see Box 2), which in turn were associated with 37.1 million tonnes of carbon dioxide (CO₂) emissions risk¹⁷. These risks are concentrated in the Cerrado and Amazon regions, which provide 44% and 25% of beef exports respectively.

Exports from the Cerrado account for the largest share of the total cattle deforestation risk associated with

Brazil’s beef exports (51,200 ha), but exports from the Amazon region have a higher relative risk per tonne (80 ha/thousand tonnes compared to 55 ha/ thousand tonnes in the Cerrado). Exports from the Amazon account for three quarters of the overall CO₂ emissions risk from cattle deforestation associated with Brazil’s exports. This is because of the high density of carbon-rich biomass in the Amazon forest. Traders and export markets therefore have very different levels of exposure to environmental risks, depending on where they source from (Figure 2).

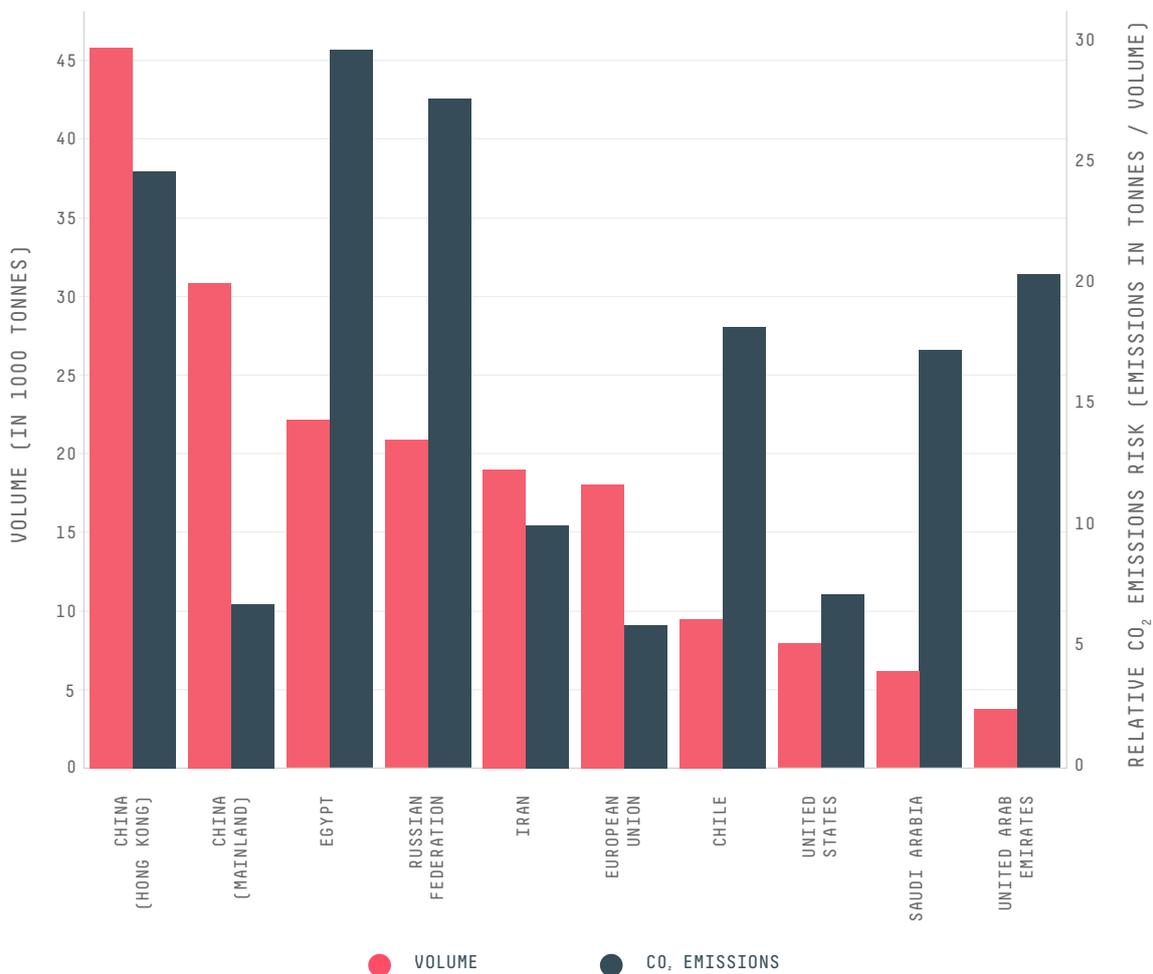


Figure 2. Volumes and relative CO₂ emissions risk of beef exports from Brazil to top 10 markets in 2017.

BOX 2. HOW DOES TRASE CALCULATE THE CATTLE DEFORESTATION RISK AND CO₂ EMISSIONS RISK FROM CATTLE DEFORESTATION ASSOCIATED WITH EXPORTS?

Trase calculates cattle deforestation risk (hectares) by multiplying the volume of carcass weight exported by a municipality (tonnes) by the cattle deforestation per tonne of carcass in that municipality (hectares/tonne). Cattle deforestation per tonne of carcass in a municipality is calculated by dividing deforestation for cattle pasture over the past five years (hectares) by cattle production in a municipality (tonnes).

Carbon dioxide emissions from cattle deforestation (CO₂ emissions per tonne) are obtained by

intersecting cattle pasture deforestation with data on above – and below – ground biomass and litter carbon stocks.

Deforestation and emissions are allocated to traders in proportion to the volume of cattle products that they export from a given municipality, relative to total cattle production in the same municipality. So, if municipality A in Brazil produced 100 tonnes of beef, which were associated with 200 tonnes of CO₂ emissions from cattle deforestation, and a company exported 20 tonnes of beef sourced from this municipality, these exports would be associated with 40 tonnes of CO₂ emissions. For more details on methods see [here](#).



CATTLE GRAZING ON DEFORESTED LAND IN THE AMAZON | PHOTO: PHOTOTREAT

MEASURING CHINA'S EXPOSURE TO ENVIRONMENTAL RISKS FROM BRAZILIAN BEEF IMPORTS

In 2017, China (mainland and Hong Kong SAR) imported 767,000 tonnes of beef from Brazil. Almost three quarters of this was sourced from the Amazon and the Cerrado regions, which are both associated with cattle deforestation. Trase shows that these imports were associated with 40,500 hectares of cattle deforestation risk.

Nearly half of China's imports were from the Cerrado (47%) and these imports were associated with the same

share of cattle deforestation risk (19,000 ha). Just under a quarter of imports were from the Amazon and these account for more than a third of the overall cattle deforestation risk (14,500 ha).

Overall, China's beef imports from Brazil are linked to an emissions risk from cattle deforestation of 13.1 million tonnes of CO₂. Imports from the Amazon account for 61% of this CO₂ emissions risk, with just 24% of the emissions risk related to imports sourced from the Cerrado.



CATTLE IN THE CERRADO | PHOTO: MARCOS ASSIS

CHINA'S CO₂ EMISSIONS RISK FROM CATTLE DEFORESTATION IS HIGHLY CONCENTRATED IN A FEW MUNICIPALITIES



Figure 3. China imports beef from 1200 municipalities, but only 25 of these account for half of the associated CO₂ emissions risk from cattle deforestation. Just five of the 25 account for a quarter of the risk.

In 2017, China imported beef from more than 1200 municipalities in Brazil. However, just 25 of these municipalities accounted for half of the CO₂ emissions risk from cattle deforestation. These include the municipalities with the highest rates of deforestation in the Amazon: Porto Velho (Rondônia), São Félix do Xingu (Pará), and Altamira (Pará), according to the most recent data from the Brazilian government's deforestation monitoring system PRODES¹⁸. Together these three municipalities accounted for 20% of all the CO₂ emissions risk from cattle deforestation associated with China's Brazilian beef imports in 2017.

This insight highlights how targeted engagement by Chinese buyers and the Chinese government could effectively mitigate these risks.

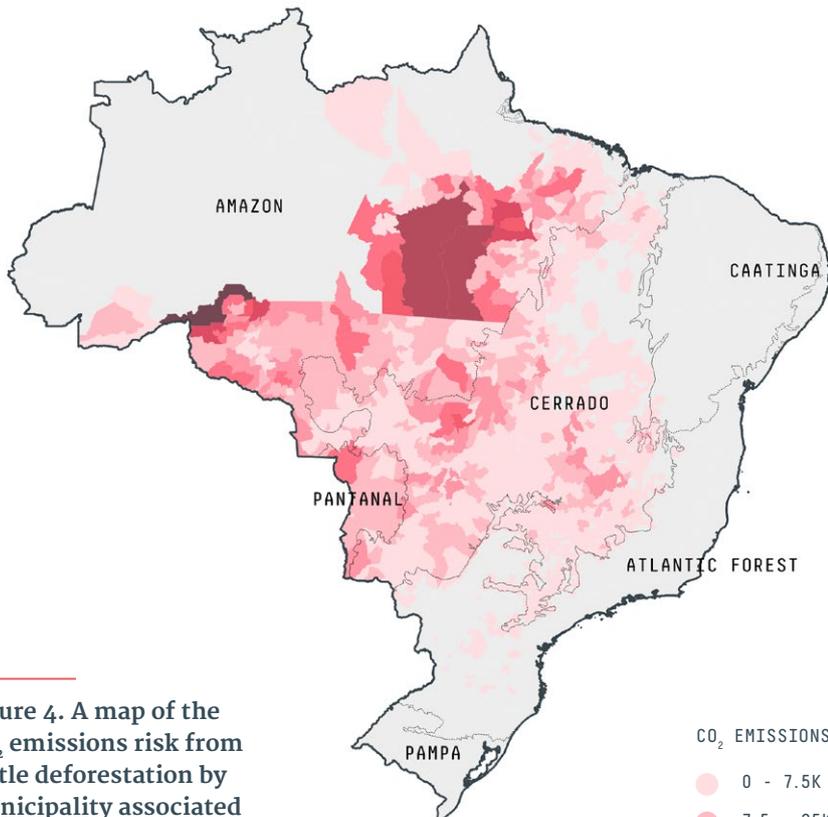
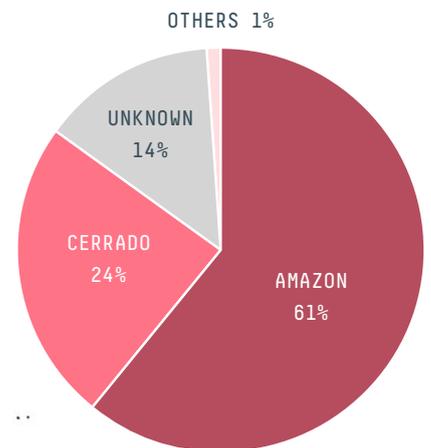
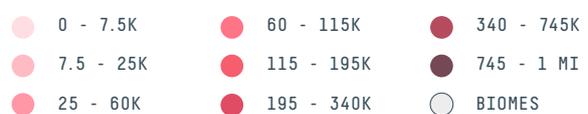


Figure 4. A map of the CO₂ emissions risk from cattle deforestation by municipality associated with Brazil's beef exports to China.

CO₂ emissions risk per biome



CO₂ EMISSIONS RISK (TONNES)



HONG KONG'S IMPORTS HAVE SIGNIFICANTLY HIGHER DEFORESTATION RISK EXPOSURE THAN MAINLAND CHINA

Beef exports from Brazil to mainland China and the Hong Kong SAR are sourced from different production regions.

This is because of different slaughterhouse licensing requirements. The Hong Kong SAR accepts exports from all federally-inspected slaughterhouses in Brazil whereas mainland China restricts exports to a smaller group of slaughterhouses that meet its sanitary

requirements. These slaughterhouses are mainly located in southern and eastern Brazil away from the deforestation frontier. As a consequence, Hong Kong's deforestation risk/tonne of beef imports was nearly double that of mainland China in 2017.

However, in 2019 mainland China licensed a further 22 Brazilian slaughterhouses for export^{19,20}. Fourteen of these are in the Amazon region and therefore the cattle deforestation risk and CO₂ emissions risk from cattle deforestation associated with mainland China's beef imports from Brazil can be expected to increase.

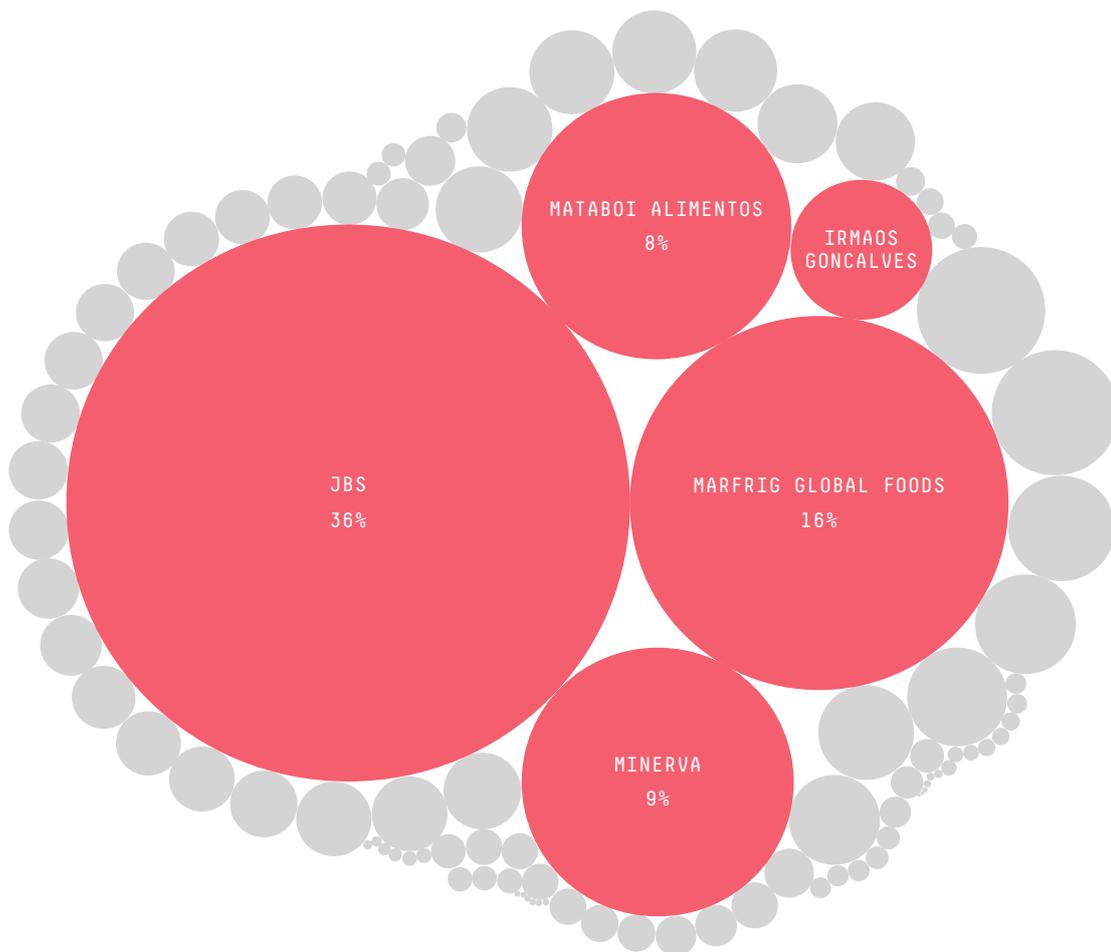


Figure 5. The companies that dominate the export trade to China and % (volume) of beef exported.

A HANDFUL OF COMPANIES DOMINATE BRAZIL AND CHINA'S BEEF TRADE

Nearly 100 companies are involved in the export of beef from Brazil to China but, in 2017, just four accounted for over 70% of all exports by volume. JBS, the world's largest meat-packing company, was responsible for over a third of all exports. At the start of 2020, JBS signed an agreement with the Chinese WH group to supply meat, including fresh beef, to the Chinese market, so this market share is expected to increase.



A BEEF PRODUCTION LINE, BRAZIL | PHOTO: MARCIO ISENSEE E SÁ

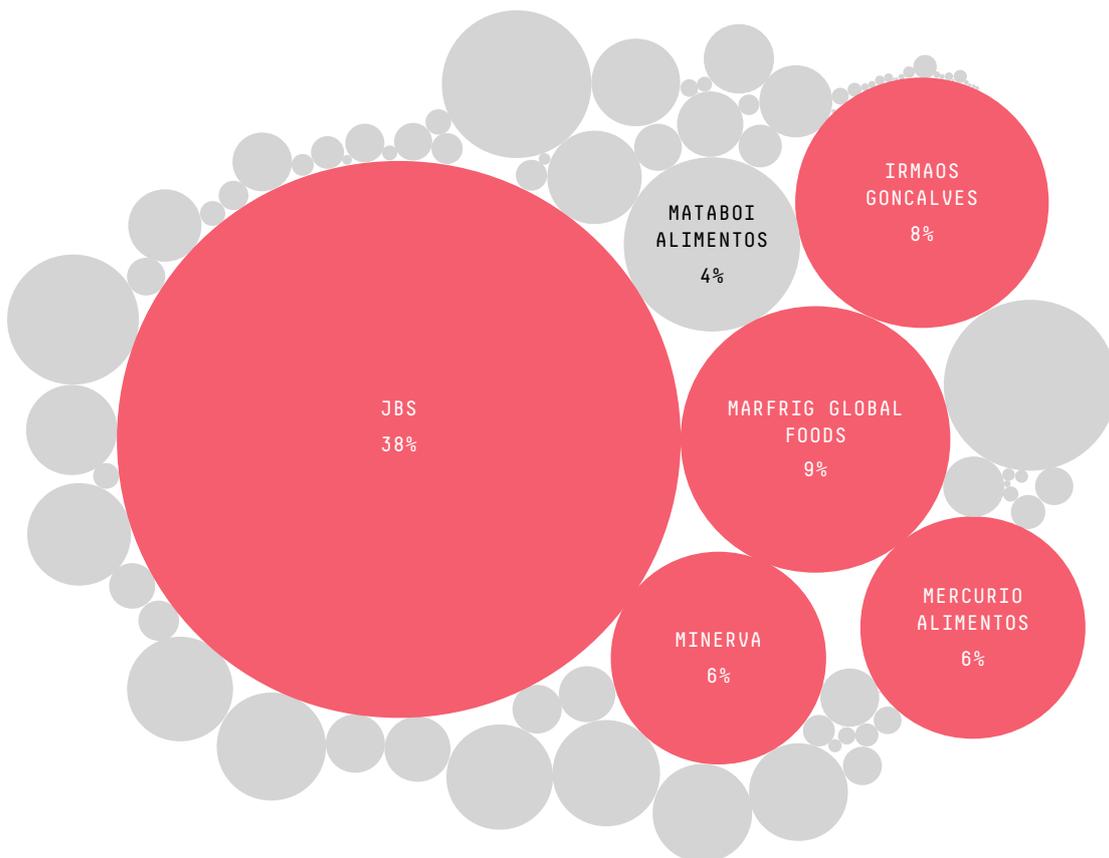


Figure 6. The percentage of CO₂ emissions risk from cattle deforestation associated with each exporter in 2017.

The volume of JBS's exports means that it accounts for a large proportion of the total CO₂ emissions risk from cattle deforestation associated with China's imports. However, sourcing patterns matter. Other companies, particularly those sourcing heavily from deforestation frontiers in the Amazon region such as Irmãos Gonçalves Comércio e Indústria and Mercúrio Alimentos, have a disproportionately high CO₂ emissions risk from cattle deforestation compared to the volumes they trade.

In contrast, Mataboi's exports to China mainly come from the State of Minas Gerais in the Cerrado, which is not at the deforestation frontier. These exports have a far lower CO₂ emissions risk from cattle deforestation than would be expected from the volume Mataboi trades.

Focusing on the importers in China, Trase data shows that this market is less concentrated than exports although the top five account for nearly a third of imports by volume (Table 1).

Table 1. The five companies importing the largest volume of beef to China and related CO₂ emissions risk.

| IMPORTER | TRADE VOLUME (TONNES) | TRADE VALUE (USD) | CO ₂ EMISSIONS RISK FROM CATTLE DEFORESTATION (TONNES) |
|--|-----------------------|-------------------|---|
| Weston Importers | 93,007 | 261,074,746 | 1,043,418 |
| Parker Migliorini International GMBH | 85,929 | 247,032,923 | 2,218,346 |
| Total enterprise | 23,458 | 66,385,034 | 462,032 |
| Shanghai New Source International Trading Co | 21,478 | 66,973,058 | 200,357 |
| Beijing Zhuochen Animal Husbandry Co | 20,679 | 58,097,928 | 182,616 |

EFFORTS TO ADDRESS CATTLE DEFORESTATION RISK IGNORE THE CERRADO

Current efforts to address deforestation driven by cattle expansion are focused on the Amazon. In 2017, 84% of exports from the Amazon were covered by some form of zero deforestation commitment (ZDC). These include the G4 agreement not to source from land in the Amazon deforested after 2009, signed by the three largest beef exporters – JBS, Marfrig and Minerva, and the TAC (Terms of Adjustment of Conduct) binding agreements with the Public Prosecution Office. The majority of slaughterhouses in the Legal Amazon as well as the three main exporters have signed TACs to monitor their

suppliers and suspend purchases where there is evidence of illegal deforestation, invasion of indigenous lands, or slave labour.

Despite these agreements, cattle deforestation (and therefore cattle deforestation risk and CO₂ emissions risk from cattle deforestation) remains high in the Amazon region and companies continue to face significant challenges in implementing these agreements successfully²¹. In particular, the failure to monitor 'indirect suppliers' to slaughterhouses increases the risk of sourcing animals that have come via fattening or calving farms linked to deforestation or slave labour²².

Despite this, the majority of China's cattle deforestation risk comes from exports from the Cerrado. This risk is concentrated in a handful of municipalities at the deforestation frontier – for example five municipalities represent over 10% of the deforestation risk embedded in exports from the Cerrado (Nova Xavantina, Água Boa, Novo São Joaquim, Campinápolis, and Paranatinga). Despite high levels of cattle deforestation risk, very few companies have ZDCs covering the Cerrado and, in 2017, only 20% of exports from the biome were covered by a ZDC.

Beyond company commitments, a number of local and national government initiatives promote more sustainable and low carbon cattle ranching. These include Brazil's Low Carbon Agriculture Plan, national programmes on Low Carbon Brazilian Beef and Carbon Neutral Beef, as well as regional programmes such as Mato Grosso's Produce, Conserve, Include (PCI) strategy. This includes the Sustainable Production of Calves project, which aims to intensify cattle production and restore degraded pastures to reduce pressures on forests.



VEGETATION IN THE CERRADO | PHOTO: FERNANDOPODOLSKI

HOW ARE BUYERS ADDRESSING DEFORESTATION RISKS FROM BEEF IMPORTS?

There are some nascent industry sustainability efforts – such as the China Sustainable Meat Declaration, which was

signed by the China Meat Association and 64 Chinese companies in 2017. But data from Global Canopy's Forest 500 project shows that in 2019 just nine of the 30 largest beef companies operating in China had public commitments to address deforestation risks in their sourcing²³.

Two Chinese companies disclosed information on beef through CDP in 2019. This included the Fujian Sunner Group, which is a signatory to the China Sustainable Meat Declaration and which reported sourcing beef from Brazil. In the disclosure the Group identifies deforestation as a risk to its beef value chain, which it reports it is addressing by putting in place a commitment to eliminate deforestation. Currently it reports that it can trace 80% of its beef to the country of origin, but says that a mature certification standard for beef along with greater supplier and customer awareness would improve its ability to manage deforestation risk.

Globally, the beef sector has been slower to take action to prevent deforestation than other commodity sectors, such as palm oil or timber. Nevertheless, a number of high-profile multinational companies, including McDonald's, Carrefour and Walmart, have made commitments to source sustainable and deforestation-free beef. A number of initiatives such as the [Accountability Framework Initiative](#) and the [Global Roundtable on Sustainable Beef](#) have developed resources and guidance on developing and implementing sustainable and ethical sourcing policies.

BOX 3. CASE STUDY OF MCDONALD'S ZERO DEFORESTATION COMMITMENT FOR BEEF

McDonald's has made a clear commitment to eliminate deforestation from its beef supply chain by 2020. This covers all of the company's operations, all of its direct and indirect suppliers and all of its sourcing. McDonald's aims to trace its supplies back to the processing facility and to monitor compliance to meet this commitment. The company has said it will engage with any suppliers that do not comply. This policy is a critical first step towards a deforestation-free beef supply chain.

Importantly, McDonald's also reports on progress against this commitment via its disclosure to CDP Forests. This includes reporting the countries it sources beef from and whether these are considered high-risk in terms of deforestation. In Brazil a high risk country, McDonald's says it has achieved 100% traceability back to the direct supplier to the slaughterhouse and that it monitors whether these direct suppliers comply with the Brazilian Forest Code and with the company's commitment to zero conversion in the Amazon and Cerrado²⁴.



MCDONALD'S IS SEEKING TO SOURCE SUSTAINABLE BEEF SUPPLIES | PHOTO: 4FR

However, the lack of monitoring of indirect suppliers remains an important gap in ensuring its supplies of beef are not associated with deforestation in Brazil. McDonald's agreed in 2016 to purchase an increasing volume of beef from JBS (starting from 250 tonnes per year) from farms in the Amazon, including from some that are part of PECSA - Sustainable Livestock of Amazonia, a project that works with cattle ranchers to restore degraded land and increase productivity, in order to support local initiatives that are addressing key drivers of pasture expansion and deforestation²⁵.

CONCLUSION

China's demand for beef is growing, and imports will continue to play an important part in meeting this demand. China's trade with Brazil, the largest exporter globally and China's main supplier in 2019, will remain important.

However, cattle ranching in Brazil, and therefore beef exports, are associated with significant environmental and social impacts. Trase's supply chain map for Brazil's beef exports illustrates how China's imports are associated with environmental risks, specifically deforestation and CO₂ emissions from cattle deforestation. The data show that China's exposure is highly concentrated both in a handful of traders and in a small number of sourcing municipalities.

This insight provides an opportunity for Chinese buyers and the Chinese government to identify and engage high-risk suppliers and sourcing regions to prevent and mitigate risks. By working with a small number of traders or local initiatives addressing sustainable production of cattle products in high-risk regions on the deforestation frontier, Chinese buyers could address these risks effectively.

Recognising and tackling environmental and social risks in beef imports from Brazil will ensure a more resilient supply chain, supporting China's food security, and contributing to international climate change and biodiversity goals.



AERIAL VIEW OF RAINFOREST | PHOTO: ILDO FRAZAO

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