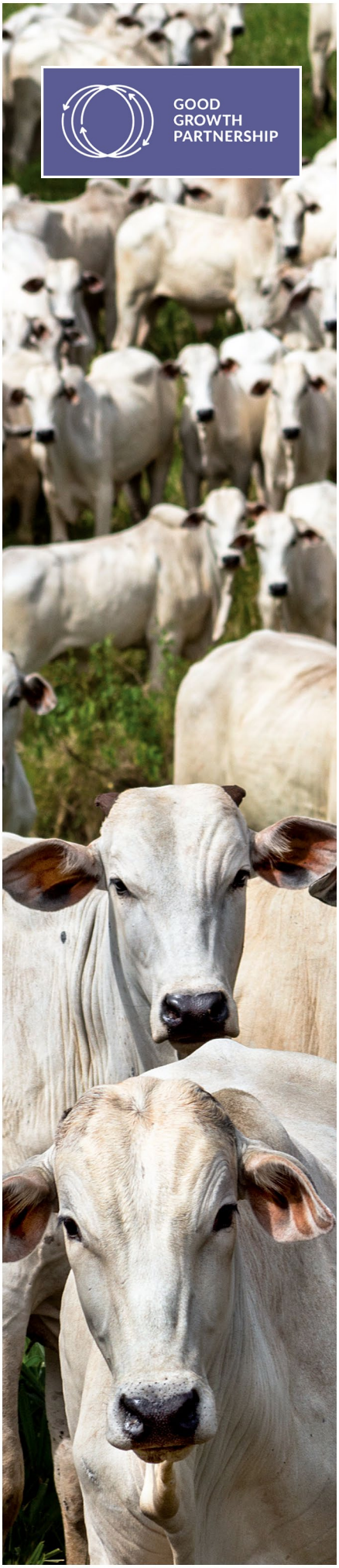

Commodity Demand Brief No.1

Issue feature: Beef

What's Next for Global Beef?

Trade Flow Dynamics

The global beef market is increasingly unpredictable as changing consumption preferences, market access, food safety concerns, and weather patterns continually shift trade flows. In the first half of 2017, there were notable trade announcements that jolted markets. China suspended imports of all meat products from Brazil as a precautionary measure after inspectors were accused of taking bribes to allow sales of tainted food. South Korea, the E.U. and Chile followed suit; yet, the full ban lasted less than a week as Brazilian authorities limited the facilities from which beef would be shipped. On June 12th, the United States and China finalized an agreement to resume shipping U.S. beef to China, which had been blocked since 2003 amid concerns of mad cow disease. And, on June 22nd, the U.S. indefinitely suspended all fresh beef shipments from Brazil due to public health fears. These shifting dynamics are coupled with increasing concern globally among consumers, governments, and companies about the impact of beef production on the environment – particularly on land conversion and greenhouse gas emissions – which is beginning to signal a desire for more sustainably produced beef.

Changing Demand and Market Implications

Beef markets and consumer preferences are dynamic and ultimately drive beef production needs and practices. By 2025, a surge in beef consumption from middle income countries worldwide will help propel global beef demand by an estimated 13%. Though demand is declining in some developed countries, rapidly growing consumer populations in Pakistan, Vietnam, Mozambique, Tanzania, Turkey, and Indonesia will increase their beef consumption an estimated 20%, and China is projected to consume nearly 10 million tons of beef annually, a 20% increase from 2016 to 2025 (see first chart). Countries currently meeting the lion's share of Chinese demand are Brazil, Australia, Uruguay and New Zealand. Australia, because of its proximity to China, became the first (and only) country to gain access to China's chilled beef market. Due to drought conditions in Australia in 2016, however, Uruguay overtook Australia in total beef exports to China. Uruguay has been investing heavily in its beef industry over the past ten years and now boasts 100% traceable beef which complies with the country's recently instated environmental regulations protecting the quality of its land and soil.

Sustainability Concerns and Transparency

Demand for responsibly produced beef is rising in some markets. In the U.S., consumer demand for grass-fed beef is soaring, though remains a relatively small percentage of overall U.S. beef consumption. This beef appeals to health-conscious citizens who prefer the lower percentage of fat and the perceived regenerative nature of the production system. While grazing cattle in the U.S. has not caused public outcry over land conversion because of sound pasture management practices, in Latin America the reverse is true. Brazil and Paraguay, the number one and seven exporters of beef globally which both produce predominantly grass-fed beef, have experienced significant pressure to limit land conversion for grazing pastures, particularly in biodiversity rich landscapes such as the Amazon and Chaco. The same is true in Australia, the world's second largest exporter, where over 90% of vegetation clearing is for grazing cattle. Growing consumer and corporate awareness and concern over the impact of beef production is evidenced in myriad recent sustainability commitments including the New York Declaration on Forests, one of

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The Good Growth Partnership is a GEF-supported program, led by the United Nations Development Programme, in partnership with the International Finance Corporation, Conservation International, the World Wildlife Fund, and the United Nations Environment Programme-Finance Initiative.

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the most sweeping corporate and government declarations to limit deforestation associated with commodity production, followed by others such as the Amsterdam Declaration. There are also new publicly available tools, such as Trase, which uses trade data to visually link commodity production and changes on the ground, such as deforestation, to exporting and importing companies and destination countries. This tool is rendering supply chains more transparent than ever, with the potential to drive the uptake of responsible production practices on the ground.

In this increasingly dynamic environment, cattle operators are grappling not just with rapidly shifting consumer preferences, but food safety concerns, greater transparency of their operations, and unpredictable weather patterns resulting in part from climate change. Due to increasingly erratic supplies and ever-changing demands, remaining competitive now means planning for long-term resilience, including:

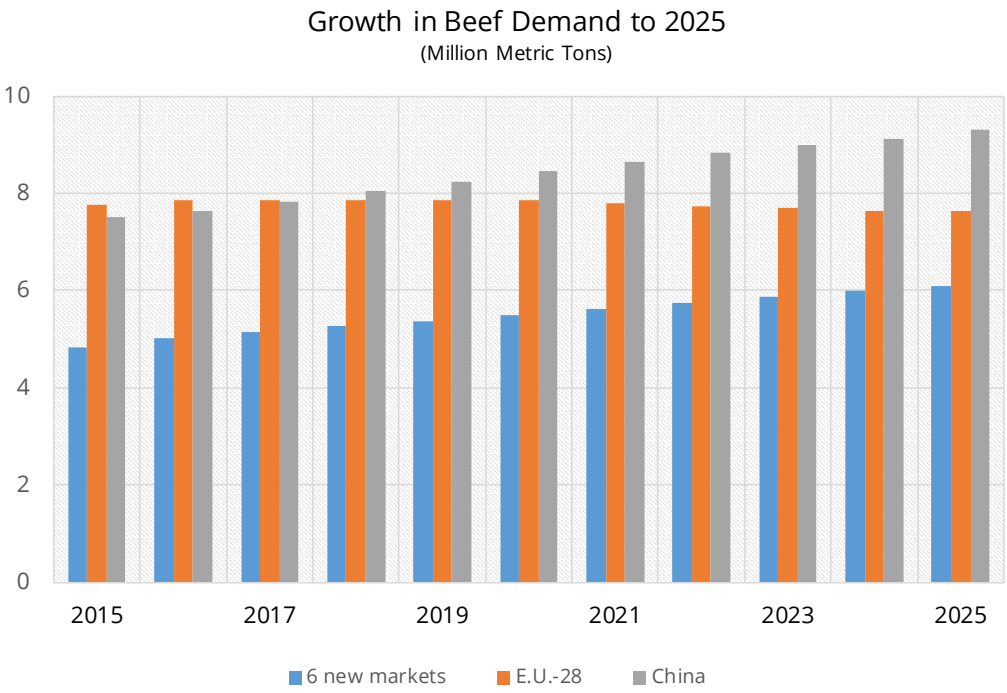
- agility in operations and trade;
- production diversification;
- transparency; and,
- safe and environmentally responsible practices on the ground.

The Cerrado Manifesto - Zero Conversion of Native Vegetation

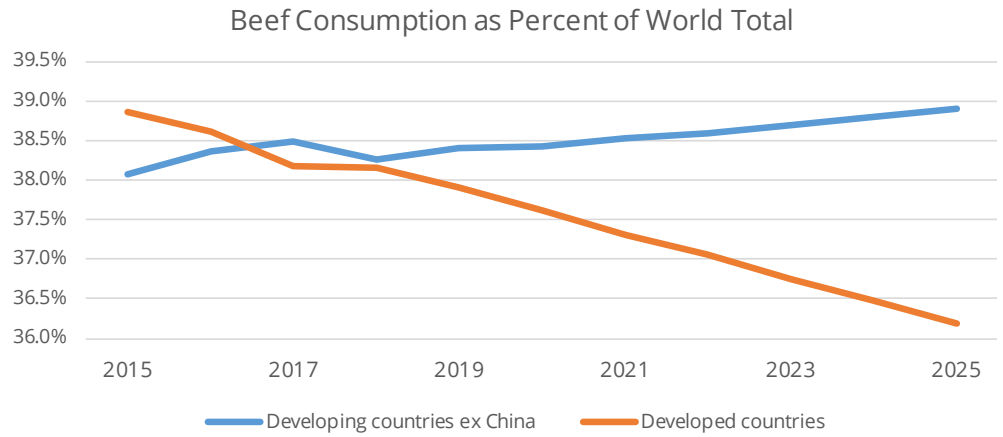
To mark Cerrado Day in Brazil, more than 40 Brazilian civil society organizations have come together to call for immediate action in defense of the Cerrado biome by companies that purchase soy and meat from the region, as well as by investors active in these sectors. The Cerrado Manifesto seeks the adoption of policies from major companies active in the biome to eliminate deforestation as well as disassociate their supply chains from recently converted areas. The Cerrado Manifesto represents the first time Brazilian civil society has organized as a block around the conversion of native vegetation in the Cerrado.

More information on the Manifesto can be found here.

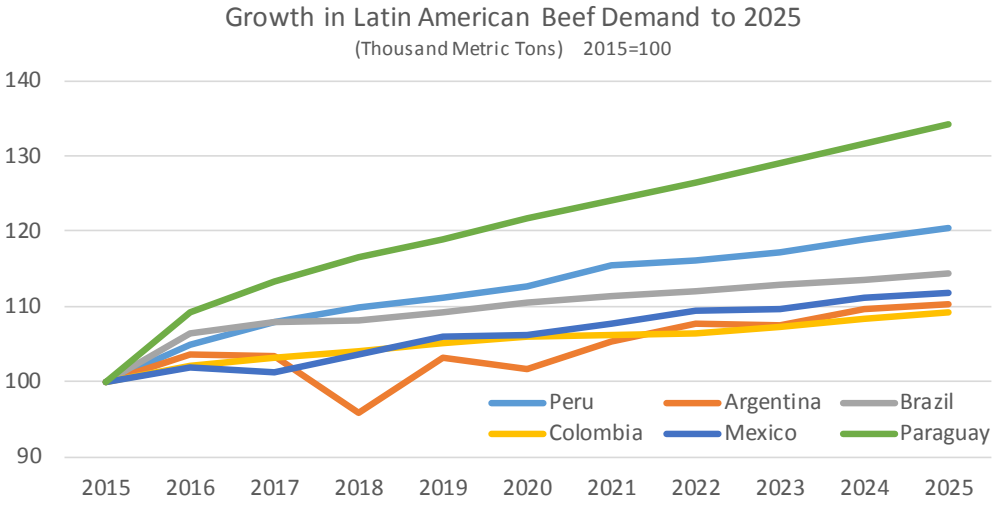
Trends in Global Beef Demand



By 2025, Pakistan, Vietnam, Mozambique, Tanzania, Turkey, and Indonesia (6 new markets) will consume almost as much beef as the 28 countries that compose the E.U., demanding 6.1 million tons of beef and veal by 2025. The E.U.-28 will demand 7.6 million tons, and China will demand nearly 10 million tons. Author's calculations based on OECD projections.



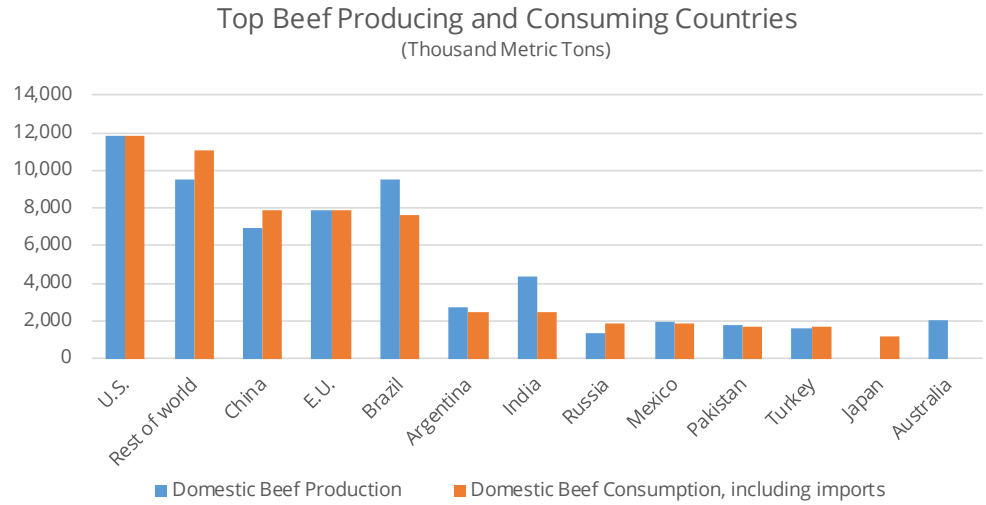
By the end of this year, developing countries (even when China is excluded) are set to overtake developed countries in beef consumption (as a percent of global consumption). While China's consumption of beef is projected to increase approximately 20% by 2025, growing consumption in other markets means China's beef consumption as a percent of the world's total will remain around 12% from 2017 to 2025. Developing countries include Zimbabwe, Ukraine, Ghana, Ethiopia, Kazakhstan, Tanzania, Egypt, Nigeria, Russia, Vietnam, Sudan, Indonesia, Peru, Argentina, Haiti, Malaysia, Iran, Colombia, Thailand, Saudi Arabia, Philippines, Mozambique, Pakistan, Paraguay, Brazil, Uruguay, and South Africa. Developed countries are members of the OECD, and can be found here. Source: OECD and author's calculations. Years 2015 and 2016 are observed data, years 2017 to 2025 are forecasts.



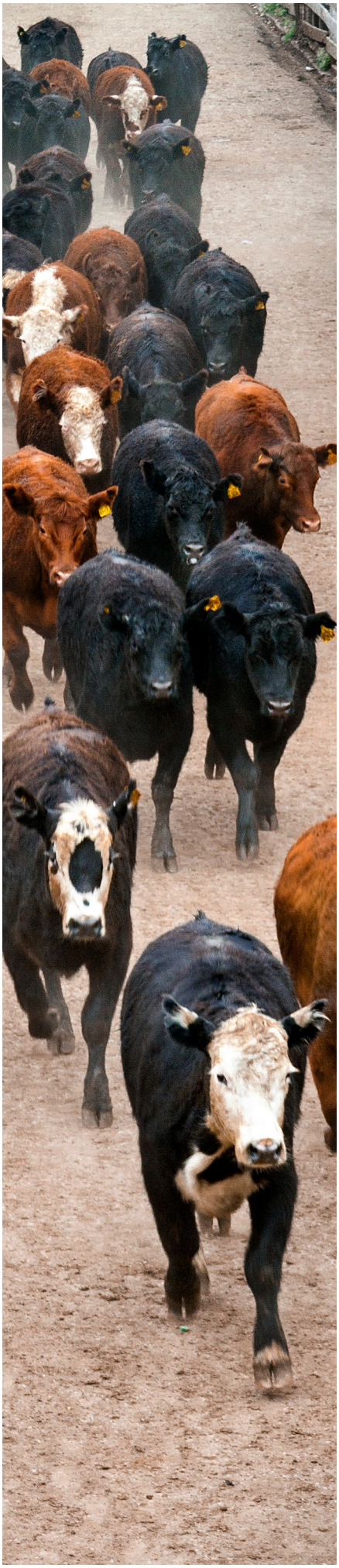
The demand for beef in Latin American countries is projected to grow steadily in the coming years. That most of the beef demand in these countries is met by Latin American production raises concern over the continued impact of cattle grazing on deforestation throughout the region. Source: OECD FAO and author's calculations. Years 2015 and 2016 are observed data, years 2017 to 2025 are forecasted values.

2017 Estimates of Top Beef Producing and Consuming Countries

Source: USDA FAS



Domestic production refers to the production of beef, veal, or carabeef in the case of India, within a country's borders. Domestic consumption is approximately the value of a country's domestic production plus its imports of beef, less its exports of beef. USDA 2017 forecast for consumption is unavailable for Australia, and the 2017 production forecast is unavailable for Japan.



Key Companies Update

As of late July, JBS finalized the sale of **its beef operations in Paraguay, Uruguay, and Argentina to Brazilian rival Minerva for $300** million to reduce its financial leverage. The deal was initially blocked by a Brazilian Supreme Court Justice, as it was deemed to interfere with JBS's ongoing corruption investigation. The deal was later approved in mid-July by a Brazilian appeals court, which also removed any restrictions on JBS's ability to negotiate the sale of assets or operations.

In late June, JBS prepared to **sell $1.8 billion in assets**, including a 19% stake in Vigor Alimentos SA **(Brazil's sixth largest dairy company)**, Moy Park **(largest meat producer in Ireland)**, and Five Rivers Cattle Feedings **(largest U.S. cattle feeding operation)**. JBS's U.S. subsidiary, JBS USA is not for sale.

JBS's move may usher change in global beef. **China's WH Group**, owner of Smithfield, is considering a purchase of Five Rivers, which handles almost 10% of cattle placed on U.S. feedlots.* This would **expand China's U.S.- based agricultural footprint**, and mark the first Chinese foray into U.S. cattle feeding operations.

*Livestock Marketing Information Center

In mid-July, **Cargill** announced a "strategic partnership", in the form of a minority investment, with Austrian natural feed additive and biotech company **Delacon**.

The partnership will enable Cargill to expand the market presence of **plant-based feed additives, known as "phytogenics"**. In doing so, Cargill is anticipating two growing trends: consumer concern with how meat is produced, and a shift in regulatory environments **away from antibiotic growth promoters** in meat production. The use of feed additives and artificial hormones is commonplace in some countries' beef production, and both the E.U. and China have taken steps to restrict the import of beef treated with specific artificial substances.

In a separate move in late August, Cargill invest an undisclosed amount in Memphis Meats, a "cell cultured" meat startup in Tennessee that is seeking to develop technology to grow meat from **self-reproducing animal cells**. Should this technology become viable, Cargill will be well positioned to take advantage of shifts in consumer demand towards animal protein that can be grown without negative environmental consequences, ushering in major changes in global meat production. Cargill has also invested in "big data" analysis platform Descartes Labs, which seeks to use geospatial tools to make predictions about crop yields.

In a good stroke of fortune for Brazilian meat producers, higher availability and cheaper prices of slaughter-weight cattle combined with flat wholesale domestic prices is giving margins on beef production an unprecedented boost. **Marfrig** has announced it will **re-open five plants** in Brazil, nearly doubling its head per month slaughtering capacity. These dynamics are also benefiting beleaguered meatpacker JBS and competitor Minerva, **whose second quarter earnings both beat analysts' expectations.**

However, **quickly exporting this new production will be challenging**. Full export access, including to the U.S., has yet to be recovered after international fallout from Operation Weak Flesh, in which inspectors were found to have taken bribes to allow the sale of tainted meat. Instead, major Brazilian beef producers are likely to **lean on the domestic market**, where 80% of Brazilian beef production is consumed in a typical year, to absorb this new capacity.

In mid-September, **Bunge** purchased a 70% controlling ownership stake in IOI Group subsidiary IOI Loders Croklaan for $946 million, with IOI Group retaining a 30% stake. **IOI Loders Croklaan** was formerly the division of Malaysia's IOI Group which uses palm oil to create specialty ingredients for use in bakery, confectionary, and other culinary applications.

About 30% of Loders' crude palm oil is traceable to the plantation level, as IOI Group directly supplies this volume through its 14 mills, 12 of which are RSPO certified. However, about 40% of Loders' palm oil is indirectly sourced through third party suppliers, managed through IOI Group, with uncertain sustainability criteria.

In the immediate future, IOI will continue to be the main supplier of palm oil to Bunge's new unit. Bunge has confirmed that it intends to base its palm oil sourcing on Loders' policy, but integration will be needed to ensure production aligns with Bunge's own zero-deforestation policy.

IOI Group is not certain to remain Bunge's long term palm oil supplier for the new unit. For the next five years, Bunge will have the right to purchase the remaining 30% stake in IOI Loders Croklaan from IOI Group, giving Bunge full autonomy from IOI and possibly shifting its palm oil supply chain.

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