

Current and future trade in livestock products

D. Enahoro ^{(1)*}, S. Bahta ⁽²⁾, C. Mensah ⁽¹⁾, S. Oloo ⁽²⁾ & K.M. Rich ⁽³⁾

(1) International Livestock Research Institute, c/o IWMI-Ghana, PMB CT 112, Cantonments, Accra, Ghana

(2) International Livestock Research Institute, PO Box 30709, Nairobi 00100, Kenya

(3) International Livestock Research Institute, c/o AfricaRice Sahel Station, Ndiaye, BP 96, Saint-Louis, Senegal

*Corresponding author: d.enahoro@cgiar.org

Summary

Rising per capita consumption, economic growth, and urbanisation, particularly in developing countries, have been driving an increased global demand for food. These changing socio-economic trends, which have largely influenced changes in dietary patterns globally, including increased consumption of livestock products in developing countries, are expected to endure and to place new pressures on livestock sector infrastructure and the delivery of veterinary services. This paper summarises current trade in meat and presents plausible projections for the future, highlighting the role of animal disease on trade patterns, and how ongoing disease outbreaks, particularly African swine fever and COVID-19, influence current and future dynamics. The authors analysed published statistics on the demand and international trade of livestock products at national and regional level and made projections to 2050 of the same generated from an integrated model of the global agricultural and food system. The resulting analyses identified patterns of trade consistent with growing populations and incomes, changing diets, and amongst other factors, the impacts of countries' disease status and constrained aggregate output on trade. For most of the livestock products analysed, economic model projections indicate increased consolidation of production and exports among a few countries. Marked increases in livestock product trade suggest a changing role for Veterinary Services in facilitating trade and extension in the years to come.

Keywords

African swine fever – Consumption – COVID-19 – Demand – Foot and Mouth Disease – Livestock – Production – Scenarios – Trade – Veterinary Services.

Introduction

The composition of world agricultural trade substantially changed in the decades leading up to the 2010s, with changes in food consumption that occurred in one region having important consequences for production and trade elsewhere (1). From the early 1960s, most developing countries witnessed a substantial increase in demand for high-value livestock products with meat, milk and eggs being the most tradable goods compared to other agricultural products whilst demand for foreign brands expanded intra-industry trade in processed consumer-ready products in high income countries (1, 2). Since then, meat and meat products have progressively become a significant and essential part of global food diets among all categories of consumers, although indications are emerging of a further nutritional shift in richer countries towards reduced meat consumption (3, 4).

Rising per capita consumption, economic growth, and diversity in regional trends and urbanisation, particularly in developing countries, are the main drivers of increasing global food demand (5, 6, 7). These changing socio-economic trends have largely influenced changes in dietary patterns, with demand shifting towards the consumption of livestock products, including fish, vegetable oils, and sugar (8, 9). The current nutrition transitions in developing countries are expected to endure and have implications for the supply and trade of livestock products as well as for livestock sector infrastructure (10, 11, 12, 13).

Currently, around 14% of livestock production is internationally traded (14). Global trade, however, tends to be dominated by a few countries and has been increasing in volume and changing in terms of products traded. Animal disease status remains an important consideration for trade in livestock and livestock products, with notifiable diseases such as foot and mouth disease (FMD) influencing market access, and, consequently, public and private investment in the livestock sector.

This chapter summarises current trade in livestock products, particularly meat, and presents plausible projections for the future. The authors will further highlight the role of animal disease on trade patterns, and how ongoing disease outbreaks, particularly African swine fever (ASF) and COVID-19, are influencing current and future dynamics. As patterns of production, consumption, and trade change, there will be differential implications for the role of Veterinary Services in facilitating trade and extension, which this discussion will touch upon.

Production and consumption of meat

Rapid growth and technological innovation in the last two decades have led to profound structural changes in the livestock sector, including a shift in the geographic locus of demand and supply to

the developing world (15). The change in diet and food consumption patterns towards livestock products has affected the global food economy. In developing countries, where the bulk of the world population resides, meat consumption has been growing (Fig. 1). Combined with the livestock sector linkages to the crop and fisheries sectors that supply feedstuffs, these trends have affected aggregate agricultural output.

The rapid growth in the meat sector has been underpinned by rising demand for poultry meat, which has consistently increased around three times the population growth rate over each of the past five decades. On the other hand, growth in per capita consumption has been stagnant or non-existent especially in ruminant meat (cattle, sheep, and goats) and pork (when China is excluded) (15). Figure 1 shows that poultry consumption in developing countries consistently outpaced production during the last ten years. The consumption of pork in developing countries, including China, one of the world's largest pork producers and consumers, has been decreasing. Similarly, red meat (cattle and goat) production and consumption growth has shown only a slight change globally during the last ten years.

Current trends in meat trade

An increase in the consumption of livestock products and change in trade policies or economic liberalisation has increasingly facilitated a rise in livestock product trade (8). Development in transport such as long-distance cold-chain shipments has made possible the trade and movement of perishable crops, livestock products, and feedstuffs over long distances (17).

Trade in livestock products has continuously increased over the last 20 years (Fig. 2). Between 1990 and 2018, the volume of meat exports increased by more than threefold (327%). However, trade in crop products still dominates agricultural trade. The proportion of meat in agricultural exports has fluctuated substantially between 5.6% and 7.5% for the last 20 years.

Although the bulk of livestock production is consumed within the country of production, the continuous rise in consumption of livestock products and the increasing degree of openness to trade has made it possible for some countries to specialise in exporting certain livestock products. Figure 3 illustrates patterns of meat exports, revealing that beef exports from Oceania and Latin America, pork from Europe and North America, poultry from Latin and North America, and mutton from Oceania have steadily been increasing in the last ten years.

On a volume basis, Brazil has been the largest beef exporter in the world since 2017, followed by Australia, India, and the United States of America (USA) (Fig. 4). India's rise in beef exports is a new phenomenon over the past decade, fuelled by rising developing country demand. Foot and

mouth disease status is a significant driver of global trade patterns in beef (and lamb), as countries that are free from FMD typically source meat from countries with a similar FMD status. There is a further distinction between those countries that are FMD-free with and without vaccination, and the highest export prices tend to be received by countries that do not vaccinate (19). Only a handful of countries (USA, Canada, Australia, New Zealand, European Union) have FMD-free without vaccination status. There is some discussion in South America, particularly in Brazil and Uruguay, to move towards an FMD-free without vaccination status (20). The commercial benefits of being FMD-free are sizable. It allows countries to maximise carcass value by sending specific cuts to those markets that are willing to pay the most for them, giving countries greater flexibility in marketing and pricing.

As with all meat products, but especially with beef, trade is predominantly in boneless cuts, with frozen cuts predominating on a volume basis. High-value fresh cuts are typically traded to European and East Asian countries from Latin America and Australia/USA. Trade in offal is also substantial, with significant and rising exports to West Africa from European markets and Brazil. Exports to China are rising substantially; for example, China now comprises 70% of Uruguay's beef exports (20).

Globally, sheep and goat meat exports have been dominated by Oceania, mainly Australia and New Zealand. In the last five years, the average annual export volume of sheep and goat meat has increased by 3% for Australia while remaining constant for New Zealand. Smaller percentages of goat and sheep meat originated from some countries in Europe (United Kingdom, Ireland, Spain, and Belgium), Asia (India and China) and Africa (Namibia) (Fig. 5). Unlike other meat categories, demand for sheep and goat meat has been more modest, though rising steadily in some markets, particularly the Middle East (21).

While we do not present comprehensive data on it, there is considerable formal and informal trade in live animals globally. Based on the United Nations International Trade Statistics Database (UN Comtrade) data, Australia exported nearly 500,000 cattle to Indonesia and just under 280,000 cattle to Turkey in 2017 (18). There is significant formal and informal trade of sheep and goats from the Horn of Africa to the Middle East as well, with one study that cites UN Comtrade data revealing nearly US\$1 billion in imports of live sheep and goats from Gulf countries from the Horn of Africa in 2015 (22). There are also sizable volumes of pastoral trade across the Sahel in West Africa, though exact figures are unknown (23). A recent study estimated that over 60% of marketed animals in Mali are exported to regional markets (24).

Figure 3 shows the global exports of pork from Europe and North America have steadily risen in the last ten years, almost entirely on strong demand from some Asian countries (Fig. 5), particularly

China, Japan, and South Korea (Fig. 6). This trend might continue in the coming few years because of the African swine fever (ASF) induced recent decrease in pork production in Asia, particularly in China, where over 20% of the pig herd was culled or died due to disease (25, 26).

Poultry meat exports have been increasing as robust demand from countries like China, including Hong Kong, propels shipments from Brazil and the USA (Fig. 6). With highly pathogenic avian influenza-related restrictions, some potential poultry meat exporters might have been unable to capture the benefit of rising China and some other Asian countries' imports (Fig. 4).

Figure 5 shows global imports of meat. Asia followed by North America and Europe are the major importers of beef. Beef imports by Asian countries (fuelled by China) have consistently increased in the last ten years and almost doubled in 2019, with a 98% increase since 2010. Similarly, the USA's beef imports have shown an increasing trend, about 11% increase over ten years, while Europe's beef imports have decreased by 18% from 2010 to 2019 as demand and population growth have slowed.

The major beef importers in Asia are China, Japan, Hong Kong, and South Korea (Fig. 6). North American beef imports were mostly from the USA (much of it being trimmings and manufactured meat for producing products like hamburgers) while Italy and Germany were Europe's lead beef importers during the last ten years. Mutton is a relatively less traded meat. However, the volume of mutton imports by Asian countries, particularly China, has shown a steady increase in the last ten years (Fig. 5).

The trend for pork and poultry imports is similar (Fig. 5). Asia is the global leader in pork and poultry imports. Between 2009 and 2019, pork imports by Asian countries have increased by about 106%. It is remarkable that since 2013, pork imports by Europe have decreased by 37% while that of Latin American countries have steadily increased by 86%. As shown in Figure 6, China, Italy, Japan, Germany, Poland, and South Korea have been the major pork importers during the last ten years.

Poultry imports by developing countries have been increasing steadily in the last ten years due to the growing consumption of poultry meat in these countries (Fig. 1). At the regional level (Fig. 5), imports by Asia, Africa, and Latin America have increased. Globally, the list of the top poultry importing countries includes Hong Kong, Saudi Arabia, Japan, China, Germany, Great Britain, the Netherlands, and France (Fig. 6).

Projections of global meat trade to 2050

While issues of model specification and accuracy as well as inherent uncertainties make it difficult to predict future food demand, supply or associated global trade, analytical models exist that help quantify plausible future scenarios in ways that can be reliably applied to policy making for the agriculture, food and related sectors (27, 28, 29). The authors used such a model, the International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT), to derive indications of how global exports and imports of livestock-derived food products will likely evolve in the future (30). The International Model for Policy Analysis of Agricultural Commodities and Trade is a suite of integrated models with economic, crop, livestock, hydrology and climate components that has been widely used for scenario analysis of the global food system (29). The model's results were analysed to assess country and regional-level variations in international trade in meat to 2050, adopting a view of the future that maintains socio-economic trends closely following what has been observed in the last few decades. This is referred to in IMPACT as the moderate socio-economic change or business-as-usual scenario. The trends, e.g., income and population growth, influence countries' outcomes on the demand and trade of food and agricultural products over the long-term.

Of four different meat types included in the analysis, the model projections suggest that international trade in poultry will increase by the most in both quantity terms and relative to a selected baseline year of 2010. Net exports of pork, beef and lamb also increase relative to this base.

In the poultry sector, net trade is projected to be positive for developed countries and the Americas, while developing regions of Asia and Africa, and Eastern Europe are net importers in aggregate (Fig. 7). The USA and Brazil top the list of net exporting countries in 2050. Net export quantities from the highest ten exporter countries for poultry products (i.e., over the decade prior to 2010) were projected to reach 26 million metric tonnes (MTs) in 2050, or 87% of poultry net exports for all countries in that simulation year. The volume in 2050 is a 223% increase from the level in 2010 for this category of exporters.

On the import side, poultry trade is projected to remain highest in Asia in the future years, but Africa and parts of Europe also make important contributions (Fig. 7). India alone accounts for more than a third of the global net imports, while Indonesia and Malaysia contribute nearly 10%. Countries with high net import quantities in 2050 include Russia, the United Kingdom and Ghana.

In the pork sector, according to the model projections, global exports grow by about 240% over 2010 estimates. The highest ten net exporters in 2050 account for 66% of projected 30.5 million net export quantities, with Asia as the main continental destination (Fig. 8). From the standpoint of trading countries, the USA remains a dominant country for pork exports in 2050, contributing 32%

of global quantities. Brazil (9%), Denmark, Poland and the Netherlands (~6% each), and Canada (4%) also make sizeable contributions to the global totals.

China has by far the highest net import volumes (62%) of pork in 2050, driving the net import position of Asia. Other countries with reasonably high net imports are in Asia (Japan, Korea and the Philippines, ~10% of global) but also in Europe (e.g., the United Kingdom, 4%) and Africa (e.g., Nigeria, 3%).

In the beef sector, the global volume of trade increases from 8.5 million MTs in 2010 to 20.1 million MTs in 2050 (an increase of 135%). International trade in beef is characterised mainly by net exports from the Americas to the rest of the world (Fig. 9). Brazil, Argentina and Uruguay are projected to contribute 11.1 million MTs or 55% of all net beef exports. Australia is also a major net exporter at 8% of the global total in 2050, as are New Zealand and Canada (around 3% share each).

The USA is projected to be the largest net importer of beef, at 3.7 million MTs or roughly 18% of the global total. Other countries post modest shares of the global total (4% to 8%) in continental Asia (Pakistan, Philippines, Afghanistan), Europe (United Kingdom, Russia) and Africa (Niger, Burkina Faso).

Net exports of meat from sheep and goat are projected to increase by 268%, from 1.5 million MTs in 2010 to 5.6 million MTs in 2050 (Fig. 10). The direction of trade is mainly from developed countries and developing countries in the Americas, to Asia. However, Africa goes from a net exporting region in 2010 to net importer in 2050. Australia and New Zealand together account for 24% of global net exports, and Iran for 8%. India, Turkey, Ireland and Spain have 2% to 4% shares each of the total net exports of sheep and goat meat.

The five highest importing countries for small ruminant meat are China, Nigeria, Pakistan, Uganda and Tanzania, which account together for 75%. Unlike the other meat products, a greater number of countries export sheep and goat meat than import it in 2050, projecting a more disparate distribution of production centres globally.

Finally, the model's alternative scenarios showed economic and climate-driven changes in consumer demand. A scenario of worsening economic conditions globally led to lowering of the aggregate demand for many foods, including meat (and to potentially lowered market prices) while harsher climate conditions, which trigger shrinking of agricultural production suppress meat supply, potentially raising prices (Fig. 11).

Discussion

The presented trends in trade of livestock and livestock products have several important market and policy implications. From the standpoint of Veterinary Services, the growing concentration amongst export markets and rising imports from the developing world have different policy effects in each setting. For importing countries, particularly those in developing countries, with rising demand and affluence, there will be greater needs to ensure food quality and safety of meat for consumers. Increased competition with imported products will put pressure on domestic producers, implying important extension roles needed for Veterinary Services to ensure local products are not crowded out. As noted by past studies (31), Veterinary Services will also need to take on a more multi-faceted role in promulgating and implementing risk-based approaches along the food chain. This will require a range of efforts including improved legislation and regulatory guidelines for domestic and international standards; harmonisation and compliance with relevant norms of the Agreement on the Application of Sanitary and Phytosanitary Measures and Codex Alimentarius, as well as mutual recognition of other country standards; strengthened monitoring and surveillance capacity across the food chain to identify prospective hazards and diseases; and facilitating enhanced communication among food chain actors. For exporting countries, most of which are developed countries, the implications of such trends are less pronounced, but the continued facilitation of exports and compliance with standards will be tantamount, with greater intra-regional and international harmonisation on standards necessary to ensure the smooth flow of trade. The COVID-19 pandemic has further highlighted the importance of regulation and biosecurity in food marketing; with greater international trade in meat products, these demands will only accelerate over time.

Projections for poultry and pork trade are particularly significant for future policy. Global trade in poultry is projected to become even more consolidated to a few countries on the export side, while imports will be more dispersed globally. In many importing countries, however, the projected changes from 2010 to 2050 are quite substantial, with potential for major disruptions to local production and/or systems supporting poultry production and consumption. Results on pork imports into Asia (particularly China) are important for similar reasons.

Beef trade presents interesting results for some smaller countries for which imports are projected to increase substantially to 2050. For example, the results foreshadow a reduced future role for countries such as Niger and Burkina Faso that are currently key exporters (at least of live animals) within their immediate sub-regions. In theory, this could lead to reduced pressure from the threat of cross-border animal diseases, but increases focus on food safety and related issues. The results could also have ramifications for food security and the supply of animal protein (32). Trade is in

overall anticipated to be a major channel through which changes in the global economy will impact on livestock sectors and the economies of many countries.

The links between international trade, animal health and veterinary epidemiology are well established, with historical examples of major outbreaks of cross-border animal diseases arising from trade (33). Formal trade of livestock animals and products, however, tends to be more highly regulated by legislation, with measures in place that could potentially limit the introduction of diseases from abroad. Informal and/or illegal cross-border animal trade on the other hand poses heightened challenges to animal disease management (34). Weak regulation associated with informal cross-border movement of animals, including in the area of disease surveillance, has been linked with increased infectious disease transmission in swine (34, 35), cattle (36), non-livestock animals (37) and even human populations (38).

The challenges related to the COVID-19 pandemic coupled with other economic downturns will also likely cause many uncertainties in global food markets (39). Compared to other markets, it is projected that the agri-food market will most likely show a lot of resilience to the crisis. Whilst global production of poultry meat is projected to expand (though at half the 2019 rate), global production of pig meat was expected to drop significantly in 2020 largely due to ASF viral disease. Meat prices have also been impacted greatly by the pandemic and have since witnessed a global slump largely due to decreasing import demand with the hardest hit products being bovine meat, followed by poultry, pig and bovine meats (39).

In general, lower prices that arise, e.g., from increased availability of livestock products, including imports, may be favourable to consumers but can have negative impacts on producers. In many countries in Africa, the impacts may be more marked in rural areas with high dependence on livestock and other agricultural production. On a more aggregate level, lower prices affect net livestock product exporting countries, potentially impacting affecting the capacities of affected countries to support the producing sectors. Climate impacts are also important and could exacerbate the direct economic outcomes from trade dynamics.

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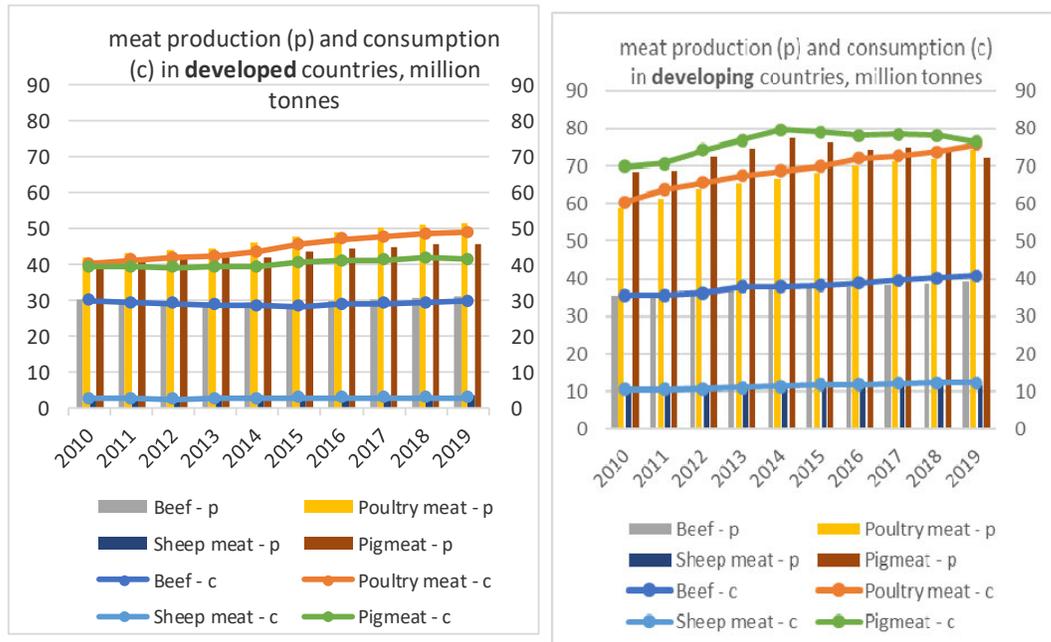


Fig. 1

Meat production and consumption by developed and developing countries, million tonnes (2010–2019). Data source: (16)

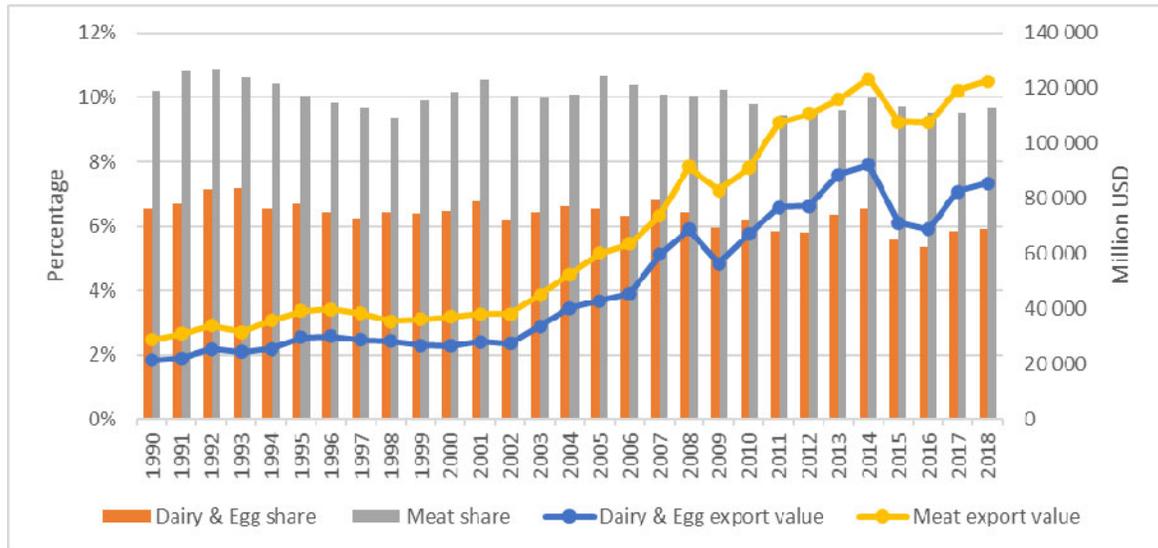


Fig. 2

Value of livestock products (million USD) and their share (percentage) of global agricultural export value, 1990-2018. Data source: (14)

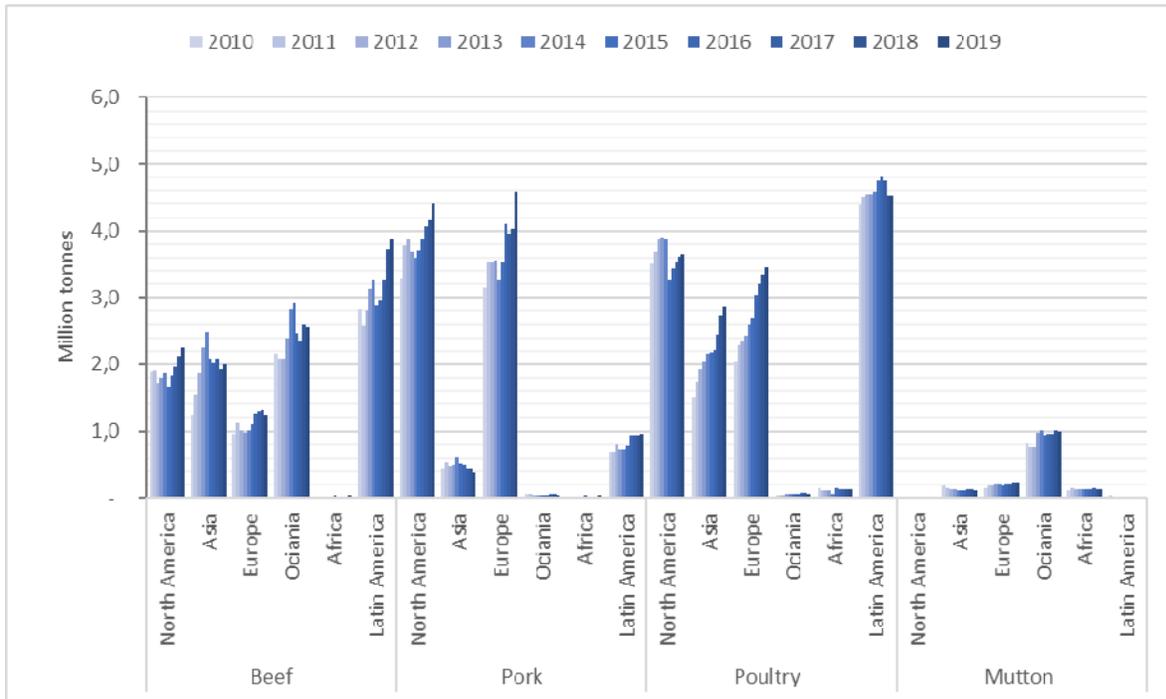


Fig. 3

Exports of major livestock products by region (2009-2019), million tonnes. Data source: (16)

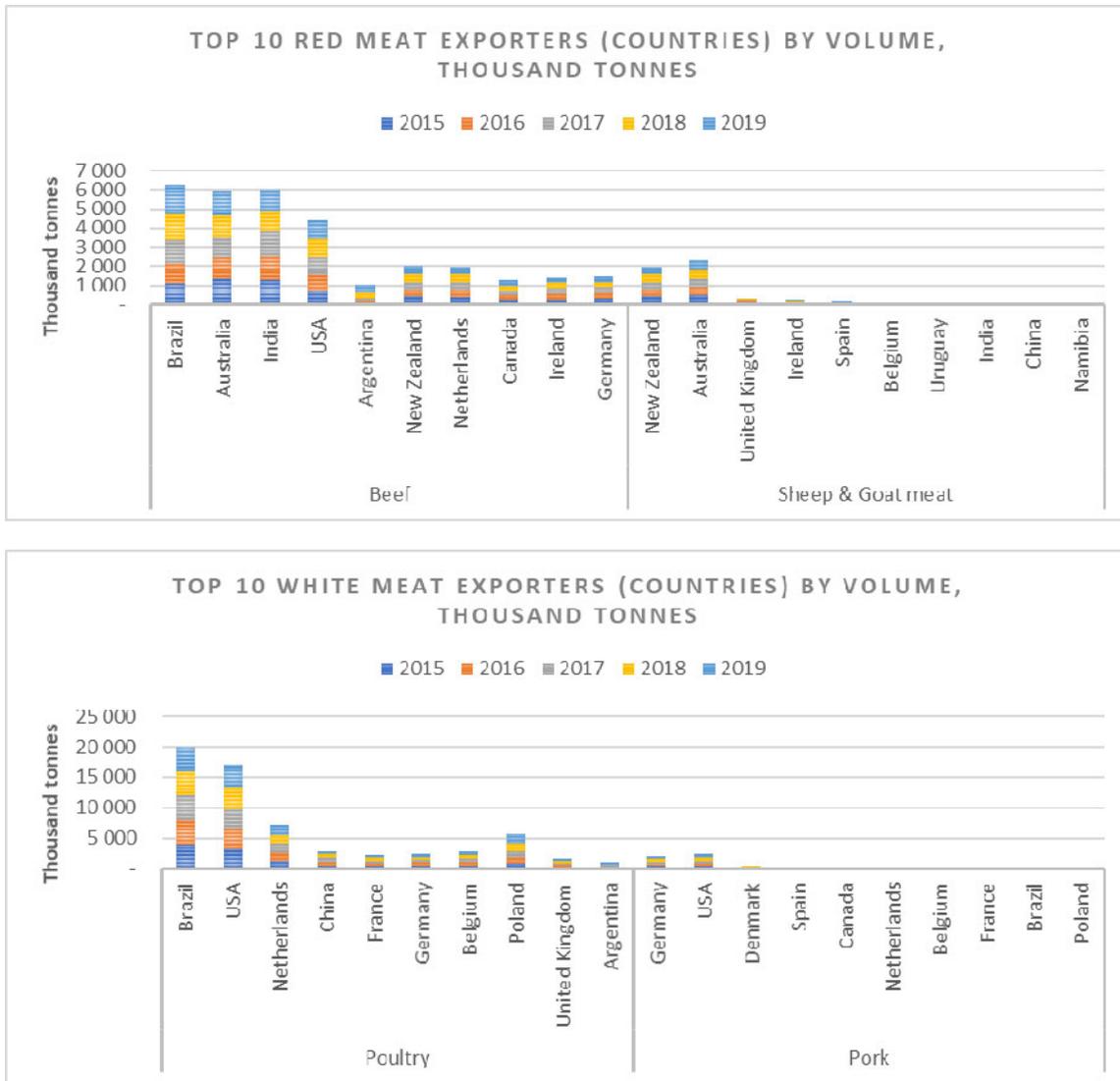


Fig. 4

Top ten exporters of red and white meat (2015–2019), thousand tonnes. Data source: (18)

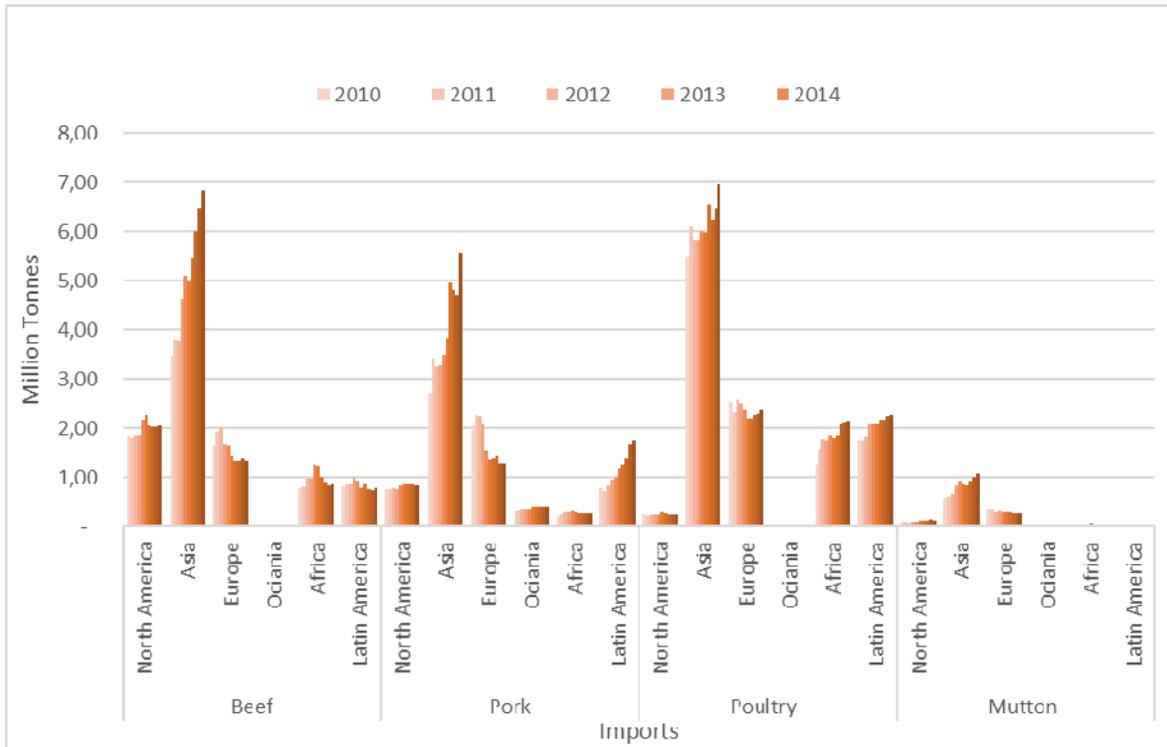


Fig. 5

Imports of major livestock products by region (2009–2019). Data source: (16)

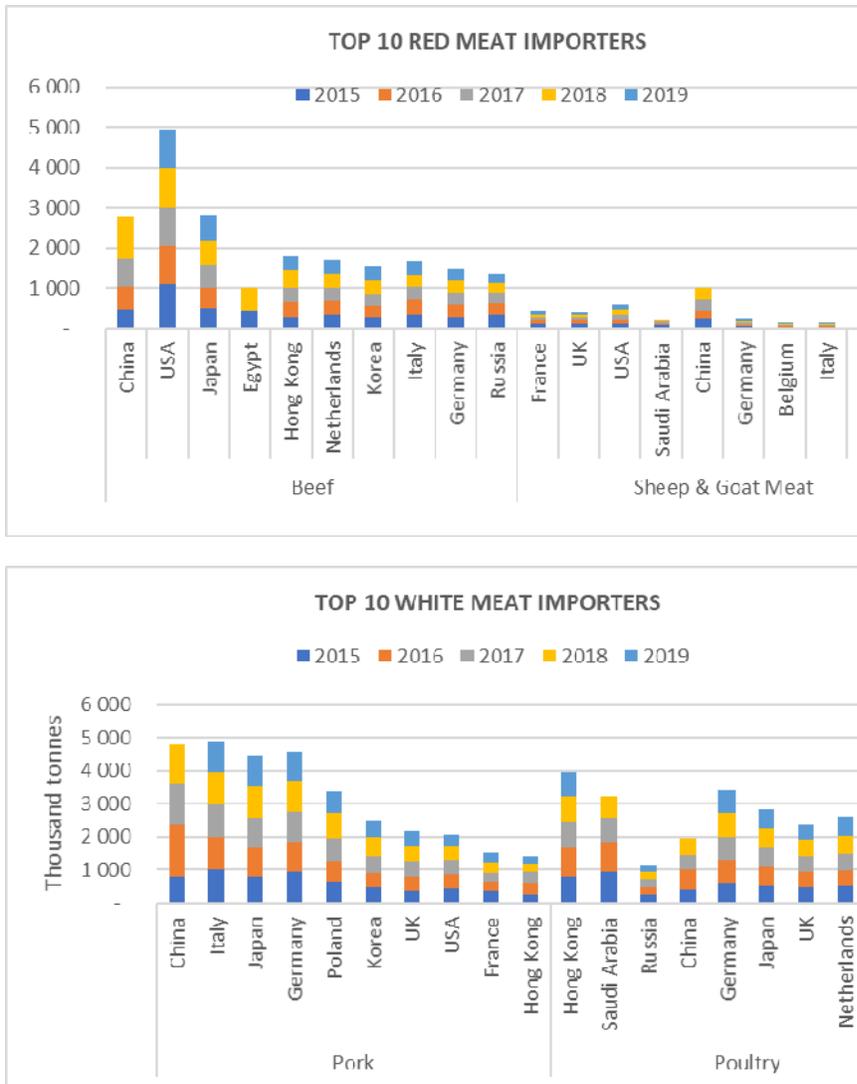


Fig. 6

Top ten importers of red and white meat (2015–2019). Data source: (18)

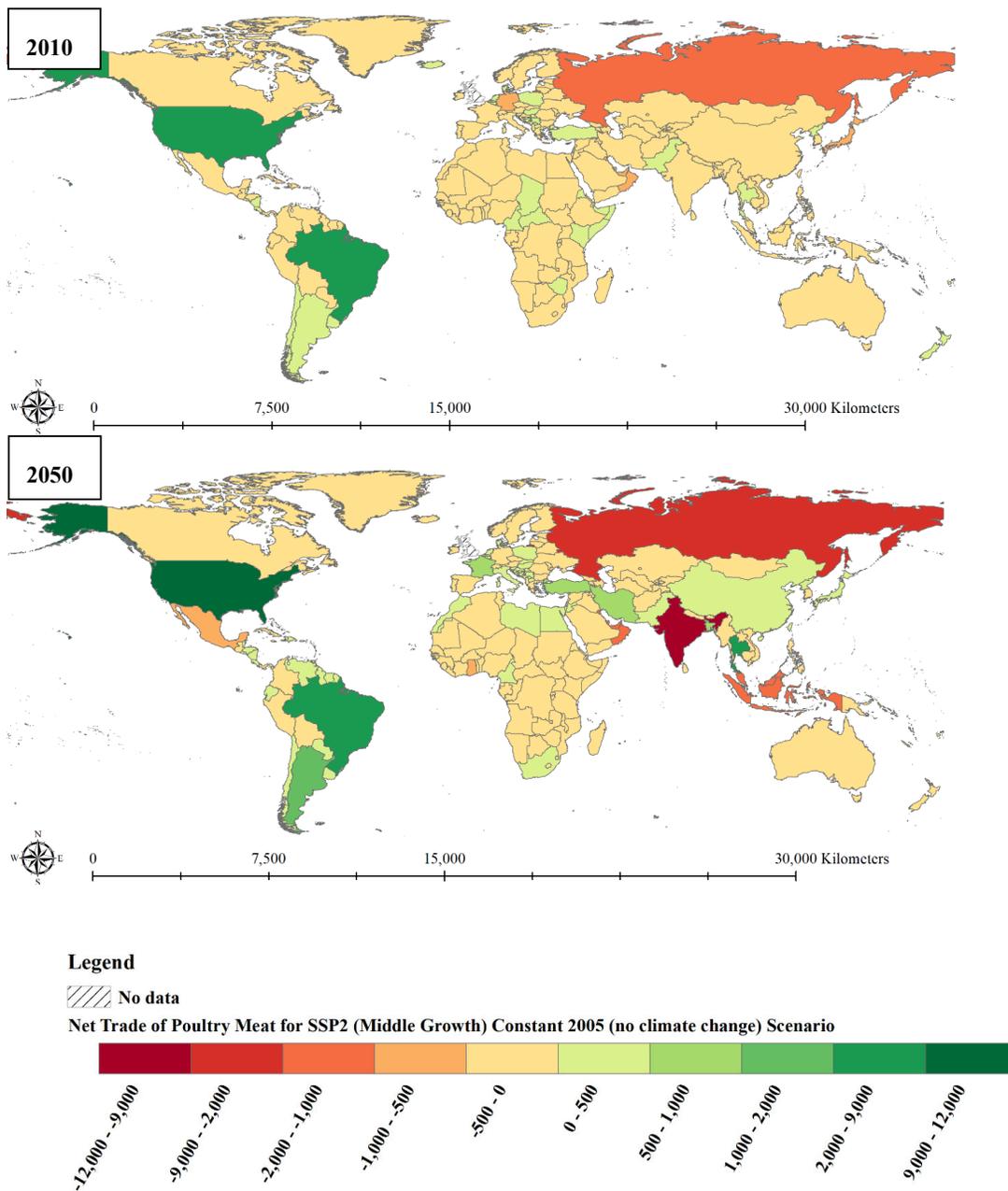


Fig. 7

Net trade of poultry meat in 1,000 metric tonnes under medium economic growth to 2050. Source: Authors' own elaboration, using IMPACT model calculations (30). Positive (negative) values are net exports (imports).

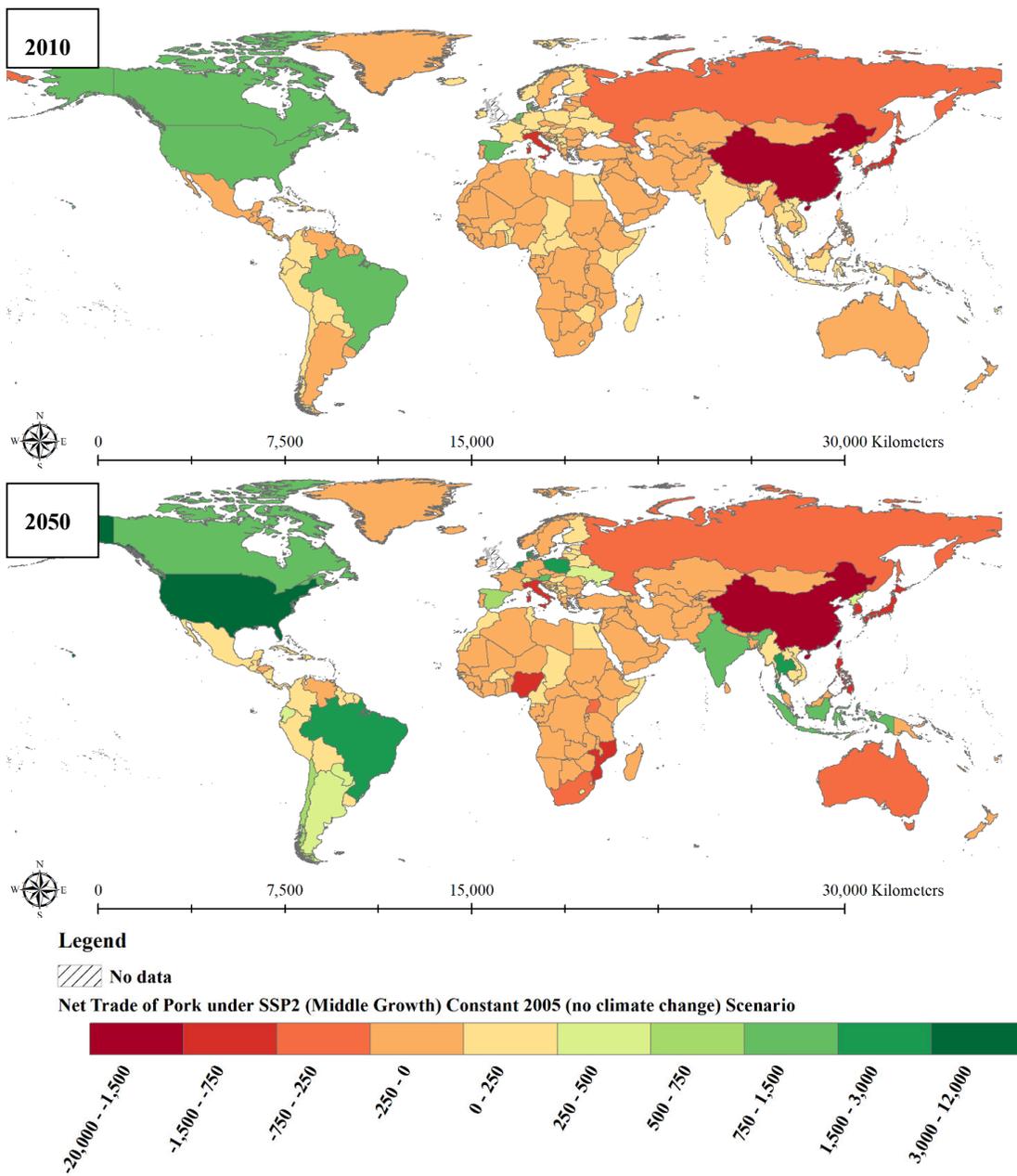


Fig. 8

Net trade of pig meat in 1,000 metric tonnes, under medium economic growth and no climate change to 2050. Source: Authors' own elaboration, using IMPACT model calculations (30). Positive (negative) values are net exports (imports).

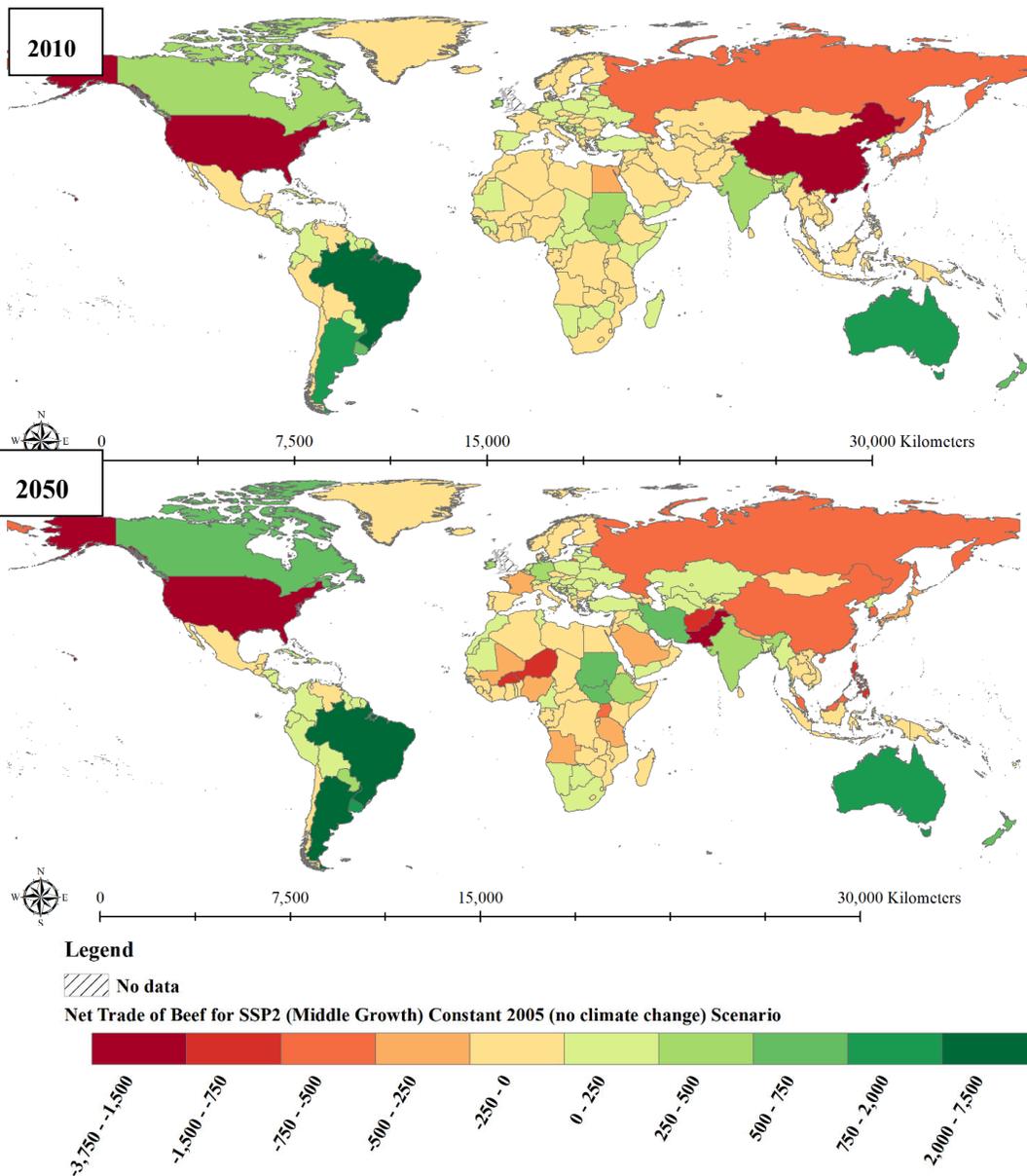


Fig. 9

Net trade of bovine meat in 1,000 metric tonnes, under medium economic growth to 2050. Source: Authors' own elaboration, using IMPACT model calculations (30). Positive (negative) values are net exports (imports).

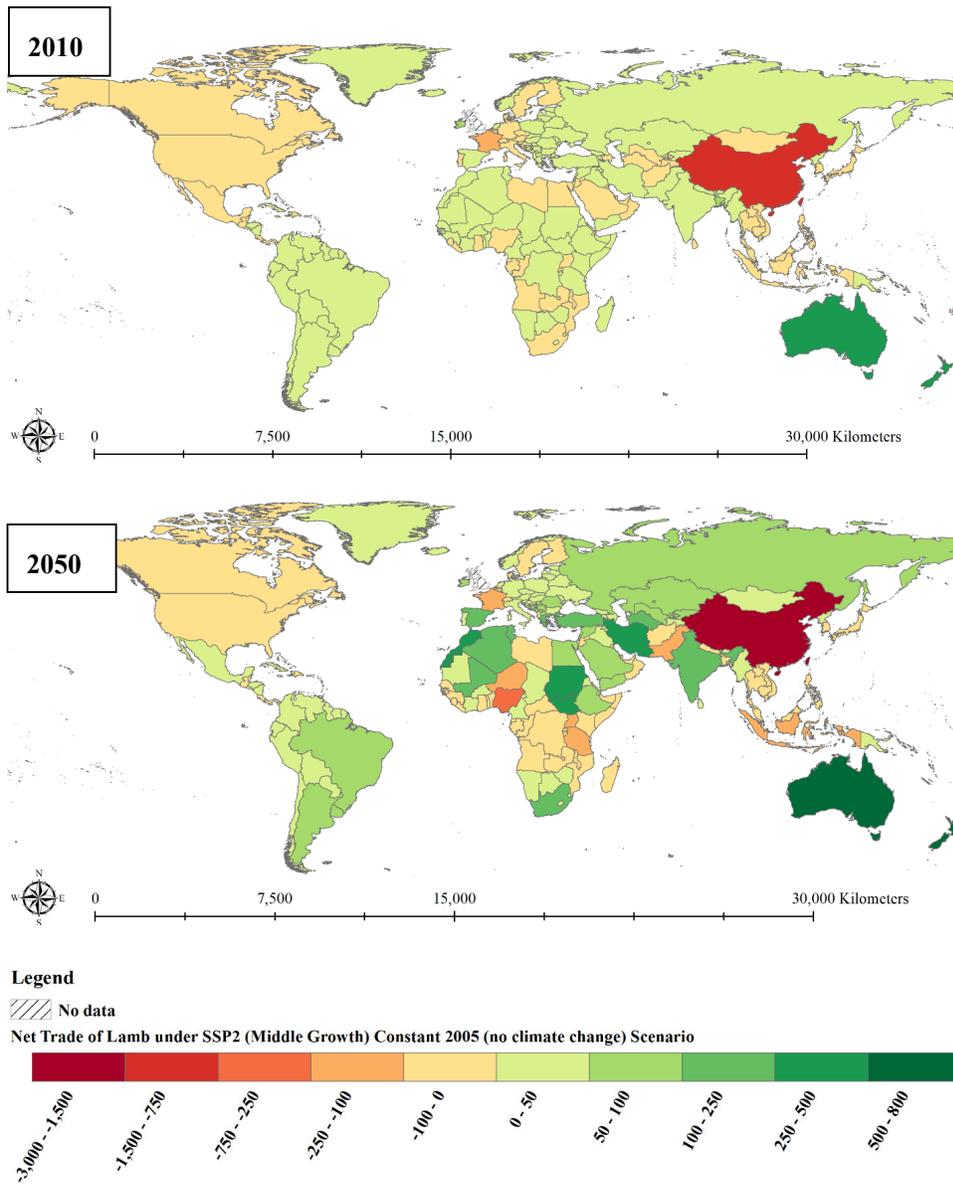


Fig. 10

Net trade of sheep and goat meat in 1,000 metric tonnes, under medium economic growth to 2050. Source: Authors' own elaboration, using IMPACT model calculations (30). Positive (negative) values are net exports (imports).

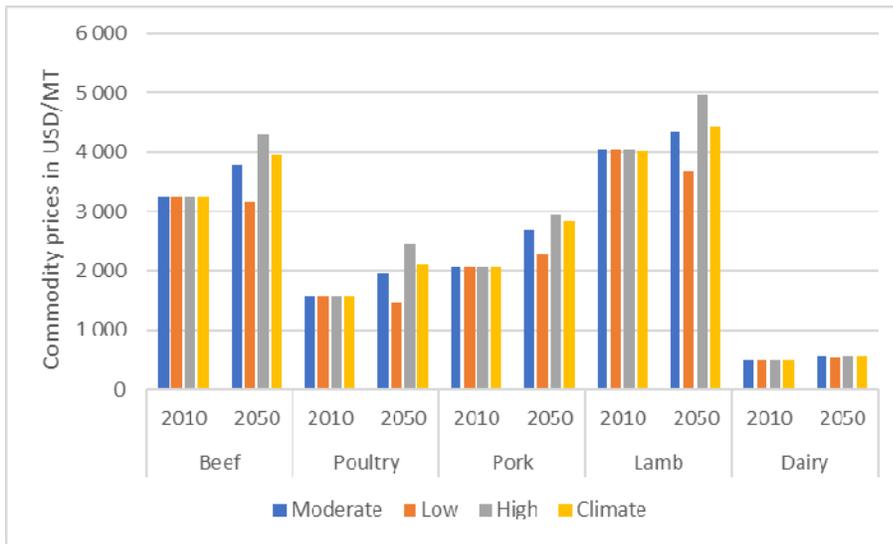


Fig. 11

Projected world prices of livestock commodities under alternative scenarios of global economic and climate change. Source: Authors' own elaboration, using IMPACT model calculations (30).