



# A DIFFERENT PRODUCT? THE FORMATION AND EXPANSION OF THE INTERNATIONAL MEAT AND LIVE CATTLE MARKET (1850–1939)

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## ABSTRACT

Global agro-food trade grew strongly during the first globalisation. The increase in demand, the fall in trade costs, liberal policies and technological advances explain this expansion in trade. Within this context, this study analyses the formation and evolution of the international market of a special product: meat. It is a peculiar product because it is perishable. Furthermore, it is important to point out that the increase in its trade was based mostly on the strong demand in the United Kingdom, which acquired an almost monopsonist position, and also on the diffusion of mechanical refrigeration. This enabled the countries of the Río de la Plata, particularly Argentina, together with Australia and New Zealand to become world leaders in meat exports.

**Keywords:** first globalisation, agricultural international trade, meat trade, Great Depression

**JEL code:** F14, N50, N70, Q17

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## RESUMEN

El comercio agroalimentario mundial creció con fuerza durante la primera globalización. El incremento de la demanda, la caída de los costes de comercio o políticas de corte liberal, así como avances tecnológicos, explican esta expansión comercial. En este contexto, este trabajo analiza la formación y evolución del mercado internacional de un producto singular: la carne. Se trata un producto peculiar debido ser muy perecedero. Además, es importante destacar que el incremento de su comercio se basó sobre todo en la fuerte demanda del Reino Unido, que adquirió una posición casi de monosopnista, y en la difusión de la refrigeración mecánica. Ésta permitió a los países del Río de la Plata, especialmente a Argentina, junto con Australia y Nueva Zelanda, convertirse en líderes mundiales en la exportación de carne.

**Palabras clave:** primera globalización, comercio internacional agroalimentario, comercio de carne, Gran Depresión

### 1. INTRODUCTION

The expansion of international trade was one of the key elements of the first globalisation (O'Rourke and Williamson 1999). It has been shown that international trade grew during this period at a very fast rate, even higher than production (Federico and Tena 2019). Agricultural products constituted a fundamental part of this expansion in trade and their exchanges also grew rapidly (Aparicio *et al.* 2009). From a theoretical perspective, several reasons explain this growth in trade (Harley 1986; O'Rourke and Williamson 2002; Pinilla and Ayuda 2010). First, it has been found that technological change, which was highly relevant during the industrialisation process, gave rise to a rightward shift in the supply curves due to the increased production possibilities that led to more trade. Another factor increasing international exchanges was the shift to the right of the demand curves, caused by the increase in *per capita* income in countries that experienced significant economic growth as a result of industrialisation. Finally, commodity market integration also favoured growth in trade, particularly due to the reduction in transport costs and tariff liberalisation, which brought down trade costs (Irwin 2002; Estevadeordal *et al.* 2003; López-Córdova and Meissner 2003; Jacks *et al.* 2008).

However, the weight that all of these factors had in the expansion of trade of different products varied greatly. In general, each of these factors is assumed to have had a symmetrical and separate impact on the growth of trade of different products. However, significant differences can exist in the importance of each factor. These differences are not usually

contemplated and the interrelations between them can affect and modify the demand and supply curves and the commodity market integration process.

In general, there is a need for a perspective that places more emphasis on the characteristics and specific features of each product in order to understand how their international markets formed in the first globalisation and the reasons for the growth in their trade. In fact, many of the studies analysing the global trade and market integration of a specific product usually choose cereals as the representative product of agro-food trade (Federico 2021, p. 5). The preference for this group of products is not a coincidence. Their trade was already very active in the pre-industrial era and during the first globalisation they represented around 20 per cent of world trade in agricultural and food products (Pinilla and Aparicio 2019). However, we believe that our knowledge of international agri-food trade in the first globalisation can be significantly expanded if we study other groups of products with characteristics different to those of cereals.

Within this context, our objective is to analyse the formation of the international meat market during the first globalisation, taking into account the causes for its expansion, its rhythms and the participation of the different world regions in it. The trade of meat is an ideal candidate for expanding our knowledge regarding the formation of the international markets of agricultural products in the first globalisation.

Therefore, although meat exchanges were always less important than the trade of other products, such as cereals, plantation crops or textile fibres, they had a significant weight in global agri-food trade, which, between 1900 and 1938 fluctuated between 5 and 8 per cent of this trade. For some regions, the trade of meat was more important. For example, during the same period, it represented more than 10 per cent of agri-food exports in South America or Oceania (Aparicio *et al.* 2018, p. 74). It was also significant in Europe; in the first third of the 20<sup>th</sup> century, it accounted for between 15 and 20 per cent of the exports of agri-food products and more than 10 per cent of imports of these products.

However, we believe that there is an even more important reason for studying the trade of meat, namely the essential role that this product, together with dairy products, acquired in the human diet. In preindustrial societies, its consumption was limited by the budgetary restrictions faced by the majority of families, but it gradually gained a prominent role in the provision of calories and proteins in contemporary societies. Therefore, it is essential to study the consumption of meat in order to understand the so-called nutritional transition, that is, the progressive modification of a diet composed mainly of plant-based foods to one in which food produced from animals (meat and milk) became increasingly more important (Popkin 1993; Grigg 1995). From a historical perspective, this process took place in Western Europe from the mid or end of the 19<sup>th</sup> century,

depending on the degree of development of the different countries. Furthermore, the consumption of meat and dairy products in this period was directly related to a higher level of biological well-being (anthropologically measured) as it implied the considerable incorporation of a source of quality proteins (Martínez-Carrión 2016).

The trade of meat had other distinctive features compared with other goods which make it particularly interesting: it is a highly perishable product and Great Britain had a dominant position in its trade. These two characteristics also render the study of meat highly attractive: first, the technical difficulties involved in its transport; and second, the almost monopsonist nature of Great Britain. Due to all of these reasons, we seek to place particular emphasis on studying the extent to which these two characteristics affected the formation of the international market, the evolution of its trade and its geography in the first globalisation and its collapse during the Great Depression.

In order to conduct our study, we have combined two principal statistical sources and have reviewed the extensive literature of the period. The first source of data is the International Institute of Agriculture (IIA), which published trade data periodically between 1909 and 1930 for 62 agri-food products. This institution began to publish annual trade data from 1925 and for previous years it published the averages of four time cuts: 1909–1913, 1924–1928, 1928–1932 and 1934–1938. In order to analyse the relative weight of meat in total agri-food trade, we have multiplied the 62 products by their price in 1925 dollars. In this way, the units of measurement of all the products are standardised and comparable. However, as previously mentioned, the main inconvenience of the series which we have constructed based on the IIA data is that there are no annual data before 1925 or any data for the years before 1909. Therefore, we have complemented the IIA series with the import data of the United Kingdom obtained from the Annual Statement of the Trade of the United Kingdom (1854–1935). This has enabled us, first, to obtain a complete series of meat imports of the United Kingdom (by far the world's leading meat importer) from 1852 and second, to calculate a series of international price indexes of meat based on the unit value of British meat imports. In this way, we believe that we make an important contribution to the existing literature as we provide a precise quantitative dimension to the study of the global trade of meat, which until now did not exist.

Our study highlights the great importance that a crucial technological change had for the expansion of the trade of meat: the invention and diffusion of mechanical refrigeration. It also shows that the dominant position of Great Britain had a significant impact when explaining the participation of the different countries as exporters, both during the first globalisation and, most significantly, in the 1930s, due to the Ottawa agreements between Great Britain and its empire. Furthermore, other demand

and supply variables, such as income, consumer preferences or genetic improvements in cattle and variables such as the business structure or trade policy, were important for shaping the international trade of meat and live cattle.

The study has four parts which are organised in chronological order. The first part analyses the beginning of the formation of the international meat market in the second half of the 19<sup>th</sup> century. The second studies the period from the last decade of the 19<sup>th</sup> century until 1921, a period of great expansion of the trade of this product. The third analyses the consolidation of the market from 1921 to the beginning of the Great Depression. The fourth part examines the impacts of the 1929 crash and subsequent depression on the trade and prices of meat. Finally, we will draw the main conclusions.

## 2. THE BEGINNING OF THE FORMATION OF THE INTERNATIONAL MEAT MARKET (1840–1890)

The pioneering British industrial revolution gave rise to sustained economic and demographic growth for the first time in history. A consequence of this was an increase in the demand for agricultural products and also a progressive change in consumption patterns towards a more varied diet (Grigg 1995). In this way, foods with a higher income elasticity were incorporated, including meat and dairy products. In Great Britain, between 1840 and 1890, the annual meat consumption *per capita* rose from 34 to 49 kg (Yates 1960, p. 25). Meat had previously been a regular component of the diets of the high-income groups but, during the 19<sup>th</sup> century and beginning of the 20<sup>th</sup> century, it progressively became a product of mass consumption (McFall 1927, p. 155).

However, this increase in the demand for meat by the British population could not be fully satisfied by the national cattle supply, even though it increased in detriment to vegetable production (Putnam 1923, pp. 15–16). Furthermore, in the mid-19<sup>th</sup> century, the problems of distributing meat to urban areas such as London aggravated the problem of shortages (Perren 1975). Therefore, while agricultural prices remained stable in Great Britain during the first half of the 19<sup>th</sup> century (Federico 2011, p. 30), the price of meat increased due to the imbalance between demand and supply<sup>1</sup>. As a result, the only way of satisfying the national demand for meat and other agricultural products was through imports. In this way, in response to the ecological limits arising from the mass production of food at a national level, the United Kingdom externalised its agricultural production to the extent where, in around 1860, practically half of its food

<sup>1</sup> According to Perren (1975, p. 396) the wholesale price of meat in London increased from 73 pence per 14 lb to 101 pence per 14 lb between 1846 and 1872.

consumption came from exports from Asia, Africa, Latin America and, particularly, the European settler countries (Otter 2012, p. 815).

The increase in the demand for primary products, the reduction in transport costs and the liberation of international trade made it possible for other countries to exploit this opportunity to specialise in the production and export of raw materials and agricultural products, while importing manufactured goods from the industrial core in what is known as the Great Specialisation (O'Rourke and Findlay 2007, pp. 365–425). One of the agricultural products most studied by the literature is cereals, probably the most representative case of this process; its trade expanded and its markets integrated quickly after the first half of the 19<sup>th</sup> century (Jacks 2005; Federico 2008).

However, the formation of an international meat market encountered enormous difficulties as it was a highly perishable product<sup>2</sup>. The absence of any kind of technology that maintained the meat in good condition during the long trips limited the number of countries that could participate in its trade, even though they possessed the ideal factors for meat production. The only possibility was to export live animals for their subsequent slaughter or to conserve the meat through processes such as, first, salting or drying, and later, canning (Perren 2006, p. 38). Australia and the United States exported large amounts of tinned meat to the British market. Even other types of conserves, such as meat extracts, pioneered in South America, acquired prominence among certain British consumers.

However, British consumers were used to consuming fresh, high-quality meat (Putnam 1923, p. 18)<sup>3</sup>, and tinned meat was not well regarded. This problem could be partly overcome through the import of live cattle which were subsequently slaughtered. However, this type of trade involved serious health and logistics problems (loss of weight during long trips, death of the animals, etc.). In fact, the outbreaks generated by the arrival of diseased cattle led Great Britain to impose a series of restrictions on their imports (Perren 1978).

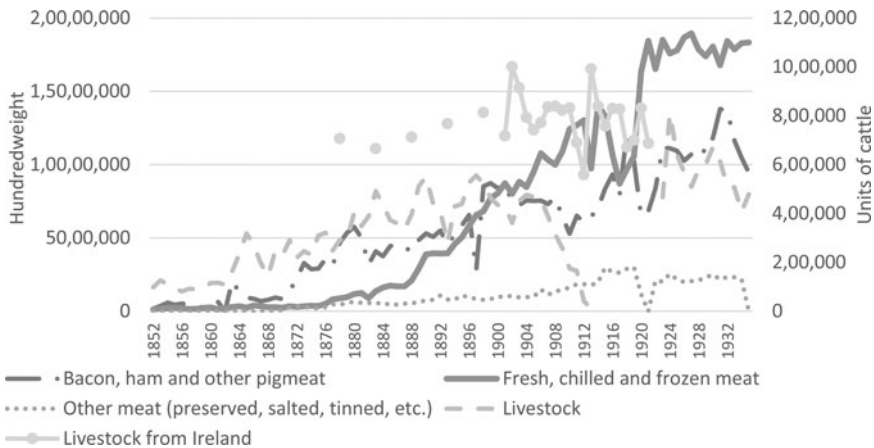
If we contemplate the meat and live cattle imports of Great Britain, we can observe in Figure 1 that, until 1870, they were practically all live animals and that they had increased substantially since the 1860s. Initially, Europe was the principal supplier of Great Britain (Zimmerman 1962) with Ireland as the principal source of supply (Perren 1971, p. 436).

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<sup>2</sup> The decomposition of meat is extremely fast compared with other perishable products. Fruit, for example, can be loaded before it is fully ripe and complete its maturing process during its transportation. With meat this possibility does not exist (see Oddy 2007).

<sup>3</sup> The preference for fresh meat was not just because it tasted better, but also due to how it looked and health problems. This latter issue generated considerable public debate in British society (see Atkins 2004). On the other hand, another sign of the importance of consuming national meat can be observed in butchers' reports of fraud related to the origin of the meat, irrespective of whether these frauds were substantiated or not. See Higgins (2004).

**FIGURE 1**  
Imports of meat and live cattle in Great Britain.



Source: Annual Statement of the Trade of the United Kingdom (1854–1935). For the data on Ireland: Putnam (1923, p. 156).

Notes: (a) The British statistics modified the classification criteria over the years, which explains certain fluctuations. For example, until 1865, fresh, tinned, salted beef, etc. are included in the item of «beef» imports. Subsequently, the statistics disaggregate the products, enabling a better comparison between the different types of meat. Therefore, it is highly probable that the item «Other meat (preserved, salted, tinned, etc.)» is somewhat underestimated in the early years of the graph, but this does not change the trend in any way. (b) The calculation of the units of cattle imported has been made as a weighted average of the different species. The weightings have been obtained from Hayami and Ruttan (1985). The species taken into account, together with the weightings in parentheses, are donkeys or asses (0.8), horses (1), goats (0.1), pigs (0.2), chickens (0.01), cattle (0.8), geese (0.01), sheep (0.1), ducks (0.01) and turkeys (0.01). (c) A hundred weight = 112 pounds.

Before the diffusion of mechanical refrigeration, the companies participating in the production, and to a lesser extent, the export of meat (prepared), were largely financed with local capital. For example, the so-called salteries in South America were companies with rudimentary production methods and intensive in labour, producing and exporting jerky, a type of salted and smoked meat consumed by the enslaved workforce in Brazil and Cuba until the end of the 19<sup>th</sup> century. Even in the United States, where the export of hog products was fairly relevant in the second third of the 19<sup>th</sup> century, the capital was also local. In Oceania, the companies were mainly small-scale processed meat firms and there is also evidence of a lack of capital, particularly in Australia (Perren 2006, p. 60).

In the 1870s, pork imports experienced a strong boom, with the United States being an important producer and exporter. As well as the production and export capacity of the United States, the relative ease of conserving pork fostered its trade in relation to other meats. The concentration of pork exports from the United States to the British market increased in the

1880s. The explanation for this is that while Great Britain lifted the prohibition of importing this meat from North America at the end of the 1880s, continental Europe maintained trade restrictions for several years (Olmstead and Rhode 2015, p. 35). However, Ireland continued to be an important source of British meat imports, in the 1870s representing 20 per cent of the meat consumed by the British, double that of North American meat. Seen from the supply side, Ireland exported more than half of all the meat produced between 1850 and 1890 (Huttman 1978, p. 253). In the 1890s, this trend reversed, and the United States became the principal exporter of meat to the British market.

With respect to live cattle, in the second half of the 1870s, Canada and the United States also gained relevance in the British market. Two facts explain the success of the United States. On the one hand, it became the pioneer country in eradicating livestock diseases through scientific advances and political coordination (Olmstead and Rhode 2015). On the other hand, major improvements were made to the organisation and coordination of the large abattoirs with the transatlantic companies in order to ensure a regular supply of cattle to Great Britain (Harley 2008). In any event, the world trade of live cattle was less Euro-centric. In addition to the central role of Great Britain as an importer, trade between periphery countries such as Argentina and Chile, French West Africa and Ghana or China and Hong Kong, among others, was frequent (Yates 1959).

Therefore, until the end of the 19<sup>th</sup> century, the absence of technology that enabled meat to be exported across long distances meant that, unlike cereals, which had a market clearly integrated into the Atlantic throughout the 19<sup>th</sup> century (and even before; Federico 2021, p. 5), the international meat and live cattle market was not very integrated and the amounts exchanged could not grow intensely. This can be observed clearly when contemplating the differential of beef prices between the United States and Great Britain, which was significantly higher than the price differential of cereals (Harley 2008). However, prices converged even more quickly than those of cereals once the obstacles to the long-distance trade of meat had been overcome at the end of the 19<sup>th</sup> century (O'Rourke and Williamson 2002, p. 38).

### 3. TECHNOLOGICAL CHANGE AND THE EXPANSION OF THE INTERNATIONAL MEAT MARKET (1890–1913)

Global trade in meat changed radically as a result of the huge technological innovation of mechanical refrigeration<sup>4</sup>. The possibility of freezing or chilling meat to a temperature between 0 and  $-2^{\circ}\text{C}$  had two

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<sup>4</sup> For the evolution of refrigeration, first with the use of ice, then with fans and finally with mechanical refrigeration as well as the principal actors of this process, see Troubridge (1912).



fundamental consequences for the market: first, it facilitated the transport of meat enormously; and second, the geography of trade also changed substantially.

The diffusion of this technological innovation can be observed in Figure 1: at the end of the 19<sup>th</sup> century, the trade of refrigerated meat was able to grow fast with the elimination of the obstacle that made it impossible to undertake the long-distance trade of meat that was not salted, dried or tinned; in other words, being able to transport it in a way that pleased the British consumer, in terms of its taste and appearance. With mechanical refrigeration, supply acquired a predominant role in the growth of the global meat trade. The difference in the transatlantic freight rates between the different products exported by Argentina underline the importance of mechanical refrigeration. The average freight rates of beef exports from Argentina fell from 28.23 pounds per tonne in 1870–1875 to 6.66 pounds per tonne in 1909–1913, a reduction of 80 per cent. On the other hand, the reduction in cereal freight rates between the same years was only 37 per cent<sup>5</sup>. A direct consequence of this innovation was also that the exporting countries climbed the value chain as they were no longer just producers of animals but also transformers of raw materials. In fact, the refrigeration industry played a fundamental role in the industrialisation of Argentina and Uruguay (Bulmer-Thomas 2003).

Until then, the trade of meat had been enormously limited by distance. As a hegemonic importer, Great Britain had sourced live animals from nearby European countries or North America. Mechanical refrigeration enabled countries in the southern hemisphere, whose possibilities of participating had been severely limited, to acquire a dominant role as meat exporters between the end of the 19<sup>th</sup> century and the beginning of the 20<sup>th</sup> century.

As well as mechanical refrigeration, other factors contributed to the profound restructuring of the trade of meat. On the one hand, the problems of animal health were still a long way from being resolved. This meant that once trading refrigerated meat had become possible, the trade restrictions relating to live animals not only continued but increased. In 1892, Great Britain passed the Diseases of Animals Act, which prohibited the imports of cattle from the European continent. In 1900, foot-and-mouth disease was detected in Argentina and Uruguay and therefore the imports of cattle from these countries was also prohibited (Perren 1978). As a result of these laws, at the beginning of the 20<sup>th</sup> century, Great Britain only allowed imports from the United States, Canada, South Africa and the Faroe Islands.

<sup>5</sup> Calculations based on Tena and Willebald (2013, pp. 62–63).

On the other hand, the United States reduced its exports of meat to supply a rapidly increasing domestic market due to the fast rise in its demand associated with the increase in income *per capita* and the population as a result of the high levels of immigration. In view of the above, with the exception of pork, shortly before the First World War, the United States ceased to be an important actor in the global meat market (Bacon and Schloemer 1940).

Although the first shipment of frozen meat was made between the United States and Great Britain in 1874 through the use of ice (International Institute of Agriculture 1938, p. 228), the diffusion of mechanical refrigeration from the mid-1880s enabled strong growth in refrigerated meat imports in Great Britain, which were sustained over the long term. Meanwhile, the imports of live cattle showed signs of stagnation and a downward trend (see Figure 1). In 1910–1914, imported meat in Great Britain already represented 42 per cent of the country's total meat consumption (Perren 1971). From a different perspective, British meat imports grew from less than 5 per cent of total imports in 1875 to 10 per cent in 1900. Furthermore, the average British consumer had already established a clear order of preferences in terms of types of meat. The favourite meat was beef, followed by pork and then lamb. In the same years, other agro-food products, such as cereals or sugar, stagnated or reduced their weight in total imports (Huttman 1978, pp. 247–248).

Mechanical refrigeration not only gave rise to a change in the patterns of international trade, but also implied a major restructuring of the business model. The explanation for this change can be found in the very nature of refrigeration; the fact that refrigerated meat is a highly perishable product implies the need to reduce the time between production and consumption. Therefore, refrigeration brought about the creation of large oligopolistic companies that integrated the whole value chain with strong economies of scale. This process occurred first in the United States, so the principal meat companies (Swift & Co, Armour and Morris and Schwarzhild and Sulzberguer) dominated the national market. However, at the end of the 19<sup>th</sup> century, a process of capital inflow began, first from Britain and then the United States in the principal producing areas in order to promote this oligopolistic structure and dominate meat exports. Usually, the companies agreed the export quotas to the British market. However, the arrival of American meat packers to Argentina led to a price war in 1911 and another in 1913. In order to gain market share, the American companies purchased more animals from the *estancieros*, increasing the purchasing prices. This gave rise to an increase in the supply of beef in Britain and, therefore, lower prices (i.e. a divergence of prices).

However, the success of the new meat-producing countries, such as Argentina, Uruguay, New Zealand, Australia or Denmark, in meat exports

cannot be explained by mechanical refrigeration alone. It has to be understood as a long-term process in which these countries adapted their supply to the British preferences. It was, therefore, the result of a constant interaction between supply and demand. A good example of this relationship is that the majority of the meat exported to Great Britain from the principal exporters was English cattle breeds (Otter 2012, p. 818). The case of Argentina is paradigmatic. Before the beginning of refrigerated meat exports, there was an active process to increase the productivity of livestock by importing selected animals from Great Britain. Furthermore, the fodder of the cattle was complemented with fodder such as alfalfa and the exporting activity led to a clear modernisation of the cattle-rearing activity (Barsk and Gelman 2001; Sesto 2002). Exporting refrigerated meat also required strong capital investment in meat-packing plants for an adequate processing of the meat and an extension of the railway network in order to reach areas further away from the sea, where the booming agricultural sector was moving its cattle-rearing activities.

Despite an active attempt to diversify meat exports to other countries, due to circumstantial or structural factors, Argentina ended up focusing its exports on the British market (Rayes 2015). Therefore, in 1913, it exported 99 per cent of Great Britain's chilled beef imports, due to the technological improvements in the refrigeration companies (both local and foreign capital companies) and the crossbreeding and selection of more productive beef breeds (Pinilla and Rayes 2019).

Argentina replaced the United States and became the world's leading beef exporter. However, even though the United States was no longer an important exporter, its leading companies penetrated the South American market. Unlike the British refrigeration companies, the North American firms did not create new companies but acquired some of those already existing in Argentina and Uruguay, such as La Plata, purchased by Swift & Co or La Blanca, acquired jointly by Armour and Morris and Swift (Perren 2006, p. 66). There were two main reasons for North American companies to enter South America. First, to escape the anti-monopoly pressures prevailing in the United States (Lluch 2015); and second, to capitalise the sunk cost incurred at the end of the 19<sup>th</sup> century in the creation of a wholesale and retail distribution network in Britain when they dominated meat exports to the British market.

The adaptations in supply also explain a good part of the success of New Zealand and Denmark in conquering the British market in lamb and bacon exports, respectively. In the case of New Zealand, the adaptation to British preferences through the crossing of sheep breeds was a fundamental factor (Woods 2012). Furthermore, the possibilities opened by mechanical refrigeration led to a strong growth in productivity, not only of the activities related to meat or milk production, but also of the economy as a whole, including industry (Greasley and Oxley 2009). The large

national sheep cattle owners of the country financed the refrigerators (production), although the exports were financed by British capital. The wide dispersion of refrigerators in Oceania hindered the business integration process, which translated into an irregular supply of meat exports for the British market. In the case of Denmark, its success was based on the creation of a national brand of high-quality bacon through public-private collaboration and the use of economies of scale which had been created with the production of butter (Higgins and Mordhorst 2015). In this way, even before the First World War, Denmark accounted for 45 per cent of British bacon imports.

In short, as highlighted by some studies conducted for the United States (Dimitri 2002; Goodwin *et al.* 2002), mechanical refrigeration enabled the integration of the meat market which had not occurred until then, as a sign of the lack of convergence of its prices (O'Rourke and Williamson 1999, p. 47). This fact is even more salient if we take into account that the meat supply of the principal exporters was oligopolistic; a small number of companies controlled a large part of exports, as the lack of competition hindered the market integration of other products such as spices (Federico 2021, pp. 5, 9).

Although it is difficult to draw conclusions based on the trade data due to the under-reporting and the increase in contraband during the war (Aparicio 2000, p. 50), the First World War had short- and long-term effects on the international meat market. In the short term, meat imports in the United Kingdom (and allied countries) during the war increased due to the growth in demand to feed the troops. The imports of bacon and frozen and tinned meat increased in detriment to fresh meat as it was easier to preserve (see Figure 1). Furthermore, the increase in transport costs was particularly harmful to the South American exporters and favoured those of the United States which provided 80 per cent of the meat consumed in the United Kingdom (Perren 2005, p. 224). In the long term, soldiers helped to disseminate the consumption of meat among the European population during the post-war period. Furthermore, some countries, such as Canada, took advantage of the juncture in order to modernise their meat-packing industry (Bliss 1978).

#### 4. THE CONSOLIDATION OF THE GLOBAL MEAT MARKET (1921–1929)

The 1920s had highs and lows for international agricultural trade. On the one hand, global exports grew at an annual rate of 7 per cent between 1921 and 1929, that is, more than they grew in the first globalisation due to the recovery after the First World War. European demand played an essential role in this growth as, at the beginning of the 1920s, European

agricultural production was still lower than that of the years preceding the war (Federico 2011, p. 25).

However, tensions also began to arise in international markets. Some countries initiated a policy to stimulate production with the objective of achieving agricultural self-sufficiency. Therefore, a period began characterised by an increase in trade barriers and strong state intervention to regulate and direct national production (Aparicio *et al.* 2009). As a consequence, certain products, such as cereals, started to show signs of oversupply (Pinilla and Aparicio 2019) and global agricultural exchanges began to slow down in the second half of the 1920s.

The behaviour of the meat and live cattle market was not very different, although with certain nuances. During the first half of the 1920s, there was strong growth and a diversification of European imports. As a result, Great Britain lost relative weight in global trade. This growth and diversification of imports was due to several reasons. First, the soldiers returning from the front who were used to eating tinned meat rations spread the habit of eating meat throughout the rest of the population (Duncan 1984, p. 83). Furthermore, the joint population of Great Britain, Germany, France, Italy and Belgium was larger in 1925 than in 1913, so potential demand increased. On the other hand, the increases in income due to the post-war recovery implied higher growth in the imports of meat than those of other agricultural products, due to the higher income elasticity of meat. In fact, while cereals had a negative income elasticity in the 1920s (Pinilla and Aparicio 2019, p. 60), several authors show a higher elasticity for meat in different periods of time. For example, Richard Stone calculates an income elasticity of 0.5 for meat between 1920 and 1938 and Yates of 0.52 for the years following the Second World War (Stone 1954; Yates 1960)<sup>6</sup>. The rise in meat consumption is also explained by the changes in the diet of the working class and, to a lesser extent, of the rural population (International Institute of Agriculture 1938, p. 232). Finally, the impact of the war on the livestock herds of Germany and other countries affected by the war and the lower European tariffs until 1925 also stimulated meat imports (Bacon and Schloemer 1940, p. 183). These factors explain, on the one hand, why European meat imports in 1923–1925 were 50 per cent higher than in 1911–1913 (Timoshenko 1933, p. 556) and on the other, why Great Britain's share of world imports fell from 80 per cent in 1909–1913 to 66 per cent in the 1920s. Nevertheless, it maintained a completely hegemonic position in the global trade of beef and even more so in that of lamb and pork.

<sup>6</sup> According to Clark *et al.* (1995), the income elasticity of meat was higher in the mid-19<sup>th</sup> century (around 1.1–1.5). It is natural that as meat became a product of mass consumption, its elasticity declined.

The high relative weight of global meat imports of Great Britain is much higher than this country's share of the imports of other products. It varied between 65 and 80 per cent in the years preceding the First World War and the 1930s. The only product that is close to these figures is butter, in which Great Britain accounted for as much as 60 per cent of its global trade in the 1920s. In fact, even though dairy products or eggs could be considered, as in the case of meat, as quality sources of protein, only butter had a relatively important weight with respect to total agri-food trade (between 2 and 3.7 per cent depending on the period). For example, milk only represented 0.5 per cent and eggs between 1 and 2 per cent. The weight of the British market in the imports of other prominent agricultural products such as wool, sugar, rye or maize fluctuated between 20 and 30 per cent of total world imports during the same period (Aparicio 2000).

Why did Great Britain account for such a large share of global meat imports? Its early industrialisation, a liberal trade policy and the fact that it was the leading country explain why it imported large volumes of meat but do not explain why the percentage of meat imported was relatively higher than other food products. Again, part of the answer resides in the fact that meat is a highly perishable product. Mechanical refrigeration was not only a necessary investment in ships, but also in unloading ports and butchers' shops. The company Eastman had around 600 butchers' shops with freezers installed in 1894. Other companies, such as Dewhurst the Master Butcher also invested in installing refrigerators in their retail outlets and certain cooperatives did the same. On the contrary, France and Italy did not have any ships with mechanical refrigeration or butchers' shops with refrigerators until a little after the outbreak of the First World War (Oddy 2013, p. 236).

From the supply side, the 1920s were fundamental for the specialisation in the international meat market. During these years, the periphery countries were able to fully exploit their comparative advantage and consolidate their position as world leaders in meat exports. In other words, after overcoming the technological obstacles and with meat consumption widely expanding across Great Britain and Europe, the 1920s witnessed the Great Specialisation in this market. Therefore, with the exception of pork, the majority of the trade of meat was carried out over long distances, with the principal pattern being from south to north, with Oceania and South America being the major exporters. Beef was transported mainly chilled or frozen. Lamb was traded frozen and finally, pork was mainly sold in the form of bacon or ham.

The comparative advantage of each exporting country implied that Argentina and Uruguay specialised in exporting chilled beef, while Australia, and to a lesser extent Brazil, did so in frozen beef of a lower quality (International Institute of Agriculture 1938, p. 258). During this decade,

the American companies gained a greater share of the Argentine export market to the detriment of local and British companies. In the second half of the 1920s, Armour, Swift and Wilson controlled more than 50 per cent of meat exports, while Sansienna, formed with Argentine capital, only controlled 10 per cent. The rest (Vestey, River Plate British & Continental and S. & A. M. Co) were formed with British capital.

However, in the 1920s, the increase in demand for fodder by Europe in order to stimulate its livestock production boosted the production of maize in Argentina at the cost of the beef herds. Therefore, the Argentine beef herd shrank from 37 million cattle in 1922 to 21 million in 1930. In spite of this, Argentina did not lose its position as the world's leading beef exporter as it continued to export the highest quality meat. Furthermore, the third price war, initiated by the Vestey group, somewhat compensated this process, as the supply of beef increased again in Great Britain and its prices decreased between 1926 and 1927 (see Figure 3). On the contrary, Uruguay lost share of beef exports partly due to the cartelisation of its refrigerators (of foreign capital) and partly due to the absence of intensive technological improvements in its pastureland, which led to a long process of stagnation in its livestock sector (Bulmer-Thomas 2003; Álvarez Scaniello 2018, p. 480).

The nature of lamb implied that it could only be exported in a frozen state and not chilled. Therefore, Oceania did not have the disadvantage of being further away than South America and not able to export chilled meat with a lower period of conservation. In other words, Oceania and South America were on equal terms for exporting lamb. Again, the comparative advantage in the 1920s led Argentina to specialise in beef in detriment to lamb and Oceania to gain weight in global lamb exports. New Zealand, which was the world's largest exporter, continued to implement technological improvements to adapt to the British preferences in the 1920s. This is evident in the fact that it slaughtered and exported increasingly younger animals (International Institute of Agriculture 1936, pp. 149–150). Although to a lesser extent, Australia also implemented technological improvements (particularly in the south), which, together with the increase in sheep livestock during the second half of the 1920s, led to an increase in the weight of its lamb exports at an international level from 1928 (Capie 1978). Only in the case of pork (bacon) did a European country, namely Denmark, become the leading exporter.

However, from the second half of the 1920s, several European countries, which had gained a greater share of world meat imports (see Table 1), began to apply strong restrictive measures to live cattle and meat imports. For example, Germany maintained and even reduced the restrictions on cereal imports with respect to the pre-war levels, while it increased those on meat and live cattle. France quadrupled the tariffs on live cattle with respect to the pre-war levels, it multiplied the tariffs on

**TABLE 1**

Shares of the principal importing and exporting countries of different meats with respect to the global meat trade (volumes)

<b>Imported beef (%)</b>	<b>1909–13</b>	<b>1924–28</b>	<b>1928–32</b>	<b>1934–38</b>
Great Britain	70.62	56.00	64.44	73.63
France	0.64	6.05	3.81	2.21
Germany	4.13	10.53	5.48	3.57
Belgium	2.27	5.68	4.08	1.45
Italy	1.18	6.80	5.82	3.63
The United States	2.77	2.62	3.75	4.32
<b>Exported beef (%)</b>	<b>1909–13</b>	<b>1924–28</b>	<b>1928–32</b>	<b>1934–38</b>
Argentina	51.43	58.40	50.52	51.70
Uruguay	11.05	11.33	11.69	9.99
Brazil	0.04	3.76	7.20	6.53
Australia	12.20	7.07	7.52	11.92
New Zealand	3.01	2.51	2.76	5.47
<b>Imported lamb (%)</b>	<b>1909–13</b>	<b>1924–28</b>	<b>1928–32</b>	<b>1934–38</b>
Great Britain	97.64	93.00	93.45	96.21
France	0.10	3.46	3.38	2.51
<b>Exported lamb (%)</b>	<b>1909–13</b>	<b>1924–28</b>	<b>1928–32</b>	<b>1934–38</b>
Argentina	26.60	29.23	23.63	14.37
Uruguay	1.05	6.35	5.38	2.25
Australia	26.58	11.32	16.20	26.26
New Zealand	40.63	48.57	49.87	52.72
<b>Imported bacon, ham and lard (%)</b>	<b>1909–13</b>	<b>1924–28</b>	<b>1928–32</b>	<b>1934–38</b>
Great Britain	91.40	89.86	89.37	89.54
Germany	0.25	0.04	1.76	2.38
The United States	0.00	0.00	0.17	2.59
<b>Exported bacon, ham and lard (%)</b>	<b>1909–13</b>	<b>1924–28</b>	<b>1928–32</b>	<b>1934–38</b>
Denmark	34.66	41.01	52.38	44.43
The United States	51.74	31.84	14.77	7.51
Canada	6.85	7.57	2.00	16.33
The Netherlands	1.05	6.44	10.22	8.02

Source: *Annuaire international de statistique agricole* (1909–1939).



**TABLE 2**  
World imports of meat and live cattle (index numbers, 1909–13 = 100, volumes)

Products	1909–13	1924–28	1928–32	1934–38
Cattle beef <sup>1</sup>	100	503.3	513.7	415.9
Pigs	100	107.7	134.5	84.6
Beef	100	204.1	162.0	143.7
Lamb	100	107.9	126.3	129.2
Pork	100	215.2	160.2	152.6
Bacon, ham and lard	100	172.0	199.5	142.2

Source: *Annuaire international de statistique agricole (1909–1939)*.

<sup>1</sup>The extraordinary growth in world imports of cattle beef between 1909–1913 and 1924–1928 is overvalued, as the estimate of the volume of world imports in 1909–1913 is undervalued. This is because the estimation of this amount is based on the hypothesis that the percentage of British imports of the world total remained constant between the two sub-periods. However, we know that the separation of Ireland from Great Britain in 1922 meant that Irish exports of cattle beef to Great Britain were no longer considered as domestic trade and had become international trade. This converted Great Britain into the world's leading importer of beef, above the United States and Germany. As a result, the percentage of the world total represented by British imports in the pre-war period would be quite a lot lower than the sub-period 1924–1928. Therefore world imports would be somewhat higher than the amount estimated. This problem also affected the relative importance of beef in the total exchanges of the group in the pre-war period.

fresh and chilled meat by 2.6 and those on frozen meat by 1.7 (Bacon and Schloemer 1940, pp. 611, 713). The reason behind this type of policy is that, once the size of the herd had been restored to pre-war levels, they sought to stimulate national production. Therefore, these policies followed a similar trend to those applied to the agricultural production of other products. As a result, the imports of live cattle and meat fell notably during the second half of the 1920s. In spite of this, the trade of live cattle and meat in the 1920s was greater than in the years prior to the First World War. This increase occurred both in absolute volumes and with respect to total agricultural trade (Tables 2 and 3).

Therefore, despite the restrictions of several European countries on meat imports, the trade of this product continued to increase in weight and was relatively dynamic in the 1920s. This is because the reduction in imports in different European countries was compensated for by the increase of imports of Great Britain, as this country maintained a free-trade policy in agricultural imports until the end of 1931 (Glickman 1947). Another factor, although less important, explaining the concentration of global imports in the United Kingdom is the difference in the levels of meat consumption in the principal importing countries. While the British consumed over 60 kilos of meat per inhabitant and year during

**TABLE 3**  
World imports of meat and live cattle with respect to total agricultural imports (%), volumes

Products (%)	1909–13	1924–28	1928–32	1934–38
Cattle beef	0.63	2.42	2.33	2.01
Pigs	0.40	0.33	0.39	0.26
Beef	1.59	2.49	1.86	1.76
Lamb	0.90	0.74	0.82	0.89
Pork	0.34	0.57	0.40	0.4
Bacon, ham and lard	1.42	1.87	2.04	1.55
Total group	5.29	8.43	7.83	6.87
Total agricultural trade	100	100	100	100

*Source:* Annuaire international de statistique agricole (1909–1939).

the 1920s and 1930s, Germany consumed around 40 kilos and France a little over 30 kilos. Therefore, after a diversification of European meat imports in the years following the First World War, the imports once again concentrated in Great Britain due to the protectionist policies of the continental countries.

In short, in the 1920s, a major specialisation of the trade of meat took place. Each country specialised in accordance with its comparative advantage, conditioned by the British preferences with respect to the types of meat, which were also more specialised. In this period, chilled beef (national or Argentine) was preferred by the consumer, followed by Danish or national bacon and, finally, mutton. Frozen and tinned meat had little importance. However, the protectionist measures of certain European countries, which had gained relevance in world imports, and the fall of Argentine beef exports, slowed the growth of the trade of meat in the same way as agricultural trade. On the other hand, Great Britain absorbed part of the imports that other countries restricted, which led to the international meat market behaving in a relatively dynamic way compared with other agricultural products.

## 5. THE IMPACT OF THE GREAT DEPRESSION ON THE INTERNATIONAL MEAT MARKET (1929–1938)

In 1929, world trade collapsed in what we can consider as the definitive end of the first globalisation. Trade restrictions multiplied and there was an increase in bilateralism and the establishment of certain regional trade and monetary areas, such as between the metropolis and its colonies,

prolonging a previous trend (Eichengreen and Irwin 1995). One of the characteristics of the policies of the 1930s was the widespread use of quotas as a way of restricting imports (Madsen 2001; Federico 2012, pp. 25–26). Similarly to international trade, agricultural trade nosedived from 1929, falling in volume by 13 per cent between 1929 and 1934, with a severe reduction in prices and a strong disintegration of international markets (Hynes *et al.* 2012; Aparicio *et al.* 2018, p. 69). In fact, protectionism in agricultural products from 1929 was greater than in other products in Europe. According to the estimates of Liepmann, a good part of European industrial countries had agricultural tariffs of over 50 per cent in 1931 (Liepmann 1938, p. 106). Although agricultural trade showed signs of recovery from the second half of the 1930s, the annual growth rate during this decade was negative (–1.2 per cent) (Aparicio *et al.* 2018, p. 69).

As well as the exchanges, agricultural prices also plummeted between 1929 and 1932. In fact, agricultural prices fell more than those of manufactured goods. Therefore, the terms of trade worsened for the exporting countries of primary products (Ocampo and Parra-Lancourt 2010; De Bromhead *et al.* 2019a). The sharp fall in prices meant that the value of exports of many agricultural products fell significantly. For example, between 1929 and 1932, the value of the trade of wheat fell by 60 per cent, that of bacon by 50 per cent and that of wool by 70 per cent (International Institute of Agriculture 1947, p. 352).

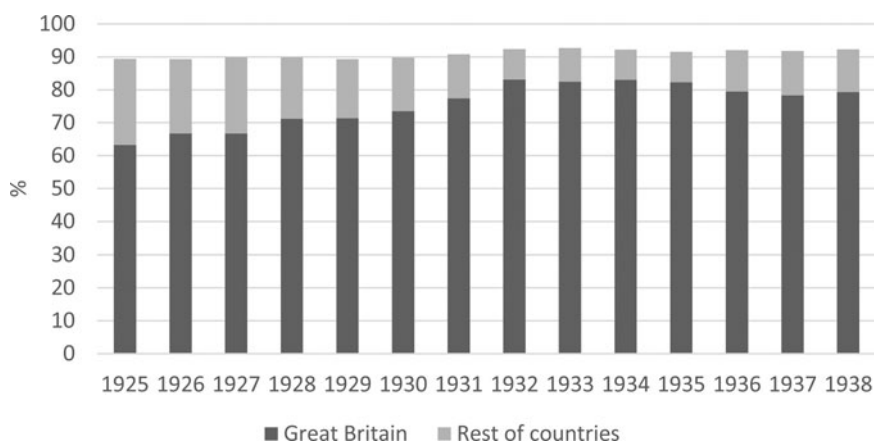
Great Britain, which accounted for 71 per cent of global meat imports in 1929, did not substantially revise its agricultural tariff policy until 1932. The lower weight of agriculture with respect to industry meant that the scarce intervention and low protectionism after the First World War had largely been directed at the industrial sector<sup>7</sup>. The change of government at the end of 1931 led to a radical change in economic and trade policy. Therefore, in response to the requests of its farmers, the government began to implement a policy of trade protection, subsidies, price fixing and direct regulation in the production of several agricultural products (Cohen 1934).

At the same time, as with other empires, Great Britain began to intensify the diversion of its trade towards its colonies and dominions. This whole process was materialised in the Ottawa Conference in 1932 in which Great Britain and its colonies and dominions participated. The conference had two primary objectives related to meat: first, it sought to increase farmers' income, as it was argued that the fall in meat prices at a global level threatened even the national production of meat and, second, the British dominions had the objective of increasing their share of the

<sup>7</sup> An exception to this was the protection and intervention of the beet sugar industry during and after the First World War. See Research Staff (1943, pp. 122–126) and Bill (1988).

FIGURE 2

Percentage represented by meat imports to Great Britain with respect to the principal importing countries.



Source: *Annuaire international de statistique agricole* (1909–1939).

Notes: (a) «Rest of countries» is made up of Germany, France, Austria, Italy, the United States and Belgium.

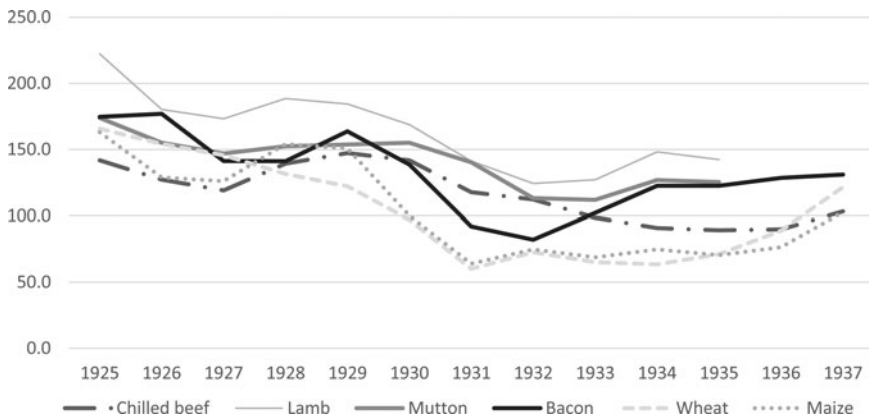
British market at the cost of third countries that did not belong to the empire (Rooth 1985, p. 174). In order to achieve the objectives of the conference, the mechanisms were clear: to give preference to meat (and other products) in the British market originating in countries belonging to the empire through import quotas imposed on third countries. However, Great Britain also reserved the right to reduce the maximum quotas of foreign products if the dominions could not supply sufficient quantities, or even impose quotas on the dominions if there was a conflict of interests with its domestic farmers. The latter measure was particularly emphasised for meat, stressing that the imports from the empire or third countries could not hinder domestic production (Perren 1995, p. 56.)

Therefore, using as a base period the years 1931 and 1932, and in accordance with the type of meat and its nature (i.e. whether it was frozen or chilled), Great Britain imposed obligatory maximum quotas on meat imports which implied a reduction that varied between 10 and 35 per cent with respect to the base period for foreign countries. With regards to its dominions, even though they could freely export, they reached different agreements in order to voluntarily regulate their meat sales<sup>8</sup>. During the second half of

<sup>8</sup> For details of the Ottawa measures and all the international agreements in Great Britain from 1931, see Research (1943, pp. 163–221).

FIGURE 3

Index of meat and cereal prices (unit values of british imports 1909–1913 = 100).



Source: Annual Statement of the Trade of the United Kingdom (1854–1935).

the 1930s, tariffs became more important in detriment to quotas for regulating British imports, but the imperial preferences were maintained.

The strong dependency of Argentina on its beef exports to Great Britain and the efforts that the country had made to adapt to the preferences of the British consumers (with Argentine beef becoming the favourite imported meat of the British consumer, above bacon and mutton), meant that this country was severely affected by the imperial preferences of Ottawa. This led to a rapid mobilisation of the Argentine government; taking advantage of the exporting and financial interests that government had in Argentina, in 1933 it signed an Anglo-Argentine pact so that, at least, the quotas agreed in Ottawa were not raised. When the Anglo-Argentine agreement expired in November 1936, a new agreement was signed in which Argentina was guaranteed a minimum quota (Imperial Economic Committee 1938, p. 85). However, in reality, in all senses, the dominions were reinforced in the British market by the measures taken in Ottawa.

Similarly to what had occurred in the 1920s, the refrigeration companies financed with U.S. capital reinforced their share of meat exports in South America. Between 1932 and 1939, they controlled almost 60 per cent of Argentine meat exports, while the English companies lost share. With respect to the local companies, Sansiena, which merged with a Uruguayan company, maintained 10 per cent of meat exports. The Argentine government imposed a regulation whereby 15 per cent of exports were reserved for private and public local companies (Argentine Meat Producers Corporation).

Within this context, it is relevant to ask ourselves how the Great Depression and the Ottawa measures affected the international trade of meat, taking into account the dominant position of Great Britain that had been further reinforced in the second half of the 1920s (see Figure 2). The response to this question can be addressed in three ways: the first is by analysing the impact of prices; the second by measuring their impact on the total volumes of meat exchanged and the third by studying the changes that took place in the principal exporting and importing countries.

### 5.1 Impact on Prices

In order to analyse the impact of the Great Depression and the Ottawa agreements on meat prices, we have constructed a price index based on the unit values of British imports. We consider that, due to the large share of the British market in global imports, its import prices are a good estimate of world meat prices. Furthermore, we have added wheat and maize prices to gain a comparative perspective with two important products in the international agricultural market.

From 1929, the price of all meats fell to a greater or lesser extent, but the reduction was smaller in that of other agricultural products highly important to trade, such as cereals. We consider that the two main arguments of this study also help to explain the better behaviour of international meat prices: that is, it is a highly perishable product and Great Britain was, by far, the world's leading importer. With respect to the first, it is well-known that large volumes of accumulated stock of cereals led to the reduction of their international prices (Pinilla and Aparicio 2019). However, it was not possible to accumulate large volumes of stock of meat over the course of several years as, particularly in the case of chilled meat, it becomes inedible after a short space of time. Therefore, a lower volume of global stocks of meat than cereals meant that its price behaved better. Second, Great Britain left the gold standard early, giving rise to a relatively fast recovery after the Great Depression. As it was the leading importer, this promoted the improvement in prices of products with a higher income elasticity, such as meat, with respect to cereals.

With regards to the Ottawa agreements, apparently in no case did they have a negative effect on meat prices. In fact, except for beef prices, which maintained a decreasing trend from 1930, the prices of lamb and particularly bacon increased considerably from 1932. This is explained by the quotas applied on foreign bacon and the low elasticity of substitution between national and imported bacon (mainly Danish). For the British consumer, Danish and British bacon were two different products.

Therefore, the quotas of Danish bacon established by the Ottawa agreements did not imply a transfer of consumption to British bacon in detriment to Danish bacon. What, in fact, happened was that there was a reduction in imported bacon, and therefore in its prices due to the restriction of supply. Other authors have made the same observation of the price of Danish bacon increasing more rapidly than that of British bacon during this period (Higgins and Mordhorst 2015, p. 161). Finally, from 1935, although slowly, meat prices began an upward trend due to the improved international situation. From the point of view of British consumers, according to Perren (2006, p. 142), the impact of the quotas was negative as, at a time of unemployment in the manufacturing sector, they were faced with an increase in the price of meat and a restriction in terms of their choice of the type of meat to consume.

### *5.1.1 The effect on the volume of trade*

The trade of meat in terms of absolute volume (thousands of quintals) displayed a relatively dynamic behaviour in the 1930s in spite of the poor global economic situation. From 1929, the volumes, which had decreased in the previous years, grew notably until, in 1931, they reached their maximum level. The explanation is already known: on the one hand, Great Britain continued absorbing the imports that other countries such as France, Germany, Austria or Italy prevented through more restrictive measures. On the other hand, the improved behaviour of meat prices in relation to those of wheat and maize from 1929 (see Figure 3) stimulated production and the trade of meat in relation to cereals, so some producers reassigned land from grain to pasture. In 1932, with the agreements of Ottawa, trade fell slightly due to the quotas imposed by Great Britain. However, trade stabilised and did not take long to grow again. The greater reduction is explained by bacon, the global imports of which fell by 24 per cent between 1931 and 1938, as beef had been losing weight since 1927 for the reasons already explained. Therefore, we can consider that the 1930s were relatively stable for the trade of meat and given the context of depression, we can say that trade was relatively dynamic. In fact, both the protectionist policies and the variations in the income of the meat-importing countries in the 1930s affected the global meat trade from the intensive margin. In other words, the leading export companies did not react by exporting more or fewer types of meat (extensive margin), but a greater or lesser quantity of the type of meat that they previously exported (intensive margin). In accordance with the theory of Schott (2009, p. 131), this was most probably reinforced because in many cases the exporting companies controlled the value chain. These results are in line with the behaviour of all of the imports of Great Britain during the Great Depression

(De Bromhead *et al.* 2019a). Thus, the evolution of the global meat market fits better with the comparative advantage theory and the Great Specialisation than with intra-industry trade behaviour. This is probably due to two reasons. First, in intra-industry trade, product differentiation is more significant, so other types of trade costs are more important in trade behaviour. Second, we are working with a high level of aggregation data (Betrán and Huberman 2016; Huberman *et al.* 2017).

## 5.2 Changes in the Geography of the Trade of Meat

Recently, the literature has noted that the imperial preferences had a strong impact on the increase in the weight of the British dominions and colonies in the British market, although the impact of these measures at an aggregate level was limited (De Bromhead *et al.* 2019b). According to the League of Nations, total British imports from the empire increased from 30.2 to 41.9 per cent between 1929 and 1938. During the same period, most empires carried out a similar process. Despite the importance of Great Britain as a world importer, in this article we seek to gain a more global perspective of the geographic impact of the Great Depression and Ottawa on the principal meat exporters (Tables 4–6).

Argentina maintained a dominant and stable position in beef exports during the 1930s although, as we have explained, they exhibited a downward trend from 1927. The reason for this stability in the 1930s is that, although Argentina was not reinforced with the treaties with Great Britain in 1933 and 1936, it made great efforts to diversify its sales to other countries and subsidised exports (Imperial Economic Committee 1933, p. 20). Argentina and Uruguay signed a treaty with Germany and Italy to increase their frozen beef exports, and both of these countries gained weight as importers of this type of meat from 1935. These measures partially compensated the fall generated by the Ottawa agreements and the aggregate beef exports from South America were relatively stable, although in the British market they lost more than 20 per cent of the frozen beef market between 1930 and 1936 (Perren 2006, p. 140).

The Ottawa agreements had a considerable effect on the participation of British dominions. New Zealand, and particularly, Australia showed a high capacity of negotiation in Ottawa (Duncan 1963), enabling them to sign a clause that allowed them to send unlimited «experimental shipments». This, in practice, meant that they could export chilled beef, which was the type of meat in which Argentina had specialised, with no limitations. In 1932, the quota of chilled beef in the British dominions was 0.1 per cent; in 1930 it had increased to 12.4 per cent. Therefore, this enabled Australia to develop its chilled beef industry in the long term. Therefore, although Argentina maintained its weight in world



**TABLE 4**  
Shares of the principal beef exporters with respect to global exports

<b>Beef (%)</b>	<b>1925</b>	<b>1926</b>	<b>1927</b>	<b>1928</b>	<b>1929</b>	<b>1930</b>	<b>1931</b>	<b>1932</b>	<b>1933</b>	<b>1934</b>	<b>1935</b>	<b>1936</b>	<b>1937</b>	<b>1938</b>
Argentina	53.33	61.36	61.94	50.31	52.80	47.70	50.59	56.77	52.86	53.33	51.07	51.82	50.00	52.54
Uruguay	11.26	12.23	11.27	11.30	11.69	14.51	12.21	11.18	11.11	10.81	12.15	8.80	9.64	8.82
Brazil	3.91	0.62	2.89	6.23	7.60	10.30	7.43	5.46	5.30	5.09	7.01	8.11	5.94	6.50
Australia	9.66	5.60	5.01	8.73	7.59	6.75	7.94	8.42	9.02	10.99	10.66	11.68	12.68	13.21
New Zealand	2.65	1.82	1.88	3.82	1.91	2.02	2.47	3.43	5.93	5.74	5.74	5.21	5.20	5.51

*Source:* Annuaire international de statistique agricole (1909–1939).

**TABLE 5**  
Shares of the principal lamb exporters with respect to global exports

Lamb (%)	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Argentina	32.65	25.11	28.83	26.93	27.71	23.20	22.15	19.97	18.00	14.29	14.34	15.28	14.56	13.43
Uruguay	3.65	8.53	8.57	5.10	7.66	8.18	4.88	1.73	2.80	2.39	2.07	2.05	2.29	2.42
Australia	11.68	15.15	9.02	12.09	12.52	13.87	21.77	19.48	18.38	25.65	25.93	24.82	27.05	27.68
New Zealand	46.91	47.39	48.94	51.72	47.73	50.00	46.92	55.31	56.14	52.24	53.05	54.11	52.14	52.15

*Source:* Annuaire international de statistique agricole (1909–1939).

**TABLE 6**  
Shares of the principal bacon, ham and lard exporters with respect to global exports

<b>Bacon, ham and lard (%)</b>	<b>1925</b>	<b>1926</b>	<b>1927</b>	<b>1928</b>	<b>1929</b>	<b>1930</b>	<b>1931</b>	<b>1932</b>	<b>1933</b>	<b>1934</b>	<b>1935</b>	<b>1936</b>	<b>1937</b>	<b>1938</b>
Denmark	51.78	51.85	59.49	59.68	45.89	54.00	56.67	57.51	51.81	47.77	47.37	43.45	41.81	41.48
The Netherlands	4.86	9.79	11.65	14.21	9.76	8.83	9.99	11.45	10.92	9.49	8.40	7.86	7.43	6.79
Canada	16.46	11.69	6.20	4.13	2.42	1.18	0.88	2.43	5.98	11.81	13.58	17.70	20.48	18.47
United States	1.20	1.23	1.17	1.30	23.16	17.81	9.28	6.69	9.31	9.59	7.78	6.41	5.63	7.97

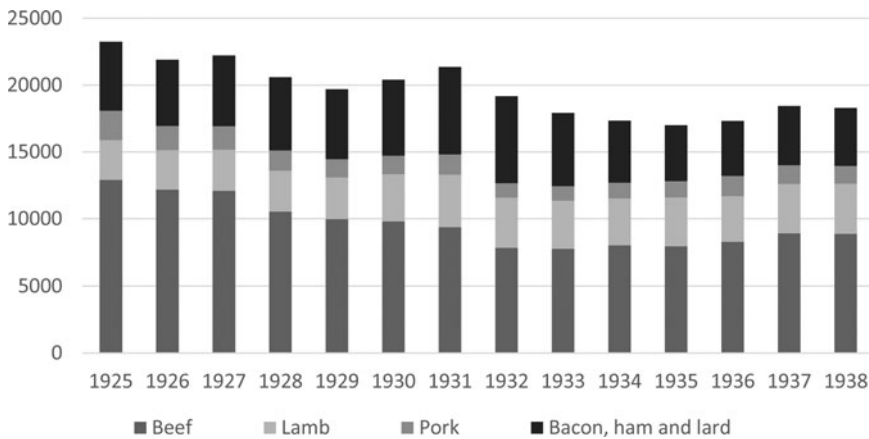
*Source:* Annuaire international de statistique agricole (1909–1939).

exports at an aggregate level, it did so at the cost of losing its relevance in the export of chilled beef and gaining it in frozen beef. Given that chilled beef had a higher price than frozen beef, the aggregate monetary value of Argentine beef exports was affected by the British restrictions. Therefore, although there were no significant changes at a global level, the Ottawa agreements led to a substitution of Argentine beef for Australian beef in the British market, the latter being of a lower quality. Uruguay, as in the case of Argentina, did not drastically reduce its beef exports due to the crisis and the Ottawa agreements, but was faced with an increasing number of competitors in the export of lower quality beef, such as Brazil and Australia.

As far as lamb is concerned, the Great Depression and the Ottawa agreements reinforced and accelerated the trends that had begun in the second half of the 1920s, when Argentina and Uruguay were losing weight and Australia and New Zealand gained prominence due to the comparative advantages of each country. In 1929, Argentina still accounted for 27.3 per cent of British mutton and lamb imports. This share fell to 13.1 per cent in 1937. From 1932, New Zealand stabilised its exports which had been growing in the previous years, while those of Australia continued increasing. Therefore, overall, the percentage of mutton and lamb that Australia and Oceania supplied to Great Britain increased from 59 per cent in 1920 to 80 per cent in the 1930s. It is important to remember that Great Britain agreed voluntary restrictions on exports several times with its dominions, which explains the possible fluctuations.

In bacon, ham and lard, the Ottawa measures had a great impact on the geographical composition of exports. Unlike beef and lamb, this was due to the fact that the dominions did not have the same capacity to produce and export as Denmark. From 1932, Denmark began to lose prominence in absolute and relative values and did not recover. Canada benefited most from these changes. Its share of global exports grew from a little over 2 per cent to 20 per cent at the end of the 1930s. Therefore, Denmark's share of bacon exports to the British market fell from 66 per cent in 1931 to 55 per cent in 1935. In spite of this, there was not a complete replacement of Danish exports and global exports of bacon fell between 1932 and 1938, which is largely explained by the total reduction in the trade of meat (see Figure 4). The fact that world bacon prices did not recover more quickly is probably due to the higher percentage share of Canadian bacon of global exports in detriment to Danish bacon as the former was of a lower quality. In fact, in the 1930s, the Danish regulations were increased to improve the quality of its bacon. Therefore, in monetary terms, the loss of global share of the bacon market did not imply a reduction in export revenue (Higgins and Mordhorst 2015). With respect to the

**FIGURE 4**  
World imports of the different types of meat (thousands of quintals).



Source: *Annuaire international de statistique agricole* (1909–1939).

trade of pork, from 1929, exports from Australia increased considerably and even more so from New Zealand, accounting for 80 per cent of British imports in 1937 (Imperial Economic Committee 1938, p. 11).

In summary, meat prices worsened from the Great Depression, but behaved better than agricultural prices. This made the volume of trade increase in the worst years of the Great Depression (1929–1932). With the Ottawa agreements, the international prices of meat began an upward trend. This is because imported and national British meats did not have a full substitution relationship. That is to say, British consumers did not consider imported and national meats as equal products. From 1932, the volume of meat exchanged at a global level fell, but it recovered from 1935 due to the improved global situation. With respect to the geographical composition, the impact of the Ottawa agreements particularly affected bacon, as it enabled Canada to gain considerable weight at a global level due to the British preferences to the detriment of Denmark. In the case of beef, Argentina and Uruguay diversified their exports and did not lose much share at a global level, although Australia became the world's second exporter, displacing Uruguay. In other words, although important changes took place within the British market at a geographical level, at a global level they were not so relevant. Finally, in the case of lamb, the agreements simply reinforced an existing trend that had begun in the preceding years.

## 6. CONCLUSIONS

The expansion of international trade and the shaping of integrated world markets, together with high capital and labour mobility are the basic elements of the first globalisation. It has been frequently assumed that the increase in demand, due to the rising incomes in the industrialising countries, the reduction in transport costs and the liberalisation of tariffs generated opportunities that benefited the periphery countries. These opportunities were based on a complementary specialisation to the industrial centre, on which to base their economic development. However, it has also been pointed out that the technological changes were crucial for this increase, giving rise to a displacement of the supply curve to the right. This has not always been taken into account. It has frequently been assumed that there was a kind of automatic mechanism between the expansion of demand and the response of supply. However, when analysing specific countries, some studies have also attempted to highlight how the changes in supply were fundamental for this increase in the exports of agro-food products to take place (Pinilla and Rayes 2019). A good example is the Danish case, in which a technological innovation, namely the cream separator, had a decisive impact on the increase in productivity in the production and export of butter at the end of the 19<sup>th</sup> century (Lampe and Sharp 2019, pp. 194–197).

The analysis of the international trade of meat has enabled us to examine several fundamental aspects of the globalising phenomenon. First, we can conclude that the characteristics of each product were fundamental for understanding their dynamics in international trade. Meat encountered enormous difficulties in increasing its trade despite the strong growth in demand. Only a fundamental technological innovation, mechanical refrigeration, led to rapid growth and market integration after its adoption and diffusion. Technological innovation changed supply dramatically, driving trade.

These difficulties for expanding trade during a good part of the 19<sup>th</sup> century were undoubtedly highly important for understanding the strong concentration of imports in Great Britain which almost transformed into a monopsonist in the world market. The pioneering British industrialisation, with the resulting rapid increase in income and the demand for meat implied the import of growing amounts of this product, both from Ireland which then formed part of the United Kingdom and foreign countries.

However, the later industrialisation of continental Europe and the slower pace of economic growth meant that, until the First World War, Great Britain absorbed an overwhelming percentage of world meat imports. As far as we know, there were no other agro-food products that had such a high concentration of imports in a single country.

These difficulties for the expansion of trade, until the adoption of mechanical refrigeration, also explain the very scarce participation of countries with a high export potential but which could not overcome the limitations imposed by the long trips due to them being so far away from the British market. Therefore, it was initially the countries of continental Europe that supplied British demand, principally with live animals, together with the United States, a country that exploited its closer geographical proximity to the British Isles, and the considerable development of its livestock industry throughout the 19<sup>th</sup> century. Mechanical refrigeration was the last trigger that enabled the countries of the Río de Plata, particularly Argentina, together with Australia and New Zealand, which had spent years adapting their livestock production to British preferences, to become world leaders in meat exports.

Finally, the impact of the Great Depression on the trade of meat was different to that on other products. Its trade was less affected by the crisis, but the protectionist measures of the countries of continental Europe and the imperial preferences adopted by the British Empire Economic Conference of Ottawa in 1932, implied a certain reshaping, from a geographical point of view, of world trade in meat. Great Britain recovered share until it again represented three-quarters of global imports. On the other hand, the countries that benefited from the imperial preferences, such as Australia, Canada and New Zealand, substantially increased their share in the global market, particularly in lamb and pork.

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## SOURCES AND OFFICIAL PUBLICATIONS

Annuaire international de statistique agricole (International Yearbook of Agricultural Statistics), Rome: International Institute of Agriculture, 1909–1939.

Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions (1854–1935) and Statistical Abstract for the United Kingdom, Parliamentary Papers. London.

Imperial Economic Committee (1933): *Meat. A Summary of Figures of Production and Trade Relating to Beef, Mutton & Lamb, Bacon & Hams, Pork, Cattle, Sheep, Pigs and Canned Meat*. London.

International Institute of Agriculture (1936): «International Trade in Meat» *Studies of Principal Agricultural Products on the World Market*. Rome

International Institute of Agriculture (1938): «World Production in Meat» *Studies Of Principal Agricultural Products on the World Market* (No. 3). Rome.

International Institute of Agriculture (1947): «The World's Coffee» *Studies Of Principal Agricultural Products on the World Market* (No. 9). Rome.

The Research Staff of the National Institute of Economic and Social Research (1943): *Trade Regulations & Commercial Policy of the United Kingdom*. London: Cambridge University Press.

## REFERENCES

- APARICIO, G. (2000): «*El comercio internacional de alimentos y materias primas agrícolas entre 1900 y 1938*». Zaragoza: Universidad de Zaragoza, PhD dissertation.
- APARICIO, G., PINILLA, V., and SERRANO R. (2009): «Europe and the International Trade in Agricultural and Food Products, 1870–2000», in P. LAINS and V. PINILLA (eds), *Agriculture and Economic Development in Europe since 1870*. London: Routledge, pp. 52–75.
- APARICIO, G., GONZÁLEZ-ESTEBAN, A., PINILLA, V., and SERRANO R. (2018): «The World Periphery in Global Agricultural and Food Trade, 1900–2000», in V. PINILLA and H. WILLEBALD (eds), *Agricultural Development in the World Periphery. A Global Economic History Approach*. London: Palgrave, pp. 63–88.
- ATKINS, P. J. (2004): «The Glasgow Case: Meat, Disease and Regulation, 1889–1924». *Agricultural History Review* 52 (2), pp. 161–182.
- BACON, L., and SCHLOEMER, F. (1940): *World Trade in Agricultural Products*. Rome: International Institute of Agriculture.
- BARSK, O., and GELMAN, J. (2001): *Historia del agro argentino. Desde la conquista hasta fines del siglo XX*. Buenos Aires: Grijalbo.
- BETRÁN, C., and HUBERMAN, M. (2016): «International Competition in the First Wave of Globalization: New Evidence on the Margins of Trade». *The Economic History Review* 69 (1), pp. 258–287.
- BLISS, M. (1978): *A Canadian Millionaire: The Life and Business Times of Sir Joseph Flavelle, Bart., 1858–1939*. Toronto: Macmillan of Canada.
- BILL, A. (1988): *South America and the First World War. The Impact of the War on Brazil, Argentina, Peru and Chile*. Cambridge: Cambridge University Press.
- BULMER-THOMAS, V. (2003): *The Economic History of Latin America since Independence the Economic History of Latin America since Independence*. Cambridge: Cambridge University Press.



- CAPIE, F. (1978): «Australian and New Zealand Competition in the British Market 1920–39». *Australian Economic History Review* 18 (1), pp. 46–63.
- CLARK, G., HUBERMAN, M., and LINDERT, P. (1995): «A British Food Puzzle, 1770–1850». *The Economic History Review* 48 (2), pp. 215–237.
- COHEN, L. R. (1934): «Agricultural Reorganisation and Price Control». *The Economic Journal* 44 (175), pp. 968–975.
- DE BROMHEAD, A., FERNIHOUGH, A., LAMPE, M., and O'ROURKE, K. (2019a): «The Anatomy of a Trade Collapse: The UK, 1929–1933». *European Review of Economic History* 23 (2), pp. 123–144.
- DE BROMHEAD, A., FERNIHOUGH, A., LAMPE, M., and O'ROURKE, K. (2019b): «When Britain Turned Inward: The Impact of Interwar British Protection». *American Economic Review* 109 (2), pp. 325–352.
- DIMITRI, C. (2002): «Contract Evolution and Institutional Innovation: Marketing Pacific-Grown Apples from 1890 to 1930». *The Journal of Economic History* 62 (1), pp. 189–212.
- DUNCAN, R. (1963): «Imperial Preference: The Case of Australian Beef in the 1930s». *Economic Record* 39 (June), pp. 153–165.
- DUNCAN, R. (1984): «The Demand for Frozen Beef in the United Kingdom, 1880–1940». *Journal of Agricultural Economics* 15 (4), pp. 82–88.
- EICHENGREEN, B., and IRWIN, D. (1995): «Trade Blocs, Currency Blocs and the Reorientation of World Trade in the 1930s». *Journal of International Economics* 38 (1–2), pp. 1–24.
- ESTEVADEORDAL, A., BRIAN, F., and TAYLOR, A. (2003): «The Rise and Fall of World Trade, 1870–1939». *Quarterly Journal of Economics* 118 (2), pp. 1057–1106.
- FEDERICO, G. (2008): «The First European Grain Invasion: A Study in the Integration of the European Market 1750–1870». EUI Working Paper HEC No. 2008/01.
- FEDERICO, G. (2011): *Breve historia económica de la agricultura*. Zaragoza: Prensas Universitarias de Zaragoza.
- FEDERICO, G. (2012): «Natura Non Facit Saltus: The 1930s and the Discontinuity in the History of European Agriculture», in P. BRASSLEY, Y. SEGERS and L. VAN MOLLE (eds), *War, Agriculture and Food: Rural Europe from the 1930s to the 1950s*. London: Routledge, pp. 15–32.
- FEDERICO, G. (2021): «Commodity Market Integration» *Oxford Research Encyclopedia of Economics and Finance*.
- FEDERICO, G. and TENA, A. (2019): «World Trade, 1800–1938: a New Synthesis». *Revista de Historia Económica-Journal of Iberian and Latin America Economic History* 37 (1), pp. 9–41.
- GLICKMAN, D. (1947): «The British Imperial Preference System». *The Quarterly Journal of Economics* 61 (3), pp. 439–470.
- GOODWIN, B., GRENNES, J. T., and CRAIG, A. L. (2002): «Mechanical Refrigeration and the Integration of Perishable Commodity Markets». *Explorations in Economic History* 39 (2), pp. 154–182.
- GREASLEY, D., and OXLEY, L. (2009): «The Pastoral Boom, the Rural Land Market, and Long Swings in New Zealand Economic Growth, 1873–1939». *Economic History Review* 62 (2), pp. 324–349.
- GRIGG, D. (1995): «The Nutritional Transition in Western Europe». *Journal of Historical Geography* 21 (3), pp. 247–261.
- HARLEY, C. K. (1986): «Late Nineteenth Century Transportation, Trade and Settlement», in W. FISHER, R. M. McINNIS and J. SCHNEIDER (eds), *The Emergence of a World Economy, 1500–1914, part II, 1850–1914*. Wiesbaden: Franz Steiner Verlag, pp. 593–618.

- HARLEY, C. K. (2008): «Steers Afloat: The North Atlantic Meat Trade, Liner Predominance, and Freight Rates, 1870–1913». *Journal of Economic History* 68 (4), pp. 1028–1058.
- HAYAMI, Y., and RUTTAN W. V. (1985): *Agricultural Development: An International Perspective*. Baltimore: Hopkins University Press.
- HIGGINS, D. (2004): «'Mutton Dressed As Lamb?' The Misrepresentation of Australian and New Zealand Meat in the British Market, c. 1890–1914». *Australian Economic History Review* 44 (2), pp. 161–184.
- HIGGINS, D., and MORDHORST, M. (2015): «Bringing Home the 'Danish' Bacon: Food Chains, National Branding and Danish Supremacy over the British Bacon Market, c. 1900–1938». *Enterprise and Society* 16 (1), pp. 141–185.
- HUBERMAN, M., MEISSNER, C., and OOSTERLINCK, K. (2017): «Technology and Geography in the Second Industrial Revolution: New Evidence from the Margins of Trade». *Journal of Economic History* 77 (1), pp. 39–89.
- HUTTMAN, J. (1978): «British Meat Imports In the Free Trade Era». *Agricultural History* 2 (52), pp. 247–262.
- HYNES, W., JACKS, S. D., and O'ROURKE, K. (2012): «Commodity Market Disintegration in the Interwar Period». *European Review of Economic History* 16 (2), pp. 119–143.
- IRWIN, D. A. (2002): «Long-Run Trends in World Trade and Income». *World Trade Review* 1 (1), pp. 89–100.
- JACKS, D. S. (2005): «Intra- and International Commodity Market Integration in the Atlantic Economy, 1800–1913». *Explorations in Economic History* 42 (3), pp. 381–413.
- JACKS, D. S., MEISSNER, C., and NOVY, D. (2008): «Trade Costs, 1870–2000». *American Economic Review* 98 (2), pp. 529–534.
- LAMPE, M., and SHARP, P. (2019): *A Land of Milk and Butter: How Elites Created the Modern Danish Dairy Industry*. Chicago: University of Chicago Press.
- LIEPMANN, H. (1938): *Tariff Levels and the Economic Unity of Europe*. London: George Allen & Unwin.
- LLUCH, A. (2015): «Politics of Regulation on Natural Resources and Food Commodities in Latin America: The Beef Export Trade and Meat Packing Industry in Argentina (c. 1890–1939)» Session Regulation of Natural Resources 1850–2000, Global Perspectives. WEHC 2015, 17th World Economic History Congress, Japan, Kyoto, 3–7 August.
- LÓPEZ-CÓRDOVA, J. E., and MEISSNER, C. (2003): «Exchange-Rate Regimes and International Trade: Evidence from the Classical Gold Standard Era». *American Economic Review* 1 (93), pp. 344–353.
- MADSEN, J. (2001): «Trade Barriers and the Collapse of World Trade During the Great Depression». *Southern Economic Journal* 4 (67), pp. 848–868.
- MARTÍNEZ-CARRIÓN, J. M. (2016): «Living Standards, Nutrition and Inequality in the Spanish Industrialisation. An Anthropometric View». *Revista de Historia Industrial* 2 (64), Monográfico, pp. 11–50.
- MCFALL, J. R. (1927): *The World's Meat*. California: D. Appleton.
- O'ROURKE, K., and FINDLAY, R. (2007): *Power and Plenty. Trade, War and the World Economy in the Second Millennium*. Princeton: Princeton University Press.
- O'ROURKE, K., and WILLIAMSON, J. G. (1999): *Globalization and History Globalization and History: The Evolution of a Nineteenth-Century Atlantic Economy*. London: MIT Press.
- O'ROURKE, K., and WILLIAMSON, J. G. (2002): «When Did Globalisation Begin?». *European Review of Economic History* 6 (1), pp. 23–50.

- OCAMPO, J. A., and PARRA-LANCOURT, M. (2010): «The Terms of Trade for Commodities since the Mid-19th Century». *Revista de Historia Económica/Journal of Iberian and Latin American Economic History* 28 (1), pp. 11–43.
- ODDY, J. D. (2007): «The Growth of Britain's Refrigerated Meat Trade, 1880–1939». *Mariners Mirror* 93 (3), pp. 269–280.
- ODDY, J. D. (2013): «From Roast to Beef to Chicken Nuggets: How Technology Changed Meat Consumption in Britain in the Twentieth Century», in A. DROUARD and J. R. ODDY (eds), *The Food Industries of Europe in the Nineteenth and Twentieth Centuries*. England: Ashgate, pp. 231–246.
- OLMSTEAD, A. L. A., and RHODE, P. W. (2015): *Arresting Contagion: Science, Policy, and Conflicts over Animal Disease Control*. Cambridge, London: Harvard University Press.
- OTTER, C. (2012): «The British Nutrition Transition and Its Histories». *History Compass* 10 (11), pp. 812–825.
- PERREN, R. (1971): «The North American Beef and Cattle Trade with Great Britain, 1870–1914». *The Economic History Review* 24 (3), pp. 430–444.
- PERREN, R. (1975): «The Meat and Livestock Trade in Britain, 1850–70». *The Economic History Review* 28 (3), pp. 385–400.
- PERREN, R. (1978): *The Meat Trade in Britain, 1840–1914*. London: Routledge and Kegan Paul.
- PERREN, R. (1995): *Agriculture in Depression*. Cambridge: Cambridge University Press.
- PERREN, R. (2005): «Farmers and Consumers Under Strain: Allied Meat Supplies in the First World War». *Agricultural History Review* 53 (2), pp. 212–228.
- PERREN, R. (2006): *Taste, Trade and Technology: The Development of the International Meat Industry since 1840*. England: Ashgate.
- PINILLA, V., and APARICIO, G. (2019): «International Trade in Wheat and Other Cereals and the Collapse of the First Wave of Globalization, 1900–38». *Journal of Global History* 14 (1), pp. 44–67.
- PINILLA, V., and AYUDA, M. I. (2010): «Taking Advantage of Globalization?: Spain and the Building of the International Market in Mediterranean Horticultural Products, 1850–1935». *European Review of Economic History* 14 (2), pp. 239–274.
- PINILLA, V., and RAYES, A. (2019): «How Argentina Became a Super-Exporter of Agricultural and Food Products during the First Globalisation (1880–1929)». *Cliometrica* 13 (3), pp. 443–469.
- POPKIN, B. (1993): «Nutritional Patterns and Transitions». *Population and Development Review* 19 (1), pp. 138–157.
- PUTNAM, G. (1923): *Supplying Britain's Meat*. London: G.G. Harrap.
- RAYES, A. (2015): «Destinadas a un destino: los inicios de las exportaciones Argentinas de carnes frigoríficas, 1883–1913». *Estudios Interdisciplinarios de América Latina y el Caribe* 26 (1), pp. 7–30.
- ROOTH, T. (1985): «Trade Agreements and the Evolution of British Agricultural Policy in the 1930s». *The Agricultural History Review* 33 (2), pp. 173–190.
- SCANIELLO, A. J. (2018): «Technological Change and Productivity Growth in the Agrarian Systems of New Zealand and Uruguay (1870–2010)», in V. PINILLA and H. WILLEBALD (eds), *Agricultural Development in the World Periphery. A Global Economic History Approach*. London: Palgrave, pp. 467–492.
- SCHOTT, P. K. (2009): «US Trade Margins during the 2008 Crisis», in R. BALDWIN (ed), *The Great Trade Collapse: Causes, Consequences and Prospects*. London: VoxEU, pp. 127–142.
- SESTO, C. (2002): «La formación del mercado de novillos en pie argentino y la incorporación al mercado de carnes británico 1889–1900». *Iberoamericana. Nordic Journal of Latin American and Caribbean Studies* 32 (1), pp. 73–110.

- STONE, R. (1954): *The Measurement of Consumers' Expenditure and Behavior in the United Kingdom, 1920–1938 (Volume 1)*. Cambridge: Cambridge at the University Press.
- TENA, A., and WILLEBALD, H. (2013): «On the Accuracy of Export Growth in Argentina, 1870–1913». *Economic History of Developing Regions* 28 (1), pp. 28–68.
- TIMOSHENKO, V. (1933): *World Agriculture and the Depression*. Michigan: Ann Arbor.
- TROUBRIDGE, C. J. (1912): *A History of the Frozen Meat Trade: An Account of the Development and Present Day Methods of Preparation, Transport, and Marketing of Frozen and Chilled Meats*. London: Constable & Co.
- WOODS, R. (2012): «Breed, Culture, and Economy: The New Zealand Frozen Meat Trade, 1880–1914». *Agricultural History Review* 60 (2), pp. 288–308.
- YATES, P. L. (1959): *Forty Years of Foreign Trade*. London: Allen & Unwin.
- YATES, P. L. (1960): *Food, Land and Manpower in Western Europe*. London: MacMillan.
- ZIMMERMAN, D. (1962): «Live Cattle Export Trade between United States and Great Britain, 1868–1885». *Agricultural History* 36 (1), pp. 46–52.