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Tesis Doctoral

MEAT CONSUMPTION AND TRADE IN HISTORICAL PERSPECTIVE

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MEAT CONSUMPTION AND TRADE IN HISTORICAL PERSPECTIVE

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Resumen

El estudio de la carne, tanto en términos de su consumo como de su comercio, ha sido objeto de extensa investigación en la historia económica. Por un lado, el aumento de su consumo ha estado tradicionalmente asociado con una mejora en el bienestar, debido a su aporte de proteínas de alta calidad. Además, el incremento en el comercio de carne a nivel global ha estado vinculado a una mayor integración de los mercados, especialmente gracias a la innovación de la refrigeración mecánica. Por otro lado, especialmente en las últimas décadas, el exceso en el consumo de carne se asocia a diversas enfermedades cardiovasculares y su comercio se vincula problemas medioambientales derivados de la intensificación de la producción ganadera.

Estas dos connotaciones, una positiva y otra negativa, se reflejan con claridad en el caso español. Históricamente, España ha mantenido un nivel de consumo y exportaciones de carne relativamente bajo en comparación con otros países desarrollados. No obstante, a partir de la década de 1960, experimentó una transformación significativa, con un aumento sustancial en la producción, consumo y, posteriormente, exportaciones de carne que conllevó problemas de salud y desafíos ambientales.

En este contexto, la tesis se divide en dos partes centrales. La primera se enfoca en el consumo de carne en España desde la segunda mitad del siglo XX hasta la actualidad. En esta sección, compuesta por tres capítulos, se explora la evolución del consumo de carne a nivel nacional y se analizan las disparidades en el acceso a la carne según los ingresos y las regiones. Además, se investigan los factores que influyen en el consumo de carne, como los ingresos, los precios y las preferencias.

La segunda parte se concentra en el comercio de carne y se compone de un capítulo internacional que examina la evolución del comercio de carne a nivel mundial desde el siglo XIX hasta la Segunda Guerra Mundial. En este capítulo, se subraya el papel crucial de la refrigeración mecánica en la expansión del comercio de carne a larga distancia. El último capítulo analiza los determinantes de las exportaciones de carne española desde la segunda mitad del siglo XX hasta la actualidad, explorando cómo España pasó de ser un importador neto de carne a convertirse en un destacado exportador, especialmente en el caso de la carne de cerdo. Se utiliza un modelo de gravedad para investigar si el crecimiento del mercado interno en España y la adhesión a la Unión Europea influyeron en las exportaciones de carne.

Abstract

The study of meat, both concerning its consumption and trade, has been the subject of extensive research in economic history. On one hand, the increase in meat consumption has traditionally been associated with improved well-being due to its high-quality protein content. Furthermore, the growth in global meat trade has been linked to greater market integration, especially owing to the innovation of mechanical refrigeration. On the other hand, especially in recent decades, excessive meat consumption is associated with various cardiovascular diseases, and its trade is linked to environmental issues stemming from intensified livestock production.

These two connotations, one positive and one negative, are clearly reflected in the case of Spain. Historically, Spain has maintained relatively low levels of meat consumption and exports compared to other developed countries. However, starting in the 1960s, it underwent a significant transformation, with a substantial increase in meat production, consumption, and subsequent exports, leading to health issues and environmental challenges.

In this context, this dissertation is divided into two central parts. The first part focuses on meat consumption in Spain from the second half of the 20th century to the present. This section, consisting of three chapters, explores the evolution of meat consumption at the national level and analyzes disparities in meat access based on income and regions. It also investigates factors influencing meat consumption, such as income, prices, and preferences.

The second part centers on meat trade and consists of an international chapter that examines the evolution of global meat trade from the 19th century to the Second World War. In this chapter, the crucial role of mechanical refrigeration in expanding long-distance meat trade is emphasized. The final chapter analyzes the determinants of Spanish meat exports from the second half of the 20th century to the present, exploring how Spain shifted from being a net meat importer to becoming a prominent exporter, especially in the case of pork. A gravity model is used to investigate whether domestic market growth in Spain and European Union membership influenced meat exports.

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INTRODUCCIÓN

El consumo y el comercio de carne han sido dos temas ampliamente estudiados en historia económica (Perren, 2006). De hecho, el estudio en el largo plazo de ambos enfoques permite observar dos connotaciones muy distintas. La primera es positiva con respecto al bienestar y al crecimiento económico: por un lado, desde épocas pre industriales hasta bien entrados en la segunda mitad del siglo XX, un mayor consumo de carne se suele asociar con un mayor nivel de bienestar (medido, por ejemplo, antropométricamente) debido a una mayor ingesta de proteínas de alto valor biológico (Vecchi and Coppola, 2006; Magnan, 2012; Otter, 2012; Scrinis, 2013; Stolz, Baten and Reis, 2013; Gazeley and Newell, 2015). Por otro lado, el incremento en el comercio global de carne desde finales del siglo XIX se asocia con una mayor integración mundial de los mercados debido a la invención y difusión de una innovación como es la refrigeración mecánica (Duncan, 1962; Perren, 1975; O'Rourke and Williamson, 1999; Oddy, 2007; Harley, 2008; Pinilla and Rayes, 2019). La segunda connotación es claramente negativa. A saber, a partir de la segunda mitad del siglo XX, el exceso en el consumo de carne está asociado a diversos problemas de salud tales como enfermedades cardiovasculares, obesidad y diabetes (Popkin, 2009; WHO, 2021). Además, el fuerte incremento en el comercio de carne en las últimas décadas se asocia a un incremento en la producción debido al fomento de la ganadería intensiva, y, por ende, a los problemas medioambientales que ello genera (Ilea, 2009; Willett *et al.*, 2019).

El caso español es perfectamente ilustrativo de ambas connotaciones. Históricamente, el consumo de carne (así como de leche u otros productos ganaderos) ha sido relativamente bajo con respecto al resto de países desarrollados (Cussó Segura, 2005; Gallego, 2016). Como país mediterráneo, gran parte de la dieta en España a principios del siglo XX se basaba en productos como el pan, legumbres, pescado, vino, ciertas frutas y hortalizas, etc. (Garrabou Segura and Cussó Segura, 2007). Por lo tanto, aunque con diversidad regional (Domínguez Martin, 1996; Nicolau-Nos and Pujol Andreu, 2006; Cussó Segura and Pujol Andreu, 2016), el peso de la carne en la dieta era relativamente bajo en la primera mitad del siglo XX. A pesar de la mitificación posterior de la dieta mediterránea (DuPuis, 2016), la realidad es que grandes grupos poblacionales padecían malnutrición en España con dicha dieta (Cussó Segura, 2005; Pujol Andreu and Cussó Segura, 2014). No obstante, a partir de la década de 1960, la dieta en España cambió completamente. De este modo, en línea con una profunda transformación económica que convertía a España

en un país desarrollado, el consumo de carne y otros productos ganaderos como la leche o los huevos creció significativamente (Clar, 2008; Collantes, 2014). En otras palabras, la dieta en el país se alejaba de patrones mediterráneos y se occidentalizaba (Moreno, Sarría and Popkin, 2002). En consecuencia, a partir de los años 70 y 80 del siglo XX, al igual que en la actualidad, los problemas de malnutrición en España ya no se relacionaban con una ingesta baja de carne, sino por el exceso en su consumo. Por lo tanto, a pesar de que la tendencia en el consumo de carne está en proceso de ligera caída, su consumo actual todavía excede las recomendaciones máximas (Varela-Moreiras *et al.*, 2010; Ruiz *et al.*, 2016). Además, este exceso en el consumo de carne está relacionado con la prevalencia de enfermedades no infecciosas en el país, tales como la obesidad o la diabetes (Cerrillo *et al.*, 2023).

Volviendo de nuevo a la primera mitad del siglo XX, el bajo consumo de carne en España implicaba una baja producción de dicho producto (siempre en términos comparativos con el resto de países desarrollados), y, por tanto, unas exportaciones también reducidas (Clar, Serrano and Pinilla, 2015). La producción de carne, caracterizada entonces por una ganadería de tipo extensivo, era sostenible y energéticamente eficiente (Rodríguez Zúñiga, 1980; Ríos-Núñez and Coq-Huelva, 2015; González de Molina *et al.*, 2017). Además, a nivel regional, la producción se situaba en aquellas zonas del país, como por ejemplo la región del norte, con unas condiciones agroclimáticas idóneas para ello (Domínguez Martin, 1996; Collantes, 2015b). Sin embargo, de nuevo a partir de la década de 1960, los sistemas de producción ganadera en España cambiaron radicalmente (Langreo, 2008; Clar, Martín-Retortillo and Pinilla, 2018). Ante una demanda creciente de proteínas debido al crecimiento de la renta per cápita y las tasas de urbanización, la oferta cárnica del momento no podía satisfacer la demanda debido a la baja productividad del sector (Clar, 2005, 2022). Esto implicó la crisis de la ganadería tradicional (Simpson, 1995; Domínguez Martín, 2001b) y la posterior implantación del modelo *agribusiness* en el sector cárnico español (Clar, 2008, 2013). Es decir, la producción cárnica se industrializó, por lo que ya no se ubicaba en aquellas zonas con una ventaja comparativa en la producción ganadera, sino en grandes centros de consumo y zonas donde existía un dinamismo previo en el desarrollo de empresas de pienso, entre otros factores (Langreo, 2008). Además, este nuevo modelo implicaba una importación masiva de pienso, la introducción de razas más productivas (en detrimento de razas autóctonas) y de empresas foráneas (Domínguez Martín, 2001a; Clar, 2010)

El modelo *agribusiness* también implicó un fuerte incremento en la productividad del sector, reforzado a su vez por unas fuertes economías de escala. Por lo tanto, la fuerte demanda podía satisfacerse ahora debido a la intensificación de la producción ganadera (Ríos-Núñez and Coq-Huelva, 2015). Por lo tanto, y retomando ahora la perspectiva del comercio, una vez España se adhirió a la Unión Europea y la peste porcina se erradicó, las exportaciones cárnicas crecieron bruscamente en los años 90, hasta el punto que, en 2020, España se convirtió en el primer exportador mundial de carne de cerdo (Serrano *et al.*, 2015; Clar, 2022). Sin embargo, a pesar del claro éxito español en la conquista de los mercados mundiales de carne, es evidente que dicho proceso ha tenido importantes costes ambientales (González de Molina *et al.*, 2020).

En este contexto, la presente tesis es un análisis del recorrido histórico de un producto agroalimentario concreto: la carne. Dicho análisis se hace desde dos perspectivas distintas, pero, como se ha ido evidenciando hasta ahora, muy relacionadas: el consumo y el comercio. Aunque uno de los capítulos (el cuarto) adopta una perspectiva internacional y el marco temporal se ubica entre el siglo XIX y la Segunda Guerra Mundial, el resto de la tesis se centra en España desde la segunda mitad del siglo XX hasta la actualidad.[1] Dicho marco temporal permite ver lo desarrollado hasta ahora: como un país mediterráneo en los años 50, con un consumo bajo de carne e importador neto de dicho producto, pasa a ser en los años 80 y 90 uno de los mayores consumidores de Europa, y, posteriormente, el mayor exportador mundial de carne de cerdo. Aunque las connotaciones, primero positivas y después negativas, a nivel de salud y de medioambiente, en la evolución del consumo y comercio de carne en el largo plazo no toman un aspecto protagonista en la tesis, dotan de importancia al trabajo y lo contextualizan en los grandes debates actuales.

La primera parte de la tesis está formada por los tres primeros capítulos y se centra en el consumo de carne. El objetivo de esta primera parte es doble. El primero adopta un punto de vista descriptivo. A saber, trata de describir las principales tendencias en el consumo de carne en España con diversas fuentes desde la segunda mitad del siglo XX hasta la actualidad. Esto se hace desde una perspectiva nacional (capítulo primero) y por

[1] En realidad, la mayor parte de la tesis suele tomar como último año de referencia 2019. Esto se debe a la posterior crisis del COVID-19, ya que esta ha sido un shock suficientemente importante como para romper las tendencias en el consumo y comercio de las últimas décadas.

desigualdades a nivel de renta y regiones dentro del país (capítulo segundo). El segundo objetivo de esta primera parte trata de aportar un punto de vista más causal. Es decir, en el capítulo tercero se analiza el papel de la renta, precios y preferencias en la etapa de masificación del consumo de carne en el país (1958-1990). En esta primera parte de la tesis está siempre presente la comparación con otro producto clave en la transición nutricional: los lácteos.

La segunda parte está compuesta por los capítulos cuarto y quinto y trata de analizar el comercio de carne. Como se ha mencionado, el capítulo cuarto adopta un punto de vista internacional. En este, se analiza de forma descriptiva la formación, evolución y consolidación del mercado mundial de carne y ganado vivo entre el siglo XIX y la segunda guerra mundial. Por último, el capítulo quinto, que da cierre a la presente tesis, trata de investigar qué determinantes explican las exportaciones de carne en España desde la segunda mitad del siglo XX hasta la actualidad. Por lo tanto, en la parte relacionada con el comercio, también encontramos un capítulo descriptivo (capítulo cuarto) y uno causal (capítulo quinto).

El análisis de dos partes importantes de la cadena de valor de la carne (consumo y comercio), junto con dos marcos temporales distintos (primera globalización y segunda), y una perspectiva nacional e internacional, permiten observar y comparar la evolución de ciertos patrones históricos. En primer lugar, el capítulo 4 muestra como la revolución industrial británica generó grandes cambios en las sociedades a nivel global. A saber, el incremento de la renta en la sociedad británica implicó un fuerte aumento en la demanda de carne, llevandose a cabo de este modo la transición nutricional. Dicho aumento en la demanda no podía ser satisfecho por la oferta doméstica, por lo que, al tratarse del país líder, las importaciones de carne aumentaron masivamente desde finales del siglo XIX. De este modo, cambios en la dieta británica fomentaron un patrón clásico de la primera globalización: un incremento en el comercio de alimentos desde la periferia (formada principalmente por Argentina, Uruguay, Australia y Nueva Zelanda) al núcleo industrial (O'Rourke and Findlay, 2007). De este modo, se observa claramente las relaciones directas entre consumo y comercio. En segundo lugar, el caso español a partir de la segunda mitad del siglo XX muestra patrones comparables pero distintos al caso británico. Por un lado, la tardía culminación de la transición nutricional española implicó grandes cambios en la producción. A saber, el incremento en la demanda de carne implicó la creación de grandes economías de escala en el sector para satisfacer dicha demanda.

No obstante, a diferencia de Inglaterra, España no importó masivamente carne desde la periferia, sino que, por el contrario, se convirtió en un gran exportador. Por lo tanto, la relación consumo-comercio en este caso es distinta. Además, esta relación reproduce patrones estilizados de la segunda globalización. Es decir, la exportación de carne de España hacia Europa muestra el incremento en el comercio entre países desarrollados. Por otro lado, el gran incremento de China en las importaciones de carne españolas, se explica principalmente porque dicho país está culminando su transición nutricional. En consecuencia, el comercio internacional durante la segunda globalización es más complejo que en la primera, ya que se pasa de un monopsonio en las importaciones globales a una diversificación en el comercio, donde la carne se exporta entre países con similares y distintos niveles de desarrollo.

En el capítulo 1, a modo introductorio de la parte del consumo de la tesis, el principal objetivo es analizar de forma descriptiva la evolución del consumo medio de carne en España desde la segunda mitad del siglo XX hasta la actualidad. Para ello, se reúnen datos de varias fuentes: las encuestas de presupuestos familiares, el panel de consumo alimentario, la FAO y los balances alimentarios del ministerio. Además, esto se hace desagregando por tipos de carne (vacuno, ovino, pollo, cerdo, carne fresca, congelada y procesada). Cuando se reúnen y se presentan de forma conjunta todos los datos de dichas fuentes, uno rápidamente se da cuenta de que, a partir de los años 80, hay una clara divergencia entre los datos de las encuestas y el panel y los datos de la FAO. Las dos primeras fuentes muestran un crecimiento en el consumo de carne entre los años 50 y los años 80, para después estancarse y posteriormente iniciar un ligero descenso que dura hasta nuestros días. En cambio, la FAO muestra un crecimiento continuo de carne desde los años 50 hasta aproximadamente 2010. Esta divergencia entre ambas fuentes también es visible en la literatura. A saber, algunos trabajos consideran que el consumo de carne ha crecido de forma ininterrumpida desde los años 60 y otros trabajos consideran que a partir de los años 90 hubo una saturación en el consumo. Analizando en profundizad todas las fuentes, un primer objetivo secundario del trabajo es reconciliar ambas perspectivas. El segundo objetivo secundario del capítulo es diferenciar dos modelos distintos de consumo alimentario. El primer modelo de consumo estaría caracterizado por una creciente ingesta calórica basada en el consumo de carne estandarizada (carne de pollo y cerdo). El segundo estaría caracterizado por una caída en el consumo de carne y un incremento en el consumo de carne procesada y con un mayor grado de diferenciación.

Una vez se ha descrito el consumo de carne a nivel medio en España desde la segunda mitad del siglo XX utilizando varias fuentes, el principal objetivo del segundo capítulo es describir las desigualdades en el consumo de carne en España en el mismo marco temporal. Concretamente, utilizando las encuestas de presupuestos familiares y el panel de consumo alimentario, se presentan una serie de datos homogéneos sobre las desigualdades por renta (cuartiles) y regiones dentro de España (divididas en norte, interior, mediterráneo y Andalucía) en el acceso a la carne. Lo que se observa es que, en los años 60, existían grandes desigualdades en el consumo de carne a nivel de renta y, en menor medida, por regiones. En cambio, en línea con el fuerte incremento en el consumo de carne hasta los años 90, las desigualdades desaparecen tanto por niveles de renta como por regiones. Sin embargo, a partir de la entrada en el siglo XXI, las desigualdades por renta vuelven a aparecer (aunque de forma menos acusada) en el consumo. La hipótesis que se plantea es que estas nuevas desigualdades se explican por el incremento en el consumo medio de carne procesada y más elaborada, ya que el precio de estas es relativamente más alto. Además de esto, un objetivo secundario del artículo es plantear si las tendencias en el consumo de carne se ajustan a dos modelos distintos de consumo alimentario. Es decir, se amplía la definición de modelos de consumo alimentario planteados en el capítulo primero y se discute cómo encaja en el caso de la carne.

El tercer capítulo tiene como principal objetivo analizar los determinantes del consumo de carne en España entre los años 50 y los años 90. Es decir, en el periodo donde el consumo se masificó entre todas las clases sociales, regiones y territorios del país, tratar de explicar cómo se suavizó la restricción presupuestaria para el consumo de carne y sus determinantes. Dichos determinantes se basan en la renta (capacidad de demanda), precios (capacidad de oferta) y preferencias. Para ello, en este caso se utilizan solamente las encuestas de presupuestos familiares de los años 1958, 1964/65, 1980/81 y 1990/91. Se observa que, en función del tipo de carne, la oferta juega un papel crucial en la masificación del consumo de carne. Además, se observa como la emigración rural-urbana y los patrones históricos regionales de consumo han sido determinantes clave para la formación de preferencias en el medio y largo plazo.

En la segunda parte de la tesis, relacionada con el comercio de carne, el capítulo cuarto trata de describir la evolución del comercio de carne mundial entre el siglo XIX y la década de los años 30. Para ello, se utilizan a nivel cuantitativo los datos proporcionados por el Instituto Internacional de Agricultura y las estadísticas de comercio exterior de

Gran Bretaña. A nivel cualitativo, se utilizan diversas fuentes secundarias de la época. Todo el análisis, que se hace a nivel de volumen, valor y precios, gira entorno a dos cuestiones. La primera es la importancia que tuvo la difusión de la refrigeración mecánica para el transporte de carne en largas distancias. Es decir, para que aquellas regiones, como Argentina, Uruguay, Nueva Zelanda y Australia, con ventaja comparativa para la producción y exportación de carne pudieran entrar en las dinámicas del comercio internacional. La segunda cuestión es la importancia de Gran Bretaña como monopsonio absoluto en la importación mundial de carne.

Como capítulo final de la tesis, el capítulo 5 vuelve al caso español. En este, se intenta analizar los determinantes de las exportaciones de carne españolas desde la segunda mitad del siglo XX hasta el presente. Es decir, se busca comprender desde un punto de vista cuantitativo, como España pasó de ser un importador neto de carne en los años 80 a conquistar los mercados internacionales en las últimas décadas, especialmente con la carne de cerdo. Para ello, se utiliza como herramienta metodológica el modelo de gravedad y COMTRADE como principal fuente de datos. Además, se intenta profundizar de forma cuantitativa en dos aspectos. El primero es si ha ocurrido un proceso de *Home Market Effect*. Es decir, analizar si el fuerte incremento en el consumo de carne entre los años 60 y 90, observado en los capítulos 1-3, implicó la creación de grandes economías de escala en el sector que lo hicieron altamente competitivo para conquistar los mercados mundiales posteriormente. La segunda cuestión a profundizar es cuantificar el impacto de la entrada de España en la Unión Europea en las exportaciones de carne. De este modo, este último capítulo permite conectar la parte del consumo y comercio de carne en España desde la segunda mitad del siglo XX hasta el presente.

Se debe tener presente que varios capítulos de la presente tesis están o bien publicados o bien en proceso de publicación. Por lo tanto, han sido sometidos a varias revisiones por pares que han ido modificando el contenido de estos, aunque manteniendo siempre sus objetivos principales.

El capítulo 1, titulado "*From Affluence to Processed Food: Evolution of Meat Consumption in Spain since the Second Half of the 20th Century*" está aceptado en la revista Historia Agraria: revista de agricultura e historia social. Actualmente se encuentra disponible en *early view*.

El capítulo 2, titulado "*Food consumption models and unequal access to meat: the case of Spain (1964-2018*)", está aceptado en la revista *Agricultural History Review*. Actualmente se encuentra en proceso de edición para su posterior publicación. En este artículo, Adrián Espinosa-Gracia participa como coautor.

El capítulo 4, titulado "*A Different Product? The Formation and Expansion of the International Meat and Live Cattle Market (1850-1939)*" está publicado en la Revista de Historia Economica / *Journal of Iberian and Latin American Economic History* y puede consultarse en Open Access. El artículo está en coautoría con Vicente Pinilla y Gema Aparicio.

INTRODUCTION

The consumption and trade of meat have been extensively studied topics in economic history (Perren, 2006). In fact, examining both aspects in the long term reveals two distinct connotations. The first connotation is positive in terms of well-being and economic growth: on the one hand, from pre-industrial times until well into the second half of the 20th century, increased meat consumption is generally associated with a higher level of well-being (measured, for example, anthropometrically) due to a greater intake of high-quality protein (Vecchi and Coppola, 2006; Magnan, 2012; Otter, 2012; Scrinis, 2013; Stolz, Baten, and Reis, 2013; Gazeley and Newell, 2015). On the other hand, the rise in global meat trade since the late 19th century is associated with greater global market integration, resulting from the invention and diffusion of an innovation such as mechanical refrigeration (Duncan, 1962; Perren, 1975; O'Rourke and Williamson, 1999; Oddy, 2007; Harley, 2008; Pinilla and Rayes, 2019).

The second connotation is clearly negative. Specifically, starting from the second half of the 20th century, excessive meat consumption is associated with various health problems such as cardiovascular diseases, obesity, and diabetes (Popkin, 2009; WHO, 2021). Furthermore, the significant increase in meat trade in recent decades is linked to increased production due to the promotion of intensive livestock farming and, consequently, the environmental issues it generates (Ilea, 2009; Willett et al., 2019).

The Spanish case is perfectly illustrative of both connotations. Historically, meat consumption (as well as dairy and other livestock products) has been relatively low compared to other developed countries (Cussó Segura, 2005; Gallego, 2016). As a Mediterranean country, a significant part of the diet in Spain at the beginning of the 20th century was based on products such as bread, legumes, fish, wine, certain fruits, and vegetables (Garrabou Segura and Cussó Segura, 2007). Therefore, despite regional diversity (Domínguez Martin, 1996; Nicolau-Nos and Pujol Andreu, 2006; Cussó Segura and Pujol Andreu, 2016), the role of meat in the diet was relatively low in the first half of the 20th century. Despite the subsequent mythification of the Mediterranean diet (DuPuis, 2016), the reality was that large population groups in Spain suffered from malnutrition with such a diet (Cussó Segura, 2005; Pujol Andreu and Cussó Segura, 2014).

However, from the 1960s onward, the diet in Spain underwent a complete transformation. In line with a profound economic transformation that turned Spain into a developed

country, the consumption of meat and other livestock products such as milk or eggs grew significantly (Clar, 2008; Collantes, 2014). In other words, the diet in the country moved away from Mediterranean patterns and became more Westernized (Moreno, Sarría, and Popkin, 2002). Consequently, from the 1970s and 1980s onward, as well as in the present day, malnutrition issues in Spain were no longer associated with low meat intake but rather with excessive consumption. Therefore, despite the slight downward trend in meat consumption, current consumption still exceeds the maximum recommendations (Varela-Moreiras et al., 2010; Ruiz et al., 2016). Furthermore, this excessive meat consumption is linked to the prevalence of non-communicable diseases in the country, such as obesity or diabetes (Cerrillo et al., 2023). Returning once again to the first half of the 20th century, the low meat consumption in Spain implied a low production of this product (in comparative terms with other developed countries) and, therefore, also reduced exports (Clar and Pinilla, 2015). Meat production, characterized at that time by extensive livestock farming, was sustainable and energy-efficient (Rodríguez-Zúñiga, 1980; Ríos-Núñez and Coq-Huelva, 2015; González de Molina et al., 2017). Furthermore, at the regional level, production was concentrated in areas of the country, such as the northern region, with favorable agroclimatic conditions for it (Domínguez Martin, 1996; Collantes, 2015b). However, once again, from the 1960s onwards, livestock production systems in Spain underwent radical changes (Langreo, 2008; Clar, Martín-Retortillo, and Pinilla, 2018). Faced with a growing demand for proteins due to per capita income growth and urbanization rates, the meat supply at the time could not meet the demand due to the low productivity of the sector (Clar, 2005, 2022). This led to the crisis of traditional livestock farming (Simpson, 1995; Domínguez Martín, 2001b) and the subsequent implementation of the agribusiness model in the Spanish meat sector (Clar, 2008, 2013). In other words, meat production became industrialized, no longer located in areas with a comparative advantage in livestock production but in major consumption centers and areas where there was prior dynamism in the development of feed companies, among other factors (Langreo, 2008). Additionally, this new model involved massive imports of animal feed, the introduction of more productive breeds (at the expense of native breeds), and foreign companies (Domínguez Martín, 2001a; Clar, 2010).

The agribusiness model also involved a significant increase in sector productivity, reinforced by strong economies of scale. Therefore, the high demand could now be met due to the intensification of livestock production (Ríos-Núñez and Coq-Huelva, 2015).

Thus, shifting the focus back to trade, once Spain joined the European Union and swine fever was eradicated, meat exports experienced a sharp growth in the 1990s, to the point that Spain became the world's leading exporter of pork in 2020 (Serrano et al., 2015; Clar, 2022). However, despite Spain's clear success in conquering global meat markets, it is evident that this process has come with significant environmental costs (González de Molina et al., 2020).

In this context, the present dissertation is an analysis of the historical trajectory of a specific agricultural product: meat. This analysis is conducted from two distinct yet interconnected perspectives: consumption and trade. While one of the chapters (Chapter 4) adopts an international perspective, covering the period from the 19th century to World War II, the rest of the thesis focuses on Spain from the second half of the 20th century to the present day.[2] This temporal framework allows us to observe what has been explained so far: how a Mediterranean country like Spain, in the 1950s with low meat consumption and a net importer of the product, became one of the largest consumers in the 1980s and 1990s in Europe, and subsequently, the world's top pork exporter. Although the long-term connotations, initially positive and later negative, regarding health and the environment, do not take a prominent role in the thesis, they add significance to the work and contextualize it within the current major debates.

The first part of the dissertation consists of the first three chapters and focuses on meat consumption. The objective of this first part is twofold. The first objective takes a descriptive standpoint. It aims to describe the main trends in meat consumption in Spain using various sources from the second half of the 20th century to the present day. This is done from a national perspective (first chapter) and by examining income and regional disparities within the country (second chapter). The second objective of this first part is to provide a more causal perspective. In other words, the third chapter analyzes the role of income, prices, and preferences during the period of mass consumption of meat in the country (1958-1990). Throughout this first part of the thesis, there is always a comparison with another key product in the nutritional transition: dairy consumption.

[2] In fact, the majority of the thesis usually takes 2019 as the last reference year. This is due to the subsequent COVID-19 crisis, as it has been a significant shock that has disrupted the trends in consumption and trade of the past decades.

The second part consists of the fourth and fifth chapters and focuses on analyzing meat trade. As mentioned before, the fourth chapter takes an international perspective. It provides a descriptive analysis of the formation, evolution, and consolidation of the global market for meat and live animals from the 19th century to World War II. Finally, the fifth chapter, which concludes the present dissertation, investigates the determinants that explain meat exports in Spain from the second half of the 20th century to the present day. Therefore, in the section related to trade, we also find a descriptive chapter (fourth chapter) and a causal one (fifth chapter).

The analysis of two significant components of the meat value chain (consumption and trade), coupled with two distinct temporal frameworks (first globalization and second), and a national and international perspective, allows for the observation of the evolution of certain historical patterns. Firstly, Chapter 4 illustrates how the British Industrial Revolution instigated profound changes in societies on a global scale. Namely, the rise in income within British society led to a substantial increase in meat demand, thus facilitating the nutritional transition. However, this increased demand could not be met by domestic supply. As the leading nation, Britain turned to massive meat imports since the late 19th century. Thus, alterations in the British diet spurred a classical pattern of the first globalization: an increase in food trade from the periphery (primarily consisting of Argentina, Uruguay, Australia, and New Zealand) to the industrial core (O'Rourke and Findlay, 2007). Evidently, this highlights the direct connections between consumption and trade.

Secondly, the Spanish case from the second half of the 20th century presents comparable yet distinct patterns from the British scenario. On one hand, the delayed culmination of the Spanish nutritional transition brought about significant changes in production. Specifically, the increased meat demand led to the establishment of extensive economies of scale within the sector to meet this demand. Nonetheless, unlike England, Spain did not engage in massive meat imports from the periphery; instead, it evolved into a prominent exporter. Consequently, the consumption-trade relationship in this instance differs. Moreover, this relationship replicates stylized patterns of the second globalization. In other words, Spain's meat exports to Europe reflect an upswing in trade between developed countries. On the other hand, China's substantial increase in imports of Spanish meat can be primarily attributed to China nearing the conclusion of its nutritional transition. As a result, international trade during the second globalization is

more intricate than in the first, transitioning from a monopolistic import market to diversified trade, wherein meat is exchanged among countries with similar and differing levels of development.

In Chapter 1, as an introductory part to the consumption section of the thesis, the main objective is to provide a descriptive analysis of the evolution of average meat consumption in Spain from the second half of the 20th century to the present day. To achieve this, data from various sources are gathered: the Household Budget Surveys, the Food Consumption Panel, FAO data, and the Ministry's food balance sheets. Additionally, this analysis is disaggregated by meat types (beef, lamb, chicken, pork, fresh, frozen, and processed meat). When all the data from these sources are compiled and presented together, one quickly realizes that, starting from the 1980s, there is a clear divergence between the data from the surveys and the panel and the data from the FAO. The first two sources show a growth in meat consumption between the 1950s and the 1980s, followed by a stagnation period and a slight decline that continues to the present day. On the other hand, FAO data indicates a continuous growth in meat consumption from the 1950s until around 2010. This divergence between the sources is also reflected in the literature. Some studies suggest that meat consumption has been continuously growing since the 1960s, while others argue that there has been saturation in consumption since the 1990s. By thoroughly analyzing all the sources, a first secondary objective of the study is to reconcile these different perspectives. The second secondary objective of the chapter is to differentiate between two distinct models of food consumption. The first model of consumption is characterized by a growing caloric intake based on standardized meat consumption (chicken and pork). The second model is characterized by a decline in meat consumption and an increase in the consumption of processed meat with a higher degree of differentiation.

Once the average meat consumption in Spain has been described using various sources from the second half of the 20th century, the main objective of the second chapter is to describe the inequalities in meat consumption within the same time frame. Specifically, using the Household Budget Surveys and the Food Consumption Panel, a series of homogeneous data on inequalities by income (quartiles) and regions within Spain (divided into northern, interior, Mediterranean, and Andalusian regions) in meat access are presented. What is observed is that in the 1960s, there were significant inequalities in meat consumption based on income and, to a lesser extent, by regions. However, in line

with the strong increase in meat consumption until the 1990s, inequalities disappear both in terms of income levels and regions. However, starting from the 21st century, income-based inequalities reemerge (although to a lesser extent) in consumption. The hypothesis posed is that these new inequalities can be explained by the increased consumption of processed and elaborated meat, as their prices are relatively higher. In addition to this, a secondary objective of the chapter is to consider whether meat consumption trends fit into two distinct models of food consumption. That is, the definition of food consumption models proposed in the first chapter is expanded, and the fit in the case of meat is discussed.

The main objective of the third chapter is to analyze the determinants of meat consumption in Spain between the 1950s and the 1990s. This period corresponds to the massification of meat consumption across all social classes, regions, and territories of the country. Therefore, the aim is to explain how the budget constraint for meat consumption was eased and its determinants. These determinants are based on income (demand capacity), prices (supply capacity), and preferences. In this case, only the Household Budget Surveys from 1958, 1964/65, 1980/81, and 1990/91 are used. It is observed that, depending on the type of meat, supply plays a crucial role in the massification of meat consumption. Additionally, it is noted that rural-urban migration and historical regional consumption patterns have been key determinants in shaping medium- and long-term preferences.

In the second part of the thesis, which focuses on meat trade, the fourth chapter aims to describe the evolution of global meat trade from the 19th century to the 1930s. Quantitative data provided by the International Institute of Agriculture and the foreign trade statistics of Great Britain are used for this purpose. Qualitative analysis is also conducted using various secondary sources from the period. The analysis, which encompasses quantity, value, and prices, revolves around two main issues. The first is the importance of the diffusion of mechanical refrigeration for the transportation of meat over long distances. In other words, it explores how regions such as Argentina, Uruguay, New Zealand, and Australia, which had a comparative advantage in meat production and export, were able to participate in international trade dynamics. The second issue is the significance of Great Britain as an absolute monopsony in the global meat import market.

As the final chapter of the thesis, the fifth chapter returns to the Spanish case. In this chapter, the objective is to analyze the determinants of Spanish meat exports from the

second half of the 20th century to the present. Specifically, it seeks to understand, from a quantitative perspective, how Spain transitioned from being a net meat importer in the 1980s to conquering international markets in recent decades, particularly with pork. The gravity model is used as the main methodological tool, and COMTRADE serves as the primary data source. Furthermore, the chapter aims to quantitatively examine two aspects. The first aspect is whether a Home Market Effect has occurred. In other words, it analyzes whether the significant increase in meat consumption observed in chapters 1-3 between the 1960s and 1990s led to the creation of economies of scale in the sector, making it highly competitive in conquering global markets later on. The second aspect to explore is quantifying the impact of Spain's accession to the European Union on meat exports. Thus, this final chapter enables the connection between the consumption and trade of meat in Spain from the second half of the 20th century to the present.

It is important to note that several chapters of this thesis have either been published or are in the process of being published. Therefore, they have undergone multiple peer reviews that have modified their content while maintaining their main objectives.

Chapter 1, titled "From Affluence to Processed Food: Evolution of Meat Consumption in Spain since the Second Half of the 20th Century", has been accepted in the journal *Historia Agraria: revista de agricultura e historia social*. Currently, it is available in early view.

Chapter 2, titled "Food consumption models and unequal access to meat: the case of Spain (1964-2018)," is currently accepted in the journal Agricultural History Review. It is also undergoing editing for future publication. In this article, Adrián Espinosa-Gracia is a co-author.

Chapter 4, titled "A Different Product? The Formation and Expansion of the International Meat and Live Cattle Market (1850-1939)," has been published in the *Revista de Historia Económica* / Journal of Iberian and Latin American Economic History and is available in Open Access. The article is co-authored by Vicente Pinilla and Gema Aparicio.

CHAPTER 1: From affluence to processed food: Evolution of meat consumption in Spain since the second half of the 20th century

This chapter has been accepted in the journal *Historia Agraria* and is currently available in early view.

1.1. Introduction

The topic of meat consumption is a highly debated and widely discussed issue in current times. There is a general agreement among the public and scientific community that overconsumption of meat in both developed and developing economies raises various health, environmental, and ethical concerns. However, it is noteworthy that the trends in meat consumption in high-income and emerging economies are divergent. While developing economies have seen an upward trend in meat consumption (Delgado, 2003), developed economies have experienced a downward trend in recent years, though this decrease in consumption is not enough to achieve sustainable diets (Stewart *et al*., 2021).

Multiple studies from different disciplines, including economic history, history, sociology, and nutrition studies, have differentiated two phases in the evolution of food consumption. Meat consumption and the consumption of other animal products such as milk, play a significant role in differentiating between these phases. The first phase is marked by an increase in meat consumption, while the second phase is characterized by a decrease in meat intake.

Nutritionist Barry Popkin identifies these two periods in his presentation of the modern nutritional transition. Generally, the nutritional transition takes place when a society reduces its consumption of plant-based foods and increases its intake of animal fat, sugar, and processed foods (Popkin, 1993; see also Grigg (1995) for a historical approach and Delgado (2003) for a focus on developing countries). However, in the final stage of the nutritional transition, Popkin argues that there is a behavioral change involving a greater awareness of eating habits. This behavioral change represents a “break” in the evolution of food consumption, where societies decrease their intake of meat, milk, sugar, and so on. Empirically, some authors have demonstrated that once a certain income level is reached, meat consumption in high-income countries tends to decrease, giving rise to this "break" (Cole and McCoskey, 2013; Hansen, 2018).

Louis Malassis, in his examination of dietary changes and food consumption models (Malassis, 1997b; Fonte, 2002; Collantes, 2016), highlights a significant "break" in the evolution of food consumption that occurred around the 1980s. During this period, wealthy societies reached a maximum calorie intake of approximately 3500 per day, with 40% of protein intake coming from animal products (Malassis, 1997b, pp. 220-24). Instead of continuing to increase food consumption, consumers began to diversify their

dietary choices and reduce their calorie intake. This shift in food consumption can be attributed to the rise of the Fordism model, which led to an increase in the consumption of standardized agro-industrial food products following the Second World War (Clar, 2008; Collantes, 2019b). In the subsequent decades, the consumption of prepared, processed, and elaborated foods became more prevalent in wealthy countries (Laajimi and Albisu, 1997; Langreo, 2008), resulting in a stabilization or decrease in calorie intake.

The prevalent view of nutritionism has also affected consumer preferences with regards to meat consumption. During the 19th century, meat was perceived as a vital source of protein in Europe, resulting in a rise in global meat trade and consumption (Scrinis, 2013, p. 115). Similarly, in the early 20th century, the global perspective on nutritionism centered on the ideal diet, promoting the intake of calories, macronutrients, and vitamins (Barona 2008, p. 91). Biltekoff, analyzing this process in the USA, refers to this paradigm as "newer nutrition," which persisted until the second half of the 20th century. However, following World War II, the view of nutritionists changed to "negative nutrition," highlighting the health risks associated with excessive meat consumption, such as obesity and cardiovascular diseases (Biltekoff, 2012, p. 6-7; Collantes, 2015a, p. 252; Scrinis, 2013, p. 141; Variyam and Golan, 2002, p. 13). As a result, shifts in mainstream nutritional views may have impacted consumer preferences by encouraging a decrease, or a "break," in meat consumption.

In summary, using the terminology employed by McNeill and Engelke (2014) to describe the significant economic and population growth that took place after 1945, we can distinguish a first period characterized by a "great acceleration" in meat consumption, and a second period marked by a decreasing and diversifying trend in meat intake.

In this context, we utilize Spain as a case study in order to analyze the evolution of meat consumption from the latter half of the twentieth century until the present. As discussed in depth in Section 1.3, there are two distinct perspectives regarding the evolution of meat consumption in Spain during this period. One perspective depicts a significant acceleration in consumption, while the other emphasizes a break around the 1990s, with consumption stagnating and tending to decrease thereafter. By presenting, for the first time, a comprehensive database of meat consumption in Spain from four sources covering the years 1952-2019, we aim to reconcile these two perspectives. Additionally, the disaggregation of meat consumption by type of animal and degree of elaboration allows us to identify two distinct models of consumption before and after the eighties, where

processed meat (specifically pork) is gaining increasing significance in the Spanish diet. From a policy perspective, this is of significance as processed meat is less healthy than fresh meat. Therefore, in order to design a policy to reduce meat consumption, it is essential to utilize accurate meat consumption data in order to understand the historical trend and identify the types of meat most popular.

The chapter is composed of five sections. Following the introduction, we provide a detailed presentation of our database, as well as a critical examination of the utilization of indirect sources of meat consumption. In Section 1.3, we examine the current state of research on meat consumption in Spain and the various perspectives presented in the literature. In the following section, we present the various series of aggregate meat consumption and explore how they may be reconciled, as well as an international perspective. In Section 1.5, we showcase the main trends of meat intake from a disaggregated perspective. Lastly, we present concluding remarks and future research directions.

1.2. Database and methodology

In order to obtain a comprehensive, reliable, and systematic series of meat consumption in Spain from the latter half of the twentieth century to the present, we have collected data from four different sources. Two of these sources utilize indirect methods: Food and Agriculture Organization (FAO) and Ministry Food Balance (MFB), while the other two utilize direct methods: Household Budget Surveys (HBS) and Food Consumption Panel (FCP). Direct methods aim to provide real consumption at the household level through surveys and shopping records, while indirect methods provide residual results (see below). The last benchmark year we are taking into account is 2019 due to data distortion caused by the COVID-19 crisis in 2020. In other words, we consider that the effects of the pandemic on meat intake should be studied separately.

Household Budget Surveys (HBS) are widely considered to be the most reliable source of data. While they are not conducted on an annual basis, they provide information on direct consumption from 1958 to 2018.[3] Basic Household Budget Surveys (BHBS) collect

[3] This paragraph is highly based on Collantes, (2012a, p. 5), and Maluquer de Motes, (2005, pp. 1271-72).
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data in 1958, 1964/65, 1973/74[4], 1980/81 and 1990/91. The sample size of the BHBS ranges from 24,000 to 28,000 households, which is considered a respectable and representative sample size.[5] The more recent Basic Household Budget Surveys (BHBS) provide increasingly detailed and disaggregated data. Nonetheless, all BHBS data has been relatively disaggregated since 1964. The Permanent Surveys of Consumption (PSC) have a smaller sample size (around 2,000 households) and the data is significantly less disaggregated than that provided by BHBS, however, it provides quarterly data on consumption from 1977 to 1985. The PSC were replaced in 1985 by the Continuous Household Budget Surveys (CHBS), which have a sample size of around 3,200 households. Finally, from 1997, the CHBS were improved with a larger sample size (around 8,200 households) and more detailed data and continues until today. The 1958, 1964/65, 1980/81 and 1990/91 Household Budget Surveys are considered the most reliable due to their sample size, but by combining all the House Budget Surveys we can present a systematic and consistent series of meat consumption in Spain from 1958 to 2019.

The Food Consumption Panel (FCP) is a reliable and direct-based source of food consumption data in Spain, providing annual series of meat consumption in a highly disaggregated form. The benchmark years range from 1987 to the present, with a sample size of approximately 12,000 households (Martín Cerdeño, 2016, p. 76). The data from the Food Consumption Panel (FCP) is published in the book "Food in Spain" from 1987 to 2005, and from 1999 until the present, it is published online.[6] To collect data on food consumption, an individualized questionnaire (shopping diary) is completed by each household, noting different categories of foods, both in physical units and in terms of expenditure, price, and place of purchase (Díaz-Méndez *et al.*, 2005). Data collection is typically carried out by private companies, which have changed (as well as their methodology) over time (Collantes, 2012). In addition to household consumption, the Food Consumption Panel also provides data on extra-domestic consumption, which is disaggregated by products in certain years. This includes consumption in public

[4] We have chosen not to consider the 1973/74 BHBS in our analysis, as it does not provide information on the intake of physical quantities, only the household spending.
[5] The 1958 Basic Household Budget Survey contains a less simple-size (around 4,000 households).
[6] https://www.mapa.gob.es/es/alimentacion/temas/consumo-tendencias/panel-de-consumo-alimentario/series-anuales/default.aspx

institutions such as nursing homes and consumption in restaurants, which has been obtained from 1987 to 2007 and from 2017 to 2019.

The Food and Agriculture Organization (FAO) provides annual, online, and homogenized series of meat consumption data from 1961 to the present.[7] Similarly, the Ministry of Food Balance (MFB) provides annual series of meat consumption data from 1952 to 1980. Both series present highly similar results, as they are obtained through indirect estimations. This similarity is due to the fact that the FAO series is based on official data provided by the Spanish Government. The FAO series is calculated by summing the total quantity of food produced in a country, plus the imported quantity, and subtracting the amount exported. Additionally, it accounts for storage and transportation losses during the food chain, as well as variations in stock between years. Therefore, the consumption per capita offered by FAO is actually a measure of "food availability" rather than actual consumption. However, "real" consumption may not be equivalent to "food availability." For example, in the case of dairy product consumption in Spain, "dairy product availability" is higher than actual consumption (Collantes, 2014, see figure 1). Similarly, in the case of meat consumption, it can be tentatively stated that "meat availability" provided by FAO and "real" meat consumption exhibit different trends and physical quantities.

To test this hypothesis, Appendix Figure A1.1 presents the consumption of meat in various European countries, using data provided by the Food and Agriculture Organization (FAO)[8] (indirect method) and by DAFNE-ANEMOS (direct method) for the same years. DAFNE (Data Food Networking) compiles Household Budget Surveys from 28 European countries with the assistance of different institutions from each participating country. After collecting the raw food consumption data from each country, it cleans and standardizes it for potential comparison, both at a national level and for different groups of consumers (educational level, area of residence, etc.).

As shown in Appendix Figure 1.1, there are discrepancies between the two data sources. The first discrepancy is related to quantity, where in all cases, FAO presents higher

[7]In fact, FAO provides data from a few years before 1961 but they are not published online. We obtained data from physical volumes since 1952. The predecessor of FAO was the International Institute of Agriculture (IIA). It offers consumption data from some European Countries since the early twentieth century. However, as underlined by the IIA, the data is not too reliable.
[8] https://www.fao.org/faostat/es/

quantities than DAFNE-ANEMOS. The second and more significant difference is related to the trends. DAFNE-ANEMOS illustrates a slight downward trend in every country from the sample (excluding Portugal, which illustrates a U-shaped inverted trend), but FAO displays a slight upward trend during the same period.

Therefore, it can be concluded that the Food and Agriculture Organization (FAO) database is not suitable for investigating actual meat consumption patterns. Instead, it is a valuable tool for analyzing food availability from a broad perspective, taking into account all aspects of the supply chain. However, if the objective is to analyze changes in dietary habits, it is more appropriate to use direct methods of measuring consumption. Despite this evidence, several studies analyzing meat consumption still continue to rely on data from the FAO (Alexandratos, 2006; Garcia-Closas, Berenguer and González, 2006; Kanerva, 2013; Vranken *et al.*, 2014; Sans and Combris, 2015; Hansen, 2018; Milford *et al.*, 2019). It is crucial to note that data on apparent consumption (food availability) and consumption surveys provide different information, and thus, they should be used for different purposes. Apparent consumption data is useful for environmental studies, while consumption surveys can be used for studying consumption patterns at the individual level or for nutritional studies.

After collecting the meat consumption data from the 4 databases, our analysis of the evolution of meat consumption in Spain during the last 70 years is based on two criteria. In addition to total meat intake, the data is aggregated according to the type of animal and degree of elaboration. Five categories of animal are considered: beef, lamb, poultry, pork, and other meats. Within the "pork" category, products such as cold meats (e.g. dry, soft, and smoked), cold cuts, salted meat, meat cured products, etc. are included, as most of these products consumed in Spain are derived from pigs (e.g. ham, chorizo, sausages, mortadella, blood sausage, etc.). The main products in the "other meats" category throughout the period have generally been rabbit meat, other fresh meat, and remains. Additionally, given that the 1958 Household Budget Survey (HBS) only offers three types of meats (“meats”, “ham and cold meats” and “poultry”) we have classified “ham and cold meats” as pork and divided “meats” into beef and sheep meat categories (50 percent each) for the purposes of this analysis.

With regard to the degree of elaboration, three types of meats are included in the analysis: refrigerated/fresh meat, frozen meat, and processed meat. The data provided by the Food and Agriculture Organization (FAO) does not permit disaggregation based on the type of

elaboration. Therefore, only direct sources are used to analyze the evolution of this type of meat. It is important to note that the conduct of these two types of disaggregation (type of elaboration and origin of animal) is relevant for two reasons. Firstly, it acknowledges that while the first type of disaggregation is from the producer's perspective, the second one is also from the viewpoint of the consumer. Specifically, when a consumer is deciding to purchase a type of processed meat such as sausages, they are not necessarily considering which animal the meat comes from. Secondly, prepared products (such as processed meat) were one of the main characteristics of food habits in high-income countries during the second half of the twentieth century (Germán, 2009, p. 11).

Finally, in order to obtain accurate price series throughout the period, we utilize nominal implicit prices calculated based on expenditure and physical consumption data obtained from both the surveys and the panel. These nominal implicit prices are then deflated to 2013 euros using the general price index provided by the INE.

1.3. Literature review: The rupture and the Spanish case

To the best of our knowledge, there is currently no research that systematically analyzes the consumption of meat in Spain during the second half of the 20th century. Nevertheless, the topic has been addressed to a limited extent in some studies, such as research on the livestock sector or the consumption of other food products (Domínguez Martín, 2001b; Cussó Segura and Garrabou Segura, 2007). Meat and milk consumption in Spain increased during the interwar period, primarily driven by income growth (Langreo and Germán, 2018, p. 171). Despite this, Spanish citizens' meat intake during the early 20th century was lower in comparison to that of most European countries (Bernabeu-Mestre *et al*., 2007, p. 13), However, fish consumption in Spain was among the highest in Europe (Simpson, 1995, p. 179). The Spanish Civil War (1936-1939) and the subsequent post-war period resulted in a severe deterioration of both the Spanish economy and population's diet, leading to a significant decrease in food intake (Cussó and Garrabou Segura, 2007, pp. 89-90). As a result, food shortages led to a significant reduction in the standard of living for Spanish citizens (Martínez-Carrión, 2016). Even in the 1950s, a decade after the Civil War, Spanish residents were consuming less meat than citizens of Turkey or Greece (Clar, 2010, p. 192, see note 1).

In the 1960s, the situation underwent a significant change. As the Spanish population began to align with European standards, they abandoned their traditional Mediterranean

diet[9] and adopted a more Westernized dietary pattern (Clar, 2008, p. 134; Moreno *et al*., 2002). That is, prior to the 1960s, meat was primarily viewed as a food for special occasions (Marrodan *et al*. 2012, p. 59), However, in a short period of time, meat consumption in Spain experienced a significant increase, alongside other livestock products such as milk (Collantes, 2014; 2019a; Hernández-Adell, Muñoz Pradas, and Pujol-Andreu, 2019) and to a lesser extent, fish (Moreno, Sarría, and Popkin, 2002, p. 994), although the latter started from higher levels of consumption. Therefore, the Spanish population underwent the modern nutritional transition within a few decades (Moreno, Sarría, and Popkin, 2002; Cussó Segura and Garrabou Segura, 2007) with meat becoming a widely consumed product. However, not all types of meat experienced equal growth in this process. In fact, while beef and lamb consumption decreased in the Spanish diet, poultry and particularly pork became the primary meats consumed by Spanish citizens (Domínguez Martín, 2001a; Langreo, 2008). According to literature, the average Spanish consumer chose to increase meat consumption based on the more affordable and standardized types of meat, which were associated with the more intensive and industrialized livestock sector: poultry and pork (Clar, 2005; 2008). In both cases of dairy products and fish, the trend was similar, with an increase in the consumption of standardized products that allowed for mass consumption (Collantes, 2014; Giráldez Rivero and Espido Bello, 2021).

However, in the literature on meat consumption trends, a degree of ambiguity emerged in the 1980s. Two distinct perspectives have been identified. The first perspective posits a "great acceleration" in meat consumption, with intake continuing to increase until the early 21st century. The second perspective, on the other hand, suggests a discontinuity in the 1980s and a subsequent stagnation or decline in meat consumption until the present day. The literature on the proposed "great acceleration" in meat consumption is particularly prominent in agroecological studies. One such study, which examined the ecological footprint of agriculture and food in Spain during the latter half of the 20th

[9] It is worth noting that the concept of the "Mediterranean diet" has been romanticized. On one hand, there has never been a historical moment in which any region solely based its diet on Mediterranean products. Additionally, there are other healthy culinary traditions, such as those in China or Japan, that have not received as much recognition (Du Puis, 2016, pp. 107-108). Furthermore, as literature on the Spanish case has shown, even during periods when the diet was thought to be Mediterranean, many groups of consumers experienced deficiencies in several micronutrients (Cussó Segura, 2005; Garrabou Segura and Cussó Segura, 2009; Collantes, 2015b; Medina-Albaladejo and Calatayud, 2020) .

century, found that "*per capita meat consumption has increased by 7,1 times since 1955, jumping from 14 kilograms to 114 in 2000*" (Carpintero Redondo, 2006, p. 40). A decade later, another agroecological study stated that "*The consumption of meat has more than quadrupled, from 56 g/capita/day in the 1960s to 243 g/capita/day today (2017)*" (González de Molina et al. 2017, p. 6). It should be noted that the authors acknowledge that their objective is not to investigate actual food consumption, but rather apparent consumption (see page 2). However, the aforementioned study has been cited in subsequent studies as evidence of a fourfold increase in meat consumption in Spain during the latter half of the 20th century (González de Molina, García, and Casado, 2017, p. 45; Infante-Amate et al., 2018, p. 500; González de Molina et al., 2020, p. 207). In addition to agroecological studies, other works from various disciplines also support the perspective of a "great acceleration" in meat consumption. For example, Clar (2010, p. 177) using data from the FAO, states that the per capita consumption of meat in Spain increased from 21,5 kg in 1961 to 123 kg in 2001. Other international studies also support this trend (Kanerva, 2013, p. 9). In a book chapter, the argument of the "great acceleration" is presented in clear terms, stating that after a period of expansion in meat consumption in Spain until 1985, the expansion "*has not finished thereafter but it has continued, placing Spain in the second position, just after Austria, with a quantity nearly 95 kg in 2010, having reached even 107 kg per person and year around 2005*" (Clar, 2017, p. 414). Finally, Bernabeu-Mestre (2008, p. 125) states that the diet in Spain in recent decades is characterized by "*high fat intake, an increase in the daily consumption of meat*."

However, other studies, less related to economic history, do not concur with this perspective, but rather indicate a break in meat consumption, characterized by stagnation and subsequent decline in its consumption from the 1990s. For example, in Langreo (2008, p. 50), where the meat production system in Spain is analyzed, it is stated that: "*meat consumption within Spain has hardly risen since joining the EEC (1986), even significant falls have occurred; the take-off that is detected from the beginning of the nineties* (referring in this case to total consumption, not per capita) *responds to the increase in population, due mainly to the growing presence of immigrants [...] in general terms, it should be noted that there is a trend towards a decrease in per capita consumption, parallel to an increase in fish consumption*." The same author also points to a stagnation in consumption between 1987 and 2000 (Langreo Navarro 2002, p. 44).

Ríos-Núñez and Coq-Huelva (2015, p. 528) in reference to the period 1985-2005, state that "*One of the reasons for the lower intensity of agrarian growth processes was the stagnation of domestic consumption of some products; for instance, meat and milk*". In Mili, Mahlau, and Furtsch (1998, p. 162), trying to study consumers' preferences towards meat, it was stated that "*Taking into consideration the survey results, we estimate that in 1992 a level of meat consumption has been reached close to saturation, since numerous consumers do not seem to have the intention of increasing meat consumption for health reasons, even in the case of an increase in their purchasing power*". Finally, from a sociological perspective, Furitsch (1992, p. 224), also argues that "*meat consumption in Spain has become stagnant in the years between 1987 and 1990, despite a positive evolution of real incomes*".

By presenting, for the first time, a systematic database that includes various sources of meat consumption in Spain since 1952, we aim to reconcile the conflicting perspectives on the trends in meat consumption in Spain during the second half of the 20th century. Additionally, the high level of data disaggregation allows us to distinguish between two different food consumption models, where processed meat is becoming increasingly prevalent.

1.4. Evolution of meat consumption in Spain: A comprehensive view

After compiling data from all sources (as outlined in section 1.2), Figure 1.1 illustrates the annual per capita meat consumption in Spain from 1952 to 2019. Upon initial examination, at least two notable aspects can be observed in the data presented. Firstly, there is a significant discrepancy between data from FAO and data from other sources starting from the 1980s. Furthermore, this discrepancy is not only in terms of quantity, but also in terms of trends. While the data provided by FAO suggests a significant increase in meat consumption in Spain up until the early 21st century and a recent resurgence, the remaining data series indicate a notable increase until the early 1980s, followed by a decline thereafter.

The large discrepancies between data from the FAO and surveys and the panel in Spain regarding meat consumption require further examination. To understand this discrepancy, three key considerations must be taken into account. Firstly, as previously noted, it must be acknowledged that actual consumption and apparent consumption measure different things, thus it is logical that they present different data. Secondly, differences in actual

meat intake and apparent consumption are not exclusive to Spain, as several studies have highlighted (Serra-Majem *et al.*, 2003; Naska *et al.*, 2009; Hallström and Börjesson, 2013; Yu and Abler, 2014). In third place, the discrepancy between both series appears in the 1980s, which rules out several hypotheses such as, for example, that FAO includes the weight of bones and the surveys and the panel do not, as if this explained the differences it would do so throughout the entire period.

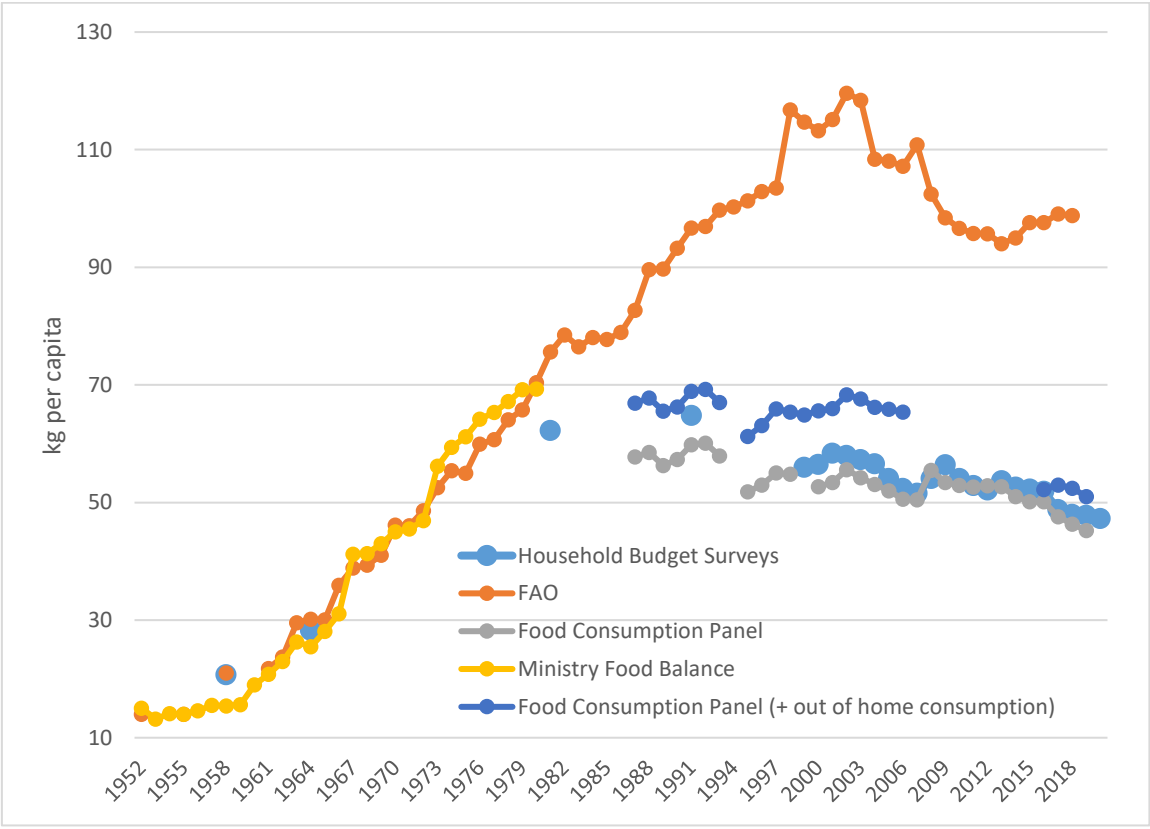
The differences between the two series may be attributed to various factors. Firstly, some studies suggest that it is primarily due to non-home consumption (Alexandratos 2006, p. 115; Naska et al. 2009, p. 169), as the weight of this has increased in recent decades and surveys do not measure this dimension of consumption. However, the panel does. The total consumption of meat (home + non-home) according to the panel in 2001 was 66,1 kilograms per capita, meanwhile, the FAO shows 115 kilograms per capita for the same year. Therefore, non-home consumption, although it is not the main cause of these differences, has some influence. Another potential explanation is the production aspect. In the case of China, it has been shown that differences between actual and apparent meat consumption are due to an overestimation of production figures used to calculate apparent consumption. This overestimation is attributed to perverse incentives in the collection of statistics by officials (Fueller, Hayes and Smith, 2000; Yu and Abler, 2014). Collantes (2014) notes that in the case of dairy products in Spain, adulteration based on watering down the milk overestimated production. In the case of meat, there was a methodological change for the calculation of national meat production in 1986, which led to a significant increase in production figures (Ministerio de Agricultura, Pesca y Alimentación, 1987). However, although it is likely that this had some influence, it cannot be definitively stated that the new production figures are incorrect.

In a recent and interesting study (Cerrillo *et al.*, 2023) , it is claimed that the panel data is erroneous and meat consumption in Spain in 2017 is 50 percent higher than indicated by this source. However, this would imply that not only is the panel data undervalued, but also other independent studies, such as Household Budget Surveys or the ANIBES study (Ruiz *et al.*, 2016), which reach similar consumption data, are also undervalued. Furthermore, even if this were true and meat consumption were 50 percent higher, there would still be significant disparities between the FAO data and the survey and panel data. In fact, one of the limitations of the aforementioned study is that to calculate losses along the value chain, they use a work from the FAO (Gustavsson, Cederberg and Sonesson,

2011). In this study, coefficients of loss along the value chain are calculated for each continent. Therefore, it is likely that the coefficients used for Europe are significantly different from those of Spain.

Indeed, it is likely that for the Spanish case, losses in the value chain were especially pronounced from the 1980s onwards. This is due to the fact that production in the 1980s, after a slight stagnation, increased significantly once again. However, this strong increase was no longer for the domestic market, as it had reached a saturation point. Thus, production was now intended for the external markets, resulting in Spain becoming one of the world's leading pork exporters. This probably implied an increase in meat waste in the value chain proportionally greater. Therefore, this factor and the aforementioned ones, would be the main candidates to explain the discrepancies between the "available meat" as reported by the FAO and the actual consumption as reported by surveys and the panel.

Figure 1.1. Meat Consumption in Spain (1952-2019)



Source: See section 1.2

The second salient feature of Figure 1.1 is the presence of two distinct patterns of meat consumption in Spain, with a clear break around the 1980s. Beginning from a relatively low value in the 1950s (approximately 10-15 kg per capita), meat consumption experienced a dramatic expansion in the 1960s that persisted until the 1980s. During that

decade, consumption per capita reached around 60 kg, representing a substantial quantity. In other words, consumption in Spain grew threefold within a span of twenty years. This increase in average meat consumption masks major changes in terms of disparities. Before the 1970s and 1980s, there were significant disparities in access to meat, with it being a luxury item for the majority of the population. However, with the observed increase in the 1980s, these disparities disappeared (both in terms of income and regions within the country (Delgado and Pinilla, 2022). Therefore, like in the case of dairy products (Collantes, 2015b), the large increase in meat consumption can be explained by the increase in lower incomes and regions with lower consumption (such as Andalusia). However, the trend from the 1980s onwards is quite different. From that decade, meat consumption stagnated for a decade, before subsequently declining. The patterns of dairy product and meat consumption in Spain during this same time period are notably similar (Collantes, 2014). The trend of increasing fish consumption has persisted, albeit to a lesser extent, however, a decline in consumption has been observed in recent years (González-Laxe, 2018).

Table 1.1, based on data obtained from DAFNE-ANEMOS, presents an illustration of the consumption of meat in several European countries from 1980 to 2012. In the early 1980s, Spain and France were among the countries with the highest consumption of meat in the sample. As previously mentioned, during these years, Spain achieved peak consumption and completed the modern nutritional transition. However, while France began to lower its consumption in the 1990s, Spain remained at its peak. In the following years, all countries in the sample were consuming similar amounts of meat (approximately 55-60 kg per capita), with Portugal being the country with the highest consumption of meat. In fact, during the first decade of the 21st century, Spain became one of the least meat-consuming countries in the sample, with Greece and Estonia consuming more meat than Spain. As illustrated in Figure 1.1, the downward trend continued after 2010, with Spaniards currently consuming around 48 kg of meat. It is evident that not all countries experienced this "rupture" at the same time. For example, Chile experienced a significant increase in the consumption of chicken meat and milk in the 1990s (Llorca-Jaña *et al.*, 2020), while countries like Spain and France had begun to lower their consumption of animal products during that time. On the other hand, other countries such as the United Kingdom had begun reducing their consumption of meat a few years prior. The differences between each country are attributed to a variety of factors such as supply

factors (relative prices of meat), demand factors (income, urbanization, etc.) and preferences (Milford *et al.*, 2019).

Table 1.1. Consumption of meat in different European countries (kg per capita)

	1981-85	1986-90	1991-95	1996-2000	2001-2005	2006-12
Spain	62,2 (1981)	57,7* (1987)	64,8 (1991)	54,8* (1998)	54,2** (2003)	52,1** (2012)
Greece	54,8 (1981)	63,5 (1987)	n/d	54,4 (1998)	58,0 (2004)	56,2 (2012)
United Kingdom	54,4 (1985)	54,0 (1988)	n/d	48,6 (1998)	n/d	n/d
France	62,0 (1985)	n/d	59,5 (1991)	n/d	n/d	n/d
Finland	51,1 (1985)	47,5 (1990)	n/d	54,4 (1998)	n/d	n/d
Estonia	n/d	n/d	n/d	n/d	62,0 (2004)	n/d
Portugal	n/d	52,2 (1990)	59,5 (1995)	58,4 (2000)	53,0 (2000)	n/d

Source: Author's elaboration from DAFNE-ANEMOS: http://dafne-anemos.hhf-greece.gr/ * Food Consumption Panel. ** Household Budget Surveys

In summary, real meat consumption in Spain during the latter half of the twentieth century did not experience a significant acceleration. As a result, the trend in "real" consumption does not align with that of "available food" for meat, particularly from the 1980s onward. This discrepancy is the main difference between previous studies and the current analysis. Following the shift in the 1990s, Spanish dietary patterns have exhibited a decreasing trend in meat consumption. The notion of a "great acceleration" in meat consumption is not supported by the data. While consumption may still exceed recommendations from scientific consensus, it is not as high as previously reported by the Ministry of Consumer Affairs in Spain (approximately 90 kilograms per capita per year in 2018, according to FAO data) and the trend is moving in the direction of a more sustainable and healthy level of meat consumption, although the pace of change is not pronounced enough.

1.5. Consumption of meat: A disaggregated point of view

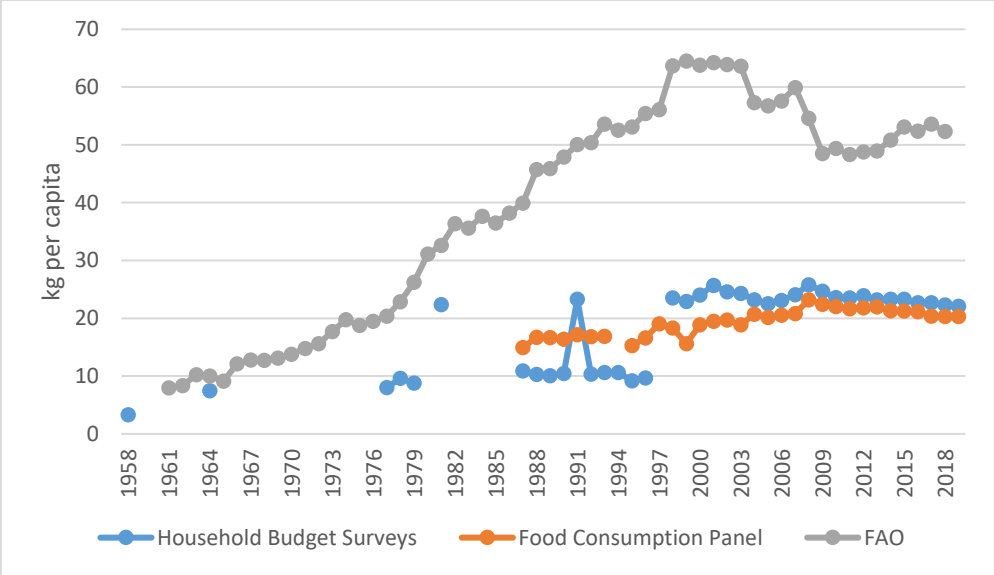
With regard to the consumption of meat from a disaggregated perspective, in the second part of this study, an attempt is made to obtain a more detailed view. Is there a rupture in all types of meats? Are there differences between FAO and other series for all types of meat? What are the possible causes behind these patterns? And, in line with the general trend in food consumption in high-income countries, has the consumption of processed meat increased over time at the expense of standard meat? To answer these questions, our

database is utilized to analyze the evolution of consumption based on both the type of animal and the type of meat elaboration (see methodology section).

1.5.1. From the type of animal: The traditional perspective

Most authors analyzing the evolution of meat consumption in Spain during this time frame base their conclusions on either an aggregate perspective or by the type of animal. This is mainly due to the fact that they usually use data from FAO, which only provides data in this manner. Within this section, we present the evolution of pork consumption through Figure 1.2, whereas the trends in beef, lamb, "other meats" and poultry, are available for observation within the appendix (see figure A1.2, A1.3, A1.4 and A1.5).

Figure 1.2. Consumption of pork in Spain



Source: See section 1.2

In general, there are at least three notable characteristics present in all figures. Firstly, as expected, data from the Food and Agriculture Organization (FAO) is significantly different compared to other sources, although not throughout the entire period. Secondly, the absolute quantity consumed varies greatly among the different types of meats. Thirdly, not all meats display the "rupture" at the same time, and some show a more pronounced break than others.

The evolution of beef consumption in Spain over time can be observed to display an inverted U-shape pattern (see Appendix Figure A1.2). Beginning at a level of approximately 6-8 kilograms per capita in the period between 1958 and 1964, consumption of beef grew notably until the 1980s, reaching 11 kilograms per capita during that decade. It can be noted that prior to the identified "rupture" point in the 1980s,

beef consumption displayed a similar behavior to the aggregate consumption of meat in Spain. However, from the 1990s, an accentuated downward trend can be observed, lasting until the present day, with current consumption per year being even lower than levels seen in the 1960s, at less than 6 kilograms per capita. In contrast, the consumption of sheep meat displays a substantially different pattern over time (see Appendix Figure A1.3). From the starting point in 1958, the trend has been consistently downward, with consumption levels being almost non-existent today at around 1 kilogram per capita. The FAO data for sheep meat is found to be accurate until around 1980 and from 2007 until the present day. In the years between these two points, the FAO data displays an expansion, deviating from the trends observed in other sources. With regard to other types of meat (Appendix figure 4), such as rabbit meat and other fresh meats, there is no identified "rupture" point. Instead, a consistent upward trend can be observed throughout the benchmark period. In the 1980s and 1990s, rabbit meat was the most consumed product in this category. However, beginning in the 21st century, categories such as "other fresh meats" or "remains" have grown in popularity, expanding the category of "other meats" while rabbit meat has lost significance in the Spanish diet.

Pork and poultry, while they are currently the primary types of meat consumed in Spain, display distinct patterns of evolution over time. Pork exhibits a long-term expansion trend (see figure 1.2). Beginning in the 1950s, the rate of growth was particularly spectacular, with consumption levels being minimal at the start of the period. From that point, although the rate of growth was less pronounced, the expansion continued until the first decade of the 21st century. In recent years, a slight downward trend has been observed. In contrast, the identified "rupture" point for poultry consumption occurred a few years later than for aggregate meat consumption (see Appendix figure A1.5). From the 1950s, per capita consumption grew significantly until the 1980s. From that point, a downward trend has been observed, resulting in an inverted U-shape pattern. However, unlike aggregate meat consumption, from 2007, consumption levels have tended to plateau. The data from the FAO series is found to be consistent with other sources until 1986, at which point it deviates, displaying an uninterrupted expansion until the present day.

Table 1.2. Proportional weight of various meats in overall meat consumption (%)

	1964	1981	1991	2000	2010	2018
Beef	25,9	15,3	18,8	15,6	12,5	10,6
Lamb	19,1	6,7	6,9	5,0	3,2	2,3
Pork	26,6	35,9	31,5	41,0	44,6	46,7
Poultry	18,9	35,1	37,5	27,1	25,3	28,3
Other meat	9,6	7,0	5,3	11,0	14,4	12,1

Source: Household Budget Surveys

Table 1.2 provides a relative perspective of the amount consumed of each type of meat in relation to all meat consumed. In 1964, the diversification rate of meat consumed was relatively high, with the Spanish population tending to consume similar amounts of each type of meat. However, during the 1980s and 1990s, beef and lamb lost significance in the Spanish diet, while pork and poultry gained importance, accounting for approximately 70% of all meat intake. As a result, meat consumption became more standardized around pork and poultry, as these livestock sectors were based on industrial intensive production. After the rupture, poultry consumption decreased in significance and currently represents approximately 27% of all meat consumed. Notably, pork consumption has been steadily increasing since the 1950s, currently representing nearly half of all meat consumed in Spain. The consumption of pork is further analyzed in Table 1.3, which illustrates the evolution of pork consumption disaggregated into cold meats and other pork products (mainly fresh and frozen pork).

Table 1.3. Proportional weight of fresh, frozen, and cold pork meat in overall pork consumption (%):

	1964	1981	1991	2000	2010	2018
Fresh and frozen pork	27,1	45,2	40,3	33,7	34,7	35,9
Cold meats	72,9	54,8	59,7	66,3	65,3	64,1

Source: Household Budget Surveys

Before the 1980s, most pork consumption was in the form of cold meats (such as chorizo). However, during the period of high meat consumption (before the rupture), fresh and frozen pork gained significance, accounting for 45% of all pork consumption. After the rupture, cold meats regained significance and currently account for approximately two-thirds of all pork consumed. This highlights the increasing consumption of processed pork products in the Spanish diet.

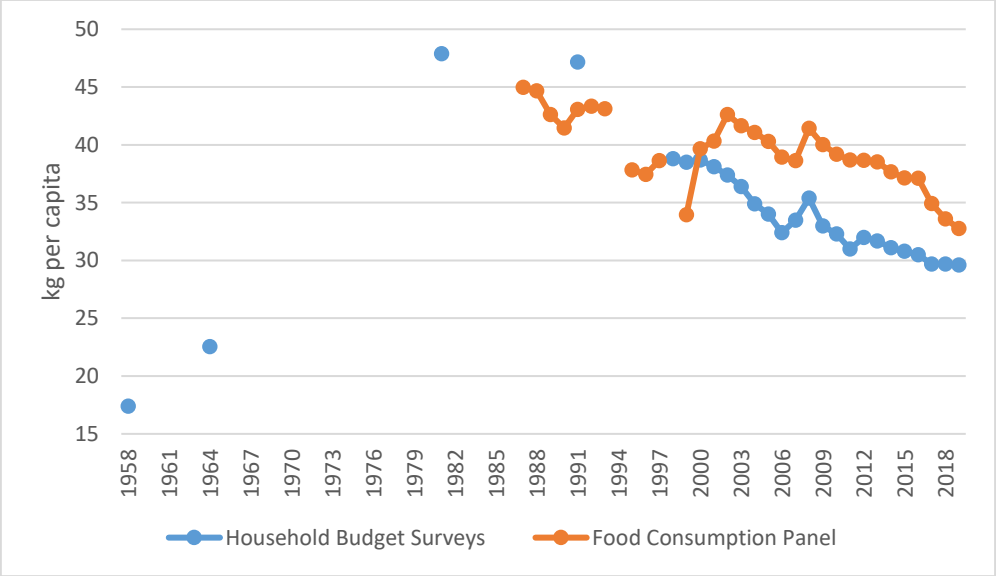
The possible causes behind these patterns are complex and multifaceted. However, for the purpose of simplification, we will examine three main factors: prices, income, and preferences. In this section, we will focus primarily on the first two factors, while the third will be examined in the following section. Appendix Figure 1.6 illustrates the relative prices of the four types of meat analyzed thus far. Between the 1950s and 1980s, we observe distinct patterns in the meats whose production was industrialized first versus those whose production was still primarily based on extensive livestock farming. The relatives prices of the former (pork and chicken) experienced a significant decrease, while the prices of the latter either increased (lamb) or decreased to a lesser extent (beef). While the extent to which this influenced a greater consumption of pork and chicken at the expense of beef and sheep is uncertain, it is evident that these changes in price played a role. Despite the stabilization of prices for the four meats in question, the prices of pork and chicken remained notably lower. As a result, these two meats, despite a decrease in absolute consumption, remained the primary types of meat consumed (see Table 1.2). On the demand side, between the 1950s and 1970s, there was a significant growth in Spanish income (see Appendix Figure A1.7). During this period, Spain transitioned to a fully developed country and income levels converged with those of Europe. This further encouraged a greater consumption of meat in line with Western patterns. However, it would appear that from the 1980s, income played a less significant role in meat consumption. This is because, despite the fact that income continued to grow, with some interruptions due to economic crises such as those of the 1970s, the early 1990s, and 2007, meat consumption did not. Therefore, this suggests that preferences played a more significant role from the 1980s.

In summary, only beef and poultry displayed similar trends to overall meat consumption, whereas pork experienced a significant increase in consumption and lamb displayed a prolonged decline over the past 70 years. The prolonged expansion of pork consumption following the rupture can be attributed to the consumption of processed meats, which leads us to the final section of the study. Factors such as prices and income played a crucial role in the increase in pork and chicken meat consumption until the 1980s, while consumer preferences became increasingly important from that decade onwards.

1.5.2. From the consumer point of view: A different perspective

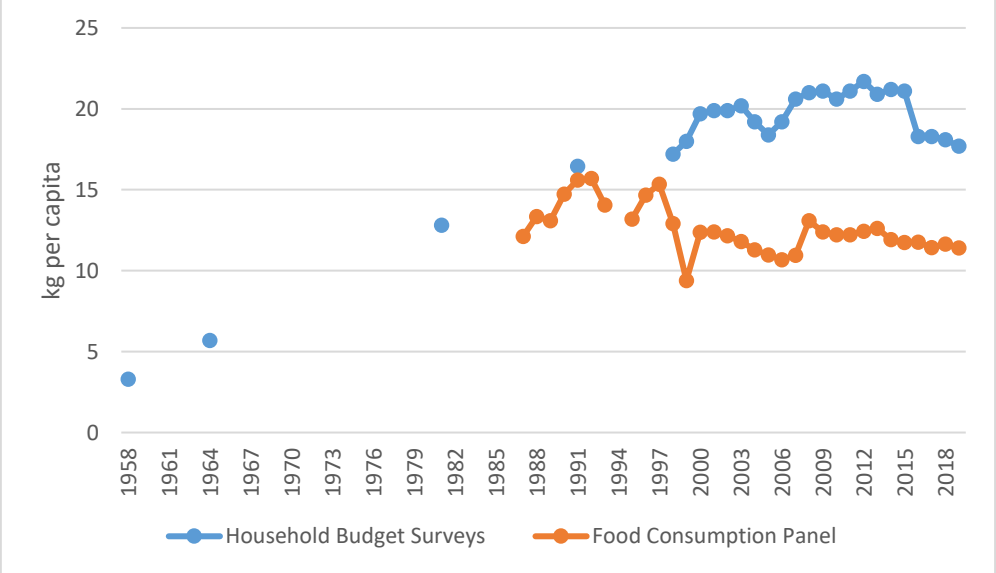
In this section, we aim to examine the consumption of meat from a consumer perspective, specifically by analyzing the consumption of fresh and processed meat in Spain. Utilizing data obtained through direct methods, as the FAO does not provide data on the degree of elaboration, we aim to determine if the trend of increased consumption of processed food in high-income societies is also reflected in meat consumption in Spain.

Figure 1.3. Consumption of fresh meat in Spain



Source: See section 1.2

Figure 1.4. Consumption of processed meat in Spain



Source: See section 1.2

Figures 1.3 and 1.4 depict the evolution of fresh/refrigerated and processed meat, respectively. The data for fresh and refrigerated meat (Figure 1.3) illustrates that it has

been the most consumed form of meat over time. Additionally, its evolution clearly demonstrates the rupture observed in overall meat intake (see Figure 1.1), with a significant increase until the 1980s and a decline thereafter. The trend of decreasing consumption after the rupture is more pronounced compared to overall meat consumption, forming a distinct inverted U-shape. Presently, Spanish citizens consume approximately 30 kg per year of this type of meat, representing a substantial reduction from the 1980s (around 50 kg). This pattern supports the argument that standardized meat (in this case, fresh meat) played a significant role in the acceleration of meat consumption until the 1980s. It was primarily consumed in the form of chicken and pork, the most industrialized livestock sectors. However, following the rupture, the consumption of standardized meat has been decreasing in the Spanish diet.

The consumption of processed meat exhibits a distinct pattern, as shown in Figure 1.4. Specifically, the trend of increasing consumption of processed meat persisted at least until the early 21st century. According to Household Budget Surveys, this growth in consumption continued throughout the second decade of the 21st century. In the most conservative scenario, processed meat consumption appears to have plateaued in the 2000s. Like pork, the decline in processed meat consumption occurred relatively recently. As a result, the patterns of consumption for processed and fresh meat appear to be inversely related. While processed meat was relatively insignificant in the 1960s, it has gained increasing significance over time. Therefore, the overall decline in meat consumption has not been as pronounced due to the relatively minor decrease in processed meat intake.

Table 1.4. Proportional weight of various meats in overall meat consumption (%)

	1958	1964	1981	1991	2000	2010	2018
Refrigerated/fresh meat % (HBS)	84,1	79,7	74,5	72,8	63,9	58,6	59,8
Refrigerated/fresh meat % (FCP)	n/d	n/d	n/d	n/d	75,3	74,0	72,5
Frozen meat % (HBS)	n/d	0,1	2,5	1,9	n/d	n/d	n/d
Frozen meat % (FCP)	n/d	n/d	n/d	n/d	1,2	2,9	2,4
Processed meat % (HBS)	15,9	20,1	23,0	25,4	36,1	41,4	40,2
Processed meat % (FCP)	n/d	n/d	n/d	n/d	23,6	23,0	25,2

Source: See section 1.2

Table 1.4 presents an analysis of the evolution of meat consumption in Spain by quantifying the proportion of each type of meat in relation to the aggregate consumption of meat. The data illustrates a trend of increasing proportion of frozen meat, although its overall consumption remains relatively low, comprising approximately two percent of total meat consumption. Of particular interest is the comparison of refrigerated/fresh meat and processed meat. However, the proportions of these two types of meats vary depending on the source of the data. According to the Household Budget Surveys (HBS), in 1958, refrigerated and fresh meat accounted for 85% of total meat consumed, while processed meat accounted for only 15%. This trend remained consistent throughout the 1980s and 1990s, with fresh and refrigerated meat accounting for 73% and processed meat accounting for approximately 25%. However, from the early 21st century, the picture has undergone a significant change, with both types of meats approaching each other in terms of consumption. Processed meat now accounts for 40% of total meat consumed, while fresh and refrigerated meat accounts for around 60%. This pattern illustrates how the consumption of meat in Spain aligns with the two models of consumption observed in developed countries, one characterized by the consumption of standardized agro-industrial food products, and the other by an increase in the proportion of processed products.

Despite similarities in the overall patterns, the evolution of consumption of processed and fresh meat differs when utilizing data from the Food Consumption Panel (FCP) as a source. While the trend towards an increasing proportion of processed meat is evident, the rate of this increase is less pronounced when compared to data from the Household Budget Surveys. According to FCP, 25% of total meat intake was in the form of processed meat, while HBS data indicates that this figure is 40%. It is likely that the actual consumption of processed meat falls somewhere between these two values. Furthermore,

when considering not only processed meat (such as smoked, cured meat, or meat with added chemical preservatives) but also meat that has been prepared or processed in other ways, the trends become even more pronounced. In 2001, approximately 50% of chicken consumption was in the form of "whole chicken", while by 2019, this figure had dropped to 30%, with chicken in pieces and fillets (i.e. prepared chicken) accounting for 70%. Additionally, prepared dishes based on meat have been gaining in popularity (both in canned and frozen forms). According to the panel, consumption of these dishes was around 1 kilogram per capita per year in 2001, and by 2018, this figure had risen to 1,4 kilograms per capita. Conversely, other higher-quality products, such as certified meat, have shown a downward trend since 2009, although this trend appears to be reversing in recent years. It is plausible that this pattern is the result of the economic crisis of 2008. In summary, regardless of the source of data, it is clear that there is a growing trend of consumption of prepared, processed and elaborated meat, while standardized meat is becoming less important. This pattern is similar to the trends observed in dairy products, where the increase in processed cow's milk consumption between the 1950s and 1990s was followed by a decline in milk consumption and a corresponding increase in the consumption of dairy products that have undergone a higher degree of transformation.

As previously established, processed meat constitutes a significant proportion of total meat consumed, with estimates ranging between 25% and 40%. Table 1.5 provides a detailed analysis of the evolution of the primary components of processed meat, both in absolute and relative quantities.

Table 1.5. Consumption of the principal processed meats

Kg per capita	1964	1981	1991	2004	2010	2018
Ham	0,9	4,2	4,9	4,1	4,0	3,4
Chorizo, fuet and salami	2,1	3,0	3,7	2,4	2,2	2,0
Sausages and blood sausage	0,0	1,4	1,7	0,9	1,5	1,4
Cold cuts and others	2,7	3,2	4,2	2,7	3,1	3,3
% of total meat intake	**1964**	**1981**	**1991**	**2004**	**2010**	**2018**
Ham	3,2	6,7	7,6	7,7	7,6	7,3
Chorizo, fuet and salami	7,4	4,8	5,7	4,5	4,2	4,3
Sausages and blood sausage	0,0	2,2	2,6	1,7	2,8	3,0
Cold cuts and others	9,5	5,1	6,5	5,1	5,9	7,1

Source: See section 1.2

Prior to the 1980s, chorizo, fuet, salami, cold cuts, and other processed meat products were the most commonly consumed in Spain. However, during the 1980s and 1990s, ham emerged as the fastest growing product and eventually became the preferred processed meat among the Spanish population. Despite a decline in absolute consumption over the past decade, ham still accounts for 7.3% of all meat consumed. In contrast, chorizo, fuet, and salami have tended to remain stagnant since the 1990s, while cold cuts and other processed meat products have gained in popularity in recent years. Additionally, while sausages and blood sausages currently only account for 3% of total meat intake, they have consistently grown in popularity since the 1960s. As can be observed, the majority of processed meat products are derived from pork. Therefore, it can be deduced that table 1.3 and 1.5 are two sides of the same coin, and the extensive expansion of pork consumption can be attributed to an increase in cold meats intake, which in turn constitutes a significant portion of processed meat.

Appendix Figure A1.8 illustrates the prices of processed and fresh meat from the mid-20th century until present. The data demonstrates a marked decline in prices for both types of meats, with a similar trend, up until the 2000s. Subsequently, prices tend to stabilize. However, it is noteworthy that throughout the entire period, the price of processed meat is consistently higher than that of fresh meat. This suggests that consumer preferences play a critical role in the relative increase in consumption of processed meat, particularly pork, as previously highlighted in Table 1.5.

While it is acknowledged that the dominant nutritional discourse advocates for a moderate consumption of red and processed meats, due to health and environmental concerns (Martins de Carvalho *et al.*, 2016; Martínez *et al.*, 2020), there is a distinct preference for processed meats, particularly cured meats, among the Spanish population (Furitsch, 1992; Clar, 2022; Marqués, 2022). This phenomenon can be attributed to two factors. Firstly, traditional high consumption of pork sausages, particularly in rural areas (Clar 2022, p. 8; 2010, p. 180). Secondly, and likely with greater explanatory power for recent years, is the increasing influence of large-scale distribution in the value chain and industry strategies to expand the range of products and added value of the meat industry (Langreo 2008, p. 167). The growing influence of distribution within the retail industry has been observed to occur first in durable products and subsequently in perishable products (Langreo and Germán, 2018). This trend is particularly evident in the consumption of fresh (perishable) and processed (durable) meats. According to data from the Food Consumption Panel, in the year 2000, 12% of fresh meat was purchased at hypermarkets, 32% at supermarkets, and 29% at butcher shops/delis. In contrast, the percentages for processed meat in the same year were 19%, 36%, and 15% respectively. In 2019, supermarkets continued to gain market share in all types of meats, while butcher shops/delis experienced a decline in market share, however, the differences in consumption patterns remain. As Langreo (2008) has noted, major companies within the meat industry, such as CampoFrío, Fortes, and Casa Tarradellas, are characterized by heavy investment in advertising. This enables them to adapt to the demands of large-scale distribution, where product segmentation and differentiated quality are key factors. Even smaller companies have been successful in certain market segments by differentiating their products based on origin denominations. Therefore, despite consumer concerns for the health, environmental, and food safety effects of meat consumption (such as the "mad cow" crisis (Langreo, 2002)), this has been partially offset by industry and large-scale distribution strategies, particularly for processed and prepared meats. Collantes (2019) also notes similar trends in the dairy market, where late 20th century advertising campaigns for second transformation products emphasized the health benefits and modernity of these products, leading to a greater inclination towards consumption of these products at the expense of cow's milk.

In addition to the relative increase in the consumption of processed meats, other factors may have mitigated a more rapid decline of overall meat consumption following the

1990s. As Langreo (2008, p. 50) posits, one possible contributing factor could be the increase in immigration during this period, as well as the growth in tourism. Additionally, demographic structures may have played a role in shaping consumption trends, particularly in regards to the aging population. Studies have shown that households where the primary purchaser is over 65 years old tend to have a higher consumption of meat (Martín Cerdeño, 2016, p. 80; 2019b, p. 10), which is a similar pattern observed in dairy products (Collantes, 2015b).

In summary, similar to other developed nations, a distinction can be made between two distinct consumption models, one prior to the 1980s and another following it. Prior to the 1980s, the expansion of meat consumption was based on standardized forms such as fresh and refrigerated meats, with the fall in prices of fresh meat and the increase in income being the key drivers. However, following the 1980s, the decrease in overall meat intake was accompanied by a corresponding increase in processed and prepared meats. The rise in consumption of pork products such as ham, chorizo, and cold cuts may have played a role in mitigating the decline in overall meat consumption. These preferences, which are influenced by both the meat industry and socio-demographic factors, may have played a crucial role in shaping consumption patterns.

1.6. Conclusions and future research

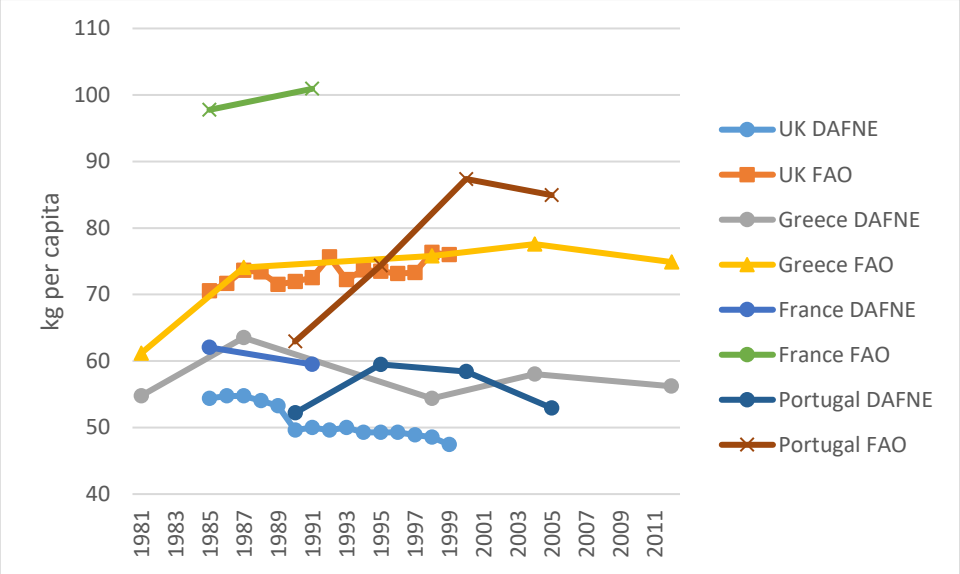
The culmination of the modern nutritional transition in Spain entailed a rapid shift towards a westernized diet. Along with other socioeconomic changes, the Spanish population became one of the largest meat consumers in Europe in a short period of time. During this process, standardized meat, specifically chicken and pork, was the most commonly consumed. At the same time, beef and lamb, which were based on extensive livestock production, saw a decrease in consumption. In other words, from 1950 to 1980/90, meat became a mass consumer product. However, in the following years, the trend shifted and the Spanish average consumer began to consume less and less meat. Concurrently, processed and more sophisticated meats, particularly pork-based products, began to gain weight in total meat consumption while fresh and refrigerated meats saw a decrease in importance. Utilizing four sources of food consumption data has enabled us to explain this second phase of the history and reconcile differing perspectives on meat consumption trends during this period. As stated by both the Ministry of Consumer Affairs in Spain and literature, meat consumption is still relatively high. However, the trend towards decreased consumption must be taken into account in the design of an

appropriate food policy. Additionally, from a public health perspective, an appropriate food policy should also focus on reducing the consumption of processed meats.

This result encourages the initiation of two different branches in future research. First, this chapter has made reference to the average meat intake per capita, but differences in income, region, and age must be considered (Collantes, 2015b; Cussó Segura and Andreu, 2013; Medina-Albaladejo and Calatayud, 2020; Hernández-Adell, Muñoz Pradas, and Pujol-Andreu, 2019). Second, while some hypotheses have been proposed, a quantitative understanding of the main drivers of both expansion and recession trends in meat consumption in Spain is not yet known. Factors such as income, meat prices, cultural and religious values, health and environmental concerns, urbanization, advertising, and dominant nutritionism opinions, among others, all play a role in consumer decision-making regarding meat intake. A better understanding of these variables would allow for a deeper understanding of consumer preferences with respect to meat.

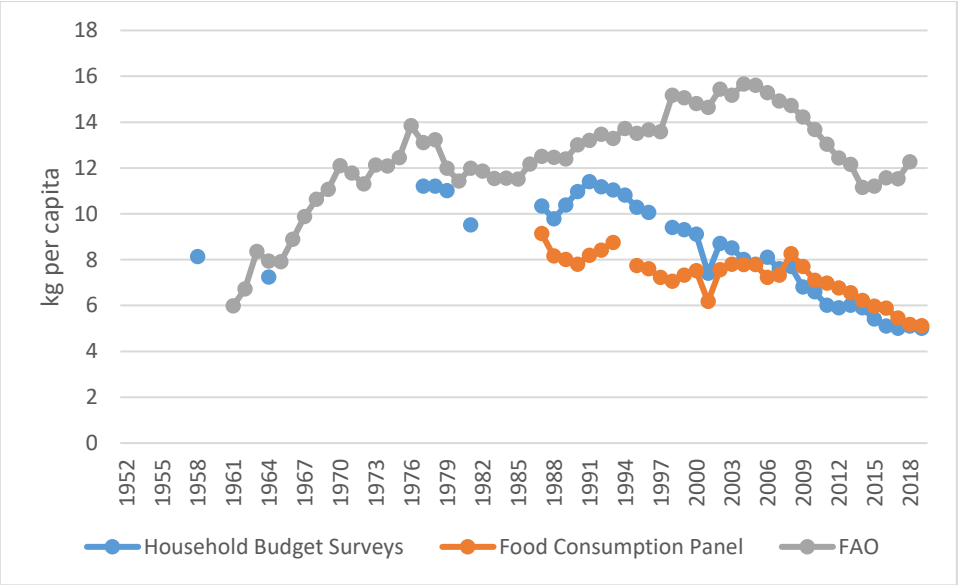
Appendix

Figure A1.1. Meat consumption with data from FAO and DAFNE



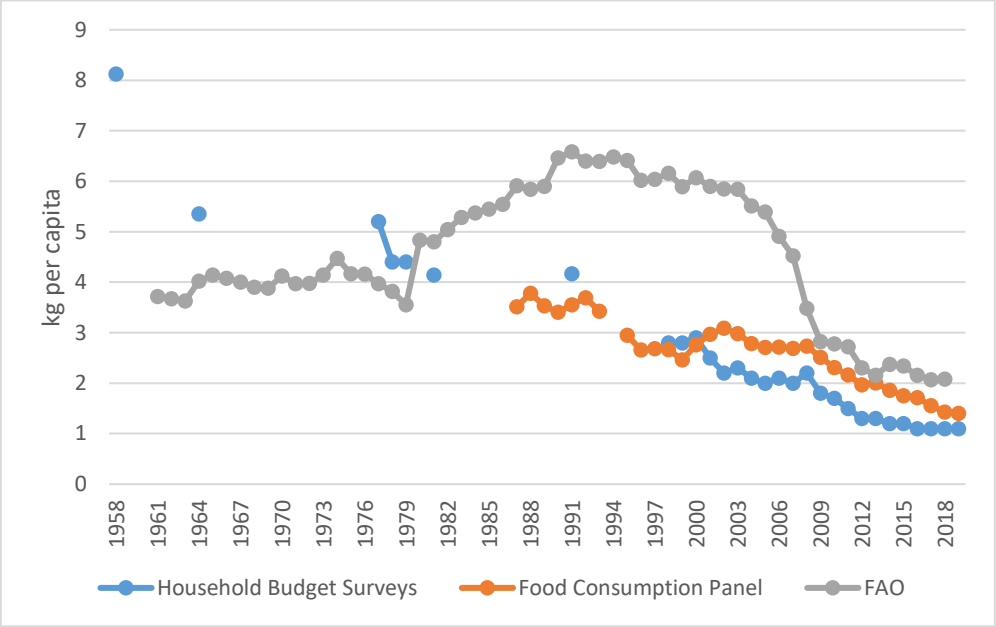
Source: Author's elaboration from FAOSTAT and DAFNE-ANEMOS

Figure A1.2. Consumption of beef in Spain



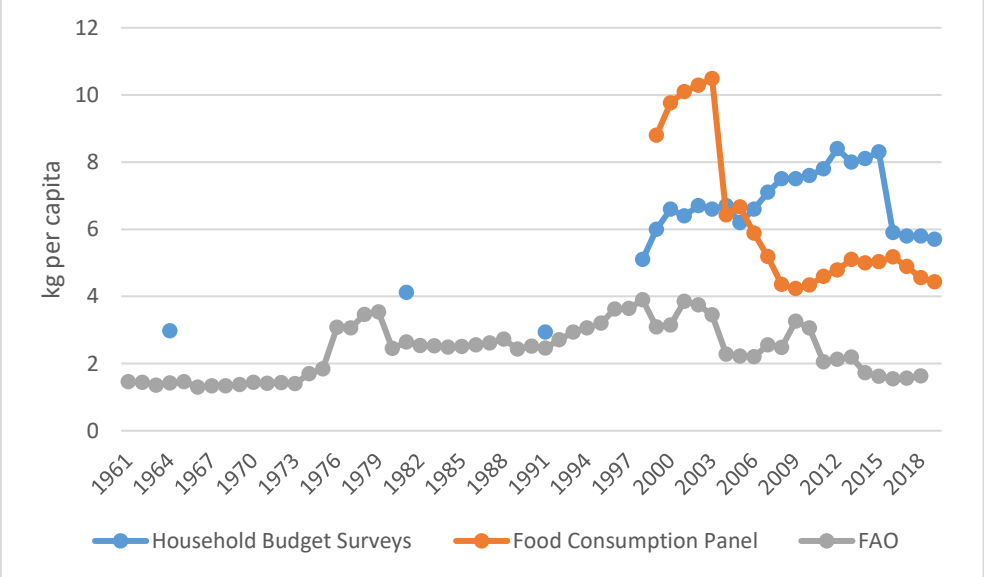
Source: See section 1.2

Figure A1.3. Consumption of lamb in Spain



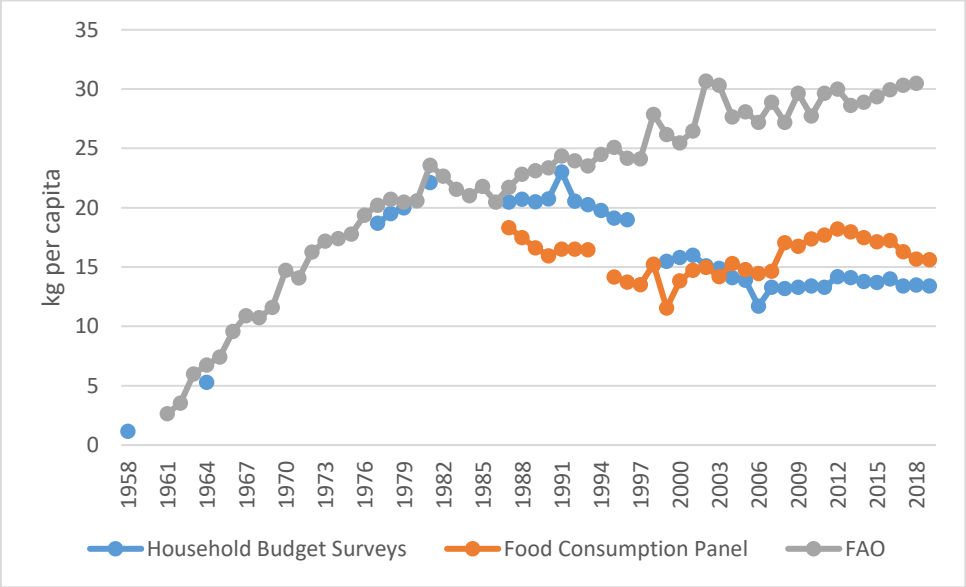
Source: See section 1.2

Figure A1.4. Consumption of other meat in Spain



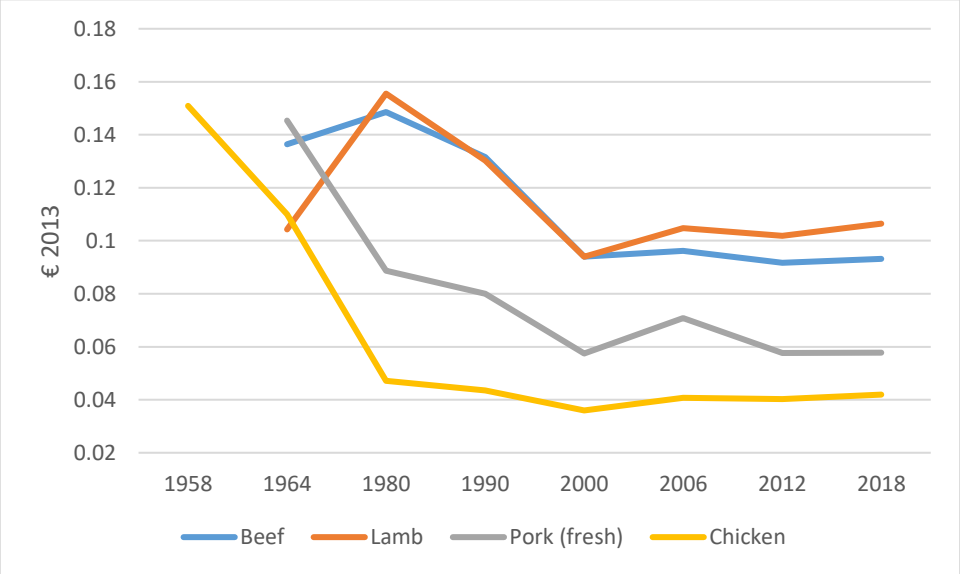
Source: See section 1.2

Figure A1.5. Consumption of poultry in Spain



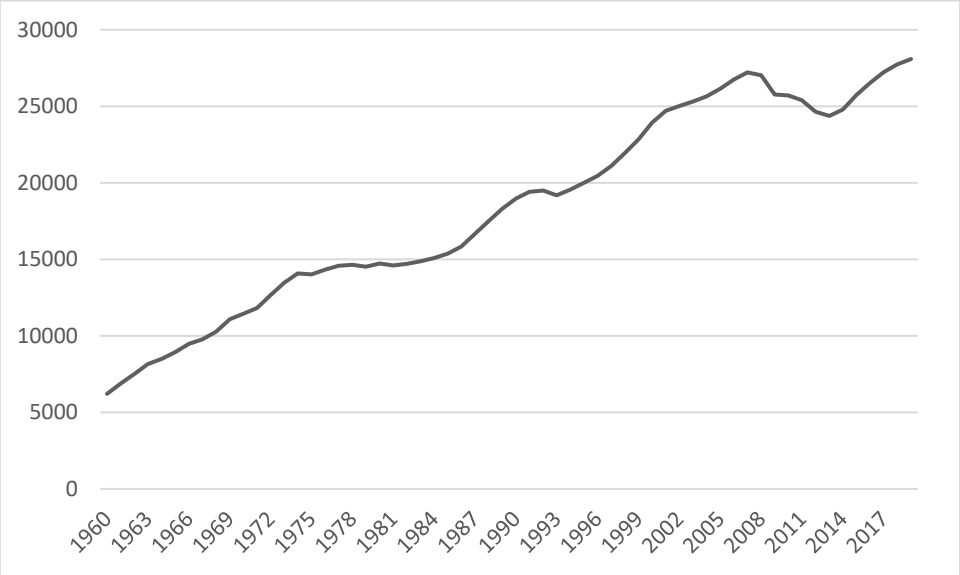
Source: See section 1.2

Figure A1.6. Relative prices of various types of meat



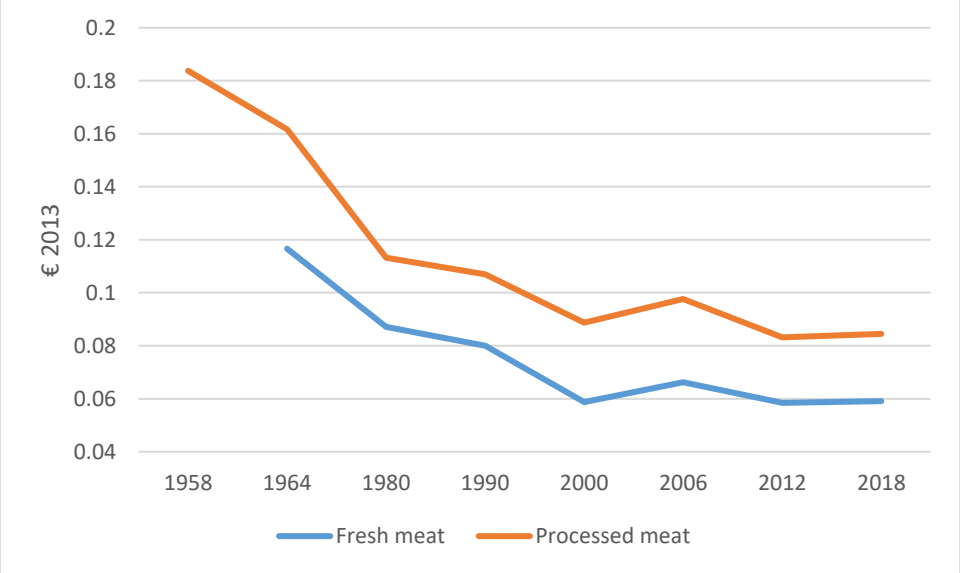
Source: See section 1.2

Figure A1.7. Real GDP per capita in Spain ($ 2010)



Source: World Bank: https://datos.bancomundial.org/

Figure A1.8. Relative prices of various types of meat



Source: See section 1.2

CHAPTER 2: Food consumption models and unequal access to meat: The case of Spain (1964-2018)

This chapter has been accepted in the journal Agricultural History Review and is currently undergoing the editing process.

2.1. Introduction

Meat consumption is a widely discussed topic, not only by academics, but also by politicians and international organizations, such as the World Health Organisation and the Food and Agricultural Organisation of the United Nations (hereafter, WHO and FAO, respectively). Nowadays, the public debate concerning this topic is focused on excessive meat consumption, which is raising health, environmental and even ethical concerns, both in affluent and developing regions (Gerber *et al.*, 2013; Ekmekcioglu *et al.*, 2018). In this context, the Spanish Minister of Consumer Affairs, asked Spanish citizens for to reduce meat consumption, joining the opinion of the WHO and the academic literature (Popkin, 2009; Martins de Carvalho *et al.*, 2016; Raphaely and Marinova, 2016; Martínez *et al.*, 2020; WHO, 2021). According to data provided by FAO, the Spanish population was the largest meat-eater in the European Union in 2018. In other words, the minister's claim is both a reflection of the scientific and social consensus.

However, the study of meat consumption in high-income countries usually faces at least two problems. First, we lack long-term series of meat consumption. Has meat consumption increased or decreased on the long run? Undoubtedly, this question is important in order to design the right food policy. In fact, when analysing meat consumption series in the long term, most of the literature usually uses FAO series (Alexandratos, 2006; Kanerva, 2013; Milford *et al.*, 2019). However, these do not provide real food consumption, but 'food availability' (production + imports - exports) instead. This could be a problem since food availability and real consumption do not necessarily follow the same trend. As a matter of fact, this issue is accentuated in the Spanish case, because FAO data and 'direct' estimates of meat consumption are measuring different things (Sineiro García and Lorenaza Fernández, 2008). Second, most of the works studying meat consumption base their conclusions on national average consumption per capita. Although the abstraction of the average consumer can be useful to present a general idea of the main food consumption trends in the societies, there undoubtedly are huge differences between consumer groups (Vecchi and Coppola, 2006; Cussó Segura and Pujol Andreu, 2013; Collantes, 2015b; Hernández-Adell, Muñoz Pradas and Pujol Andreu, 2019; Medina-Albaladejo and Calatayud, 2020). For example, during the culmination of the modern nutritional transition, some specific groups based on particular regions, gender, age, income or type of residence (rural or urban areas) fell behind (Cussó Segura, 2005; Cussó Segura, Gamboa and Pujol Andreu, 2018). Again, for the

policymaker's purpose, the segmentation patterns among meat-consuming groups are important in order to design a less regressive – or more equally distributed - policy to reduce meat consumption.

In this context, the aim of this chapter is two-fold. First, we use Spain as a case study in order to study how inequalities in meat consumption evolved from the second half of the twentieth-century to the present. Specifically, we focused on disparities from two perspectives: income (quartiles) and regions. To do this, we present a long-term series of meat consumption based on reliable and comprehensive sources of direct food consumption in Spain. Thus, we try to fill the aforementioned gaps in the literature.

Spain is an interesting case due to the dramatic economic, political, social, and nutritional changes that it underwent since the 1950s. That is to say, as a Mediterranean country, the Spanish citizens' diet during the first half of the twentieth-century was based on bread, vegetables, wine, fruits and other Mediterranean foodstuffs. The consumption of animal products was low (Domínguez Martín, 2001b; Cussó Segura and Garrabou Segura, 2007; Marrodán, Montero and Cherkaoui, 2012). However, over a few years, the Mediterranean diet was substituted by a 'westernized' diet (Moreno, Sarría and Popkin, 2002). The consumption of products such as milk and meat grew dramatically until the 1980s, completing the modern nutritional transition (Clar, 2008; 2022; Collantes, 2014; González de Molina *et al.*, 2020). Furthermore, at the end of the twentieth-century, processed and sophisticated food have been gaining ground in the Spanish citizens' diet, alongside a drop in meat and milk consumption (Laajimi and Albisu, 1997; Langreo, 2008; Collantes, 2016). Based on an explicit definition of a food consumption model, the second objective of this chapter is to discuss whether meat consumption in Spain fits properly with the food consumption model's framework (Collantes, 2015a).

The chapter is structured as follows. Section 2 includes a literature review concerning food consumption models and inequalities in meat consumption in Europe. In Section 3, data sources and the construction of the database will be explained. In Section 4, descriptive analyses of the evolution of meat consumption in Spain from the second half of the twentieth-century, as well as its distributive patterns, are presented. In Section 5, we discuss the identification of two distinct consumption patterns in Spain during this period. Finally, Section 6 concludes with final remarks and future research lines.

2.2. Literature review: Food consumption models and inequalities in meat consumption in Europe

From historical and nutritional points of view, several works have highlighted the importance of meat in changes in consumption patterns. Once famines have been eradicated, societies tend to shift from a plant-based diet to a more animal-based diet (Popkin, 1993). This process is called the modern nutritional transition (Grigg, 1995). Furthermore, this pattern is similar around the world, giving way to the so-called 'westernisation' of diets (Popkin, 2003; Pujol Andreu and Cussó Segura, 2014).

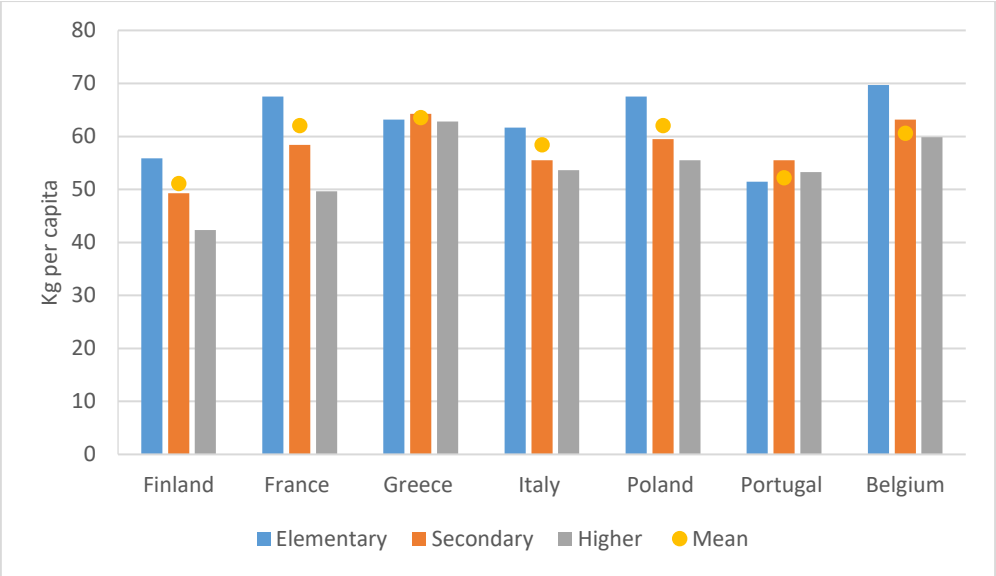
Without neglecting the nutritional transition framework, in this chapter we use a specific definition of a food consumption model in order to analyse the main patterns and the evolution of meat consumption (Malassis, 1997a). We use the framework developed by Malassis in 1997 for two reasons. First, we consider that, both from quantitative and qualitative perspectives, it is a comprehensive framework, since it includes both supply and demand factors. That is to say, it takes into account more variables besides prices or income. Second, we can present a comparative framework to the consumption of dairy products (Collantes, 2015a). Although the degree of processing differs from meat to dairy products, their comparison is interesting because of their important roles in the nutritional transition. Broadly speaking, the first consumption model emerged in the decades following World War II in high-income countries. It was characterized by the formation of diets based on mass agro-industrial foodstuffs (Germán, 2009; Collantes, 2019b). That is to say, consumers tended to eat 'standardized' foodstuffs produced in a 'Fordist' agriculture in order to increase their calorific intake (Clar, 2008, 2022; Godley, 2014). However, once consumers reached high levels of both calories intake and proteins coming from animal products, they decided to not increase the former anymore, but to diversify food consumption instead (Malassis, 1997a). Thus, during the last decades, the spread of the consumption of processed and elaborated food products have characterised a second model of food consumption (Fonte, 2002; Fernández-Armesto, 2003; Germán, 2009; Magnan, 2012; Collantes, 2016; Maguire, 2016). In some respects, the Malassis framework is somewhat similar to the food regimes framework (Friedmann and McMichael, 1989; Magnan, 2012). However, the food regime framework does not pay enough attention to the demand side or, in other words, to the changes in consumer preferences over time (Collantes, 2018).

Food consumption inequalities in western societies have also been a frequently discussed topic in the literature, since these can be a mirror of the differences in living standards (Cussó Segura, 2005). Specifically, access to meat (and other animal foodstuffs) in some countries involved greater well-being (measured by height), since meat is a source of quality proteins (Martínez-Carrión and Puche-Gil, 2011). Thus, meat consumption has been a clear example of huge inequalities in the access to a particular food product, especially before World War II. In the early nineteenth century, before the nutritional transition began in Europe, cereals and potatoes accounted for 65-75 per cent of total calorific intake (Grigg, 1995). In Britain, although it was the first country in Western Europe in which that meat became a mass consumer good throughout all socioeconomic classes, there were great disparities in meat consumption according to the type of employment and regions around 1870 (Clark, Huberman and Lindert, 1995; Gazeley and Newell, 2015). In central and south-western France in the early nineteenth century, meat consumption accounted for less than 5 per cent of total calorific intake (Grigg, 1995). In Paris, household spending on meat was higher than in rural zones, and meat consumption differed between rural areas too (Postel-Vinay and Robin, 1992). In addition to inequalities within countries, disparities in meat consumption between European countries were also remarkable. Specifically, there was a gap in meat consumption between the Atlantic and Mediterranean countries, since Mediterranean food products characterized the diet of the latter. Food products such as cereals, vegetables, pulses or wine, among others, were frequent in the Spanish or Portuguese diets during the nineteenth century and the first half of the twentieth century. In contrast, the consumption of meat and dairy products was more prevalent in central and northern Europe. For example, at the eve of World War I, the apparent consumption of meat in Spain and Italy respectively was 18 and 13 kilos per capita and per year, while in Britain, France, and Germany it was 60, 48 and 48, respectively (Pujol Andreu and Cussó Segura, 2014). Consequently, the absence of food animal products in countries such as Spain led to the lack of basic micronutrients, such as calcium or vitamin A, in the majority of the population during the first half of the twentieth century (Cussó Segura, 2005; Garrabou Segura and Cussó Segura, 2009; Collantes, 2015b; Medina-Albaladejo and Calatayud, 2020).

However, after World War II, food consumption inequalities in Europe tended to disappear, both within and between countries. Although there are not systematic studies

analysing inequalities in meat consumption in Europe from the second half of the twentieth century, it seems that, around the 1980s, their consumption was already widespread, both throughout regions and different socioeconomic classes (see Figure 2.1). In other words, all social classes in each country had achieved a considerable level of consumption ranging around 40-70 kilos per capita and year. Therefore, meat became a mass consumption food product.

Figure 2.1. Meat consumption in Europe by education level (1985-1990)



Source: Author's elaboration from DAFNE-ANEMOS: http://dafne-anemos.hhf-greece.gr/
Notes: Meat and meat products. Finland and France 1985, Greece 1987, Italy 1990, Poland 1988, Portugal 1990, Belgium 1987-88

In recent decades, food consumption patterns in Western countries have been characterized both by a decrease in the calorific intake, and the incorporation of sophisticated and elaborated products in the diet. In other words, once the nutritional transition ended, the average consumer aimed to change its consumption patterns, instead of consuming more. These qualitative changes in diets brought about increases in consumption of products with differential quality (e.g.: organic products, designation of origin, etc.), but also processed or ultra-processed products and ready meals (Collantes, 2019b). This pattern has also occurred in the case of meat. For example, consumption in Britain has dropped around 15-20 per cent from 2008 (Maguire, 2016). However, it is highly probable that the increase in the consumption of more elaborate and sophisticated foodstuffs has not been equal in all consumer groups. The reason is that these new products, either with a higher degree of processing or preparation, or presenting a differential quality, are usually more expensive than standardized food produced in a 'Fordist' agriculture (Maguire, 2016). The consumption of dairy products in Spain in

recent decades is a good example. The importance of more sophisticated dairy products such as yogurts, chilled desserts or cheese has become larger and larger in the Spanish diet since around the 2000s (Collantes, 2014). At the same time, the consumption of standardized dairy products such as milk has been losing ground since the nutritional transition ended. Nevertheless, this change occurred along with a resurgence of inequalities in the access to sophisticated and elaborated dairy products. That is to say, both income and age played an important role in this new segmentation (Collantes, 2015b). In Section four, we try to analyse how inequalities in meat consumption based on income and region evolved in Spain since the sixties.

However, an important stream of the literature has also addressed the negative aspects of the nutritional transition. Up to this moment, we have only considered the positive side of diet 'westernisation', in terms of a higher access to certain goods, such as meat and dairy products. Nonetheless, it is undeniable that this change in consumption patterns brought about important impacts in such delicate fields as the environment and health, issues that are specially accentuated in the case of meat consumption. Concerning environmental impacts, it is well-known that livestock production is responsible for a high fraction of global greenhouse gases emissions (Ilea, 2009). In the case of Spain, some studies argue that the industrialization of agriculture and the increasing feed demands of intensive livestock farming, which favoured increases in meat consumption, were linked to pressures on croplands and the abandonment of pasture lands, rendering negative impacts on land use (González de Molina *et al.*, 2017; 2020). Furthermore, from the perspective of materials and energetic inputs, these changes also were associated to increases in abiotic resources (mainly, fossil fuels), in detriment of other energy sources that were dominant in agriculture until the 1960s (namely, biomass) (Infante-Amate *et al.*, 2015; Di Donato and Carpintero, 2021).

Besides, as was mentioned earlier, the nutritional transition and the 'westernisation' of the Spanish, partially associated to an excessive meat consumption, diet might also have negative impacts on health. As is already well-know, an excessive meat intake can be associated with coronary diseases, such as heart attacks or strokes, and to cancer diagnoses (Micha, Wallace and Mozaffarian, 2010; Quintana Pacheco *et al.*, 2018; Mota *et al.*, 2019; Papier *et al.*, 2023). Moreover, besides these well-known illnesses, this has also been related to chronic and infectious diseases (Fogelholm, Kanerva and Männistö, 2015; Espinosa, Tago and Treich, 2020; Domínguez *et al.*, 2021) . In fact, this constitutes

a specific problem in Spain, as 53 per cent of adult population and 30-40 per cent of children between 5 and 19 years old have been diagnosed with overweight, this being strongly linked to meat consumption (Cerrillo *et al.*, 2023).

Nonetheless, there might be some important countervailing factors to these trends imposed by the 'westernisation' of the Spanish diet, as another important part of the scientific community points out. We refer here to the cultural changes that have been taking place in the past few decades, related to the appearance of vegetarian and vegan movements. In fact, while nowadays only around 1.5 per cent of the Spanish population is vegan, this proportion is estimated to increase in the near future (Cherry, 2006; Van der Post and Hogeweg, 2009; Gheihman, 2021). These might constitute an important balance to the problem of excessive meat consumption, and relevant in years to come to tackle down both environmental and health issues attached to it (Corpet, 2011; Scarborough *et al.*, 2014; Grassian, 2020). In addition, health messages, mainly coming from international organisms or other authorities, are important in shaping consumers' behaviours, specifically those related to excessive meat consumption. In this respect, the mainstream nutritional discourse may affect meat consumption patterns (Biltekoff, 2012).

2.3. Database and methodology

In order to analyse meat consumption in Spain during the second half of the twentieth century, we have used two sources: Household Budget Surveys (HBS) and the Food Consumption Panel (FCP). Although there are other sources providing data on food consumption such as the FAO, they have two data-related problems. First, they do not provide data according to consumers' characteristics such as income or region. That is to say, they only offer data according to the 'average consumer' by country or region. However, many different types of consumers within each country do not follow the average trends in consumption (Hernández-Adell, Muñoz Pradas and Pujol Andreu, 2019). Second, FAO provides 'food availability' per capita. Therefore, data is based on indirect estimation of consumption. Roughly speaking, it sums production and imported food, and subtracts the exported amount. However, as mentioned before, real food consumption and food availability are not measuring the same phenomenon. In other words, indirect methods may be suitable for the purposes of ecological analysis, but might be misleading for studying real food consumption. Thus, in order to obtain a reliable estimation of real food intake, as well as inequalities in food consumption, direct estimation methods, such as those provided by the HBS and FCP are the most suitable

sources for Spain. Direct estimation methods are either based on households surveys or shopping records.

Regarding HBS, we use the so-called Basic Household Budget Surveys carried out in 1964/65, 1980/81, and 1990/91 (INE, 1965-69; 1983-85 1992-95). The 1964/65 HBS contains a sample of around 20,000 surveyed households and the data is disaggregated, displaying around 19 kinds of meat (Martinelli Lasheras, 2009). Furthermore, food consumption is disaggregated according to many consumer characteristics (age, income, urban and rural places, geography, etc.). In this sense, the 1964 HBS is similar to those carried out in 1980/81 and 1990/91, but the latter contains a bigger and more disaggregated data sample, with around 24,000 household surveyed (Maluquer de Motes, 2005).

The FCP is another reliable and direct-method source of food consumption in Spain. It provides annual data from 1987 to 2020,[10] highly disaggregated by socioeconomic status, age, household size, number of children in the household, region, etc. The data sample is around 12,000 households. We use the Food Consumption Panels of 2006, 2012 and 2018. One of the advantages of using the FCP is that it contains data about food consumed outside the household. This consumption mostly corresponds to consumption in restaurants and hotels, but also in public institutions, such as retirement homes or prisons. However, consumption outside the household data by income and region are available from 2017, while average values can be gathered for 1987-2007, 2017, and 2018. One of the main problems linked to the FCP is changes in the methodology employed through time. Moreover, data collection is carried out by private parties, so the methodology is not entirely in the public domain.

We built a database on meat consumption for the years 1964/65, 1980/81, 1990/91, 2006, 2012 and 2018, by linking the HBS and FCP. Although there exists a HBS for 1973/74, it provides only data of expenditures, instead of physical consumption. To analyze patterns of inequality, we focused on two dimensions: access to meat based on income levels and access to meat across regions within the Spanish territory.

[10] From 1999 it can be consulted online: https://www.mapa.gob.es/es/alimentacion/temas/consumo-tendencias/panel-de-consumo-alimentario/series-anuales/.

Besides the series of physical consumption, we present a price series for the whole period. For this purpose, we use data on expenditures and physical consumption, also obtained from the HBS and FCP. As we are interested in analyzing the evolution of meat prices in comparison to the rest of consumption goods, we deflate the series of nominal prices by using a General Prices Index, which is obtained from Maluquer (Maluquer de Motes, 2005).

Regarding income, we have classified meat consumption by quartiles. The first quartile contains the poorest households, and the fourth quartile represents the richest ones. In fact, 1980/81 and 1990/91 HBS provide data in that manner. However, the FCP offers data by 'socioeconomic status'. That is to say, it distinguishes consumption by four classes: 'high and medium-high', 'medium', 'medium-low' and 'low'. Both educational levels and occupation of the breadwinner of the household are taking into account in categorising each class. Even if HBS also provides data by education and occupation, it does not allow to us build four equally sized groups (such as quartiles). Therefore, it is important to analyse inequality trends not as longitudinal series but as cross-sectional data (Collantes, 2015b), since passing from 1990 to 2006, there is a change in income categories. The 1964/65 HBS does not provide food consumption per income quartiles, but per 15 household income segments. In order to reach a homogeneous series, we converted the 15 income segments into four groups of income (Collantes, 2012). Each group contains approximately the same number of households (no less than 20 per cent of all households are assigned to each group). In order to present reliable results, we weight each segment of income by its weight of income in each group's total.

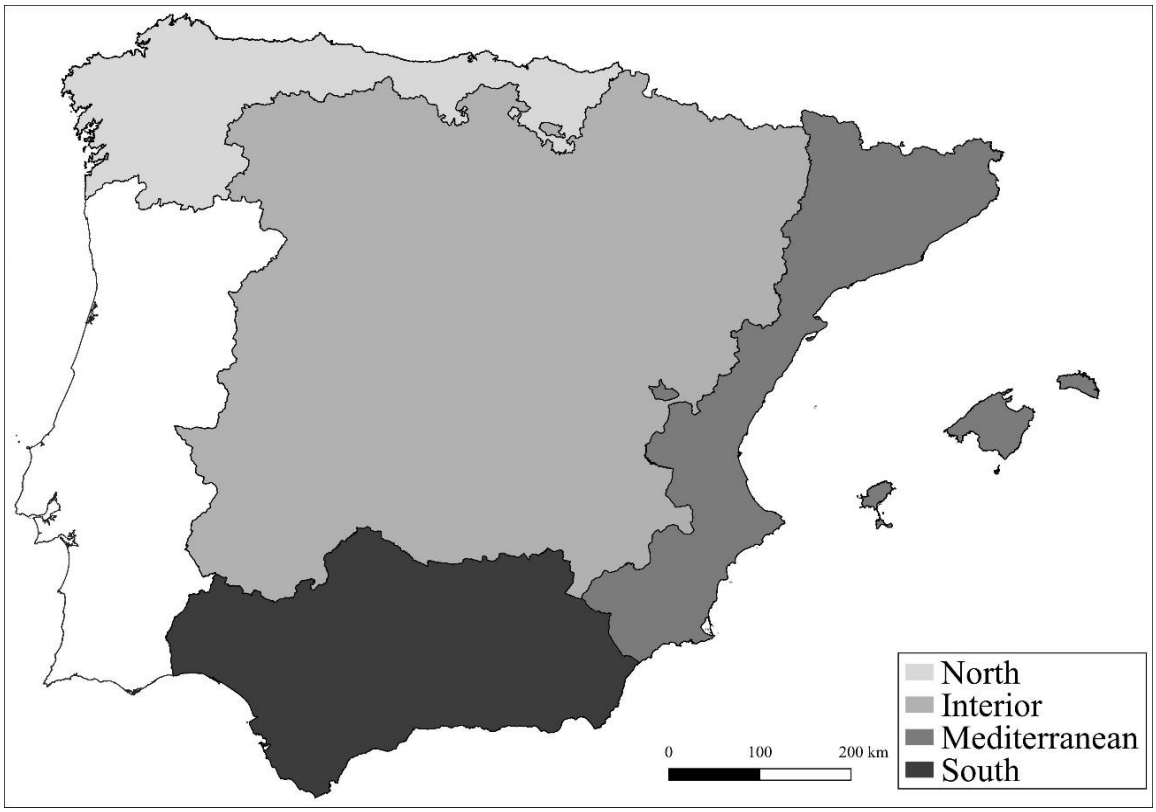
In this analysis of inequality by levels of income, it should also be remarked that the specific dimension of inequality we are addressing is that of disparities in physical quantities of consumed meat. This analysis can be slightly biased, as meat consumption can also be related to other types of inequality, such as different impacts on health depending on the affected social class.

We classify meat consumption according to four different macro-regions, with similar agro-climatic conditions (this affects consumption patterns, due to the relative prices of production linked to climatic comparative advantages): North, Mediterranean, Interior and South (Andalusia) (see Figure 2.2) (Simpson, 1995; Collantes, 2015b). Each region is formed by autonomous regions, which correspond to the NUT2 level of territorial

aggregation. [11] Following the same treatment as with income data, average consumption in each NUT2 is weighted by the proportion of its population in the macro-region's total, using data from the Spanish Statistics Office (INE, 1962, 1973, 1985, 1994, 2006, 2012, 2018). As data variability within the macro-regions can be high, we will refer to consumption by autonomous region and province when necessary.

[11] Following Eurostat criteria according to NUTS (Nomenclature of territorial units for statistics) classification, NUTS2 refer to basic regions for the application of regional policies. In the case of Spain, the 17 autonomous communities are Galicia, Asturias, Cantabria, Basque Country, Navarra, La Rioja, Aragón, Madrid, Castille-León, Castille-La Mancha, Extremadura, Catalonia, Valencia, Balearic Islands, Andalusia, and the Canary Islands.

Figure 2.2. Macro-regions in Spain



Source: Author's elaboration

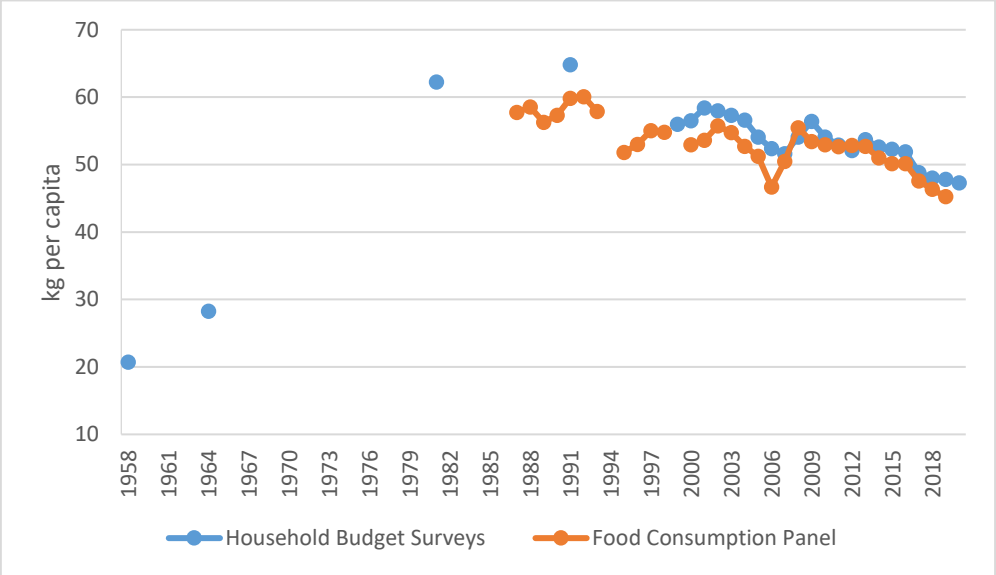
2.4. Meat consumption in Spain: A comprehensive view

2.4.1. Meat consumption in Spain

In Spain, as a Mediterranean region, the consumption of meat has not historically been predominant (Garrabou Segura and Cussó Segura, 2009; Clar, 2022). In the early twentieth century, the calorific intake from livestock products was around 11 per cent of the total. Moreover, there were huge inequalities in the access to this kind of foodstuff (Gallego, 2016). In other words, dairy products and meat were not mass food consumption products. This is despite the fact that in the early twentieth century the demand for livestock products increased (Langreo and Germán, 2018). However, both the Civil War (1936-39) and the post-war period involved backwardness in the food consumption patterns. That is to say, starting from a lower level of consumption than Europe, meat consumption decreased even more during this period (Martínez-Carrión, 2016). Thus, there was a deterioration in the standard of living of the population (Cussó Segura and Garrabou Segura, 2007; Martínez-Carrión, 2016). However, in 1959 the 'stabilization plan' was implemented. Roughly speaking, this involved several economic policies that encouraged economic growth after several years of stagnation caused by the

policies of the dictatorial regime and its preference for autarchy (Barciela, 2003; Christiansen, 2013). Spain returned to the economic growth path of the years before the Civil War, culminating in the industrialisation process, increasing the urbanisation rate, converging to the rest of Europe, and tending to reduce inequality levels (Carreras and Tafunell, 2010). At the same time, consumer patterns in the Spanish population also changed. The diet in Spain became westernized, so that consumption of livestock products increased (Marrodán, Montero and Cherkaoui, 2012). As can be observed in Figure 2.3, in the 1950s, meat consumption in Spain was low (namely, lower than in countries such as Greece and Turkey) (Clar, 2010). However, meat consumption increased until the 1990s, even reaching a higher consumption per capita than France (based in DAFNE-ANEMOS data). From that period, consumers seemed to reach a 'satiety point', so consumption tended to decline until the present. It has been pointed out that this 'satiety point' in Western Europe implied the consumption of 3000 calories per day, and 40 per cent of the intake of proteins coming from animal products (Malassis, 1997a). In fact, in Spain, calories, proteins, and fats from meat, which respectively represented 6, 17, and 13 per cent of total macro-nutrients in 1964, increased to 14, 38, and 20 per cent in 1990. Afterwards, these percentages slightly decreased. Despite these decreases, meat still represented a consumption of fats above nutritional recommendations (Varela-Moreiras *et al.*, 2007, 2013).

Figure 2.3. Evolution of meat consumption in Spain (1958-2019)



Source: Author's elaboration from Household Budget Surveys and Food Consumption Panel.
Notes: Only consumption inside households

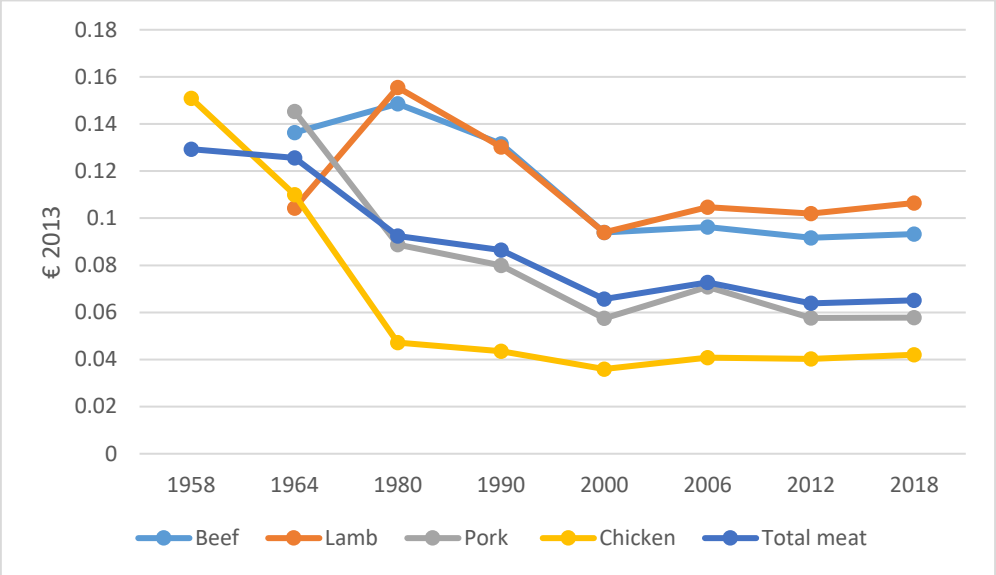
2.4.2. Meat consumption inequalities by income levels

In the 1960s, when meat consumption in Spain was lower than in Western Europe, income was a key factor in determining the amount of meat consumed (Bernabeu-Mestre *et al.*, 2007). Thus, the highest income quartile was characterised by a westernized diet and completed the nutritional transition earlier. On the other hand, the consumption patterns of the lowest income quartile were characterized by the consumption of Mediterranean food products. As Table 2.1 shows, meat consumption in the highest quartile was greater than in the lowest quartile. Since these patterns are very similar to the consumption of dairy products, the intake of quality proteins, calcium and vitamin A in the poorest segments of the Spanish population was deficient (Cussó Segura, 2005; Collantes, 2015b). Even though inequalities were found in all types of meat, these were higher in beef and chicken.

However, our data also show that around the 1980s and 1990s, the scenario was completely different. Meat consumption spread across all social classes. In this way, inequalities by income disappeared. In other words, all income quartiles consumed around 60 and 70 kilos per capita and per year. In fact, meat consumption in Spain reached higher levels than in the rest of Europe (see Figure 2.1). Thus, the Spanish population, following the same food patterns as other Mediterranean countries such as Portugal, completed the nutritional transition and westernized its consumption patterns by incorporating a higher quantity of proteins and fat coming from animal products (Bento

et al., 2018). Furthermore, the relationship between meat consumption and income turned negative. These results are in line with other studies, showing that income elasticity in food consumption is not constant over time (Nicolau and Pujol Andreu, 2005). As has been analysed elsewhere (and is corroborated in our data), the development of mass consumption of meat is mainly explained by the consumption of pork and chicken; that is to say, in those types of meat where production first became intensive (Domínguez Martín, 2001a; Langreo, 2008; Godley, 2014; Ríos-Núñez and Coq-Huelva, 2015). The easy access of US companies to Spain, the imports of more productive breeds (as broiler chickens) and animal feed, led to a massive production of pork and chicken at very low prices (Clar, 2008, 2010). In fact, chicken and pork prices were lower than the general index of food products (Clar, 2022), while the prices of cow and lamb, which were based in extensive farming, behaved contrarily. This can be observed in Figure 2.4 below, where meat prices in relative terms to a General Prices Index are shown (see Section II). In the long-run, two different trends can be observed. On the one hand, there is a higher decrease in total meat prices than in the rest of consumption goods towards the end of the twentieth-century. On the other hand, towards the turn of the century, there is a stagnation in the sense that meat prices increased at a similar pace than the rest of consumption goods. Concerning the first trend, meat consumption was massively increasing, while during the second observed period, meat consumption started to stagnate after a slight decrease. However, the disaggregation by types of meat allows us to analyze the consumption patterns associated to each type. That is, between the 1960s and the 1980s, beef and lamb prices grew more than the rest of consumption goods due to their lower productivity (extensive farming). Nonetheless, pork and poultry prices decreased more than the rest of prices, fostering a higher consumption.

Figure 2.4. Relative prices of different types of meat



Source: Author's elaboration from Household Budget Surveys and Food Consumption Panel

Therefore, both increases in meat supply and income growth explain the spread of meat consumption among Spanish citizens. Table 2.1 shows this process. While there are income inequalities in beef consumption, consumption of chicken and pork is spread across all social classes. Thus, standardized agro-industrial products (pork, chicken and processed milk) explain the modern nutritional transition in Spain (Collantes, 2014).

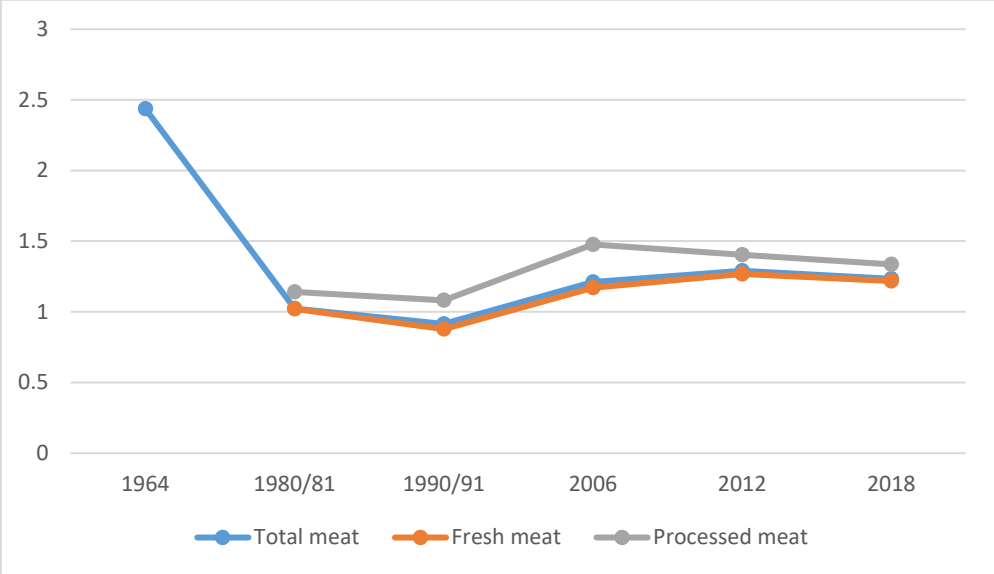
Table 2.1. Meat consumption in Spain according to income (kg per capita and year)

		Total meat	Beef	Sheep meat	Pork	Poultry	Other meat	Fresh meat	Transformed meat	Frozen meat
1964/65	**Quartile 1**	19,9	6,1	6,8	5,3	1,6	n/d	n/d	n/d	n/d
	Quartile 2	25,6	8,4	8,0	5,6	3,4	n/d	n/d	n/d	n/d
	Quartile 3	35,4	12,2	10,3	7,3	5,5	n/d	n/d	n/d	n/d
	Quartile 4	48,5	18,2	12,3	9,4	8,5	n/d	n/d	n/d	n/d
1980/81	**Quartile 1**	63,2	8,0	4,5	22,0	24,2	4,3	49,5	11,5	2,2
	Quartile 2	63,1	9,5	4,0	22,1	23,0	4,5	49,0	12,5	1,6
	Quartile 3	65,1	11,6	3,9	23,4	21,8	4,2	50,2	13,5	1,3
	Quartile 4	64,7	14,9	4,1	21,7	20,3	3,6	50,5	13,1	1,1
1990/91	**Quartile 1**	67,0	8,9	4,2	23,7	27,4	2,7	50,2	15,2	1,6
	Quartile 2	66,9	10,4	4,0	25,0	23,9	3,3	48,1	17,1	1,7
	Quartile 3	65,3	11,9	4,1	23,3	22,7	3,1	47,8	16,6	0,8
	Quartile 4	61,3	12,9	4,2	21,5	20,0	2,5	44,0	16,4	0,8
2006	**Quartile 1**	43,3	5,5	2,4	17,1	12,6	5,9	33,9	8,2	1,2
	Quartile 2	53,3	7,1	2,8	21,9	15,1	6,4	41,7	10,6	0,9
	Quartile 3	51,8	7,5	2,5	21,2	14,9	5,5	39,4	11,6	0,8
	Quartile 4	52,5	8,7	2,9	21,1	14,6	5,2	39,7	12,1	0,6
2012	**Quartile 1**	45,3	5,5	1,9	18,3	15,7	4,0	33,6	9,9	1,6
	Quartile 2	53,5	6,3	1,9	22,2	18,6	4,4	38,9	12,5	1,7
	Quartile 3	53,8	6,5	1,7	22,4	18,5	4,8	38,9	13,1	1,7
	Quartile 4	58,4	8,2	2,3	23,8	19,5	4,9	42,7	13,9	1,8
2018	**Quartile 1**	42,5	4,5	1,4	18,5	14,6	4,1	31,2	10,0	1,2
	Quartile 2	46,5	4,8	1,4	20,4	15,8	4,7	33,5	11,9	1,0
	Quartile 3	46,2	5,1	1,3	20,2	15,6	4,5	33,3	11,8	1,0
	Quartile 4	52,4	6,6	1,4	22,8	17,2	5,0	38,0	13,4	0,9

Source: Author's elaboration from Household Budget Surveys and Food Consumption Panel. Note: Quartiles are ordered from lowest to highest levels of income

However, in the 1990s, we observe some changes in meat consumption patterns, which consolidated at the beginning of the twenty-first century. On the one hand, meat consumption stabilized, to start falling in all income quartiles afterwards. On the other hand, the importance of processed (transformed) meat increased at the turn of the century, while the consumption of fresh meat fell. In other words, in relative terms, consumption of '*embutidos*' (especially pork meat, such as ham, chorizo or mortadella) increased, while consumption of fresh poultry and pork meat decreased, which in average are cheaper than the former. That is to say, even though consumption of processed meat dropped, it was less accentuated than in fresh meat. Moreover, like happened with dairy products, there is also a resurgence of inequalities by income levels (Collantes, 2015b).

Figure 2.5. Relative consumption of fourth to first quartile (Q4/Q1) for different types of meat



Source: Author's elaboration from Household Budget Surveys and Food Consumption Panel. Note: Quartiles are ordered from lowest to highest levels of income

To delve into this fact, Figure 2.5 shows the evolution of relative consumption of the poorest to the richest quartile since the second half of the twentieth-century in total, fresh, and processed meat. Two aspects stand out. First, as already said, the strong reduction in inequalities from 1960 to 1980/90. Second, and again with similarities to the dairy products case, inequalities in processed meat are higher than in fresh meat.

Moreover, since processed meat gained importance in total meat consumption, this fact fostered further disparities since the twenty-first-century. However, Figure 2.5 also displays that there were inequalities in the quantities of fresh meat consumption. In fact, excluding beef, which shows the same inequality patterns since the second half of the

twentieth century (probably due to this having higher prices (Langreo, 2002)), pork and fresh chicken display the highest level of disparities, since these are the most consumed types of meat. That is to say, paradoxically, the same standardized meats, which made it possible to eliminate inequalities in the access to meat, are the ones that are most important in the resurgence of inequalities in recent years. Nevertheless, if we look carefully at the data, the argument is nuanced. The two types of fresh meat that show the highest level of inequality are beef and chicken, as most of the pork consumed around the 1980s is in processed form (cold meat). The Food Consumption Panel disaggregates consumption of chicken into 'whole chicken', 'chicken pieces' and 'chicken fillets'. Since 2012, inequalities in chicken consumption appear in chicken pieces and chicken fillets; there are no disparities in the consumed quantities of whole chicken. That is to say, disparities in fresh meat are also more accentuated in the consumption of meat with a greater degree of elaboration or better quality, such as 'certified meat' (which means that it adjusts to certain standards of quality, alimentary safety, and sustainability imposed by public organisms). Therefore, consumption of standardized meat, with a low degree of elaboration (such as whole chicken), shows a low degree of inequality. Regarding beef, as already mentioned, it never developed in a mass consumer good. Table 2.2 shows that prices may have influenced these new patterns of inequalities. Namely, those meats with higher prices, such as certified meat, beef, chicken fillets or processed meat, also present higher levels of inequalities. Within processed meat, we may also see higher inequalities in those meats with higher prices, such as cured ham.

In fact, concerning the increases in inequality reappearing at the turn of the twenty-first century, two different patterns can be distinguished. Before the 2008 crisis, disparities were concentrated in the consumption of fresh and quality-certified meat. On the contrary, after the recession, inequality increased because disparities widened in transformed meat, especially on that of the lowest quality (mainly, '*embutidos*', by which we refer to chorizo, mortadella, chopped, sausages, etc.). This being so, increasing inequality during the pre-crisis period has a very different character, associated to a soaring consumption of high-quality meat in the highest quartile. Meanwhile, post-recession disparities widened in the lowest extreme of income distribution, with the lowest quartile increasing consumption of cheap low-quality meat much more than the other income groups. These differences might be associated with the effects of the recession, which might have been especially harsh for low-income classes. Thus, although there seems to be a structural

change in increasing inequalities during the first years of the twenty-first century, the 2008 crisis has probably had an important cyclical role in these patterns of inequality.

Table 2.2. Average prices by type of meat (€ per kilo)

	2006	2012	2018
Total meat	6,2	6,3	6,6
Certified meat	8,7	9,8	8,7
Fresh meat	5,6	5,7	6,0
Beef	8,2	9,0	9,5
Whole chicken	2,3	2,7	3,2
Chicken fillets	5,9	6,4	6,2
Processed meat	8,3	8,2	8,6
Cured ham	14,0	13,4	14,1
Chorizo	7,6	7,9	8,5
Sausages	3,3	3,4	3,5
Cold meat	6,0	6,6	6,7

Source: Author's elaboration from the Food Consumption Panel

Finally, Table 2.3 shows inequalities in meat consumption outside the households. However, disaggregated data by income is only available from 2017. Hence, we focus on 2019, as the year prior to the pandemic crisis. As can be seen, in line with what happened with inter-household consumption, there exist inequalities by income. Particularly, these differences are explained by the consumption of the highest quartile, as the other three practically consume the same quantities. Besides this, there not seem to be significant differences between fresh and processed meats. Therefore, although meat consumption outside the household represents a relatively small part of total meat consumption (around 10-20 per cent), this additional consumption outside the household also contributes to the resurgence of inequality after the turn of the century.

Table 2.3. Consumption outside the household by income quartiles in 2019

	Total meat	Fresh meat	Processed meat
Q1	7,3	6,4	0,9
Q2	5,4	4,7	0,7
Q3	5,1	4,4	0,6
Q4	5,3	4,6	0,7

Source: Author's elaboration from the Food Consumption Panel. Note: Quartiles are order from lowest to highest levels of income

In short, the reappearance of inequalities in meat consumption is mainly explained by processed meat and fresh meat that had been subject to some preparation. Therefore, not all citizens adopted the new consumption patterns since the 1990s.

2.4.3. Meat consumption inequalities by regions

In addition to income levels, geography may influence consumption patterns in a society. This is due to different factors. For instance, regional cultural diversity may shape a diet. Another factor could be the relative price of each food product due to the agro-climatic condition of that region (comparative advantage). In fact, Spain is a Mediterranean country, but it presents a great climatic variety. Hence, each region has historically specialized in the production of different food products. For example, agro-climatic condition of the interior region involved specialisation in the production of wheat. On the other hand, the Mediterranean region has specialized in the production of fruits and vegetables due to irrigation works (Ayuda and Pinilla, 2020). In the northern region, with a similar climate to that of Atlantic Europe, the production of meat and milk has been representative (Domínguez Martin, 1996; Cussó Segura and Pujol Andreu, 2013).

Table 2.4. Meat consumption in Spain according to region (kg per capita and year)

		Total meat	Beef	Sheep meat	Pork	Poultry	Other meat	Fresh meat	Transformed meat	Frozen meat
1964/65	**North**	26,4	12,0	0,9	8,6	2,2	2,5	20,7	5,4	0,2
	Interior	30,9	7,4	7,8	7,9	4,5	3,1	23,9	7,0	0,0
	Mediterranean	38,9	6,0	7,5	10,4	11,0	3,8	30,7	8,1	0,1
	South	16,9	3,2	3,3	6,2	2,5	1,5	11,9	4,9	0,0
1980/81	**North**	65,4	19,7	1,4	19,7	17,5	6,9	53,1	11,4	0,8
	Interior	69,7	13,3	7,4	25,0	20,9	2,9	52,2	13,1	4,2
	Mediterranean	67,2	8,7	5,1	21,7	26,7	4,8	52,8	14,2	0,2
	South	53,9	6,2	1,1	22,7	21,9	1,9	39,4	11,7	2,7
1990/91	**North**	66,7	20,1	2,0	23,0	17,8	3,6	50,4	14,9	1,3
	Interior	69,0	12,9	6,8	24,4	21,9	2,8	51,3	17,0	0,6
	Mediterranean	66,2	8,0	5,0	22,2	27,1	3,9	48,4	17,5	0,2
	South	58,6	5,6	0,9	25,7	23,8	2,5	43,2	14,3	1,0
2006	**North**	54,2	12,1	2,1	21,3	13,6	5,2	43,7	9,5	0,9
	Interior	54,9	8,6	4,0	22,2	14,8	5,4	42,9	11,3	0,7
	Mediterranean	50,7	5,9	2,9	19,0	15,7	7,2	39,7	10,4	0,5
	South	42,0	3,2	0,9	19,8	13,8	4,1	30,2	11,1	0,5
2012	**North**	53,0	9,7	1,7	22,3	16,0	3,8	40,3	11,7	1,0
	Interior	55,3	7,5	2,7	22,3	18,6	4,6	41,3	12,5	1,4
	Mediterranean	54,2	5,8	2,0	21,7	19,2	5,6	40,5	12,2	1,4
	South	47,8	4,1	1,0	21,2	17,9	3,6	33,5	12,9	1,3
2018	**North**	47,8	7,1	1,2	21,4	14,5	4,4	36,0	10,8	0,7
	Interior	47,4	5,7	1,8	20,4	15,8	4,6	34,7	11,8	0,9
	Mediterranean	48,1	4,9	1,7	20,1	16,5	5,2	35,7	11,4	0,9
	South	42,7	3,2	0,6	20,0	15,6	3,6	29,5	12,3	0,8

Source: Author's elaboration from Household Budget Surveys and Food Consumption Panel

Table 2.4 shows the consumption of each type of meat in each macro-region. Around the sixties, as occurred with income, there were marked inequalities in the access to meat consumption by geographical areas. Despite being the largest consumer of dairy products, the North was not the largest meat-consumer; instead, it was the Mediterranean region. The interior consumed slightly more meat than the North, while consumption in the South (Andalusia) was the lowest (Collantes, 2015b). That is to say, paradoxically, the Mediterranean region had a more westernized diet, at least as far as meat consumption is concerned (Cussó Segura and Pujol Andreu, 2016).

However, within each macro-region, there are marked differences. For instance, in the Mediterranean region, consumption in Barcelona, Balearic Islands, Lleida, Valencia and Castellón was higher than in Murcia or Alicante. From a disaggregated point of view, chicken and pork were the main meats consumed in this region. In the North, in line with its abundance of cattle, beef was the most consumed meat. Meanwhile, in the Interior region, lamb and mutton were the main meats. Finally, in the South, where meat consumption was not very popular, pork predominated. That is to say, unlike what happened with dairy products, there was a major decoupling between the type of meat consumed and the comparative advantages of each region, especially in pork and chicken. There are two factors behind this pattern. First, even though both are perishable products, meat trade between regions is easier than milk. Second, already in the 1960s, modern chicken and pork slaughterhouses tended to be located in large cities, so this may explain higher meat consumption in Barcelona, Valencia or Madrid (Clar, 2008; Langreo, 2008). In other words, the agribusiness model, which integrated the entire value chain, was implemented in Europe and Spain early, especially in chicken production (Godley, 2014; Clar, 2022).

Inequalities in meat consumption by geographic areas in the 1980s and 1990s tended to disappear, especially when compared with the disparities present during the 1960s. In fact, the persistence of the disparities is explained by a lower meat consumption in the South. As occurred with income, the mass consumption of pork and chicken tended to reduce inequalities between regions. The North was the only region in which beef consumption continued to be the main meat consumed. In other words, in the 1990s, industrial meat production of pork and chicken made it possible that all regions could spread the consumption of meat. Hence, Spain followed the European patterns (according to DAFNE-ANEMOS, countries shown in Figure 2.1 did not present great differences

between rural and urban areas, neither in meat nor dairy consumption) (Collantes, 2015a, see table 1). Unlike the case of income, at the beginning of the twenty-first century, there was no resurgence of regional inequalities. In other words, the patterns of meat consumption established in the 1990s did not change, so chicken and pork continued to be the most consumed meats, followed by beef and lamb (whose production became intensive later) (Langreo, 2008).

2.5. Two models of food consumption?

As was already mentioned, several works have analysed the evolution of food consumption from a historical point of view. For example, the nutritional transition model takes into account variables such as demographic growth, income or the urbanization rate in order to explain changes in dietary patterns. Other works, focused on demand variables, highlight income and urbanisation rates in order to explain growth in the consumption of meat and dairy products (Delgado, 2003). Food regimes literature also attempts to apply a theoretical point of view to analyse the historical changes in food systems (McMichael, 2009; Magnan, 2012). However, these works are essentially qualitative and are not focused on diet patterns (Collantes, 2018). Malassis' model attempts to explain the evolution of food consumption patterns through different food consumption models (Fonte, 2002; Collantes, 2015; 2016). The main advantage of the Malassis model is that it is flexible, systematic, and combines supply and demand arguments, as well as quantitative and qualitative points of view. In this way, it helps to present a theory of the main historical changes and evolution of food consumption patterns.

We present a comparative point of view with the consumption of dairy products in Spain (Malassis, 1997a; Collantes, 2015a), to define the food consumption models in a systematic way. As mentioned in the Introduction, most studies analyse the evolution of food consumption based on the average data of a country or region. Therefore, inequalities in access to food are often not taken into account (Hernández-Adell, Muñoz Pradas and Pujol Andreu, 2019). With our database, we can combine the analysis of food consumption models with inequalities. For the construction of a food consumption model, there are three different consumption patterns. Each pattern is formed of different variables, which must have an internal coherence. The first pattern is related to aggregate consumption. That is to say, a sustained change over time in the trends of consumption may lead to the appearance of a new food consumption model. The second pattern includes two variables: First, the degree of transformation or elaboration of food; second,

the practices or habits related to food. To measure the latter, we focus on domestic and extra domestic consumption. Finally, the third pattern includes inequalities in food consumption.

Based on the outlined theoretical framework, we discuss below whether meat consumption in Spain since the second half of the twentieth-century fits into two different food consumption models. First, we focus on trends in aggregate meat consumption. As Figure 2.3 shows, there is a clear change in trends around the 1980s and 1990s. That is to say, both in dairy products and meat, there are two differentiated trends in consumption (Collantes, 2014). The first trend is upward, with an increase in meat consumption. The second trend is downwards. Therefore, meat consumption reached a 'satiety' point around the eighties. This pattern can also be observed in France and other developed countries. Thus, without admitting causality, it seems that, when a certain level of income is reached, meat consumption tends to stabilize, to decrease afterwards (Vranken *et al.*, 2014).

The first variable of the second pattern is the degree of transformation or elaboration of food. In the case of dairy products, the diffusion of processed cow's milk explains the development of mass milk consumption in Spain. In the case of meat products, chicken and pork, both based on intensive livestock production, explain meat consumption growth until the 1990s. In other words, both the nutritional transition and the formation of the first food consumption model in Spain are explained by the growth of standardized agro-industrial food product (Collantes, 2019b). Table 2.5 shows the evolution of the weight of fresh/frozen and processed meat with respect to total meat consumed. As can be seen, fresh meat was the main type of meat consumed until the 1980s, that is to say, in the frame of the first consumption model. Nevertheless, according to the HBS, processed meat (specifically, '*embutidos*' proceding from pork, such as ham, chorizo or, to a lesser extent, processed meat such as hamburgers or sausages) gained importance in total meat consumption since the nineties. However, the FCP shows stagnation since the eighties in this kind of meat. Probably, the real amount of processed meat consumed is within this range. Therefore, it seems that the increase in processed meat consumption was a gradual process and not an abrupt change from the first model to the second. As it turns out, the transition from one model to another is a complex and persistent process (Fonte, 2002). However, the increase in consumption of processed foods is not an exclusively Spanish phenomenon. Namely, the consumption of ultra-processed foods has increased in Sweden since the 1990s (Juul and Hemmingsson, 2015). Moreover, this phenomenon also

appeared in middle and low-income countries, such as Mexico (Marrón-Ponce *et al.*, 2019). In fact, this pattern is globally increasing obesity, cardiovascular diseases, cancer, or type 2 diabetes (Zobel *et al.*, 2016).

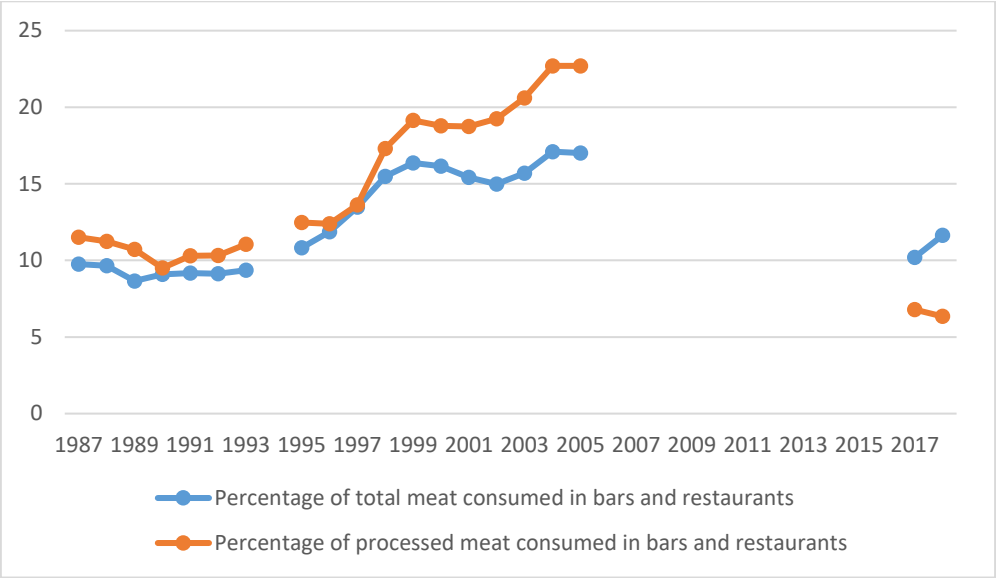
Table 2.5. Consumption of fresh and processed meat with respect to total meat consumption (%)

	1958	1964	1980/81	1990/91	2006	2012	2019
Fresh and frozen meat (%) HBS	84	80	75	75	63	59	63
Processed meat (%) HBS	16	20	25	25	27	41	37
Fresh and frozen meat (%) FCP	n/d	n/d	n/d	75	75	76	75
Processed meat (%) FCP	n/d	n/d	n/d	25	25	24	25

Source: Author's elaboration from Household Budget Surveys and Food Consumption Panel

The second variable of the second pattern is food consumption habits; in our case, domestic and consumption outside the home. As explained in the methodological section, data is only available since 1987. Furthermore, data represents processed meat and total meat consumption. As observed in Figure 2.6, both total and processed meat consumption have increased since the 1990s (in the latter case, especially processed meat consumed in bars and restaurants). While the total out-of-home consumption increased by 50 per cent between the 1980s and 2006, the increase in processed meat was about 100 per cent. However, even though there is no data between 2006 to 2017, and the methodology between both years is different, it seems that consumption outside the home has significantly fallen in the last decade. In other words, consumption has returned to the levels of the 1990s. These results are similar to those shown for dairy products (Collantes, 2015a). Therefore, the behaviour of the consumer in terms of food habits does not follow a clear and coherent pattern to be inserted into a food consumption model. Probably, the decision to consume outside the household is more related to income, so the economic crisis since 2008 might have influenced this pattern. However, although socioeconomic variables are important in order to explain consumption outside the home, several studies for developed countries (specially Europe and Australia) show that there are other factors besides income. Among these additional factors besides prices, we find other explanations related to consumer preferences, such as the time spent cooking at the household, satisfying the children or other members of the household, or factors associated to gender, race, physical activity, level of education, age, psychology, marketing, etc (Janssen *et al.*, 2018).

Figure 2.6. Total and processed meat consumed in bars and restaurant with respect total meat consumed (%)



Source: Author's elaboration from Food Consumption Panel

Lastly, we analyse inequalities in order to see whether there are two different food consumption models since the second half of the twentieth century. To do this, we rely on the results presented in sections 4.1 and 4.2. Essentially, it can be affirmed that the different character of inequality that developed at different times fit into two food consumption models. In the 1960s, inequalities in the access to meat were significant both at regional and income levels. On the one hand, the highest quartile consumed more meat than the lowest. On the other hand, in big cities such as Barcelona, Madrid or Valencia, or in places where agro-climatic conditions were suitable for meat production, consumption was also higher than in the Interior and South regions. However, in the frame of the first consumption model, which consolidated around the 1980s, inequalities disappeared, both in terms of income and regions. That is, the productivity increases in intensive livestock sectors (pork and chicken) allowed the spread of meat consumption across all regions and social classes. Nevertheless, the second model, initiated around the nineties and consolidated in the last two decades, is characterized also by a reappearance of income inequalities. An important part of these new inequality patterns is explained by the consumption of processed meat and a new type of fresh meat with a higher degree of elaboration or a differential quality (chicken in pieces and in fillets, certified meat, etc.). DAFNE-ANEMOS, by using cross-sectional data, analyses whether there are inequalities in the access to certain elaborated meats in some European countries between the late twentieth century and the start of the twenty first-century, with varied results. Concerning total meat consumption, with the exception of Albania (2006) and Armenia (2004), no

other countries show signs of inequalities in consumption by educational levels. Nonetheless, meat with a high degree of elaboration does present inequalities, although without a clear pattern. On the one hand, in Estonia (2006), Greece (2004), Poland (2000), and Portugal (2005), there are inequalities in the access to transformed meats or meat dishes by educational levels. On the other hand, in Norway (1996-98), there only exist inequalities in chicken consumption, which is precisely the kind of meat that allowed the development of mass consumption in Spain.

Therefore, with similar trends to those observed in dairy products, we are able to differentiate two different food consumption models in meat consumption in Spain since the second half of the twentieth century. The first model was in place by the 1960s around the sixties, although its origins lay in the early part of the century, interrupted by the Civil War and the post-war years.

The main characteristics of the first model were an increase in the consumption of standardized animal food products (pork, chicken and processed cow's milk), by which the Spanish population experienced the nutritional transition and to some degree abandoned the Mediterranean diet (Garrabou Segura and Cussó Segura, 2009). These 'westernized' consumption patterns were well-established in the 1980s and 1990s. Even though we do not have enough data to be sure, most of this consumption would presumably be at home. Finally, inequalities in meat (and milk) consumption tended to disappear among both income groups and regions.

Therefore, all consumption patterns described above had a certain degree of internal coherence, so we can consider the period from the 1960s to the 1990s as following one food consumption model. However, around this decade, food consumption patterns changed enough to give way to another food consumption model. First, meat consumption reached what Malassis named the 'satiety point'. That is to say, meat and milk consumption stagnated for a few years, and then decreased. This downward trend continues to the present day and is similar to the cases of other countries, such as the UK (Stewart *et al.*, 2021).

However, the drop in consumption of both meat and dairy products was slight due to the relative increase in the consumption of products subject to a higher degree of transformation. Thus, in the new food consumption model, food products such as ham and sausages, as well as flavoured yogurt or other refrigerated desserts, have gained

importance in the Spanish diet. Nonetheless, the changes in food habits regarding domestic and out-of-home consumption are not clear enough in order to fit them into the second food consumption model. Probably, cyclical variations in income associated to the recession were more important in determining consumption of meat outside the household than structural factors. Finally, inequality levels have been different in each model. On the one hand, mass consumption in the first model involved a reduction in disparities. On the other hand, in the second model, a reappearance of inequalities took place. The consumption of processed and more elaborate meat seems to be the main determinant of these new inequalities.

2.6. Conclusions and future research

The study of inequalities is one of the most analyzed topics in economic history. Inequality can manifest in a plethora of dimensions, and be measured and defined in several ways. In this chapter, we are addressing inequality in the access to a specific food product: meat.

Starting from high inequality levels by income and geographical areas in the sixties, those decreased until around 1980/90. In this period, Spain completed the modern nutritional transition, so the consumption of Mediterranean products lost ground. At the same time, the dietary patterns converged to those of Europe. Therefore, food products such as meat and dairy products became mass consumption food products. However, at the beginning of the twenty-first-century, new disparities emerged, which were explained by the access of the most affluent to more elaborated and processed meat. In the second part of this chapter, we have relied on a theoretical framework applied to history in order to analyse the evolution and changes in food consumption patterns. Like the case of dairy products, we concluded that two different models of consumption characterized meat consumption in Spain. The first model consolidated in the 1980s, and was characterized by increases in calorific intake, based in standardized food products mainly consumed in households. All this crystalized in inequality reductions. The second model appeared around the first decade of the twenty-first century, characterized by decreased in both meat and dairy products, as well as increases in elaborated food products, resulting in increases in inequality.

Therefore, in this chapter, we have complemented the literature by adding long-term and accurate data of meat consumption in Spain. Probably, as the Spanish Minister of

Consumer Affairs stated, the consumption of meat in the Spanish population is excessive and ecologically unsustainable. However, it is also true that the trend in the last years is decreasing. Nevertheless, we have seen that the way this consumption is distributed, either by income or territories, is not trivial, and should also be addressed in the debate. Moreover, to design a correct policy to reduce meat consumption, it is necessary to take into account inequality and distributional patterns, since in this way the policy could be less regressive.

One of the main limitations of this chapter is the lack of causal arguments. That is to say, although we present prices series that can be useful for understanding the explicative factors behind the main trends in meat consumption, a great part of this chapter is descriptive. As has already been pointed out in the literature, there exist supply, demand, and sociocultural factors (preferences) to explain meat consumption patterns (Milford *et al.*, 2019). On the one hand, research on global nutritional transition usually emphasise demand variables, such as increases in income and population, or rates of urbanisation, in order to explain increases in consumption of, namely, meat or dairy products (Popkin, 1993; Grigg, 1995). On the other hand, other studies suggest supply factors that might have affected the increases in the consumption of livestock products in the last decades. The main explanation would lie in the fact that the intensification of livestock production provoked decreases in prices, thus fostering higher consumption (Rivera-Ferre, 2009; Magnan, 2012). In the specific case of Spain, it can also be observed this division in the literature that analyses the increase in consumption of livestock products. Namely, Clar defends that the strong fall in poultry and pork prices during the second half of the twentieth-century was a decisive factor for explaining the increase in meat consumption during this period (Clar, 2008). This would be in line with the real prices series we presented above, where decreases in intensive livestock products (pork and poultry) were observed since the 1960s, as well as increases in prices in relative terms to extensive livestock products. Besides, other works focus on demand factors to delve into this fact, for the cases of both meat and dairy products (Langreo, 2008; Collantes, 2019b). That is to say, since the 1960s, both income per capita and urbanization rates increased in Spain, thus converging to Europe and fostering consumption patterns 'westernisation'. Regarding preferences, these factors seldom appear in the literature, probably due to difficulties for their quantification. However, some studies remark their importance in several countries, being Spain among them. (Hansen, 2018; Collantes, 2019b).

Therefore, future research should be oriented towards the quantification of income, prices, and preferences, in order to reach a better understanding of the main consumption patterns, both in average and by groups of consumers. This would benefit the field of study about consumption of meat or other livestock products.

CHAPTER 3: Exploring the drivers of Spain's nutritional transition: From meat shortages to excess (1958-1990)

3.1. Introduction

As societies reach a certain threshold of calorie intake and macronutrients, consumers tend to increase their consumption of animal-derived products while decreasing their consumption of plant-derived products (Grigg, 1995; Cussó Segura and Garrabou Segura, 2007; Medina-Albaladejo and Calatayud, 2020). This complex process, with significant exceptions and differences between countries (Deaton and Drèze, 2009; Langthaler, 2018; Presa and Román, 2022), has been referred to as the modern nutritional transition (Popkin, 1993). Historically, the nutritional transition first occurred in Europe and other high-income countries and subsequently in developing countries (Grigg, 1995; Delgado, 2003; Popkin, 2003; Cheng, Gao and Seale, 2015). Therefore, global diets have tended to homogenize around the Western diet, which is high in saturated fats and sugars and low in fiber. Consequently, the nutritional transition and the homogenization of diets have costs both in terms of health (mainly due to the increase in non-communicable diseases) (WHO, 2021; Cerrillo *et al.*, 2023) and the environment (Infante-Amate *et al.*, 2018; Winders and Ransom, 2019; González de Molina *et al.*, 2020).

Both technical change in livestock production and rising demand are the main factors that the literature has identified to explain the modern nutritional transition (Domínguez Martín, 2001b; Clar, 2008; Collantes, 2019a). Regarding technical change, the increase in productivity resulting from livestock intensification, and subsequently, the growing influence of major retailers, would have led to a decline in the relative prices of these products, thus causing a significant increase in their consumption (Grigg, 1995; Clar, 2008, 2013; Rivera-Ferre, 2009; Magnan, 2012). Therefore, it would be the increase in productivity along the value chain that would induce greater consumption of products such as meat or milk. Regarding demand, the rise in per capita income in the Western countries following World War II, and subsequently in developing nations, along with the growth in population and urbanization rates, would account for the surge in animal product consumption (Popkin, 1993; Delgado, 2003).

However, the literature analyzing major dietary changes, such as the nutritional transition, often overlooks two aspects. Firstly, it does not quantitatively assess this process at the microeconomic level. In other words, the decision to consume more or less livestock products such as meat is heavily influenced by budgetary constraints. The softening of these constraints is a necessary condition for undertaking the nutritional transition. Secondly, the literature, particularly in economic history, often fails to analyze the

determinants of the nutritional transition (Collantes, 2019b). On the one hand, the softening of budgetary constraints is primarily due to falling prices and increasing income. Nevertheless, it is not commonly quantified which of the two variables carries greater significance. On the other hand, budgetary constraints do not explain the entirety of consumption since two consumers with similar budgetary constraints can have different levels of consumption. In other words, preferences also play an important role (Collantes, 2018, 2019b). In fact, since the late 20th century, preferences tend to play a greater role than income and prices because food tends to lose weight in household expenditure (Engels' law) (Mili, Mahlau and Furitsch, 1998). Understanding the quantitative process of softening budgetary constraints and the factors driving the nutritional transition at the microeconomic level may help mitigate its impact on both health and the environment.

In this context, the objective of this chapter is twofold. Firstly, I employ Spain as a case study to showcase the evolution of budget constraints on meat consumption during the second half of the 20th century. Secondly, I aim to analyze the role of income, prices, and preferences in shaping the changing capacity to consume meat. To gain a more comprehensive perspective, I do not focus solely on average consumption, but instead look at different groups of consumers (income quartiles, regions, and territories) and different types of meat (both by animal origin and degree of processing). In this way, I complement the aforementioned literature on determinants of livestock product consumption, attempting to provide a more micro, causal and quantitative perspective.

The interest in Spain as a case study lies in its status as a Mediterranean country that experienced its nutritional transition later than Western Europe (Moreno, Sarría and Popkin, 2002; Pujol Andreu and Cussó Segura, 2014). Prior to the 1970s, the consumption of livestock products in the diet was relatively low (Clar, 2008, p.136). However, there was a significant increase in the consumption of meat and other livestock products within a short period of time, leading to a shift away from Mediterranean dietary patterns (Moreno, Sarría and Popkin, 2002; Bach-Faig *et al.*, 2011). In 1958, the average meat consumption in Spain was approximately 20 kilograms per person, which is close to the current recommendations for nutritional discourse (Willett *et al.*, 2019, p. 551; Martínez *et al.*, 2020, p. 53). However, by 1980, meat consumption in Spain had surpassed 60 kilograms per capita, triple the recommended maximum consumption. Additionally, in the latter decades of the 20th century, there was a relative increase in the

consumption of processed meat, which is linked to an increased risk of colorectal cancer, coronary heart disease, and diabetes (Bonnet *et al.*, 2020, p. 3). Consequently, the prevalence of various diseases currently affecting Spanish society, such as high rates of obesity, diabetes, and other cardiovascular diseases (Cerrillo *et al.*, 2023), originated during the period under investigation in this chapter.

In addition to various studies on the Spanish nutritional transition in the 20th century (see section 3), this chapter is complemented by the works of Clar (2008) and Nicolau and Pujol-Andreu (2005). Clar claims that the implementation of a Fordist consumption model in Spain, characterized by the mass consumption of chicken, pork, milk, and sunflower oil, was highly influenced by supply. In turn, the supply was shaped by institutional variables, based on the ease with which the regime allowed foreign companies in these sectors to establish themselves in Spain. Nicolau and Pujol-Andreu emphasize that, in the long term, supply adaptations to demand are an important element for the restructuring of diets. Therefore, in this chapter, I endeavor to quantify the data presented in both works for meat consumption in Spain in the second half of the 20th century.

The chapter is structured as follows. After this introduction, in the next section, I describe how I constructed the database and the methodology. In section 3, I present descriptive data on meat consumption in Spain, relating them to the existing literature on the subject. In Section 4, I illustrate the evolution of budgetary constraints on meat consumption, along with their determinants. In the subsequent section, I present the role that preferences have played in this process. Finally, I conclude the chapter with brief conclusions, limitations, and potential future research.

3.2. Data and methodology

To illustrate the evolution of budget constraints on meat consumption during the mid-20th century in Spain, as well as its decomposition into the roles played by prices, income, and preferences, I have primarily relied on the Household Budget Surveys (HBS) as the main data source. These surveys were first conducted by the National Institute of Statistics (INE) in 1958 with the aim of obtaining information about the expenditure (and physical consumption of food items) of Spanish households (Maluquer de Motes, 2005; Collantes, 2012), as well as the consumer price index. Specifically, in this study, I use the HBS from 1958, 1964/65, 1980/81 and 1990/91, also known as the structural (or basic)

family budget surveys (Díaz-Méndez *et al.*, 2005, p. 120). Although there is an HBS for the period 1973/74, it does not provide data on food intake, but only on food expenditure. I have attempted to use alternative databases such as the one provided by the FAO to cross-reference food intake data with the expenditure data from the HBS, but the data merging does not yield consistent and reliable results (Delgado, 2022; Cerrillo *et al.*, 2023). Therefore, while the changes in food intake between 1964/65 and 1980/81 are not quantitatively analyzed, qualitative information is provided. Furthermore, as will be analyzed throughout the study, I prioritize long-term dietary changes, as consumer preferences do not change from one year to another (Nicolau and Pujol Andreu, 2005). Although the use of a single database as the foundation of the entire study may imply the existence of biases due to possible methodological errors of the source (Díaz-Méndez *et al.*, 2005), the trends (though not the exact values) in meat consumption presented in the surveys during the study period are similar to those of other sources such as the FAO and the Food Consumption Panel (from 1987 onwards), thus demonstrating the robustness and reliability of the surveys.

Since the 1964/65 survey, all of the surveys have a considerable sample size (between 24,000 and 28,000 households (Maluquer de Motes, 2005, p.1271)) and a sufficiently broad disaggregation of products to gain a detailed understanding of household consumption. In addition to providing data on food consumption at the national level, they also offer data on consumer characteristics, such as income levels, regional scope, types of municipalities (rural and urban), etc., which allow for a much better understanding of what has happened at the average level.

Since the surveys provide physical consumption and nominal expenditure data, the implicit price of each food product can be obtained (Collantes, 2019b). The expenditure data provided by the 1964/65 survey is not presented in quartiles, but rather in 5 income segments. For instance, the first segment (lowest income) does not correspond to the first quartile but to the first two income quartiles. Similarly, the last segment does not align with the quartile representing the highest income, but probably corresponds to the decile with the highest income. Building upon this, the intake quartiles from the year 1964 (see to chapter 2 for an explanation of their construction) have been adjusted to match the expenditure quartiles of that year. Therefore, the results for income quartiles of the year 1964/65 need to be interpreted cautiously. In order to calculate expenditure and prices in real terms, they have been deflated using the consumer price index offered in Maluquer

de Motes (2005, p. 1292) and linked to the one provided by the National Institute of Statistics (INE). For data on net disposable household income at the national level, the data presented by Carreras, Prados de la Escosura and Rosés, (2005, p. 1372) have been used. For disposable income by different groups of consumers, the data provided by the HBS have been used, also deflated by the general price index. Although the data provided by the HBS on disposable income may be somewhat underestimated (Torregrosa-Hetland, 2016), this does not seem to imply significant bias, as demonstrated in Collantes (2019) using alternative indicators such as GDP per capita. With regard to the types of meat analyzed, data has been aggregated both at the level of the source animal (beef, lamb, poultry (mainly chicken), and pork) and by degree of processing, i.e., fresh and processed meat.[12]

Once the database has been constructed, a methodology similar to that of (Collantes, 2019, pp. 960-62) has been employed, which consists of two parts. The first part involves calculating the budget constraint for meat consumption in Spain and determining the factors contributing to its softening over time. To calculate the budget constraint, a fixed quantity of consumed meat is chosen (reference consumption), and the expenditure on family income per capita required to consume that quantity is observed at the prevailing prices for each year. To determine the factors influencing the softening of the budget constraint over time, the following formula is utilized:

$$T_{t,t-1}(Meat\ purchasing\ power) = T_{t,t-1}(Disposable\ income) - T_{t,t-1}(Meat\ prices)$$

In other words, this is a breakdown of the cumulative annual growth rates (T) of purchasing power in the acquisition of meat, corresponding to the percentage of net disposable income per person and the prices of meat.

The second methodological part is to determine the role of preferences or, in other words, households' predisposition to consume meat. Using Collantes' methodology (2019), the so-called consumer responsiveness factor (RP) is applied:

$$RP = \frac{T_{t,t-1}(Meat\ consumption)}{T_{t,t-1}(Meat\ purchasing\ power)}$$

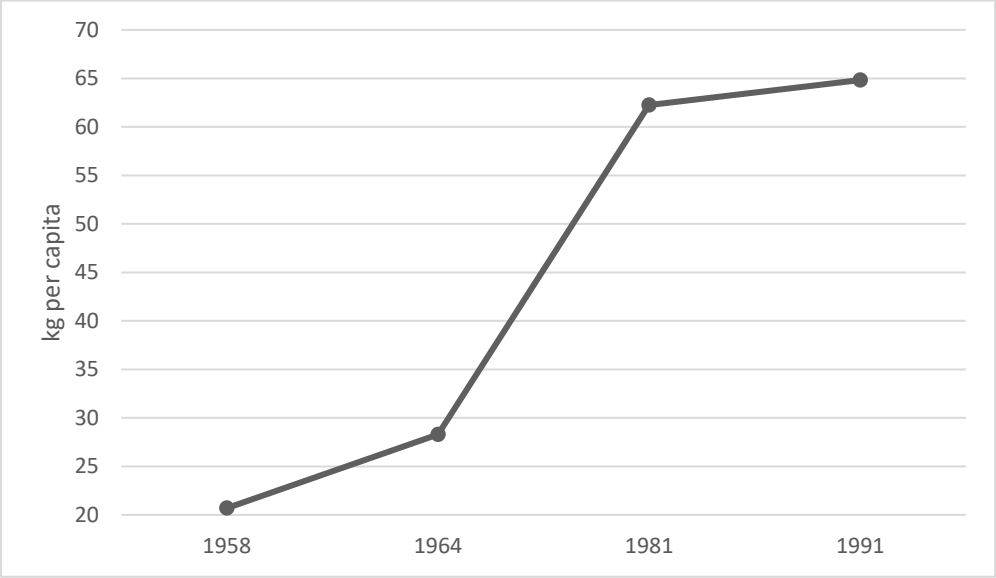
[12] I have included frozen meat in fresh meat due to its low weight contribution.

Intuitively, the responsiveness factor measures how the increase in physical meat consumption varies over a period of time with variations in the purchasing power of meat acquisition in the same period. If the RF is greater than 1, the growth in meat consumption will be higher than the growth in purchasing power adjusted for meat prices, therefore there will be an increase in the predisposition to consume meat. In other words, consumer preferences will be favorable towards meat consumption. If the RF is less than 1, the opposite will occur.

3.3. Nutritional transition and meat consumption in Spain

Historically, the Spanish diet has been characterized by the consumption of Mediterranean products (Moreno, Sarría and Popkin, 2002; Garrabou Segura and Cussó Segura, 2009; Pujol Andreu and Cussó Segura, 2014). Therefore, the consumption of livestock products, such as meat, milk or eggs, was relatively low compared to Atlantic European countries (Gallego, 2016; Delgado, 2022). This meant that large groups of consumers had deficiencies in certain micronutrients, such as calcium (Cussó Segura, 2005; Collantes, 2014; Medina-Albaladejo and Calatayud, 2020). In the first third of the 20th century, there was a certain increase in the consumption of livestock products due to improvements in both supply and demand (Clar, 2008; Collantes, 2016; Langreo and Germán, 2018). However, these limited improvements were set back due to the civil war (1936-39) and the post-war period. That is, both the poverty caused by the war itself and the economic policies applied later, as well as international isolation, resulted in both economic and dietary deterioration (Barciela, 2003; Christiansen, 2013). The latter, accentuated in the case of livestock products (Clar, 2013; Martínez-Carrión, 2016). However, the final years of the 1950s and, especially the 1960s, witnessed significant changes in the Spanish diet. In other words, Spain completed its modern nutritional transition (Moreno, Sarría and Popkin, 2002). Therefore, there was a strong increase in meat consumption (see figure 3.1). Starting from very low levels (lower than in Greece or Turkey) (Delgado, 2022)), consumption first experienced a slight increase until the 1960s, and then took off and reached over 60 kilos per person just 15 years later. Thus, consumption reached levels higher than countries like France.

Figure 3.1. Meat consumption per capita in Spanish households



Source: Own elaboration based on Household Budget Surveys

However, the remarkable increase in meat consumption (and dairy products (Collantes, 2014)) since the 1960s masks significant changes among consumer groups (Collantes, 2015b; Hernández-Adell, Muñoz Pradas and Pujol Andreu, 2019; Delgado and Pinilla, 2022). In other words, the growth in average meat consumption involved the massification of its consumption at the income, regional, and territorial levels (both in rural and urban areas). In fact, in 1960, the modern nutritional transition had been carried out only by certain social groups, usually high-income ones, while the vast majority of the population still based their diet on Mediterranean patterns (Cussó Segura, 2005). Therefore, meat consumption was not common among most of the population (Marrodán, Montero and Cherkaoui, 2012). As shown in Table 3.1, consumption was overwhelmingly higher in the highest income quartile (Q4), as well as in urban areas and in the Mediterranean and Interior regions (especially Madrid) (Cussó Segura and Pujol Andreu, 2016). In contrast, in the 1980s and 1990s, these inequalities in access to meat disappeared completely. In fact, consumption became higher among lower income quartiles and in rural areas (Lopez, 1993). In other words, it is the increase in meat consumption among less favored social groups or those with lower historical meat consumption that explains the strong increase in average terms up to the 1990s (see Table A1.1 in the appendix for consumption by disaggregated consumer groups by types of meat).

Table 3.1. Meat consumption in different consumer groups (kg per capita)

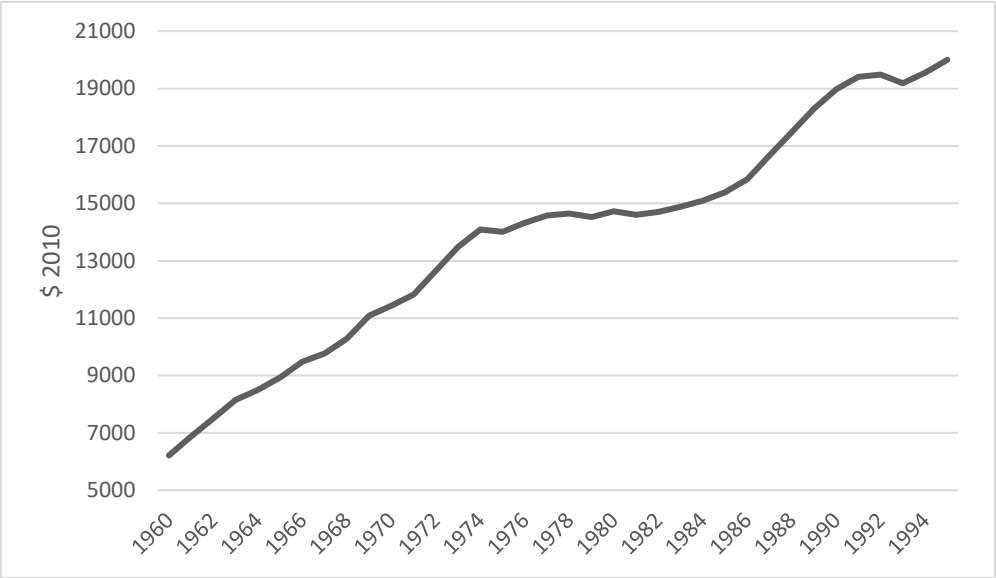
	1958	1964	1980	1990
Income				
Q1	n/d	19,9	63,3	67,0
Q4	n/d	48,6	64,8	61,3
Territory				
Urban	18,7	33,1	61,7	60,9
Rural	19,0	23,4	69,7	72,8
Regions				
North	n/d	24,5	65,4	66,7
Interior	n/d	30,9	69,7	69,0
Mediterranean	n/d	38,9	67,3	66,3
Andalucia	n/d	16.9	54,0	58,7

Source: Own elaboration based on Household Budget Surveys

Notes: Quartile 1 is the quartile with the lowest income. For the construction of the 4 regions (North, Interior, Mediterranean and Andalusia) see (Simpson, 1995; Collantes, 2015b; Delgado and Pinilla, 2022)

Undoubtedly, both changes in meat prices and increases in disposable income were important in explaining the sharp increase in meat consumption and its popularization among all consumer groups. Regarding income, after the Stabilization Plan of 1959, a series of economic policies favourable to economic growth were implemented, and per capita income in Spain grew (see figure 3.2) and tended to converge with Europe (Carreras, Prados de la Escosura and Rosés, 2005). In addition, income inequality tended to decrease (Prados de la Escosura, 2016). In other words, during this time, Spain became a developed country (Carreras and Tafunell, 2010).

Figure 3.2. Real GDP per capita in Spain



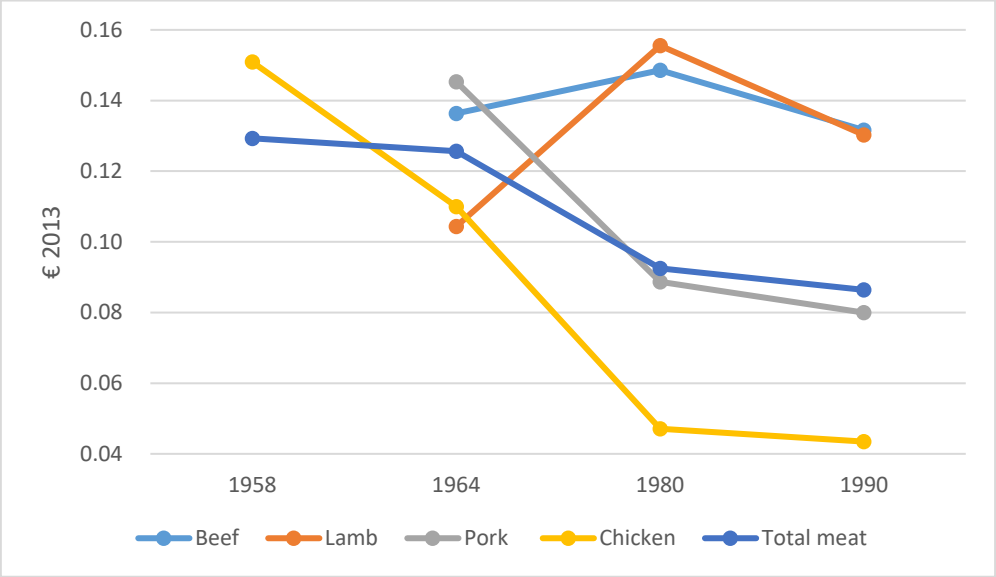
Source: World Bank: https://datos.bancomundial.org/

This entailed that food items with a higher relative price, such as meat and milk, became more accessible to the average consumer in the country. As affirmed by Igualador *et al.*, (1981, p.85), "*the strong increase caused by demand will bring about strong changes in [livestock] production*" (see also (Simpson, 1995)).

Regarding prices, significant changes in livestock production were observed during these years, which have been described in the literature as the crisis of traditional livestock farming (Domínguez Martín, 2001b; Langreo, 2002; 2003; 2008; Ríos-Núñez and Coq-Huelva, 2015; Clar, Martín-Retortillo and Pinilla, 2018; Langreo and Germán, 2018). In other words, livestock production, historically based on being rooted to the land (extensive livestock farming), was industrialized, resulting in a notable increase in productivity in the meat sector due to this technical change. The intensification of livestock farming was based on the massive importation of animal feed, as well as the penetration of American capital with advanced technology, the importation of more productive foreign breeds, and improvements in the use of substances for animal fattening (Rodríguez-Zúñiga, 1980; Domínguez Martín, 2001b; Clar, 2005; 2010; Estévez Reboredo and Sánchez de Lollano Prieto, 2022). Similar to the West (Godley, 2014), the intensification of meat production occurred first in chicken and pork, so that meats whose production was still based on extensive livestock farming, such as beef and lamb, had relatively higher prices. Therefore, as shown in Figure 3.3, the relative prices of meat experienced a sharp decline during the second half of the 20th century. This decline is explained by pork and, especially, by chicken. In contrast, the price of lamb and beef

tended to rise until the 1980s. Additionally, throughout the entire study period, they remained above the average price of meat. Clar (2008, p. 159) considers the price decline as a more important factor than income in explaining these patterns: "*the restructuring of the Spanish diet as a direct consequence of progress in income and urbanization (fundamentally) loses explanatory power the more we delve into the particular actors of change*."

Figure 3.3. Relative prices of meat



Source: Own elaboration based on Household Budget Surveys

The diverse price behavior observed in each type of meat may have exerted an influence on consumption patterns. Tables 3.2 and 3.3 depict this process. In 1964, meat consumption was highly diversified, meaning that approximately the same amount of each type of meat was consumed. However, in the 1980s, in line with the strong increase in the average meat consumption, both the growth rates in chicken and pork consumption increased more than the growth rates in sheep and beef consumption (see Table 3.2). Consequently, the consumption of the former two meats stood at over 40 kilograms per person in the 1980s and 1990s, while the latter two were less than 15 kilograms. Therefore, in the 1990s, the majority of meat consumption in Spain (over 70 percent) was based on these two meats. Regarding the degree of processing, although processed meat (mainly "*embutidos*", but also products such as sausages or hamburgers) have gained weight in the diet, in the 1990s, their consumption was around 25 percent. Therefore, the mass consumption of meat during the second half of the 20th century is mainly explained by the consumption of fresh meat, in turn derived from chicken and pork. In fact, as mentioned earlier, it is the massification of chicken and pork among consumers with

limited meat intake (low incomes, Andalusia, some inland areas, etc.) contributed to the reduction of inequalities in meat consumption in the 1980s (see Table A3.1 in the appendix).

Table 3.2. Consumption of different types of meat per person

Kg por person	**1958**	**1964**	**1980**	**1990**
Beef	n/d	7,2	9,5	11,4
Lamb	n/d	5,4	4,1	4,2
Chicken	1,2	5,3	21,9	22,7
Pork	n/d	7,4	25,8	23,3
Other meats[a]	n/d	1,7	4,1	2,9
Total[b]	**n/d**	**28,3**	**62,2**	**64,8**
Fresh meat	n/d	22,6	49,4	49,3
Processed meat	n/d	5,7	12,8	15,5
Total[b]	**20,7**	**28,3**	**62,2**	**64,8**
Percentage	**1958**	**1964**	**1980**	**1990**
Beef	n/d	25,6	15,3	17,6
Lamb	n/d	18,9	6,6	6,4
Chicken	5,6	18,7	35,5	35,0
Pork	n/d	26,3	41,4	36,0
Other meats[a]	n/d	6,2	6,6	4,5
Total[b]	**100**	**100**	**100**	**100**
Fresh meat	n/d	79,9	79,4	74,6
Processed meat	n/d	20,1	20,6	25,4
Total[b]	**100**	**100**	**100**	**100**

Source: Own elaboration based on household surveys. Notes: a) The composition of the category "Other meats" varies during the study period. Broadly speaking, it includes rabbit and horse meat, as well as meats whose origin is not specified in the surveys. b) The aggregation and homogenization of the series over time results in some discrepancies between the sum of each type of meat and the total

Table 3.3. Cumulative annual growth rates in the consumption of different types of meat

	1958-64	1964-80	1980-90	1965-90
Beef	n/d	1,8	1,8	1,8
Lamb	n/d	-1,7	0,1	-1,0
Chicken	24,3	9,9	0,4	6,0
Pork	n/d	8,6	-1,0	4,7
Fresh meat	n/d	5,4	0,0	3,2
Processed meat	n/d	5,6	1,9	4,1
Total meat	**4,5**	**5,4**	**0,4**	**3,37**

Source: Own elaboration based on Household Budget Surveys

3.4. Budget constraint, income and prices

As outlined in the previous section, significant changes occurred in meat prices and consumer income, resulting in the average consumption of meat in Spain growing and becoming widespread among all consumer groups in the second half of the 20th century. In this manner, Spain successfully underwent the modern nutritional transition and adopted Westernized consumption patterns. To examine this phenomenon, Table 3.4 presents the evolution of the budget constraint for meat consumption. It is displayed in two ways. Firstly, a fixed quantity of meat is chosen (reference consumption), and the necessary expenditure to consume that quantity with respect to the per capita disposable net family income, based on the prices of each year, is shown. This fixed quantity is set at 28.3 kilograms of meat per year, equivalent to the consumption level in 1964 (see Figure 3.1). Although this amount is relatively higher than the current recommended levels, it aligns with the prevailing consumption conditions in Spain. Moreover, in 1964, meat consumption was relatively diversified across all types of meat, indicating that the intensification of livestock farming had not yet substantially altered meat consumption patterns on average. Secondly, the necessary expenditure relative to disposable income to consume the actual amount of meat consumed each year is presented. Table A3.2 in the appendix provides the same information, disaggregated by meat types.

Table 3.4. Budget constraint for meat consumption in Spain (%)

Reference consumption	1964/65	1980/81	1990/91
National average	18,3	7,3	5,1
Income			
Q1	43,0[a]	12,7	9,9
Q4	7,8[a]	5,3	3,0
Territory			
Urban	21,7	9,6	6,2
Rural	19,9	8,5	5,6
Regions			
North	17,7	7,7	5,5
Interior	17,7	6,9	5,0
Mediterranean	15,9	7,0	4,7
Andalucia	22,6	8,4	5,4
Real consumption	**1964/65**	**1980/81**	**1990/91**
National average	18,3	16,1	11,7
Income			
Q1	35,9[a]	28,4	23,3
Q4	16,8[a]	12,0	6,4
Territory			
Urban	19,6	15,7	10,8
Rural	15,7	20,9	14,3
Regions			
North	16,3	17,9	12,9
Interior	19,2	16,9	12,3
Mediterranean	21,6	16,7	11,0
Andalucia	13,6	16,0	11,3

Source: Own elaboration based on Household Budget Surveys. Notes: a) The 1964/65 family budget survey provides expenditure data by income brackets that do not correspond to quartiles, as the lowest income bracket (Q1) covers 50 percent of households. Therefore, the results should be interpreted with caution (see methodology section)

Overall, there is a clear softening of the budget constraint for meat consumption during the second half of the 20th century. Both on average and across different consumer groups, the expenditure as a percentage of disposable income required to consume the reference consumption of meat (28.3 kilograms) has significantly decreased. At the national level, it has dropped from slightly over 18 percent to around 5 percent. The softening of the budget constraint is particularly pronounced among lower-income groups. Specifically, these groups would have needed 43 percent of their total income to consume the reference consumption. However, by 1990, they required less than 10 percent. As expected, the differences between the highest and lowest income quartiles were initially substantial, but tended to converge over the period, reducing levels of

inequality (although not completely eliminating them). Differences in the budget constraint by territory and regions are smaller than those based on income levels, resulting in similar meat expenditure relative to income as observed at the average level. Only Andalusia exhibits a higher budget constraint in 1964, although it also tends to converge with other regions in subsequent years.

Another characteristic in the evolution of the budget constraint is the high share of income dedicated to actual meat consumption. Specifically, an average family in Spain allocated nearly 20 percent of their total disposable income to meat consumption in 1964/65. At first glance, this may seem excessively high. However, in 1964/65, food expenditure accounted for around 50 percent of total household expenditure, and the share of meat expenditure in total food expenditure was approximately 25 percent in the same year, making meat the largest component of food expenditure (Maluquer de Motes, 2005). Expenditure on meat relative to income was particularly high among low-income households, as they allocated 36 percent towards it (see table A3.2 in the appendix). This suggests, as we will delve into further, that there was a strong preference for meat consumption during the 1960s. Despite the availability of relatively cheaper food options for energy and protein intake, families preferred to allocate a significant portion of their income towards consuming meat.

What explains this softening of the budget constraint? Based on the methodology outlined in section 2, it is possible to decompose the capacity to consume meat into the respective contributions of income and prices. Table 3.5 shows the main results. First, the growth of the purchasing power of all meats was particularly strong between 1958 and 1980, and then continued to grow, although less markedly. This growth was explained by the intense increase in household income and by the fall in relative meat prices (except for beef and lamb, whose relative prices increased during this period). Initially, income is the main determinant for the growth of aggregate meat (last two rows), especially between 1958 and 1964. These results are consistent since the drop in the relative prices of aggregate meat was low (0.3). In the following two periods, although price increases in importance as a driver of consumption capacity, income remains more important than prices. Therefore, between 1965 and 1990, income contribute about 60 percent of the increase in purchasing power. The same occurs with fresh and processed meat: income is more important in explaining its massification from the 60s onwards.

Table 3.5. Contribution to the growth of purchasing power of different types of meat at the national level

	1958-64	1964-80	1980-90	1964-1990
Growth of purchasing power of each type of meat				
Beef	n/d	2,7	2,2	2,5
Lamb	n/d	0,6	2,7	1,5
Pork (fresh)	n/d	6,5	2,0	4,7
Chicken	9,8	8,8	1,8	6,0
Fresh meat	5,3	5,2	1,8	3,9
Processed meat	7,2	5,6	1,5	4,0
Total meat	5,7	5,3	1,7	3,8
Growth of net disposable family income per person	5,4	3,3	1,0	2,4
Growth of the relative price of each type of meat				
Beef	n/d	0,6	-1,2	-0,1
Lamb	n/d	2,7	-1,8	0,9
Pork (fresh)	n/d	-3,2	-1,0	-2,4
Chicken	-4,4	-5,5	-0,8	-3,6
Fresh meat	0,12	-1,9	-0,9	-1,5
Processed meat	-1,8	-2,3	-0,6	-1,6
Total meat	-0,3	-2,0	-0,7	-1,5
Contribution to the growth of purchasing power				
Beef				
Income	n/d	121,1	44,7	94,3
Prices	n/d	-21,1	55,3	5,7
Lamb				
Income	n/d	551,6	35,7	160,8
Prices	n/d	-451,6	64,3	-60,8
Pork (fresh)				
Income	n/d	50,4	48,5	50,0
Prices	n/d	49,6	51,5	50,0
Chicken				
Income	55,4	37,5	54,7	39,3
Prices	44,6	62,5	45,3	60,7
Fresh meat				
Income	102,4	63,1	53,3	61,2
Prices	-2,4	36,9	46,7	38,8
Processed meat				
Income	75,5	58,4	63,3	59,0
Prices	24,5	41,6	36,7	41,0
Total meat				
Income	94,9	62,0	59,0	61,3
Prices	5,1	38,0	41,0	38,7

Source: Own elaboration based on Household Budget Surveys

However, if we conduct a more disaggregated analysis by type of meat, the argument becomes nuanced. Especially in the case of poultry (mainly chicken), the fall in prices is

more important to explain the increase in consumption capacity from 1964. Regarding pork, we observe a balance between income and prices to explain the increase in its purchasing power. However, for beef, and especially lamb, income is more important, at least in the period where meat consumption increased sharply (1964-1980). In the last period (1980-90), prices played a greater role for both beef and lamb meat.

Therefore, if meat is analyzed in an aggregated manner, the modern nutritional transition in Spain would be explained more by income than prices, in line with authors such as Popkin or Grigg (see introduction). However, when meat is examined in a detailed manner, prices play a more significant role for chicken and pork, namely, the meat types that account for the popularization of meat consumption. Therefore, in this case, works such as Rivera-Ferre (2009) or Clar (2008) for the case of Spain would be more accurate in pointing to prices as the main determinant in the modern nutritional transition. In other words, it would seem that for those meats whose technical change in production occurred earlier and more forcefully, such as chicken and pork, prices play a greater role than income. Conversely, for those meats that were historically based on extensive livestock farming, and thus had lower levels of productivity, income would play a more significant role.

Unlike the case of dairy products (Collantes, 2019b), where in almost all periods and types of products (milk and derivatives), income plays a greater role in consumption, in the case of meat we find more heterogeneity in results.

Table 3.6. Contribution of income to the growth of purchasing power of aggregated meat

	1964-80	**1980-90**
Q1	87,2	84,4
Q4	132,3	70,5
Rural	65,5	78,0
Urban	67,4	68,0
North	73,6	75,6
Interior	70,3	96,6
Mediterranean	59,8	61,1
Andalucia	62,5	76,7

Source: Own elaboration from the Household Budget Surveys. Notes: The 1964/65 family budget survey provides expenditure data by income brackets that do not correspond to quartiles, as the lowest income bracket (Q1) covers 50 percent of households. Therefore, the results should be interpreted with caution

However, national results conceal differences among consumer groups. Table 3.6 shows the contribution of income to the growth of purchasing power for total meat consumption

across different consumer groups. Consistent with the national-level findings, income plays a larger role than prices in explaining the growth in meat consumption across all consumer groups. However, there are notable differences among groups. First, income played a greater role during the mass consumption period of meat (1964-80) for high-income consumers (Q4) than for low-income (Q1) consumers. In other words, the fall in prices was important for enabling groups with lower purchasing power to consume meat regularly. During the same period, the contribution of income to meat consumption was relatively similar in rural and urban areas, but there were significant differences among regions. Particularly noteworthy are the different contributions of income in regions with such disparate levels, such as Andalusia (relatively poorer region) and the Mediterranean region (the wealthiest region in the country). This indicates that, in addition to prices and income, preferences play a significant role.

3.5. The role of preferences

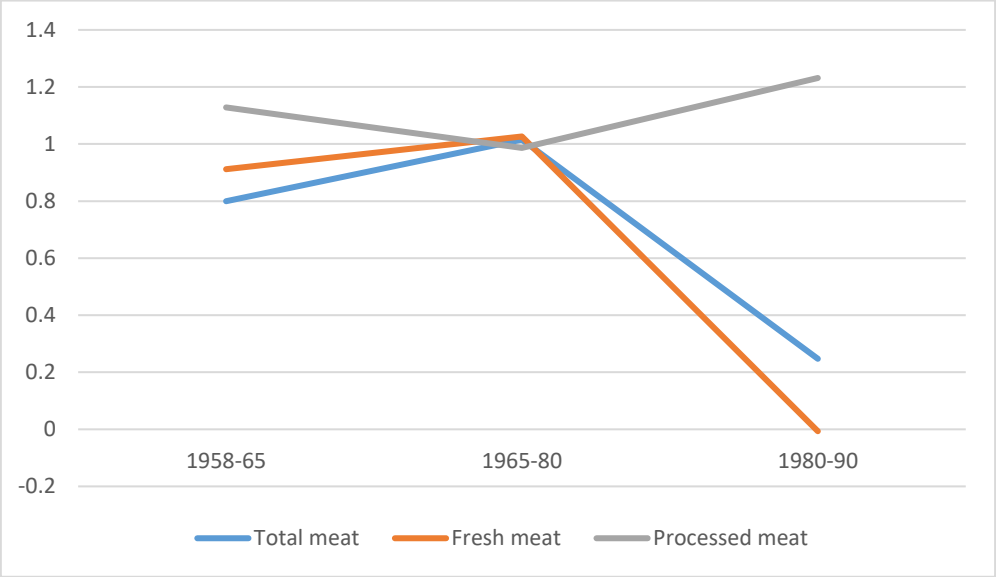
What role did preferences play in meat consumption? Although often overlooked, preferences play an important role in explaining different consumption patterns. Preferences encompass a wide range of variables. In this chapter, without aiming to be exhaustive, I focus on some of them. For example, the dominant nutritional discourse, the role of women in the labor market, the role of advertising in consumption, consumers' perception of certain products, or regional historical tradition in the consumption of certain meats. As explained in the methodological section, I will combine the analysis of preferences from both a quantitative and qualitative perspective. To quantify preferences, I use the responsiveness factor (RF). This indicates consumers' predisposition to consume meat in growth rates (see methodological section). Figure 3.4 represents the national responsiveness factor for total, fresh, and processed meat. There are at least three points to highlight.

Firstly, the high predisposition to consume meat in 1958-1965 (around 0.8). This was much higher than in the case of dairy products during the same years (almost 0), although lower than the RF of processed milk (because it was a new product) (Collantes, 2019b). To put this fact into context, figure 3.5 shows the growth rates in meat consumption and the other macronutrients (except carbohydrates). In the 1960s, the Spanish population (on average) consumed a level of macronutrients more than sufficient with respect to the minimum necessary values (Cussó Segura, 2005, p. 349) (around 3000 kcal, 60 grams of proteins, and 140 grams of lipids). Despite this, the growth rates in meat consumption

increased significantly more than those of other macronutrients, thus showing a substitution of foods as an energy, protein, and fat source. From the 1980s, when meat consumption tended to saturate, its growth rates converged with those of other macronutrients. Therefore, in the 1950s and 1960s, the predisposition to consume meat in Spain was very high due to its low historical consumption. This predisposition explains why the average Spanish household allocated nearly 20 percent of its income to meat consumption, while lower-income households allocated 36 percent of their income to it.

Secondly, the increase in the RF for total (and fresh) meat between 1958-64 and 1964-80 is remarkable. This result would not be predictable. The responsiveness factor, in my opinion, should be interpreted as a product life cycle curve (Collantes, 2019b). That is, when a product is new in the market, its predisposition to consume it is high. In other words, the increase in its consumption will be greater than the increase in adjusted purchasing power for that product. However, over time, as the product becomes more widely available, the predisposition to consume it tends to fall, as it ends up becoming a mass consumption product. Therefore, if there are no significant changes in the intrinsic characteristics of that product or a transitory change in consumers' perception of it (for example, a fad), the natural curve of the RF should be descending over time. So why is there an increase between 1958-65 and 1965-80?

Figure 3.4. National-level responsiveness factor

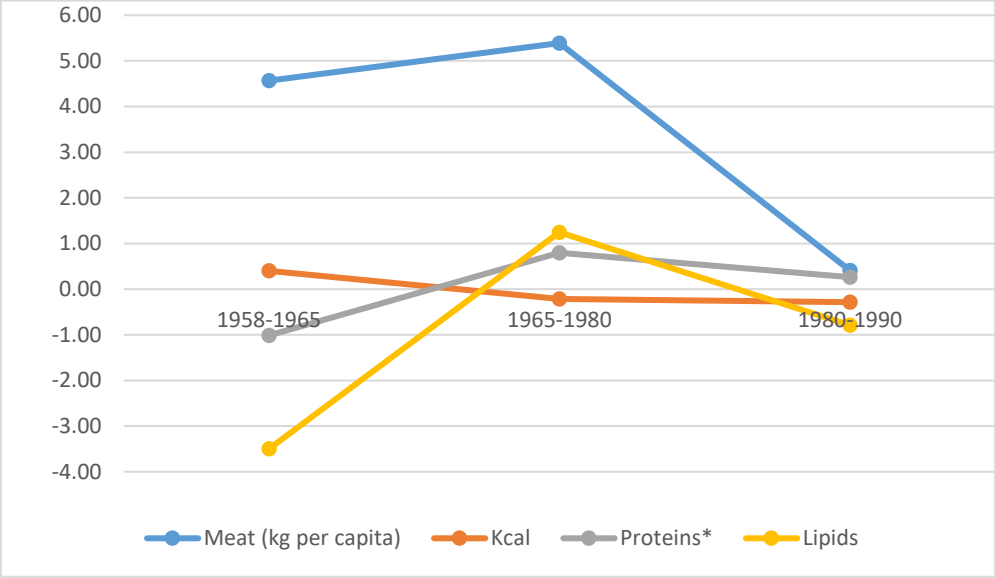


Source: Own elaboration from the Household Budget Surveys

Collantes (2019) also observed an increase in RF during this period for dairy consumption (in fact, the increase was greater than that for meat consumption). His hypothesis for this

increase is based on the fact that the type of milk consumed in 1958-64 was not the same as that consumed in the period 1964-80. In the first period, most of the milk consumed was raw milk, while in the second period it was processed milk. In other words, the mass production of processed (homogenized) milk increased confidence in this product, resulting in an increase in the RF. For meat, the argument could be similar. That is, the meat consumed in 1958-64 was produced in an extensive type of livestock farming, while in 1964-80 its production was intensive (industrialized). Therefore, the appearance of a new type of meat (or produced in a different way) could have increased the predisposition to its consumption.

Figure 3.5. Cumulative annual growth rate in meat consumption and macronutrients per person in Spain



Source: Figure 1 for meat data and Cussó, Gamboa and Pujol-Andreu (2018, p. 15) for macronutrients. Notes: * high biological value proteins

However, I consider that this argument does not apply to meat. To support this claim, I rely on the RF of poultry meat, for which there are data available since 1958 (see figure 3.6). What is observed is that the RF of this meat, being the paradigm of intensive livestock farming (Godley, 2014), follows a normal pattern since 1958, that is, decreasing. Therefore, the change in the production of chicken, from a production based on hunting and family poultry to a type of chicken produced industrially, would not explain the increase in the predisposition to the consumption of total meat between 1958-64 and 1964-80. Consequently, I consider that the explanation behind this change in preferences is based on beef.

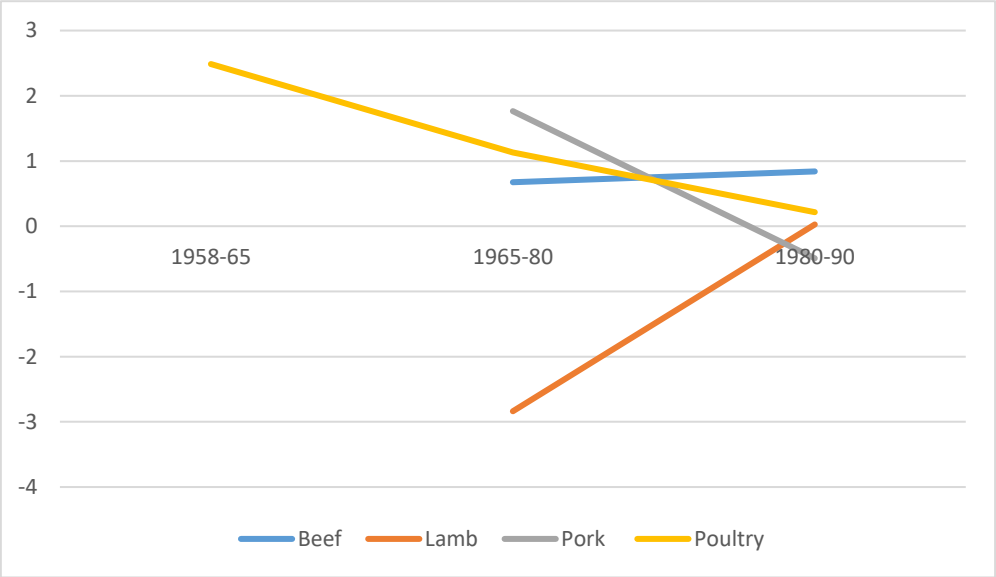
As shown in table 3.6 and table A3.1 in the appendix, beef consumption is historically linked to urban areas (Nicolau and Pujol-Andreu, 2005; Martinelli Lasheras, 2009, p. 35; Gil Roig, Angulo Garijo and Gracia Royo, 1998, p. 114). Along with chicken, the consumption of beef was almost 3 times higher in urban areas than in rural areas. Therefore, since between 1950 and 1975 there was a large migration from rural to urban areas (Collantes and Pinilla, 2011), this led to the emergence of new consumers with a greater predisposition to the consumption of beef, causing the RF of total meat to increase in this period. Because in 1964 beef consumption with respect to total meat was still high (around 25 percent), its consumption had a great influence on the consumption of total meat (and fresh meat). Clar (2013, p. 340), presents this idea clearly:

"*A new middle class emerged from the great exodus from the country to urban areas. It is calculated that in the 1960s alone more than two million Spaniards moved to the city from the countryside. However, until that time, any growth in the urban population had been reflected in greater consumption not of pork or chicken but of beef and, more particularly, veal. This partly explains why meat consumption in Spain was so low, given that veal tended to be seen as a luxury and its price was subject to large fluctuations. However, rural emigrants were generally unaccustomed to eating either beef or veal".*

Indeed, the RF of beef in 1964-80 in rural areas was 2.9, while in urban areas it was 0.52 (see Table A3.4 in the appendix). Therefore, this reinforces the hypothesis of the importance of rural-urban migration in changes in national preferences during this period (Clar, 2013). In the following years, both sheep and beef meat showed a positive RF (see figure 3.6). However, already in the 1980s, these two types of meat lost importance with respect to the total consumption of meat, so they had little effect on the RF of total meat (now dominated by chicken and pork). From the 1960s-80s onwards, figure 3.4 shows a significant decline in the predisposition to consume total (and fresh) meat. In addition to its own mass consumption, the dominant nutritional argument in Spain may have had some importance in this decline. In the first third of the 20th century, the low consumption of meat and milk by the Spanish population (on average) was a public health problem due to the importance given to the consumption of high biological value proteins (Bernabeu-Mestre *et al.*, 2008). However, in the early second half of the 20th century, the dominant nutritional discourse was different in the case of meat. For example, in the 1960s, a consumption of around 100 grams of meat per person was recommended (Vivanco and Palacios, 1964, p. 196). Therefore, unlike milk, where in the 1950s its consumption was

promoted by the state in schools (Collantes, 2017, p. 126), the relatively low consumption of meat in Spain was not considered a problem to public health and the problems caused by excessive consumption of meat were already evident (Clar, 2013, p. 340). These concerns about excess consumption of meat had already permeated society in the 1980s, thus influencing its lower preference and stagnation in consumption during this period (Mili, Mahlau and Furitsch, 1998).

Figure 3.6. Responsiveness factor of different meats



Source: Own elaboration from the Household Budget Surveys

Table 3.7. Meat consumption in rural and urban areas in 1964

	Urban	Rural
Beef	9,9	3,6
Lamb	5,0	5,7
Pork	8,0	8,6
Chicken	7,0	3,0

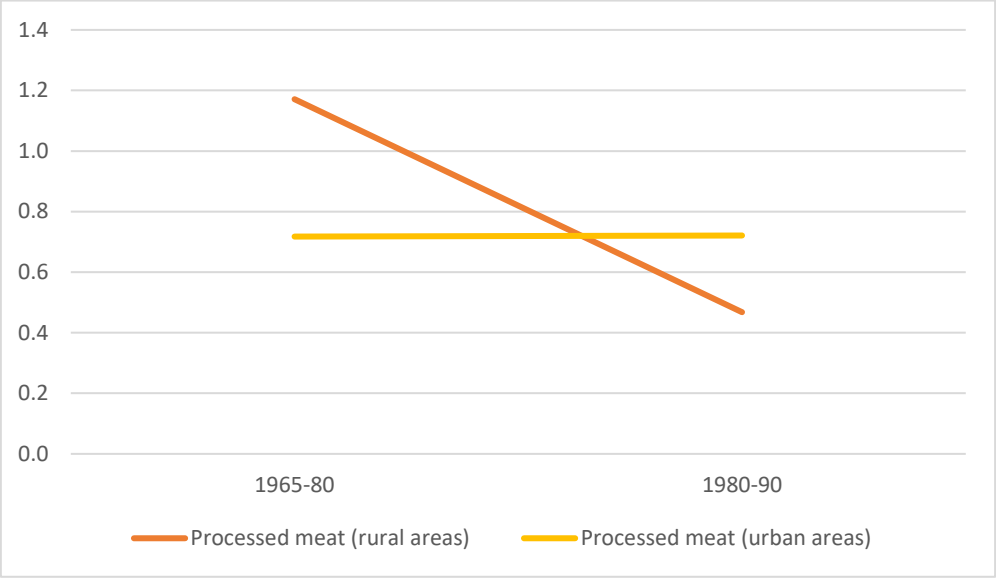
Source: Own elaboration from the Household Budget Surveys

The third important feature of Figure 3.4 is related to processed meat. Specifically, the increase in its responsiveness factor between 1964-80 and 1980-90 is noteworthy. Processed meat has been gaining weight in total meat consumption, accounting for around 40 percent of total consumption in recent years (Delgado, 2022). As outlined in the introduction, this has both health and environmental implications. What is behind this increase in the responsiveness factor of processed meat? Several factors could be at play. Firstly, the incorporation of women into the labor market. This fact, accelerated in the second half of the 20th century (Casares and Rebollo, 1991, p. 26), may have led to an increase in the consumption of processed and prepared food products due to less time

spent preparing food. However, this does not appear to be a determining factor in the case of meat. Consumption data for processed meat in 1994 shows that it is slightly higher in households where the woman is inactive in the labor market than in households where she is active (Rama, 1997, p. 129).

Therefore, I consider that the increase in the predisposition to consume processed meat is due to an intrinsic change in the characteristics of processed meat produced in Spain during this period. Historically, the consumption of processed meat in Spain was linked to rural areas, with a type of processed meat made artisanally ("*embutidos*") and a high level of self-consumption (Lopez, 1993, p. 27). Therefore, in the 1950s and 1960s, the processed meat market was still based on artisanal meat, consumed abundantly by high-income families and in rural areas. The increase in income and urbanization rates in the 1960s and 1970s demanded a type of mass-produced processed meat for this new segment of urban and middle-class consumers. The supply adapted to the demand by producing processed meats such as chopped, salami, mortadella, and, in general, to all sausages produced industrially. This type of meat, in line with a higher total expenditure on processed foods (Abad, García Delgado and Muñoz Cidad, 1994, p. 85), gained weight in total meat consumption between the 1980s and 1990s, to the detriment of other types of meat more linked to rural areas such as chorizo (Moreno, 2009). In fact, in the 1970s and 1980s, various transnational companies became interested in the production of this type of processed meat, so companies such as Nestlé and Oscar Mayer invested in the Spanish market to meet this new demand (Moreno, 2009, p. 114). Additionally, during this period, quality standards and regulations for processed meat increased (Escribano, 1981), further differentiating industrially produced processed meat from artisanal meat. In fact, in 1988, the meat sector was one of the sectors that dedicated the most resources to advertising "new products" (industrially produced processed meat) (Rodriguez Zuñiga Manuel y Soria Rosa, 1990, p. 106).

Figure 3.7. Responsiveness factor of processed meat in rural and urban areas



Source: Own elaboration from the Hosehold Budget Surveys

As shown in Figure 3.7 and as outlined previously, this new industrially produced processed meat was primarily traded in urban areas, resulting in a slight increase in its RF. In rural areas, the predominantly consumed processed meat was mainly artisanal, resulting in a decreasing trend in its responsiveness factor, as it was not considered a "new" product. However, it should be noted that the FR for processed meat varies depending on the type of income used. If I use the net available family income provided in Carreras, Prados de la Escosura and Rosés (2005) (see figure 3.4), the predisposition to consume processed meat increases more than if I use the income provided by the HBS (figure 3.7). In any case, even with the income provided by the surveys, the slope remains slightly positive and far from the RF of total and fresh meat, with the latter two RF showing a sharp decline during this period

However, the general change in preferences for processed meat masks a great variability among regions. Regions in the Interior and Mediterranean such as Madrid, Extremadura, Navarra, La Rioja, Balearic Islands, or Valencia greatly increased their consumption of ham (especially cured ham). The consumption of sausages notably increased in some areas of the north such as Galicia and Asturias, as well as in Madrid or Aragón, while its consumption fell in Catalonia. This is probably due to the fact that in the latter, its consumption has historically been higher (especially "*butifarras*"), resulting in an earlier saturation of this type of meat than in other areas. Therefore, the new offer of industrially processed meat was also conditioned by historical regional consumption patterns and had to adapt to them. In fact, regional differences in meat preferences have existed throughout

the second half of the 20th century. For example, as shown in Table A3.3 of the appendix, the predisposition to consume poultry in the Mediterranean in 1964-80 was much lower than in the rest of the regions because its consumption was already high in the 1960s. However, in the 1980s-90s, the variability in the responsiveness factor for all types of meat, in addition to decreasing, tends to homogenize in all regions, showing a convergence in consumption patterns throughout the country.

3.6. Conclusions

The nutritional transition, along with other transitions such as the demographic and epidemiological ones, is a complex and multifactorial process that has significant importance in the historical evolution of societies. On one hand, the massification of products such as meat or milk among all consumer groups implied a nutritional improvement (especially in terms of micronutrients) in more disadvantaged consumer groups such as children, pregnant women or low-income segments (Cussó Segura, Gamboa and Pujol Andreu, 2018). On the other hand, the nutritional transition and the westernization of consumption patterns also carry health costs. In recent decades, there has been an increase in non-communicable diseases such as obesity, diabetes and other cardiovascular diseases in middle-low and low-income countries (Popkin, Adair and Ng, 2017).

In this chapter, I have focused on Spain to delve into how the budget constraint was softened to carry out the nutritional transition in Spain. Additionally, I have explored some of its determinants: income, prices, and preferences. At the aggregate level of meat, income would play a greater role as a determinant of consumption. However, a more disaggregated approach by types of meat shows that the degree of industrialization of each type of meat is also a crucial factor, which would lead us to think that prices plays an important role, as shown by Clar (2008). Regarding the role of preferences, I have tried to show the importance of regional and territorial patterns to explain the change in predisposition to consume meat, as well as the importance of changes in supply to adapt to a new type of urban middle-low class consumer (Nicolau and Pujol Andreu, 2005).

The differences in the roles of prices, income, and preferences across different types of meat demonstrate the complexity and the need for disaggregation by products and consumer groups in order to understand major changes in dietary composition. This is particularly evident when comparing the determinants of meat and dairy consumption

during the second half of the 20th century in Spain (Collantes, 2017a; 2019b). In the early 1960s, the milk responsiveness factor was much lower than that of meat, as the average consumer did not trust raw milk consumption. In the case of meat, this lack of confidence did not exist. It is likely that, for this reason, prices played a more important role in the capacity for chicken and pork consumption than in milk consumption. In other words, the drop in milk prices did not increase milk consumption, but the mass production of processed milk did, as this "new" type of milk generated enough consumer confidence to become a mass-consumed product. In fact, the increase in the responsiveness factor of processed milk between 1958-64 was much greater than in the case of meat. In addition to being a new product, dominant nutritional discourse may have also conditioned milk consumption. State encouragement of milk consumption since the 1950s was something that did not happen (or at least not to the same extent) in the case of meat.

Analyzing and understanding the determinants of the nutritional transition of each product can help mitigate the negative effects, both environmentally and health-wise. On the one hand, the significance of prices in certain key meat types, such as poultry and pork, supports the implementation of taxes (such as a Pigouvian tax) to reduce consumption (Katare *et al.*, 2020; Funke *et al.*, 2022). On the other hand, the importance of preferences also supports appealing to emotional and informational factors (such as how to cook vegetarian food or increasing the availability of it) as drivers in reducing meat consumption (Harguess, Crespo and Hong, 2020)[13].

However, this chapter has some limitations that must be taken into account. Firstly, not having annual data but rather different temporal points implies assuming linearity over time which may not necessarily be the case. Additionally, at the quantitative level, income is taken as a demand variable, but other factors such as urbanization or population growth may have also been important. Lastly, other consumer groups such as gender or age differences are not analyzed, which may help better understand national consumption patterns (Collantes, 2015b).

[13] Despite the fact that most of these studies have a bias towards high-income countries.

Appendix

Table A3.1. Per capita meat intake by different consumer groups

Beef	1964	1980	1990	Lamb	1964	1980	1990
Q1	19,9	8,1	9,0	**Q1**	6,8	4,6	4,2
Q4	48,6	15,0	13,0	**Q4**	12,3	4,2	4,2
Rural	3,6	8,8	9,7	**Rural**	5,7	6,3	6,1
Urban	9,9	12,7	11,4	**Urban**	5,1	3,2	3,5
North	12,1	19,7	20,2	**North**	0,9	1,5	2,1
Interior	7,5	13,3	12,9	**Interior**	7,9	7,4	6,8
Mediterranean	6,1	8,8	8,0	**Mediterranean**	7,5	5,1	5,1
Andalucia	3,2	6,2	5,6	**Andalucia**	3,3	1,2	0,9
Pork (fresh)	**1964**	**1980**	**1990**	**Chicken**	**1964**	**1980**	**1990**
Q1	5,4	22,0	23,7	**Q1**	1,6	24,2	27,5
Q4	9,4	21,7	21,6	**Q4**	8,5	20,3	20,0
Rural	2,7	12,1	13,4	**Rural**	3,1	22,9	24,5
Urban	1,5	9.6	8,2	**Urban**	6,9	21,4	21,4
North	8,6	19,8	23,0	**North**	2,3	17,5	17,8
Interior	7,9	25,1	24,4	**Interior**	4,5	20,9	21,9
Mediterranean	10,5	21,8	22,2	**Mediterranean**	11,0	26,7	27,1
Andalucia	6,3	22,8	25,7	**Andalucia**	2,5	21,9	23,8
Fresh meat	**1964**	**1980**	**1990**	**Processed meat**	**1964**	**1980**	**1990**
Q1	n/d	49,5	50,2	**Q1**	n/d	11,5	15,2
Q4	n/d	50,5	44,1	**Q4**	n/d	13,1	16,5
Rural	17,2	55,9	56,6	**Rural**	6,3	13,7	16,2
Urban	26,5	49,5	45,7	**Urban**	6,5	12,4	15,2
North	20,	53,1	50,4	**North**	5,4	11,4	14,9
Interior	23,90	52,3	51,3	**Interior**	7,0	13,1	17,1
Mediterranean	30,7	52,8	48,4	**Mediterranean**	8,1	14,2	17,6
Andalucia	11,9	39,4	43,3	**Andalucia**	5,0	11,8	14,3

Source: See table 3.1

Table A3.2. Budget constraint for meat consumption in Spain

Reference consumption	1964/65	1980/81	1990/91	Real consumption	1964/65	1980/81	1990/91
National average				**National average**			
Beef (7,2 kilos)	5,1	3,0	2,0	Beef	5,1	3,9	3,1
Lamb (5,4 kilos)	2,9	2,3	1,5	Lamb	2,9	1,8	1,1
Pork fresh (7,4 kilos)	1,5	0,5	0,3	Pork fresh	1,5	2,6	1,6
Poultry (5,3 kilos)	3,0	0,7	0,5	Poultry	3,0	2,9	2,1
Fresh meat (22,6 kilos)	13,6	5,5	3,8	Fresh meat	13,6	12,0	8,3
Processed meat (5,7 kilos)	4,7	1,8	1,3	Processed meat	4,7	4,0	3,5
Q1				**Q1**			
Beef (7,2 kilos)	n/d	3,5	2,1	Beef	n/d	3,9	2,6
Lamb (5,4 kilos)	n/d	2,5	1,5	Lamb	n/d	2,2	1,2
Pork fresh (7,4 kilos)	n/d	0,5	0,4	Pork fresh	n/d	2,9	1,9
Poultry (5,3 kilos)	n/d	0,8	0,5	Poultry	n/d	3,7	2,6
Fresh meat (22,6 kilos)	n/d	6,0	3,7	Fresh meat	n/d	13,7	8,6

Processed meat (5,7 kilos)	n/d	2,0	1,3	Processed meat	n/d	4,0	3,3
Q4				**Q4**			
Beef (7,2 kilos)	n/d	0,9	0,6	Beef	n/d	2,0	1,1
Lamb (5,4 kilos)	n/d	0,7	0,5	Lamb	n/d	0,6	0,4
Pork fresh (7,4 kilos)	n/d	0,2	0,1	Pork fresh	n/d	2,1	1,5
Poultry (5,3 kilos)	n/d	0,2	0,2	Poultry	n/d	0,8	0,4
Fresh meat (22,6 kilos)	n/d	1,9	1,3	Fresh meat	n/d	0,8	0,6
Processed meat (5,7 kilos)	n/d	0,6	0,4	Processed meat	n/d	0,3	0,1
Urban				**Urban**			
Beef (7,2 kilos)	6,0	3,8	2,4	Beef	6,4	5,0	3,0
Lamb (5,4 kilos)	3,6	3,1	1,8	Lamb	2,7	1,4	0,9
Pork fresh (7,4 kilos)	2,0	0,6	0,4	Pork fresh	1,2	2,3	1,4
Poultry (5,3 kilos)	3,3	0,9	0,6	Poultry	3,4	2,7	1,9
Fresh meat (22,6 kilos)	16,2	7,3	4,6	Fresh meat	14,8	12,0	7,5
Processed meat (5,7 kilos)	5,5	2,3	1,5	Processed meat	4,9	3,7	3,3
Rural				**Rural**			
Beef (7,2 kilos)	5,1	3,5	2,2	Beef	2,5	4,3	3,0
Lamb (5,4 kilos)	2,9	2,6	1,6	Lamb	3,1	3,0	1,8
Pork fresh (7,4 kilos)	1,5	0,6	0,4	Pork fresh	2,1	3,4	2,4
Poultry (5,3 kilos)	3,7	0,8	0,5	Poultry	2,2	3,6	2,5
Fresh meat (22,6 kilos)	14,2	6,4	4,1	Fresh meat	10,8	15,7	10,3
Processed meat (5,7 kilos)	4,4	2,1	1,4	Processed meat	4,9	5,1	4,1
North				**North**			
Beef (7,2 kilos)	4.6	2.9	2.0	Beef	7,7	8,0	5,6
Lamb (5,4 kilos)	2.9	2.4	1.5	Lamb	0,5	0,7	0,6
Pork fresh (7,4 kilos)	1.2	0.5	0.3	Pork fresh	2,5	2,1	1,6
Poultry (5,3 kilos)	2.7	0.7	0.5	Poultry	1,2	2,2	1,7
Fresh meat (22,6 kilos)	13.9	5.9	4.2	Fresh meat	12,9	14,2	10,0
Processed meat (5,7 kilos)	3.5	1.8	1.3	Processed meat	3,3	3,7	2,9
Interior				**Interior**			
Beef (7,2 kilos)	5,5	2,7	1,8	Beef	5,7	5,0	3,3
Lamb (5,4 kilos)	2,5	1,5	1,3	Lamb	3,7	2,0	1,7
Pork fresh (7,4 kilos)	1,4	0,4	0,3	Pork fresh	0,8	2,8	1,5
Poultry (5,3 kilos)	3,0	0,7	0,5	Poultry	2,4	2,6	1,9
Fresh meat (22,6 kilos)	13,1	5,2	3,7	Fresh meat	13,8	13,0	8,8
Processed meat (5,7 kilos)	4,5	1,7	1,3	Processed meat	5,5	4,0	3,5
Mediterranean				**Mediterranean**			
Beef (7,2 kilos)	4,8	3,1	1,9	Beef	4,0	3,8	2,1
Lamb (5,4 kilos)	3,1	2,4	1,4	Lamb	4,3	2,3	1,3
Pork fresh (7,4 kilos)	1,6	0,5	0,3	Pork fresh	2,0	2,3	1,2
Poultry (5,3 kilos)	2,7	0,6	0,5	Poultry	5,3	3,2	2,3
Fresh meat (22,6 kilos)	12,3	5,4	3,4	Fresh meat	16,6	12,6	7,4
Processed meat (5,7 kilos)	3,6	1,7	1,2	Processed meat	5,1	4,1	3,6
Andalucia				**Andalucia**			
Beef (7,2 kilos)	7,3	3,9	2,5	Beef	1,1	3,9	2,6
Lamb (5,4 kilos)	2,0	2,3	1,8	Lamb	2,0	3,6	2,4
Pork fresh (7,4 kilos)	1,5	0,7	0,4	Pork fresh	9,1	11,6	7,4
Poultry (5,3 kilos)	4,6	0,9	0,5	Poultry	4,5	4,4	3,9
Fresh meat (22,6 kilos)	17,2	6,2	3,7	Fresh meat	1,1	3,9	2,6
Processed meat (5,7 kilos)	5,0	2,1	1,6	Processed meat	2,0	3,6	2,4

Source: see table 3.4

Table A3.3. Income contribution to purchasing power growth for different types of meat

Beef	**1964-80**	**1980-90**	**Lamb**	**1964-80**	**1980-90**
Q1	n/d	77,1	**Q1**	n/d	75,2
Q4	n/d	65,8	**Q4**	n/d	54,5
Rural	155,9	71,2	**Rural**	661,7	68,2
Urban	117,7	60,2	**Urban**	328,8	49,6
North	134,3	69,4	**North**	419,6	51,7
Interior	94,0	75,7	**Interior**	123,9	602,4
Mediterranean	117,5	51,2	**Mediterranean**	214,8	45,7
Andalucia	98,3	74,9	**Andalucia**	-278,9	124,5
Pork (fresh)	**1964-80**	**1980-90**	**Chicken**	**1964-80**	**1980-90**
Q1	n/d	88,9	**Q1**	n/d	79,5
Q4	n/d	65,4	**Q4**	n/d	87,3
Rural	52,8	72,0	**Rural**	34,4	74,8
Urban	49,2	66,1	**Urban**	21,1	75,2
North	62,7	55,5	**North**	42,0	117,7
Interior	57,7	96,0	**Interior**	45,7	76,8
Mediterranean	43,1	48,6	**Mediterranean**	34,1	73,8
Andalucia	77,8	72,0	**Andalucia**	37,6	68,3
Fresh meat	**1964-80**	**1980-90**	**Processed meat**	**1964-80**	**1980-90**
Q1	n/d	80,6	**Q1**	n/d	89,3
Q4	n/d	66,5	**Q4**	n/d	73,0
Rural	65,5	73,3	**Rural**	72,1	82,8
Urban	69,0	61,7	**Urban**	62,6	77,2
North	69,9	75,2	**North**	94,5	72,9
Interior	71,6	91,2	**Interior**	70,0	93,9
Mediterranean	58,5	53,2	**Mediterranean**	64,2	80,4
Andalucia	60,8	64,1	**Andalucia**	71,7	119,0

Source: See table 3.5

Table A3.4. Responsiveness factor by types of meat and consumer groups

Beef	1964-80	1980-90	Lamb	1964-80	1980-90
Q1	n/d	0,2	**Q1**	n/d	-0,2
Q4	n/d	-0,3	**Q4**	n/d	0,0
Rural	2,9	0,2	**Rural**	1,2	-0,1
Urban	0,5	-0,3	**Urban**	-2,5	0,2
North	1,2	0,1	**North**	3,6	0,8
Interior	0,8	-0,1	**Interior**	-0,1	-2,2
Mediterranean	1,0	-0,2	**Mediterranean**	-1,8	0,0
Andalucia	1,1	-0,2	**Andalucia**	4,8	-1,0
Pork (fresh)	**1964-80**	**1980-90**	**Chicken**	**1964-80**	**1980-90**
Q1	n/d	0,0	**Q1**	n/d	0,3
Q4	n/d	-0,5	**Q4**	n/d	-0,1
Rural	1,7	0,3	**Rural**	1,5	0,2
Urban	1,7	-0,5	**Urban**	0,9	0,0
North	0,9	0,4	**North**	1,6	0,1
Interior	2,3	-1,2	**Interior**	1,1	0,2
Mediterranean	1,3	-0,3	**Mediterranean**	0,7	0,0
Andalucia	2,9	0,1	**Andalucia**	1,5	0,2
Fresh meat	**1964-80**	**1980-90**	**Processed meat**	**1964-80**	**1980-90**
Q1	n/d	0,0	**Q1**	n/d	0,5
Q4	n/d	-0,3	**Q4**	n/d	0,5
Rural	1,6	0,0	**Rural**	1,2	0,5
Urban	0,8	-0,2	**Urban**	0,7	0,7
North	1,2	0,0	**North**	1,3	0,4
Interior	1,0	-0,2	**Interior**	0,7	0,7
Mediterranean	0,7	-0,2	**Mediterranean**	0,8	0,7
Andalucia	1,3	0,1	**Andalucia**	1,0	0,7

Source: See figure 3.4

CHAPTER 4: A different product? The formation and expansion of the international meat and live cattle market (1850-1939)

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4.1. 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-Junguito, 2019). Agricultural products constituted a fundamental part of this expansion in trade and their exchanges also grew rapidly (Aparicio, Pinilla and Serrano, 2009). From a theoretical perspective, several reasons explain this growth in trade (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, Frantz and Taylor. M, 2003; López-Córdova and Meissner, 2003; Jacks, Meissner and Novy, 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% 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% of this trade. For some regions, the trade of meat was more important. For example, during the same period, it represented more than 10% 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 twentieth century, it accounted for between 15% and 20% of the exports of agri-food products and more than 10% 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 nineteenth 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: 1909-13, 1924-8, 1928-32 and 1934-8. 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 nineteenth century. The second studies the period from the last decade of the nineteenth 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.

4.2. The beginning of the formation of the international meat market (1840-90)

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 (Lamartine Yates, 1960, p. 25). Meat had previously been a regular component of the diets of the high-income groups but, during the nineteenth century and beginning of the twentieth 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, p. 15-16). Furthermore, in the mid-nineteenth 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 nineteenth century (Federico, 2011, p. 30), the price of meat increased due to the imbalance between demand and supply.[14] 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 on a national level, the United Kingdom externalised its agricultural production to the extent where, in around 1860, practically half of its food

[14]According to Perren (1975, p. 396), the wholesale price of meat in London increased from 73 pence per 14lb to 101 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 nineteenth century (Jacks, 2005; Federico, 2008).

However, the formation of an international meat market encountered enormous difficulties as it was a highly perishable product.[15] 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.

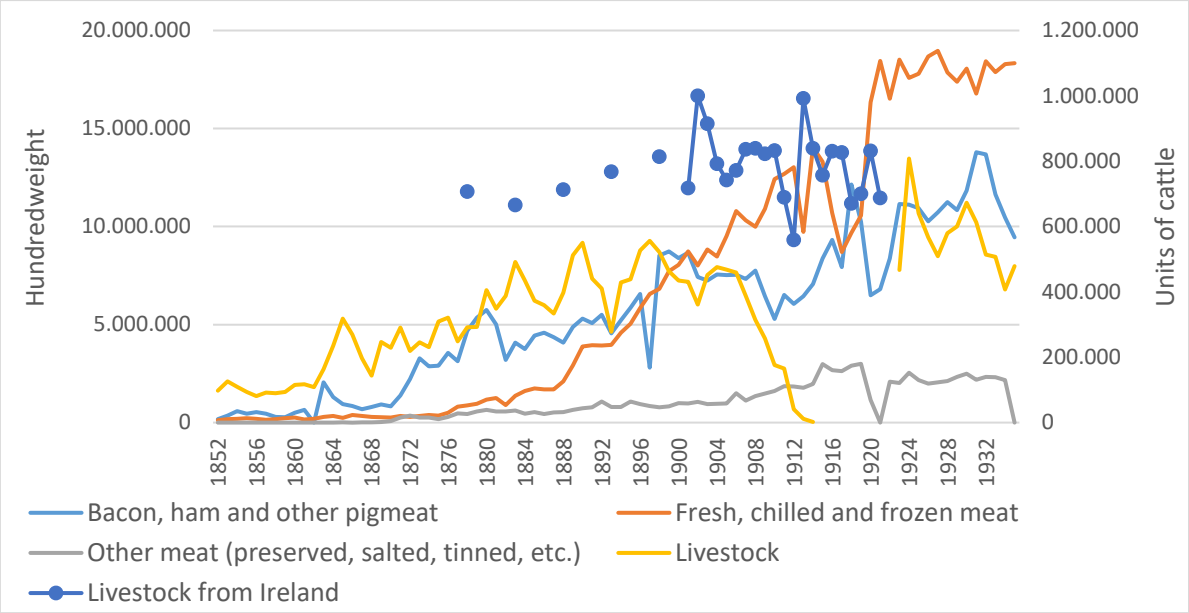
However, British consumers were used to consuming fresh, high-quality meat (Putnam, 1923, p. 18),[16] and tinned meat was not well regarded. This problem could be partly overcome through the import of live cattle which were subsequently slaughtered. However, this type of trade involved serious health and logistics problems (loss of weight during long trips, death of the animals, etc.). In fact, the outbreaks generated by the arrival

[15] 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)).

[16] 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).

of diseased cattle led Great Britain to impose a series of restrictions on their imports (Perren, 1978).

Figure 4.1. 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 and 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 W. 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). d) a hundredweight=112 pounds

If we contemplate the meat and live cattle imports of Great Britain, we can observe in Figure 4.1 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).

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 American 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 nineteenth century. Even in the United States, where the export of hog products were fairly relevant in the second third of the nineteenth 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 (Lamartine Yates, 1959).

Therefore, until the end of the nineteenth 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 nineteenth 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 nineteenth century (O'Rourke and Williamson, 2002, p. 38).

4.3. 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.[17] The possibility of freezing or chilling meat to a temperature between 0 and -2ºC had two 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 4.1: at the end of the nineteenth 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 1870-5 to 6.66 pounds per tonne in 1909-13, 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.[18] 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

[17]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 Critchell (1912).
[18] Calculations based on Tena and Willebald (2013, pp. 62-63).

possibilities of participating had been severely limited, to acquire a dominant role as meat exporters between the end of the nineteenth century and the beginning of the twentieth 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 twentieth century, Great Britain only allowed imports from the United States, Canada, South Africa and the Faroe Islands.

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 4.1). In 1910-14, 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 five 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. 247-48).

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 Schwarzchild and Sulzberguer) dominated the national market. However, at the end of the nineteenth century, a process of capital inflow began, first from Britain and then the US 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 (that is, 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 were 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, 2019); and second, to capitalise the sunk cost incurred at the end of the nineteenth 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, Grennes and Craig, 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, p. 5 and p. 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 4.1). 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 UK (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 modernize their meat-packing industry.

4.4. The consolidation of the global meat market (1921-29)

The 1920s had highs and lows for international agricultural trade. On the one hand, global exports grew at an annual rate of seven 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, Pinilla and Serrano, 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. 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 1923-5 were 50 per cent higher than in 1911-13 (Timoshenko, 1933, p. 556) and on the other, why Great Britain's share of world imports fell from 80 per cent in 1909-13 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.

Table 4.1. Shares of the principal importing and exporting countries of different meats with respect to the global meat trade (volumes)

Imported beef (%)	**1909-13**	**1924-8**	**1928-32**	**1934-8**
Great Britain	70,6	56,0	64,4	73,6
France	0,6	6,0	3,8	2,2
Germany	4,1	10,5	5,4	3,5
Belgium	2,2	5,6	4,0	1,4
Italy	1,1	6,8	5,8	3,6
The United States	2,7	2,6	3,7	4,3
Exported beef (%)	**1909-13**	**1924-8**	**1928-32**	**1934-8**
Argentina	51,4	58,4	50,5	51,7
Uruguay	11,0	11,3	11,6	9,9
Brazil	0,0	3,7	7,2	6,5
Australia	12,2	7,0	7,5	11,9
New Zealand	3,0	2,5	2,7	5,4

Imported lamb (%)	1909-13	1924-8	1928-32	1934-8
Great Britain	97,6	93,0	93,4	96,2
France	0,1	3,4	3,3	2,5
Exported lamb (%)	**1909-13**	**1924-8**	**1928-32**	**1934-8**
Argentina	26,6	29,2	23,6	14,3
Uruguay	1,0	6,3	5,3	2,2
Australia	26,5	11,3	16,2	26,2
New Zealand	40,6	48,5	49,8	52,7

Imported bacon, ham and lard (%)	1909-13	1924-8	1928-32	1934-8
Great Britain	91,4	89,8	89,3	89,5
Germany	0,2	0,0	1,7	2,3
The United States	0,0	0,0	0,1	2,5
Exported bacon, ham and lard (%)	**1909-13**	**1924-8**	**1928-32**	**1934-8**
Denmark	34,6	41,0	52,3	44,4
The United States	51,7	31,8	14,7	7,5
Canada	6,8	7,5	2,0	16,3
The Netherlands	1,0	6,4	10,2	8,0

Source: Annuaire international de statistique agricole (1909-1939)

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). 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 Sansiena, 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 4.3). 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 on 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 fresh and chilled meat by 2.6 and those on frozen meat by 1.7 (Bacon and Schloemer, 1940, p. 611 and p. 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.

Table 4.2. World imports of meat and live cattle (index numbers, 1909-13=100, volumes)

Products	1909-13	1924-8	1928-32	1934-8
Cattle beef	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)

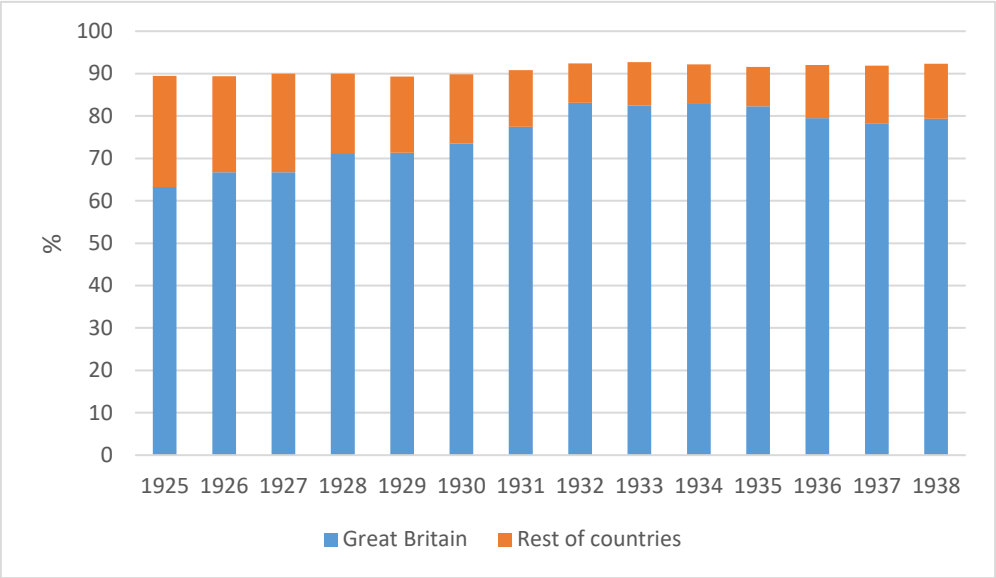
Table 4.3. World imports of meat and live cattle with respect to total agricultural imports (%), volumes

Products (%)	1909-13	1924-8	1928-32	1934-8
Cattle beef	0,6	2,4	2,3	2,0
Pigs	0,4	0,3	0,3	0,2
Beef	1,5	2,4	1,8	1,7
Lamb	0,9	0,7	0,8	0,8
Pork	0,3	0,5	0,4	0,4
Bacon, ham and lard	1,4	1,8	2,0	1,5
Total group	5,2	8,4	7,8	6,8
Total agricultural trade	100	100	100	100

Source: Annuaire international de statistique agricole (1909-1939)

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 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.

Figure 4.2. Percentage represented by meat imports to Great Britain with respect to the principal importing countries



Source: Annuaire international de statistique agricole (1909-1939). Notes: "Rest of countries" is made up of Germany, France, Austria, Italy, the United States and Belgium

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.

4.5. The impact of the great depression on the international meat market (1929-38)

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, Jacks and O'Rourke, 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, Fernihough, Lampe and O'Rourke, 2019). 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. 353).

Great Britain, which accounted for 71 per cent of global meat imports in 1929, did not substantially revise its agricultural tariff policy until the year 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.[19] 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.

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

[19]An exception to this was the protection and intervention of the beet sugar industry during and after the First World War. See National institute of economic and social research (1943, pp- 122-26) and Bill (1988).

to increase farmers' income, as it was argued that the fall in meat prices on a global level threatened even the national production of meat and, second, the British dominions had the objective of increasing their share of the 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 (that is 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 regard to its dominions, even though they could freely export, they reached different agreements in order to voluntarily regulate their meat sales.[20] During the second half of 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.

[20] For details of the Ottawa measures and all the international agreements in Great Britain from 1931, see National institute of economic and social research (1943, pp. 163-221).

However, in reality, in all senses, the dominions were reinforced in the British market by the measures taken in Ottawa.

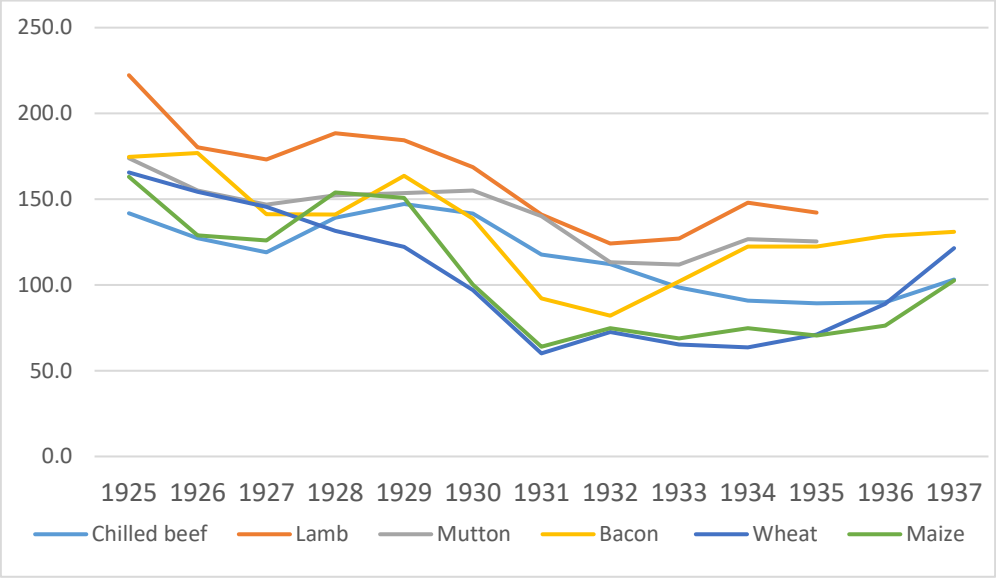
Similarly to what had occurred in the 1920s, the refrigeration companies financed with US capital reinforced their share of meat exports in South America. Between 1932 and 1939, they controlled almost 60 per cent of Argentine meat exports, while the English companies lost share. With respect to the local 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.

4.5.1. 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.

Figure 4.3. Index of meat and cereal prices (unit values of British imports 1909-13=100)



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

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 regard 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

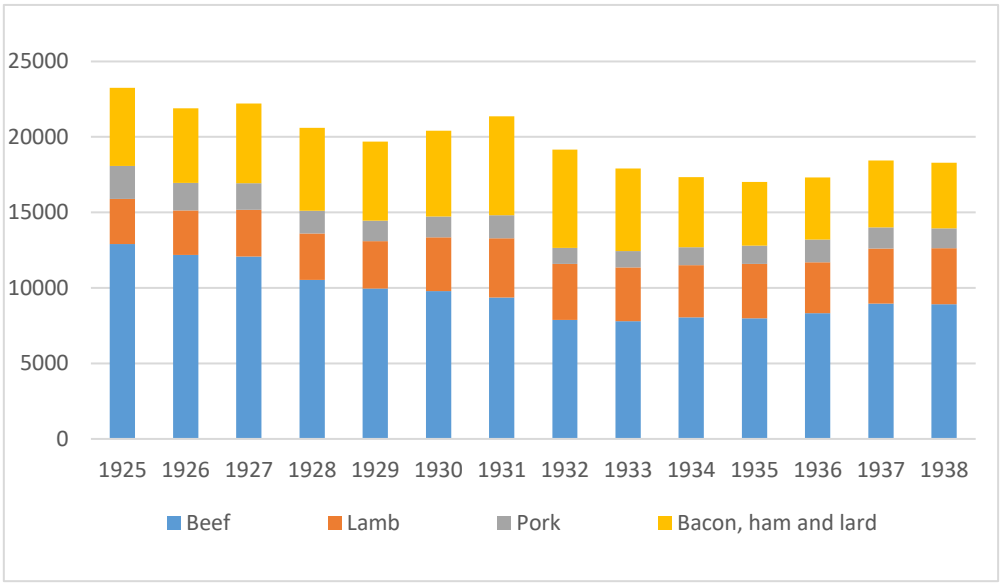
that there was a reduction in imported bacon, and therefore in its prices due to the restriction of supply. Other authors have made the same observation of the price of Danish bacon increasing more rapidly than that of British bacon during this period (Higgins and Mordhorst, 2015, p. 161). Finally, from 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.

4.5.2. 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 4.3) 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). 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, Fernihough, Lampe and O'Rourke, 2019). 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, Meissner and Oosterlinck, 2017)

Figure 4.4. World imports of the different types of meat (thousands of quintals)



Source: Annuaire international de statistique agricole (1909-1939)

4.5.3. 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 on an aggregate level was limited (De Bromhead, Fernihough, Lampe and O' Rourke, 2019). 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 chapter we seek to gain a more global perspective of the geographic impact of the Great Depression and Ottawa on the principal meat exporters.

Table 4.4. Shares of the principal beef exporters with respect to global exports

Beef %	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Argentina	53,3	61,3	61,9	50,3	52,8	47,7	50,5	56,7	52,8	53,3	51,0	51,8	50,0	52,5
Uruguay	11,2	12,2	11,2	11,3	11,6	14,5	12,2	11,1	11,1	10,8	12,1	8,8	9,6	8,8
Brazil	3,9	0,6	2,8	6,2	7,6	10,3	7,4	5,4	5,3	5,0	7,0	8,1	5,9	6,5
Australia	9,6	5,6	5,0	8,7	7,5	6,7	7,9	8,4	9,0	10,9	10,6	11,6	12,6	13,2
N. Zealand	2,6	1,8	1,8	3,8	1,9	2,0	2,4	3,4	5,9	5,7	5,7	5,2	5,2	5,5

Source: Annuaire international de statistique agricole (1909-1939)

Table 4.5. 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	32,6	25,1	28,8	26,9	27,7	23,2	22,1	19,9	18,0	14,2	14,3	15,2	14,5	13,4
Uruguay	3,6	8,5	8,5	5,1	7,6	8,1	4,8	1,7	2,8	2,3	2,0	2,0	2,2	2,4
Australia	11,6	15,1	9,0	12,0	12,5	13,8	21,7	19,4	18,3	25,6	25,9	24,8	27,0	27,6
N. Zealand	46,9	47,3	48,9	51,7	47,7	50,0	46,9	55,3	56,1	52,2	53,0	54,1	52,1	52,1

Source: Annuaire international de statistique agricole (1909-1939)

Table 4.6. Shares of the principal bacon, ham and lard exporters with respect to global exports

Bacon, ham and lard %	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Denmark	51,7	51,8	59,4	59,6	45,8	54,0	56,6	57,5	51,8	47,7	47,3	43,4	41,8	41,4
The Netherlands	4,8	9,7	11,6	14,2	9,7	8,8	9,9	11,4	10,9	9,4	8,4	7,8	7,4	6,7
Canada	16,4	11,6	6,2	4,1	2,4	1,1	0,8	2,4	5,9	11,8	13,5	17,7	20,4	18,4
USA	1,2	1,2	1,1	1,3	23,1	17,8	9,2	6,6	9,3	9,5	7,7	6,4	5,6	7,9

Source: Annuaire international de statistique agricole (1909-1939)

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 (IEC, 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 1930, the quota of chilled beef in the British dominions was 0.1 per cent; in 1932 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 exports on 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 on 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 4.4). 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 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.

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 on 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 on 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 on 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 on a geographical level, on 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.

4.6. 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 nineteenth century (Lampe and Sharp, 2019, pp. 194-97).

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 nineteenth 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 nineteenth 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.

CHAPTER 5: From net importer to global leader: Understanding the drivers of Spain's meat export growth since the 1960s

5.1. Introduction

After a period of commercial disintegration and economic slowdown at the global level during the 1930s (Estevadeordal, Frantz and Taylor. M, 2003; Hynes, Jacks and O'Rourke, 2012; Federico and Tena-Junguito, 2019), the decades following World War II were characterized by strong economic growth and a reintegration of global trade (Federico and Tena-Junguito, 2017). Thus, what the literature has called the second globalization (O'Rourke and Findlay, 2007, pp. 473-525) took place. This new era of globalization, unlike the previous one (O'Rourke and Findlay, 2007, p. 363-425), was characterized by an increase in the trade of manufactured products between developed countries (Hummels, 2007). Therefore, although the trade of agri-food products increased notably in absolute values, it lost weight with respect to global trade (Serrano and Pinilla, 2012, see figure 1).

One of the agri-food products whose trade has increased the most during the 20th century has been meat. During the second half of the 19th century, its international trade was relatively low compared to other products such as cereals. This was due to the lack of widespread mechanical refrigeration, which hindered long-distance trade (Perren, 2006; Lluch, 2019). However, during the first third of the 20th century, its global trade gained significance in relation to the overall trade of agri-food products (Delgado, Pinilla and Aparicio, 2022). After the Second World War, global meat trade exhibited even greater dynamism. Specifically, in the 1960s, the constant value of its trade in relation to the trade of agri-food products was approximately 6 percent. By the early 21st century, its significance had already increased to around 12 percent (Serrano and Pinilla, 2013, see table 1). The explanatory factors behind this dynamic behavior can be summarized in demand, supply, and trade agreements that encouraged its trade.

On the demand side, the culmination of the nutritional transition due to an increase in per capita income and urbanization rates, first in the West and later in developing countries, led to a significant increase in the consumption of meat products (Popkin, 1993; Grigg, 1995; Delgado, 2003; Pujol Andreu and Cussó Segura, 2014; Cheng, Gao and Seale, 2015; Chung *et al.*, 2020). On the supply side, the strong increase in productivity in the sector due to the implementation of the agribusiness model resulted in a fall in relative prices of meat, thereby boosting its consumption, and consequently its trade (Clar, 2008; Rivera-Ferre, 2009; Godley, 2014). Finally, several trade agreements initiated since the end of World War II, starting with the creation of the European Union and the GATT

(and subsequently the WTO), as well as other regional agreements such as NAFTA, MERCOSUR, and China's trade liberalization, further encouraged the trade of meat (Karemera *et al.*, 2015; Winders and Ransom, 2019, p. 14).

In this context, Spain stands out as one of the countries with the most international penetration of its meat exports. Until the 1960s, the diet in Spain was characterized by the consumption of Mediterranean products, resulting in relatively low meat consumption (Garrabou Segura and Cussó Segura, 2007). In fact, the country was a net importer of this product. However, between 1960 and 1980, the consumption grew significantly, turning Spain into one of the largest consumers of meat in Europe (Delgado, 2022). To meet this increased demand, the meat industry adopted an agribusiness model (Godley, 2014), characterized by large vertically integrated companies and massive imports of feed, more productive breeds, and advanced US technology (Clar, 2010). Thus, the meat sector became highly productive with large economies of scale (Serrano *et al.*, 2015). Therefore, after Spain's integration into the EU in 1986, its meat exports took off, with pork becoming the world's leading export in 2020 (Clar, 2022).

However, despite several studies focusing on the remarkable increase in meat production (and its associated environmental costs) and subsequently in the conquest of international markets (Rodriguez Zúñiga and Soria, 1989; Domínguez Martín, 2001b; Lence, 2007; Ríos-Núñez and Coq-Huelva, 2015; Clar, Martín-Retortillo and Pinilla, 2018; González de Molina *et al.*, 2020), a quantitative analysis of this process has not yet been performed, particularly disaggregated by meat types (Serrano *et al.*, 2015, p. 10).

Therefore, the objective of this chapter is to analyze how meat exports in Spain evolved from representing 0.4% of agri-food exports in the 1950s to 12% in the first decade of the 21st century (Clar, Serrano and Pinilla, 2015), making Spain the world's leading exporter of pork in 2020. In addition, we aim to emphasize two aspects. Firstly, to analyze whether there has been a Home Market Effect. That is, to quantify whether the impulse of domestic demand, reflected in a strong concentration of production and large economies of scale in the sector, has played a relevant role in the growth of exports. Secondly, to quantify the effect of the entry of Spain into the European Union in 1986 on meat exports. Although the literature points out its importance (Clar, 2013, p. 346; Langreo, 2008, p. 43), it has not yet been quantified in a disaggregated manner. Therefore, this chapter complements the work of Serrano *et al.*, (2015), where it is observed that meat exports

were driven both by the Home Market Effect and Spain's entry into the European Union. However, in this chapter, we focus on providing a somewhat more disaggregated perspective, particularly focusing on the case of pork.

This study will be structured as follows. After this introduction, section 2 analyzes the evolution of the Spanish meat industry from the 1950s to the present day from the perspective of consumption, production, and exports. In section 3, we present the data and methodology. In the following section, we present the main results of the gravity equation. Then, we discuss the results before concluding the study with a brief conclusion.

5.2. Evolution of the meat sector in Spain

The Spanish agri-food industry in the 1950s was relatively weak compared to the European one (Clar, Martín-Retortillo and Pinilla, 2018). Although limited improvements were made from the demand and supply sides in the first third of the 20th century (Langreo and Germán, 2018), the Spanish Civil War (1936-1939) and post-war period only set back the limited progress made in the agri-food industry and the economy as a whole (Simpson, 1995, p. 279; Carreras, Prados de la Escosura and Rosés, 2005). Therefore, twenty years after the Civil War, this industry was characterized by small size, low technological level, and production of low-value-added and low-degree of transformation products (Clar, 2008, p. 146). The production and productivity of meat (and other livestock products) also showed lower performance than the European average (Ríos-Núñez and Coq-Huelva, 2015, p. 519), as well as livestock production systems linked to the land (extensive livestock farming) (Domínguez Martín, 2001b; Carpintero Redondo, 2006; Clar, Martín-Retortillo and Pinilla, 2018, p. 336). Consequently, the contribution of livestock production to GDP was substantially lower than in countries such as France or Germany (Ríos-Núñez and Coq-Huelva, 2015, p. 529). For instance, in 1962, livestock production in Spain accounted for 23 percent of the total agricultural production. In contrast, in Italy, it represented 27 percent, in France 45 percent, and in Germany 55 percent (Clar, Martín-Retortillo and Pinilla, 2015, see table 5). Despite the challenging economic conditions faced by the Spanish economy in the second third of the 20th century, the historically low production of meat in Spain can mainly be attributed to the country's agro climatic conditions. As a Mediterranean country, its comparative advantage was in the production of products such as wine, olive oil, and certain fruits and vegetables (Pinilla and Ayuda, 2010; Ayuda and Pinilla, 2020). Only in a small region in the north of the country, with agro climatic conditions similar to those of Atlantic Europe,

was the production of livestock products higher (Dominguez Martin, 1996). Despite the low meat production, it was energetically efficient, sustainable, and diversified (Rodríguez Zúñiga, 1980).

Table 5.1. Meat production in Spain and Europe (thousands of tons)

Year	Meat production in Spain	Meat production in Europe	Spain/Europe
1961	659	30,004	2,2
1970	1,489	40,936	3,6
1980	2,643	54,539	4,5
1990	3,466	63,889	5,4
2000	4,913	51,304	6,6
2010	5,443	56,592	6,6
2020	7,503	65,119	11,5

Source: FAOSTAT

In parallel with production, food consumption during the first half of the 20th century was also dominated by Mediterranean products. In other words, on average, the Spanish diet was based on products such as bread, fruits, vegetables, fish, wine, etc. (Cussó Segura, 2005; Cussó Segura and Garrabou Segura, 2007). Therefore, with the exception of the northern region where consumption of livestock products was higher (Collantes, 2015b; Hernández-Adell, Muñoz Pradas and Pujol Andreu, 2019; Delgado and Pinilla, 2022), the consumption of meat in the majority of the population was reduced (Moreno, Sarría and Popkin, 2002; Bernabeu-Mestre, 2008; Marrodán, Montero and Cherkaoui, 2012; Delgado, 2022) in comparison to the European average, and even lower than countries such as Turkey or Greece (Bernabeu-Mestre *et al.*, 2007; Clar, 2008). Consequently, the low consumption of livestock products resulted in a deficit in certain micronutrients such as calcium or vitamin A in large population groups (Cussó Segura, 2005; Cussó Segura, Gamboa and Pujol Andreu, 2018; Medina-Albaladejo and Calatayud, 2020).

Regarding meat exports, they were virtually non-existent around the 1950s (Clar, Serrano and Pinilla, 2015, p. 154). In fact, Spain was a net importer of meat, with most of it coming from Argentina (Gómez Mendoza, 1995, p. 154). Nonetheless, meat imports were relatively low due to both the aforementioned limited domestic consumption and the Spanish economy's commercial isolation. Thus, during the decade following World War

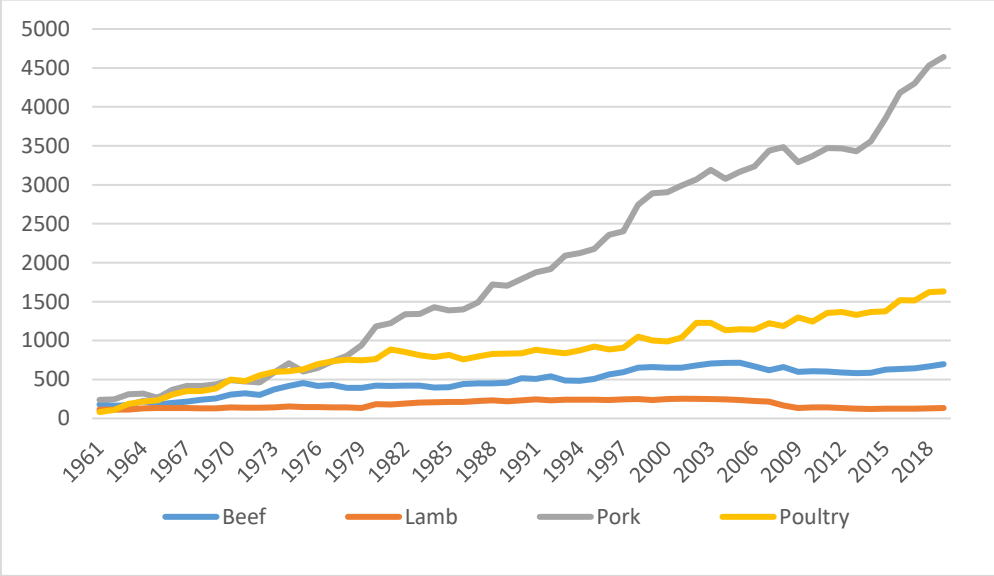
II, there was a clear correlation between meat production, consumption, and trade with the country's agro climatic conditions.

However, the scenario was completely different around the 1980s and 1990s. On the supply side (production), there was a spectacular take-off. Specifically, meat production rose from around 650.000 tons to over 3,5 million between 1960 and 1990 (see table 5.1). Furthermore, meat production went from representing less than 6 percent of total agricultural production in the 1950s to representing nearly 23 percent in the 1990s (Clar, Martín-Retortillo and Pinilla, 2015, see table 3). Thus, the weight of Spanish meat production with respect to European production doubled (see table 5.1), and the (constant) value multiplied by 5 in the same period (calculations based on FAOSTAT). However, not all types of meat participated in this expansion process. Specifically, beef and, especially sheep meat, lost weight in total meat production. In contrast, chicken and pork production increased significantly. The reason behind these patterns lies in the degree of industrialization in the production of each type of meat. In other words, it reflected what the literature has called the crisis of traditional livestock farming and the expansion of intensive livestock farming (Domínguez Martín, 2001, pp. 40-42). On the one hand, beef and sheep production remained tied to the land (Segrelles Serrano, 1993, p. 40), so it could not meet the increasing demand for cheap proteins from the Spanish population (Domínguez Martín, 2001b, p. 58). On the other hand, following Western patterns (Godley, 2014), as well as the recommendations of the FAO (BIRD and FAO, 1967) the industrialization of production, first of chicken, and then of pork, was implemented in Spain (Fernández *et al.*, 2016, p. 10). Thus, the agribusiness model was implemented for both types of meat (Clar, 2010). Broadly speaking, this production model that explains the sharp increase in chicken and pork production is based on four pillars. Firstly, the introduction of foreign breeds such as the broiler chicken in the case of poultry or the Jersey-Duroc in pigs (Clar, 2022, p. 13). These breeds were clearly more productive compared to native breeds (such as the Iberian pig), resulting in significant loss in weight of the latter (Langreo and Germán, 2018, p. 175). Secondly, there was massive imports of feed, and the United States emerged as the primary exporter. This trade relationship was established following the 1953 agreement between the two countries (Clar, 2005). Consequently, meat production became heavily dependent on the imports of foreign feed (Rodríguez Zúñiga, 1980). In fact, the massive imports of feed is key to explaining the negative coverage rate in total agri-food trade during this period (Clar, Serrano and

Pinilla, 2015, p. 65). Thirdly, and related to the previous point, there was ease in the penetration of high-tech foreign capital in the production of poultry and pork, mainly from the United States.[21] Finally, recent literature has also highlighted the importance of improving the use of substances for animal fattening (Estévez Reboredo and Sánchez de Lollano Prieto, 2022).

Thus, the production of poultry and pork was characterized by strong vertical integration in the value chain, with broiler chickens reaching a 95 percent integration level (Domínguez Martín, 2001b, p. 51; Clar, 2008). During this time, feed companies were the main axis of integration (Clar, 2022, p. 13). Meanwhile, sheep were left out of the vertical integration process (Langreo, 2008, p. 45), while beef would be integrated in later years.

Figure 5.1. Meat production in Spain (thousands of tons):



Source: FAOSTAT: https://www.fao.org/faostat/es/

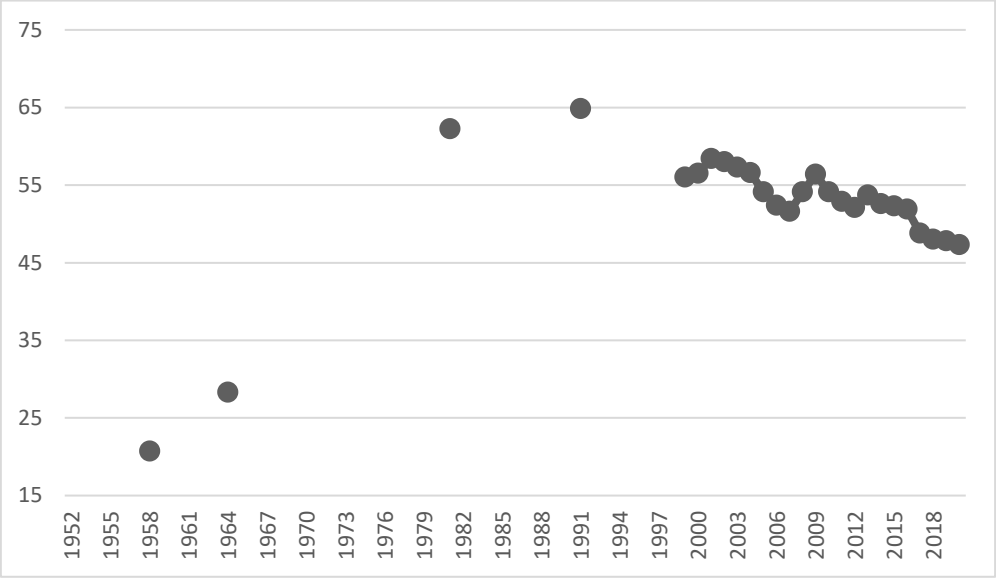
This intense vertical integration in poultry and pork production, in turn, led to a concentration of production both at a geographic and business level. At the geographic level, there was a process of decoupling between areas with suitable agro climatic conditions for livestock production and meat production. That is, meat production was no longer located in areas with abundant livestock resources, such as the north, but in those closer to major consumption centers, in areas with easy access to imported feed and where

[21] At this juncture, Clar underscores the significance of domestic intermediaries for this process (Clar, 2010).

there was a certain dynamism of feed companies, among other factors (Castell and Ramon-Muñoz, 2022). Therefore, a large part of production was relocated to the northeast, Levant, and areas near Madrid (Rodríguez Zúñiga, 1980; Segrelles, 1993; Domínguez Martin, 1996; Garcia Pascual, 1998; Sineiro García and Lorenaza Fernández, 2008).

Regarding corporate concentration, both in the pork and poultry industries (as well as in the agri-food industry as a whole (Rodríguez Zúñiga and Soria, 1989)) it also increased. For example, in 1962 there were around one and a half million farms with 3.3 pigs per farm. By 1990, the number of farms had been reduced to less than four hundred thousand, with around 32 pigs per farm. This spatial and vertical corporate integration, generated sufficient economies of scale to produce meat at a low price in response to a growing demand from the population. In other words, the combination of an increase in disposable income due to the Spanish economic growth of the 1960s and a availability of low-priced meat due to the economies of scale in the meat industry, resulted in a strong expansion in domestic meat consumption, surpassing countries such as France and England in the 1990s (Delgado, 2022, p. 20). In other words, just as with dairy products (Collantes, 2015b, 2019b; Hernández-Adell, Muñoz Pradas and Pujol Andreu, 2019), the increase in meat consumption by the less affluent classes and historically less consuming regions, generated mass consumption of total meat (Delgado and Pinilla, 2022).

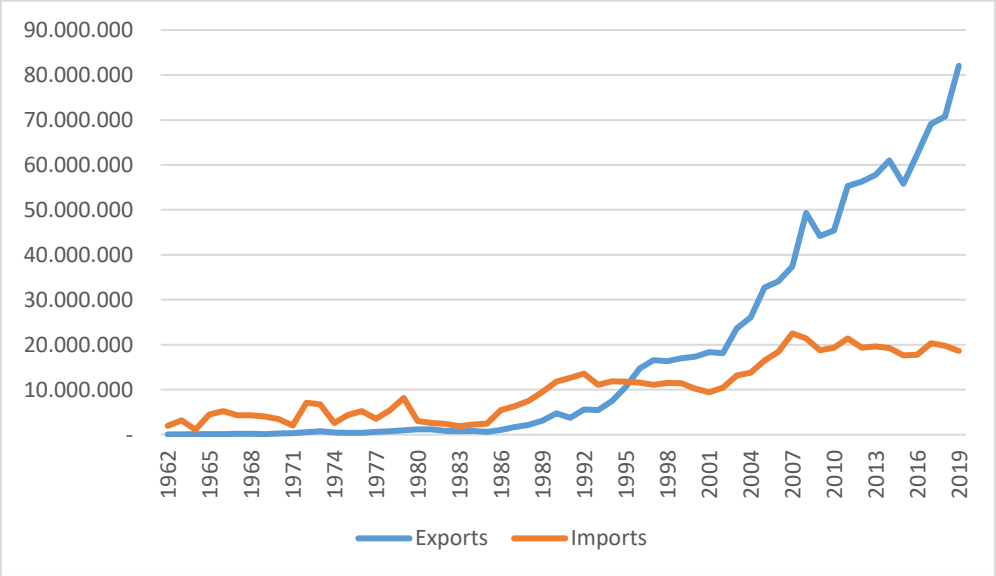
Figure 5.2. Meat consumption in Spain (kg per capita)



Source: Own elaboration based on household budget surveys and the food consumption panel. Notes: Only household consumption

As for exports, until the early 1990s, Spain was still a net importer of meat (see figure 5.3). This occurred despite the fact that the sector was already mature and competitive (Langreo Navarro, 2002, p. 44; Clar, 2022, p. 13). For example, in the 1990s, producer prices for chicken were the lowest in Europe after Denmark (Clar, 2022, p. 15). There are two reasons why Spain did not yet export meat in significant quantities in the 1980s. First and foremost, all production was absorbed by the growing domestic consumption (see figure 5.2), something that is currently happening in developing countries such as China (Cheng, Gao and Seale, 2015; Hasiner and Yu, 2019). Second, outbreaks of swine fever also delayed pork exports until it was eradicated in 1989 (Segrelles Serrano, 1993, pp. 205-206; Langreo, 2008, p. 50). That is to say, with the liberalization of meat trade in 1986, imports of meat increased while exports remained stagnant due to swine fever.

Figure 5.3. Imports and exports of meat in Spain ($ 2015)



Source: COMTRADE: https://comtrade.un.org/

Meat consumption in Spain reached a plateau in the 1980s, followed by a continuous decline that has persisted to this day (a trend also observed in other Western countries (Stewart *et al.*, 2021)). The stagnation in consumption may have caused problems of excess meat production. Consequently, once the domestic market became saturated, meat had to be placed in foreign markets. Given a mature sector (Langreo, 2008, p. 49) due to a strong increase in domestic demand since the 1960s, geographic and business concentration, and integration in the value chain, meat was competitive enough to be exported. This process, as with the entire agri-food sector (Clar, Serrano and Pinilla, 2015), was reinforced by Spain's entry into the European Union. In other words, the commercial liberalization of the meat sector, which was heavily controlled in the years before joining the EU (Langreo, 2008, p. 50), further reinforced the concentration and efficiency process of the sector due to a reallocation of resources (Melitz, 2003), since smaller companies had difficulties adapting to cutting-edge technology and the new health regulations required to enter the EU (Segrelles, 1994, p. 29). In other words, a Home Market Effect was taking place (Clar, Serrano and Pinilla, 2015; Serrano *et al.*, 2015).

Therefore, as shown in Figure 5.3, the 1990s witnessed a surge in meat exports. In value terms, between 1990 and 2019, they increased almost tenfold. Table 5.2 emphasizes the importance of Spain's entry into the EU (1986) for the sector. In 1980, extra-community countries such as Equatorial Guinea or Japan had a significant weight in Spanish meat

exports.[22] However, 10 years later, almost all foreign sales were directed to the EU. Specifically, France, Italy, Portugal, Germany, and the United Kingdom have dominated a large part of Spanish meat exports until recent years. Regarding pork exports, the pattern is similar due to its importance relative to total meat exports (see below).

[22] The significant weight of exports to Andorra was due to their subsequent re-exportation to third-party countries. The same was true for external sales of cava (Badia-Miró, Delgado and Pinilla, 2022).

Table 5.2. Main destinations of Spanish meat exports in value (%)

Total meat	**1980**	**Total meat**	**1990**	**Total meat**	**2000**	**Total meat**	**2010**	**Total meat**	**2019**
Andorra	19,7	Italy	29,6	France	27,8	France	28,3	China	18,1
France	19,2	Portugal	23,7	Portugal	26,1	Portugal	17,7	France	15,7
Japan	16,2	France	22,1	Italy	13,2	Italy	10,5	Portugal	10,5
Equatorial Guinea	12,6	Andorra	7,1	Germany	10,8	Germany	7,9	Italy	7,8
Germany	7,9	Germany	5,4	United Kingdom	4,1	United Kingdom	4,4	Japan	6,7
Romania	7,4	United Kingdom	4,2	Russia	3,1	Russia	4,1	Germany	3,8
Switzerland	3,9	Greece	2,6	Greece	2,1	Netherlands	2,6	United Kingdom	3,6
Italy	3,5	Netherlands	1,2	Netherlands	1,7	Denmark	2,1	Poland	3,0
Argentina	2,8	Belgium	0,7	Belgium	1,6	Japan	1,9	Republic of Korea	3,0
Chile	0,9	Ivory Coast	0,6	Argentina	1,1	Belgium	1,9	Czech Republic	2,3
Europe	64,3	Europe	97,7	Europe	95,5	Europe	90,9	Europe	62,5
Total (millions $)	46,1	Total (millions $)	282,6	Total (millions $)	1291,6	Total (millions $)	4161,0	Total (millions $)	8558,7
Pork	**1980**	**Pork**	**1990**	**Pork**	**2000**	**Pork**	**2010**	**Pork**	**2019**
Andorra	76,1	Andorra	31,9	France	33,1	France	31,9	China	19,6
Equatorial Guinea	15,4	France	24,5	Portugal	24,3	Portugal	12,3	France	15,2
Chile	2,8	Italy	15,2	Germany	16,2	Germany	10,1	Japan	9,1
United Kingdom	1,6	Portugal	8,8	Italy	8,5	Italy	9,5	Italy	7,3
South Africa	0,8	Germany	7,7	Russia	2,7	United Kingdom	4,7	Portugal	6,0
Argentina	0,8	United Kingdom	2,8	Argentina	1,7	Russia	3,5	Germany	4,0
Gabon	0,7	Belgium	2,5	Belgium	1,7	Denmark	2,8	United Kingdom	3,9
Uruguay	0,4	Netherlands	1,5	Greece	1,5	Japan	2,6	Polond	3,9
Portugal	0,4	Lebanon	1,3	Netherlands	1,5	Poland	2,6	Republic of Korea	3,7
France	0,3	Mexico	0,8	United Kingdom	1,4	Netherlands	2,2	Czech Republic	3,1
Europe	79,5	Europe	96,1	Europe	96,0	Europe	91,3	Europe	60,3
Total (millions $)	6,5	Total (millions $)	31,3	Total (millions $)	713,2	Total (millions $)	2918,1	Total (millions $)	6185,8

Source: COMTRADE

However, as outlined throughout the article, not all meats have participated in the export boom in the same manner. As shown in Table 5.3, since the 1990s, the majority of meat exports have been attributed to pork, accounting for around 70 percent of total exports in the last decade. In other words, the conquest of the global market by Spanish meat exports is mainly due to pork exports (see Appendix Table A5.1 for a perspective on absolute values). Despite being initially more competitive than pork, chicken did not adapt to the needs of the foreign market. The preferences for the type of chicken meat consumed in Spain and abroad are different, so the industry, focusing on conquering the domestic market, failed to do so in international markets (Clar, 2022).

Table 5.3. Weight of each type of meat on total meat exports (current dollars)

	1980	1990	2000	2010	2019
Lamb	11,5	2,8	3,9	3,5	2,5
Beef	10,2	73,6	23,1	11,3	9,7
Pultry	9,7	4,7	6,9	5,4	5,0
Pork	14,1	11,1	55,2	70,1	72,3
Other meats	54,5	7,8	10,8	9,8	10,5
Total	100,0	100,0	100,0	100,0	100,0

Source: COMTRADE. Notes: lamb includes “Meat of sheep & goats, fresh, chilled or frozen (dígit 112)”,beef includes “Meat of bovine animals, fresh ,chilled or frozen (digit 111), poultry includes “ Poultry,incl.offals ex.liver fresh,chilled,froz” (digit 114), pork includes “Meat of swine,fresh,chilled or frozen” (digit 113), “ Bacon, ham and other dried, salted, smoked pig meat” (digit 121), “Meat and edible offals, nes. Dried, salted, smoked” (digit 129) and “Sausages,whether or not in airtight containers” (digit 134), Other meats includes “Meat of horses,asses, mules & hinnies,fr.ch.fro” (digit 115), “Edible offals of animals,fresh,chilled,frozen” (digit 116), “Other fresh,chilled,frozen meat & edible offals” (digit 118), “Meat extracts & meat juices” (digit 133) and “Other prepared or preserved meat” (digit 138).
The significant relative weight of "other meats" exports in the 1980s is mainly due to the export of offal

Over the last two decades, meat production has increased significantly compared to Europe (see Table 5.1). Currently, the weight of the meat industry within the total Spanish agri-food production is 22.6 percent, accounting for 2.24 percent of the total GDP in 2019 (Huerta, 2020). In that same year, Spain had 21 percent of Europe's pig population, surpassing Germany (17.6 percent) and followed by France (9.1 percent) (Giménez García et al., 2021, p. 203). In fact, the first two countries account for 10 percent of global pig production (although well below the United States and especially China) (Giménez García *et al.*, 2021, p. 206). Additionally, meat companies have climbed positions in the total turnover of the food industry, both nationally and internationally (Clar, 2022, p. 7). Since domestic consumption has continued to decline, the increase in pig production in the last decade is explained by the increase in exports.

Table 5.4. Percentage of pork and pork product exports from each country relative to total global pork and pork product exports (current dollars)

U.S	**1962**	**1970**	**1980**	**1990**	**2000**	**2010**	**2019**
Meat of swine, fresh, chilled or frozen	9,3	3,3	5,5	4,0	12,1	14,1	15,8
Bacom,ham & other dried, salted, smoked pig meat	3,1	2,8	2,9	1,6	4,3	9,5	7,8
Germany							
Meat of swine, fresh, chilled or frozen	0,1	2,1	2,5	5,5	5,3	16,5	15,3
Bacom,ham & other dried, salted, smoked pig meat	0,1	0,7	1,4	5,2	3,2	11,3	10,2
Denmark							
Meat of swine, fresh, chilled or frozen	22,6	10,4	23,3	22,3	21,1	12,4	8,4
Bacom,ham & other dried, salted, smoked pig meat	82,2	75,8	58,7	30,5	21,2	10,7	4,6
Spain							
Meat of swine, fresh, chilled or frozen	0,0	0,2	0,0	0,2	5,6	9,1	15,6
Bacom,ham & other dried, salted, smoked pig meat	0,0	0,0	0,1	0,5	6,2	10,5	17,2

Source: COMTRADE

This is precisely what Table 5.4 shows, where it is observed that Spain has been gaining weight in the world pork exports. In 2019, the market share (in value) was greater than that of major exporters such as the United States, Denmark, and Germany. Undoubtedly, the rise in demand from China is the main reason for the great performance of Spanish pork exports abroad in the last decade (see Table 5.2). There are two reasons that explain China's high demand. Firstly, its strong economic growth has resulted in an increase in the consumption of livestock products, thus developing nutritional transition (Popkin, 2003; Cheng, Gao and Seale, 2015; Shahriar, Qian and Kea, 2019). Secondly, the outbreak of African swine fever first detected in 2018 (Shao *et al.*, 2018) has also led to growth in its imports.

5.3. Data and methodology

With regards to the data, United Nations COMTRADE database has been used to collect the value of bilateral flows of Spain's meat exports from 1963 to 2019. Thus, a total of 12 products with 4 digits have been obtained according to the SITC (revision 1) classification[23]: meat of bovine animals, fresh, chilled or frozen (111); meat of sheep and goats, fresh, chilled or frozen (112); meat of swine, fresh, chilled or frozen (113); poultry, incl.offals ex.liver fresh, chilled, frozen (114); meat of horses, asses, mules and hinnies, frozen, chilled and frozen (115); edible offals of animals, fresh, chilled, frozen (116); other fresh, chilled, frozen meat and edible offals (118); bacon, ham and other dried,

[23] Revision 1 is utilized because it enables the presentation of homogeneous products throughout the entire study period.

salted, smoked pig meat (121); meat and edible offals, nes. dried, salted, smoked (129); meat extracts and meat juices (133); sausages, whether or not in airtight containers (134); other prepared or preserved meat (138). These 12 products have been aggregated into 5 types of meat: total meat (sum of all previous digits), poultry meat (114), pork meat (113+121+134), sheep meat (112), and beef meat (111).[24]

To understand the main determinants of Spanish meat exports, we use the gravity model as a tool for the econometric analyses, first proposed by Tinbergen (1962). Currently, it is one of the most used models in the literature to understand the determinants of international trade due to its great explanatory power and its solid theoretical framework (Shepherd, 2016). In its simplest version, the gravity model indicates that trade between two countries (*ij*) is positively determined by the product of the production of both countries (i.e., their GDPs: YiYj), and negatively related by distance between them (as a proxy measure of trade costs (D)) as shown in Equation 5.1.

$$Xij = \frac{YiYj}{Dij} \tag{5.1}$$

As explained, the history of meat exports in Spain since the second half of the 20th century can be divided into two clearly differentiated stages (see Figure 5.3). The first stage would span from the 1960s to approximately the 1980s. During this stage, meat exports in Spain were virtually non-existent. The second stage would span from approximately the 1980s to the present day and meat exports would soar spectacularly. For this reason, we have estimated the gravity model for the second period (1984-2019). To identify a structural break and separate the second period, we used the Clemente et al. (1998) Innovational Outlier statistic. Using this statistic, we identified the structural break at the year 1984. Therefore, we propose the following estimation for the augmented gravity model.

[24] Digits 129 and 134, while not specified as being derived from pork, are assumed to be so given that the majority of sausages consumed in Spain are of porcine origin.

$$X_{ij,t} = \exp\left[\begin{matrix}\alpha+\beta_1 \ln(Y_{i,t})+\beta_2 \ln(Y_{j,t})+\beta_3 \ln(Dist_{ij})+\beta_4 \ln(Vol.Exchange\_rate_{ij,t})+ \\ +\beta_5 UE_{ij,t}+\beta_6 GATT\_WTO_{ij,t}+\Omega_t\end{matrix}\right]+\varepsilon_{ij,t} \quad (5.2)$$

We use as dependent variable the Spain's meat exports in value (i) to each importing country (j) in each year (t). As in the basic gravity equation, we include Spain's GDP or livestock production (Yi), the importing country's GDP (Yj), and the distance between both countries (Distij). This variable is the geographical distance, in km, between Madrid and the importing country's capital. In addition to this, we augment the standard gravity model by adding the volatility exchange rate for 10 years between exporting and importing country, and two dummy variables for the membership to the European Union and the General Agreement on Tariffs and Trade/World Trade Organization. The first one takes a value of 1 if Spain and the importing country are members of the European Union, 0 otherwise, whereas the last dummy variable takes value 1 if both Spain and the importing country belong in year t to the GATT/WTO, 0 otherwise. Finally, the model incorporates time fixed effects (Ω_t) However, in addition to the model presented in equation 5.2, we estimate a second model. The primary distinction between the two models lies in the inclusion of distance in the first model and fixed importer effects in the second model. In other words, the first model carries a more economic interpretation as distance serves as a proxy for transportation costs. In the second model, the incorporation of fixed importer effects entails a loss of economic explanation; however, it allows for control over additional country-level variables that the first model does not account for. We did not include distance and fixed importer effects in the same model to avoid issues of collinearity.

All variables were collected from the CEPII database, except for the exchange rate, which was collected from the World Bank's World Development Indicator database, and livestock production from the FAO and Agriculture Organization of the United Nations (FAO). Besides, all monetary amounts are expressed in current/nominal terms (De Benedictis and Taglioni, 2011; Shepherd, 2016).

In order to estimate the model, we rely on the Poisson Pseudo-Maximum Likelihood (PPML) estimator, proposed by Santos Silva and Tenreyro (2006). Additionally, we have clustered standard errors at the country-pair level. The main advantages of this estimator is that it is a non-linear estimator that is robust to different forms of heteroskedasticity and to the presence of zero trade flows, both frequent problems in international trade data

(Ayuda et al., 2022). The fact that it is a non-linear estimator allows us to estimate trade flows without a natural logarithmic transformation, so this permits not to omit zero trade flows, unlike other methods such as ordinary least squares (OLS) or the Heckman model (Heckman, 1979). Within this context, this estimator has converted in the workhorse in the international trade applied literature due to its desirable econometric properties. Particularly, this zero problem is quite frequent in our trade flows dataset.

As emphasized, the two main objectives of the article are to determine if there has been an Home Market Effect process and the effect of the EU on meat exports. To empirically analyze if there has been an HME, the elasticity of Spanish GDP has to be greater than the elasticity of the importer's GDP (Feenstra, Markusen and Rose, 1998). This would indicate that supply has a greater weight in the take-off of meat exports.

5.4. Results

Tables 5.5 and 5.6 present the regression results for aggregated meat and pork for the 1984-2019 period. Table 5.5 displays the model including distance (equation 5.2), while Table 5.6 includes fixed importer effects. As a supply variable, both Spanish GDP (1) and livestock production (2) are shown. The results for beef, sheep, and poultry are shown in tables A5.2 and A5.3 of the appendix.

Overall, although with some exceptions, it can be concluded that Spanish meat exports have been boosted by both supply (either GDP or livestock production) and demand from importing countries. For the second model, where distance is included as a proxy for transportation costs, it similarly exhibits the expected sign, namely negative and significant (with the exception of pork, which is not statistically significant). One of the main objectives of the article is to verify the existence of a Home Market Effect. As explained in the methodological section, this effect occurs if the elasticity of supply (GDP or livestock production) is greater than the elasticity of demand (importing country GDP) as an explanatory variable for meat exports. For both aggregated meat and pork, we observe a Home Market Effect. However, for the second model (Table 5.6), this effect is only present when we include livestock production as a supply variable. It is worth noting that livestock production serves as a more accurate proxy for supply than GDP. This means that total meat and pork exports in Spain have grown due to the growth of domestic demand, which has allowed the creation of strong economies of scale that have made the sector very competitive.

Table 5.5. Results of the gravity model for total meat and pork (including distance)

	Aggregate		Pork	
Log of Exporter GDP	1,643***		2,898***	
	(0,286)		(0,324)	
Log of Exporter Meat Production		4,830***		5,389***
		(0,538)		(0,520)
Log of Importer GDP	0,838***	0,838***	0,868***	0,868***
	(0,113)	(0,113)	(0,110)	(0,110)
Log of Distance	-0,647*	-0,647*	-0,351	-0,351
	(0,366)	(0,366)	(0,445)	(0,445)
GATT/WTO	-0,470	-0,470	-0,379	-0,379
	(0,677)	(0,677)	(0,731)	(0,731)
EU	1,164**	1,164**	1,649**	1,649**
	(0,543)	(0,543)	(0,663)	(0,663)
Log of Excvol	-0,431***	-0,431***	-0,390**	-0,390**
	(0,139)	(0,139)	(0,152)	(0,152)
Constant	-8,580***	-8,604**	-21,149***	-10,237***
	(2,825)	(3,376)	(3,492)	(3,670)
RESET test statistic	0,000	0,000	1,49	1,49
Year F.E.	Yes	Yes	Yes	Yes
R-squared	0,529	0,529	0,469	0,469
Observations	4,908	4,908	4,908	4,908
Notes: Robust-clustered standard errors by country pair in parentheses. *** p <0,01, ** p < 0,05, * p < 0,1.				

Table 5.6. Results of the gravity model for total meat and pork (including fixed importer effects)

	Aggregate		Pork	
Log of Exporter GDP	0,464		1,202*	
	(0,463)		(0,636)	
Log of Exporter Meat Production		5,450***		5,501***
		(1,268)		(1,046)
Log of Importer GDP	1,326**	1,326**	1,569**	1,569**
	(0,533)	(0,533)	(0,617)	(0,617)
GATT/WTO	-1,688***	-1,688***	-1,682***	-1,682***
	(0,398)	(0,398)	(0,388)	(0,388)
EU	1,723***	1,723***	4,372***	4,372***
	(0,527)	(0,527)	(0,931)	(0,931)
Log of Excvol	0,090	0,090	0,175***	0,175***
	(0,059)	(0,059)	(0,059)	(0,059)
Constant	-8,388***	-16,119***	-14,519***	-13,744***
	(2,003)	(2,135)	(2,476)	(1,656)
RESET test statistic	0,34	0,34	0,8	0,8
Year F.E.	Yes	Yes	Yes	Yes
Importer F.E.	Yes	Yes	Yes	Yes
R-squared	0,943	0,943	0,935	0,935
Observations	4,852	4,852	4,643	4,643
Notes: Robust-clustered standard errors by country pair in parentheses. *** p <0,01, ** p < ,.05, * p < 0,1.				

For beef and poultry, the results differ depending on the model utilized. If we include distance (Table A5.2 in the appendix), the Home Market Effect is observed, although it is much smaller compared to the total meat and pork when considering livestock production as a supply variable. On the other hand, if we incorporate fixed importer effects (Table A5.3 in the appendix), the HME only occurs in beef, but its effect is minimal. For lamb, the Home Market Effect does not occur regardless of the model used.

Therefore, in a context where countries trade goods, even if they are substitutable due to consumer preferences for variety, and under imperfect competition and increasing returns to scale, exports are more responsive to changes in domestic production than to changes in external demand (Krugman, 1980; Feenstra, Markusen and Rose, 2007; Serrano *et al.*, 2015). Therefore, this Home Market Effect occurs especially in meats where industrial production and value chain integration have been stronger, thus generating greater economies of scale (pork and to a lesser extent beef). For chicken, despite significant economies of scale being generated, the Home Market Effect had a lesser impact on exports due to the sector's focus on domestic preferences rather than meeting the demands of international markets. In meats where integration into the value chain occurred to a lesser extent (such as sheep meat), and thus they are less productive sectors, there is no HME process.

Another objective of this study is to quantify the weight of Spain's entry into the EU as an explanatory variable for meat exports. For total meat and pork, the results are less ambiguous. Specifically, in both models, the fact that Spain and the importing country are part of the EU has a large and positive effect on exports of total meat and pork. For beef and lamb, EU membership is also positive and significant in both models. As for poultry, it is positive but not significant in both models. Once again, the industry's failure to adapt to international markets may be the reason behind the lack of significance of EU membership in chicken exports (Clar, 2022).

In line with other studies on agri-food trade (Serrano and Pinilla, 2012; Ayuda, Belloc and Pinilla, 2022), the membership of the exporting and importing country in the GATT or the WTO does not have significant effects. For both total meat and pork, the aforementioned variable exhibits a negative coefficient and lacks statistical significance in the model incorporating distance as a factor. Conversely, in the model incorporating importer fixed effects, the variable in question demonstrates a negative coefficient that is

statistically significant. Indeed, for beef, lamb, and poultry, WTO membership only exhibits the "expected" results (positive and significant) for the case of poultry in the second model. This is likely due to the fact that accession to the GATT or the WTO has promoted non-tariff barriers to meat trade. Additionally, this is particularly important in products such as meat, as it is relatively easy to impose trade barriers through sanitary issues (Perren, 2006). This is evident in the case of China's meat imports (Hasiner and Yu, 2019; Peci and Sanjuán, 2020). In fact, the question of whether GATT or WTO membership affects trade has been widely debated since Rose's work (2004) and the literature shows very diverse results. Regarding exchange rate volatility, its overall effect is small and negative, although in several cases it is not statistically significant. Notably, for total meat and pork in the model including importer fixed effects, the effect is counterintuitive (positive and significant). However, it should be noted that the magnitude of this effect is exceedingly small.

The R-squared of the model including fixed effects is significantly higher than that of the model including distance. This can be attributed to the fact that by controlling for numerous unobservable country effects, the explanatory power of the model is enhanced. Furthermore, when conducting a reset test to assess the model's goodness of fit, the results indicate potential misspecification for beef, lamb, and poultry in the model that includes distance. In contrast, the reset test suggests that the model with fixed effects is correctly specified. Therefore, despite exhibiting somewhat counterintuitive results in certain variables and lacking the inclusion of distance, the latter model generally produces more reliable findings.

5.5. Discussion

How did Spain go from being a net importer of meat in the 1980s to becoming the world's leading exporter of pork in 2020? While there are some cyclical arguments to explain this fact, such as outbreaks of swine fever in certain countries in Northern Europe and China in recent years (Shao *et al.*, 2018; Valverde, 2021), the economic success of the meat industry in Spain is explained by the competitiveness generated by the boost in domestic demand. Historically, meat consumption in Spain has been relatively low and production has been based on extensive livestock farming. The strong increase in Spanish income from the 1960s onwards led to a growth in demand for meat that supply could not satisfy. Faced with this situation, the Francoist regime granted great facilities for American capital meat companies to establish themselves in Spain and quickly adopt the

agribusiness model (Clar, 2010). In this way, in just a few years, both the poultry and pork sectors were characterized by massive imports of feed, highly productive breeds, and great vertical integration in the value chain. As a result, large economies of scale were generated in both sectors. The result of this was a sharp drop in prices that drove meat consumption in Spain above the European average, further fueling economies of scale. Spain's entry into the EU in the late 1980s meant the liberalization of the sector (as it was still heavily regulated for international trade (Langreo, 2008)) and therefore a reallocation of resources towards the most competitive companies, which absorbed smaller companies and economies of scale were even further reinforced (Melitz, 2003). Therefore, with a saturated domestic market, the 1990s witnessed the growth of pork exports in Spain. The HME as a driving force has been observed in meats whose production underwent stronger industrialization, with the industry adapting to both domestic and international market preferences, particularly in the case of pork. Conversely, in meats where production was industrialized but the industry did not adapt to external markets, the HME either does not occur or occurs to a lesser extent, as seen in poultry. In contrast, meats with significantly lower productivity and lacking economies of scale, such as lamb, did not experience export promotion through the HME. In the last decade, the pork sector in Spain has taken advantage of the increase in demand from China to become the world's leading exporter ahead of major producers such as Germany. The fact that large economies of scale are key to explaining the competitiveness of the Spanish pork sector can be seen by comparing the production cost structure of the two main pork exporters in Europe: Spain and Germany (Table 5.7).

In recent years, with the exception of feed, where Spain probably has a greater dependence on imports than Germany, production costs in the Spanish pork sector are lower. The cost of labor, although Germany also pays low wages in this sector, mainly to immigrants from Poland (Stępień and Polcyn, 2016, p. 5), is still higher than in Spain. However, the bulk of the difference in cost structure is based on fixed costs and other variable costs. Regarding the latter, although reports from the Agriculture and Horticulture Development Board (AHDB) do not specify this, it is highly likely that these are costs related to transporting the pigs to the slaughterhouse. Therefore, if fixed and transportation costs are lower in Spain, this would indicate that economies of scale in the Spanish pork industry are greater than in Germany (Clar, 2022, p. 25). Greater vertical integration of the value chain in Spain than in Germany may explain this greater

efficiency in production (Klein, 2018). Other factors, such as Spain having a lower population density and therefore being able to install large farms far from urban centers, as well as greater promotion of the sector by the state, also help explain Spanish success (Lence, 2007). Unlike Germany, Spain facilitated exports to countries outside the EU in 2016 through Royal Decree 993/2014, thus strengthening its export diversification (Van Ferneij and Lecuyer, 2018). This helps explain the weight of exports to China, where adequate institutions are key for exports to the Asian country (Hasiner and Yu, 2019).

Table 5.7. Cost structure in pig production by country (pounds per kilo of carcass weight)

Spain	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Depreciation and finance (fixed costs)	0,11	0,11	0,11	0,11	0,12	0,12	0.12
Labour	0,07	0,07	0,08	0,09	0,09	0,09	0.09
Other variable costs	0,16	0,17	0,19	0,20	0,22	0,22	0.22
Feed	0,84	0,72	0,76	0,80	0,83	0,83	0.84
Total	1,18	1,06	1,14	1,20	1,26	1,26	1.27
Germany	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Depreciation and finance (fixed costs)	0,18	0,17	0,20	0,21	0,2	0,23	0.23
Labour	0,12	0,10	0,12	0,13	0,12	0,14	0.13
Other variable costs	0,24	0,22	0,25	0,27	0,23	0,27	0.27
Feed	0,76	0,65	0,69	0,75	0,80	0,77	0.80
Total	1,30	1,14	1,26	1,36	1,35	1,41	1,43

Source: AHDB

However, the economic success of the meat industry in international markets is overshadowed by the environmental issues caused by this process. Livestock production is one of the sectors that generates the most greenhouse gas emissions (Ilea, 2009), making it a clear contributor to climate change (Gerber *et al.*, 2013; Lassaletta *et al.*, 2014; Willett *et al.*, 2019). In order to meet the growing demand for meat and livestock products in Spain since the 1960s, the implementation of the agribusiness model has generated several environmental impacts that have degraded agro-ecosystems (Guzmán *et al.*, 2018). Greenhouse gas emissions from Spanish livestock production have increased from 8 to 75 million CO2e emissions since the beginning of the 21st century (Aguilera *et al.*, 2020). In particular, the management of manure use and its environmental impact remains a fundamental problem in the pig industry (Díaz Yubero, 2018; Giménez García *et al.*, 2021). Furthermore, the ecological footprint of intensification in livestock production is not limited to Spanish borders. The strong dependence on feed imports, especially from countries such as Argentina and Brazil, is related to deforestation processes and other social issues (Infante-Amate *et al.*, 2018). Therefore, this raises

questions about the viability of this model in the long term, as although various decrees have attempted to improve the environmental conditions of intensive meat production (Giménez García *et al.*, 2021), they are not sufficient to adopt a sustainable model.

5.6. Conclusions

This study aimed to quantify the most relevant variables that explain how the meat sector in Spain conquered international markets. To achieve this, we conducted a gravity model from the 1984 to 2019 with aggregated meat and several types of meat. Thus, we complemented previous literature that had done the same exercise from the point of view of the agri-food sector as a whole (Serrano *et al.*, 2015) or with other products (Sebastián Castillo and García Cortijo, 2014). The results varied depending on the type of meat, demonstrating the importance of disaggregated studies to understand the commercial dynamics of agri-food products.

The findings revealed the presence of a Home Market Effect process in meats that underwent the most intensified production and whose industry adapted to external markets (specifically, pork). That is, the strong increase in domestic demand for pork between the 1960s and 1980s implied the formation of large economies of scale. Therefore, when the sector was liberalized with Spain's entry into the European Union, the sector was competitive enough to gain market share in international markets. Thus, although exports of all types of meat grew tremendously in absolute terms, the pork sector eventually became the world's leading exporter. The results also demonstrate that, overall, Spain's membership in the European Union was a significant factor in the growth of meat exports.

Regarding future lines of work, we believe that two aspects should be further explored. Firstly, as mentioned earlier, other disaggregated products should be used to quantify their expansion process. Secondly, as outlined at the end of the discussion, the environmental impacts of meat exports should be quantified. Although this has been done for agriculture or livestock as a whole (Soto, Infante-Amate, Guzmán, *et al.*, 2016; Infante-Amate *et al.*, 2018), we consider that a disaggregated perspective is also necessary.

Appendix

Table A5.1. Spanish exports of different types of meat in millions of current US dollars.

	1980	1990	2000	2010	2019
Lamb	5,3	7,9	50,4	143,9	215,5
Beef	4,7	208,0	298,5	468,8	829,1
Pultry	4,5	13,3	89,6	223,2	430,6
Pork	6,5	31,3	713,2	2918,1	6185,8
Other meats	25,2	22,1	140,0	406,9	897,8
Total	46,1	282,6	1291,6	4161,0	8558,7

Source: see table 5.3

Table A5.2. Results of the gravity model for beef (including distance)

	Lamb		Poultry		Beef	
Log of Exporter GDP	0,726*		1,448***		1,315***	
	(0,432)		(0,392)		(0,452)	
Log of Exporter Meat Production		1,105		2,629***		2,269***
		(0,935)		(0,518)		(0,528)
Log of Importer GDP	0,932***	0,932***	0,466***	0,466***	0,849***	0,754***
	(0,140)	(0,140)	(0,125)	(0,125)	(0,145)	(0,135)
Log of Distance	-1,747***	-1,747***	-1,348***	-1,348***	-2,162***	-2,728***
	(0,294)	(0,294)	(0,279)	(0,279)	(0,380)	(0,362)
GATT/WTO	-0,489	-0,489	1,569**	1,569**	-1,755**	-1,192*
	(0,612)	(0,612)	(0,789)	(0,789)	(0,796)	(0,713)
EU	1,054**	1,054**	0,530	0,530	1,263**	1,602***
	(0,512)	(0,512)	(0,427)	(0,427)	(0,559)	(0,571)
Log of Excvol	-0,218	-0,218	-0,191	-0,191	-0,499***	-0,119**
	(0,135)	(0,135)	(0,120)	(0,120)	(0,172)	(0,055)
Constant	1,939	7,764***	-4,100	3,971*	3,658	16,123***
	(3,538)	(1,928)	(2,928)	(2,232)	(5,124)	(2,534)
RESET test statistic	22,16***	22,16***	55,6***	55,6***	14,79***	14,79***
Year F.E.	Yes	Yes	Yes	Yes	Yes	No
R-squared	0,685	0,685	0,600	0,600	0,813	0,681
Observations	4,908	4,908	4,908	4,908	4,908	4,908
Notes: Robust-clustered standard errors by country pair in parentheses. *** p <0,01, ** p < 0,05, * p < 0,1.						

Table A5.3. Results of the gravity model for pultry, beef and lamb (including fixed importer effects)

	Ovino		Poultry		Vacuno	
Log of Exporter GDP	-0,415		0,838*		1,086*	
	(0,589)		(0,439)		(0,603)	
Log of Exporter Meat Production		0,971		1,724		1,667***
		(1,622)		(1,286)		(0,644)
Log of Importer GDP	1,593**	1,593**	1,193***	1,193***	-0,350	1,364***
	(0,648)	(0,648)	(0,455)	(0,455)	(0,515)	(0,296)
GATT/WTO	1,013	1,013	-0,268	-0,268	-2,186***	-2,049***
	(0,752)	(0,752)	(0,637)	(0,637)	(0,559)	(0,187)
EU	3,376**	3,376**	1,286	1,286	5,560***	4,711***
	(1,404)	(1,404)	(0,901)	(0,901)	(1,242)	(0,802)
Log of Excvol	-0,296	-0,296	-0,228*	-0,228*	-0,230***	-0,143**
	(0,203)	(0,203)	(0,128)	(0,128)	(0,060)	(0,057)
Constant	-7,923*	-15,794***	-15,020***	-10,622***	-4,832*	-11,639***
	(4,100)	(4,010)	(3,246)	(3,408)	(2,854)	(1,752)
RESET test statistic	0,74	0,74	1,68	1,68	2,32	1,26
Year F.E.	Yes	Yes	Yes	Yes	Yes	No
Importer F.E.	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0,911	0,911	0,827	0,827	0,939	0,895
Observations	3,103	3,103	3,566	3,566	3,574	3,574
Notes: Robust-clustered standard errors by country pair in parentheses. *** p <0,01, ** p < 0,05, * p < 0,1.						

CONCLUSIONES

En esta tesis se ha llevado a cabo un análisis sobre la evolución del consumo y comercio de carne en perspectiva histórica. Dicho análisis ha ido desde el siglo XIX hasta la segunda guerra mundial con un enfoque internacional y desde la segunda mitad del siglo XX hasta el presente centrándose en el caso español. Este último enfoque ha tomado un protagonismo principal en el trabajo. Además, se ha combinado una perspectiva descriptiva y causal.

En la primera parte de la tesis, dedicada al consumo de carne en España desde la segunda mitad del siglo XX, una de las contribuciones ha sido presentar series homogéneas de consumo de carne. Esto se ha hecho de forma desagregada, tanto por tipos de carne como por tipo de consumidor. Esto ha permitido mostrar dos tendencias en el consumo en los últimos 70 años. Por un lado, un fuerte incremento en el consumo de carne entre los años 50 y los años 90 del siglo XX acompañado por una reducción en la desigualdad en su acceso. Por otro lado, una saturación en el consumo y una posterior caída de este, coincidiendo, a su vez, con una reaparición de las desigualdades. Estos patrones de consumo se enmarcan en dos modelos de consumo alimentario y en una época donde España pasaba de culminar su transición nutricional a tener unos patrones de consumo típicos de sociedades opulentas y modernas. Otro de los aportes importantes de esta primera parte ha sido el análisis de los determinantes de la masificación del consumo de carne en la segunda mitad del siglo XX. Esto se ha hecho cuantificando el peso de la capacidad de demanda, de oferta y las preferencias en la capacidad de consumir de carne.

En la segunda parte de la tesis, dedicada al comercio de carne, también se ha contribuido a la literatura de dos maneras. La primera ha sido un con un análisis descriptivo sobre la configuración, evolución y consolidación del mercado internacional de carne y ganado vivo desde el siglo XIX hasta la segunda guerra mundial. Por lo tanto, este recorrido histórico ha ido desde un mercado de carne poco integrado a nivel internacional en el siglo XIX hasta un mercado integrado y dinámico desde principios del siglo XX. Esto se ha hecho recalcando la importancia de la invención de la refrigeración mecánica y de Inglaterra como comprador principal de la carne mundial. La segunda contribución ha sido analizar, de forma cuantitativa, los determinantes de las exportaciones de carne en España desde los años 60 hasta 2019. El interés de dicho aporte radica en el impresionante crecimiento de las exportaciones en un periodo relativamente corto de tiempo. Además,

se ha enfatizado en dos aspectos. El primero ha sido cuantificar el proceso de *Home Market Effect*, vinculando así este último capítulo con los tres primeros sobre consumo. El segundo aspecto ha sido cuantificar la importancia de la entrada de España en la Unión Europea en las ventas internacionales de carne.

Regresando de nuevo al consumo de carne, las conclusiones de la primera parte de la tesis se contextualizan en debates más amplios sobre el cambio en las dietas en las sociedades en el largo plazo. Como señaló Grigg (1995), entre el siglo XIX y principios del XX, los consumidores en Europa occidental tendieron a disminuir el consumo productos de origen vegetal y consumir una mayor variedad de productos alimentarios, entre ellos, productos ganaderos. España, un país mediterráneo y con un nivel de desarrollo menor que los de estos países, también se vio inmerso en estos cambios estructurales en la dieta. En el primer tercio del siglo XX, en línea con una tendencia hacia la industrialización, el consumo de productos ganaderos tendió a incrementar (Langreo and Germán, 2018). A pesar de esto, todavía en esta época la dieta en España se caracterizaba por la ingesta de productos mediterráneos (Garrabou Segura and Cussó Segura, 2009). Sin embargo, esta tendencia a la occidentalización de los patrones de consumo se truncó por la guerra civil y la larga posguerra, por lo que, en línea con una re agrarización de la economía española, el consumo de productos ganaderos volvió a caer (Martínez-Carrión, 2016). No fue hasta finales de los años 50 y, especialmente los años 60 y 70, cuando la dieta en España cambió estructuralmente. Es decir, se alejó de patrones mediterráneos y culminó su transición nutricional. En consecuencia, el consumo de carne aumentó notablemente hasta los años 90, para después saturarse y tender a caer.

Sin embargo, el capítulo 1 ha mostrado que, para comprender los cambios en las dietas, es necesario comprender primero las fuentes. De hecho, es necesario aclarar la definición de consumo alimentario que se utiliza, ya que, en función de esta, los cambios en la dieta pueden ser muy distintos. Esto se observa con claridad al observar las tendencias en el consumo de carne utilizando el consumo real o la carne disponible. A partir de los años 90, la carne disponible en España continuó aumentando, pero el consumo real no lo hizo. Esto no implica que una fuente sea mejor que otra, significa que tienen una función diferente. A saber, el consumo real puede utilizarse para comprender los cambios en la dieta y las consecuencias de ello a nivel de salud. En cambio, la carne disponible presenta una fotografía más amplia de la cadena de valor, algo idóneo para estudios de índole ambiental. Conocer el nivel medio de consumo real en el largo plazo también muestra

que, incluso un producto desagregado, como es la carne, está formado por distintos productos con distintas tendencias en su consumo. En los años 50 y 60 del siglo XX, el consumo de carne en España estaba diversificado. Es decir, se consumía una cantidad relativamente similar de carne de vacuno, ovino, pollo y cerdo. Sin embargo, el fuerte incremento en el consumo implicó una tendencia a la homogeneización en la ingesta de carne. Es decir, gran parte del incremento en dicho consumo se explica por la carne de pollo y cerdo, ambas producidas en una ganadería intensiva. Por lo tanto, el incremento en la renta en España durante el desarrollismo fue satisfecho por la producción de carne estandarizada producida en una ganadería fordista, formándose así un modelo de consumo alimentario. En cambio, la carne procesada tomó protagonismo en el segundo modelo de consumo alimentario. En otras palabras, si la mayor parte del cerdo y del pollo consumido hasta los años 90 se consumían en forma de carne fresca, a partir de la saturación en el consumo de carne de esta década, la carne de cerdo procesada (principalmente embutidos) tomó protagonismo. Por lo tanto, el incremento en el consumo de carne procesada, más perjudicial para la salud y para el medio ambiente, se comprende mejor desde una perspectiva de largo plazo.

No obstante, el capítulo dos también muestra que, para comprender los cambios estructurales en las dietas de las sociedades, no solamente es necesario comprender los patrones de consumo a nivel medio, sino también por grupos de consumidores (Collantes, 2015b). El consumo de carne en los años 60 era relativamente bajo en términos medios, pero no para todos los grupos de consumidores. De hecho, las rentas más altas consumían la misma carne en los años 60 de la que se consume hoy en España a nivel medio. Lo mismo ocurría por regiones: mientras Andalucía tenía un consumo muy bajo, el Mediterráneo tenía un consumo no muy por debajo del que se tiene hoy. Por lo tanto, al hablar de grandes cambios en los patrones de consumo, bien sea con un enfoque de modelos de consumo o de transición nutricional, el consumo a nivel medio esconde grandes disparidades con distintas periodizaciones. Por otro lado, la reaparición de un cierto nivel de desigualdades por niveles de renta en el acceso a la carne en las últimas décadas sugiere diversas cuestiones. Por un lado, estas nuevas desigualdades son claramente menores que las de los años 60 y, muy probablemente, sus consecuencias a nivel de bienestar son menores que las desigualdades en épocas preindustriales. Por lo tanto, a pesar de que el análisis de las desigualdades y su reaparición a partir de la década de los años 80 del siglo XX está muy presente tanto a nivel científico como a nivel social

y político, un enfoque de más largo plazo nos muestra un cierto grado de optimismo. Además, en el caso concreto de la carne, la reaparición de las desigualdades implica un debate sobre el bienestar de los grupos más y menos desfavorecidos. Es decir, si el exceso en el consumo de carne se relaciona con una mayor prevalencia de enfermedades no infecciosas, los grupos de menor renta podrían verse favorecidos por este menor consumo relativo. Este argumento se refuerza todavía más si se considera que es la carne procesada lo que está detrás de estas desigualdades. No obstante, con alta probabilidad, los grupos de consumidores de renta alta consuman una carne procesada de mayor calidad y esto también tenga un impacto en la salud. Si en términos de política, el objetivo es continuar disminuyendo el consumo de carne, las desigualdades por grupos de consumidores implican también una probable discriminación en dicha política. Junto con esto, el capítulo dos también muestra la importancia de cómo medir la desigualdad, especialmente si nos centramos en el bienestar. Un buen indicador, especialmente en historia económica, es el acceso a un determinado producto alimentario, en este caso la carne. De este modo, se puede complementar con otros indicadores de bienestar, como aquellos de tipo antropométrico (Martínez-Carrión, 2016).

Una simple búsqueda de la palabra "transición nutricional" en cualquier buscador de artículos académicos nos da como resultados una gran variedad de estudios analizando de forma descriptiva como, en el largo plazo, las sociedades han tendido a aumentar el consumo de productos ganaderos. No obstante, especialmente en historia económica, hay menos trabajos que traten de analizar de forma cuantitativa qué peso tiene la capacidad oferta y de demanda en este proceso, y, todavía hay menos que traten de cuantificar las preferencias. En el capítulo tres de esta tesis se ha mostrado que, a priori, la capacidad de demanda juega un papel más importante que la de oferta, pero al desagregar por tipos de carne este argumento es muy matizable. De hecho, al hacerlo, es la oferta lo que parece determinar los cambios en la demanda, algo que otros trabajos han sugerido (Nicolau and Pujol Andreu, 2005; Clar, 2008). Si la oferta es determinante para la evolución de la capacidad de consumo en el largo plazo, probablemente la política económica, especialmente en países desarrollados, donde están llevando a cabo su transición nutricional en la actualidad, deba centrarse en la oferta para paliar los efectos negativos de dicha transición.

De forma más o menos presente, todos los capítulos de consumo de carne han tendido a compararse con la evolución del consumo de lácteos en el mismo marco temporal. La

comparación es idónea puesto que, aunque son productos cuyo grado de transformación es distinto, ambos son protagonistas en la transición nutricional. Su comparación muestra similitudes y diferencias. Por un lado, a nivel medio, ambos muestran una tendencia similar en su consumo. En los años 50, ambos productos eran poco consumidos en España y su consumo incrementó acusadamente hasta las últimas dos décadas del siglo XX. Desde entonces, la sociedad española llegó a un grado de saturación en ambos productos, por lo que su consumo tendió a caer hasta el día de hoy (aunque de forma más acusada en el caso de los lácteos). También se inició a finales del siglo XX una tendencia a incrementar, de forma relativa, un consumo de carne y lácteos con un mayor grado de transformación. En el caso de la carne, productos como los embutidos producidos industrialmente y carne con un mayor grado de preparación/elaboración (pollo en filetes) ganaron peso en la dieta. En el caso de los lácteos, hubo un incremento en los derivados (postres refrigerados, yogures, queso, etc.) (Collantes, 2014). Además, las desigualdades también recorren un viaje de ida y vuelta en los dos productos: partiendo de altos niveles de desigualdad en los años 60, estos desaparecen por completo en la década de los 80 para reaparecer a principios del siglo XX (Collantes, 2015b). No obstante, cuando se analizan los determinantes de la capacidad de consumo de ambos productos en la segunda mitad del siglo XX, aparecen diferencias importantes. Por un lado, en el caso de los lácteos, la renta juega un papel más importante que los precios en la masificación de su consumo. Por otro lado, y en relación al anterior punto, las preferencias hacia cada producto son distintas. Es decir, en los años 50, existía una desconfianza en el consumo de leche cruda en España, algo que no ocurría en el caso de la carne. Probablemente, esto explique un mayor esfuerzo estatal para la promoción del consumo de leche en las escuelas en esta época. La difusión de leche procesada de vaca es lo que permitió recuperar la confianza del consumidor medio y poder masificar su consumo. En el caso de la carne, la carne procesada industrial fue lo que incrementó las preferencias de un consumidor medio que venía de zonas rurales y estaba acostumbrado al consumo de carne procesada artesanalmente, pero no existía una desconfianza en el consumo de carne. Por lo tanto, diferencias entre la carne y la leche, dos productos que suelen agregarse dentro de "productos ganaderos" muestran la importancia de hacer un análisis desagregado por productos para comprender los determinantes de grandes cambios en la dieta.

Con respecto al comercio de carne, los dos últimos capítulos también se contextualizan en una literatura más amplia sobre comercio internacional de productos agroalimentarios.

Esta literatura abarca la primera globalización, la des-globalización en el periodo de entre guerras y la segunda globalización hasta nuestros días (O'Rourke and Findlay, 2007). Esto se hace tanto desde una perspectiva internacional y con un carácter más descriptivo como con una perspectiva nacional con un carácter más causal. En ambos capítulos la evolución del comercio se ha visto afectada por variables de oferta (innovaciones tecnológicas, mejoras productivas, etc), de demanda (incrementos en la renta y tasas de urbanización, cambio en las preferencias, etc.) e institucionales (acuerdos comerciales). No obstante, en ambos capítulos se ha puesto un especial énfasis en la oferta para comprender el comportamiento del comercio internacional. Es decir, tanto la difusión de la refrigeración mecánica en la primera globalización como el cambio técnico (intensificación de la producción ganadera) en la segunda explican una parte importante comercio de carne.

El capítulo 4 ha mostrado que en la primera globalización no hubo un comportamiento homogéneo en todos los productos agroalimentarios y que la periodización de cada producto es distinta. Mientras que en el caso de los cereales, los mercados internacionales estaban ya integrados en la segunda mitad del siglo XIX (O'Rourke, 1997), otros productos como la carne o los lácteos se integraron de forma algo más tardía. Es decir, en el caso de la carne, se necesitaba la difusión de la refrigeración mecánica para que aquellos países lejanos del núcleo industrial y con una ventaja comparativa en su producción pudieran entrar en las dinámicas de la primera globalización. Además, este proceso también tuvo importantes cambios a nivel empresarial. A saber, puesto que Estados Unidos perdió terreno en las exportaciones de carne debido, entre otras cosas, a una menor competitividad y una carne (de vacuno) de peor calidad, sus empresas penetraron en países como Argentina o Uruguay (Lluch, 2019). Es decir, en este capítulo se ha mostrado que las estadísticas de comercio exterior muestran una perspectiva macroeconómica del comportamiento internacional, pero a nivel micro las empresas juegan un papel fundamental en los patrones de comercio global. Por último, también se ha mostrado la importancia de los cambios en la política comercial cuando un país es el mayor importador mundial de un producto concreto. La temprana industrialización británica implicó un aumento en la demanda de carne, por lo que durante la primera globalización abarcó entre un 60 y un 90 por ciento de las importaciones mundiales. Por lo tanto, cuando pasó de ser de ser un país librecambista a un país proteccionista a partir de 1931, hubo una importante reconfiguración geográfica del comercio de carne (De

Bromhead *et al.*, 2017). A saber, países de su imperio, especialmente Nueva Zelanda y Australia, ganaron cuotas de mercado en detrimento de Argentina y Uruguay.

El último capítulo de la tesis ha mostrado patrones de comercio relacionados con la segunda globalización. Es decir, el comercio mundial ya no se caracteriza por la exportación de productos agroalimentarios desde países en desarrollo a países del núcleo industrial a cambio de manufacturas. En este caso, observamos un país desarrollado (España) exportando un producto agroalimentario como es la carne, tanto a países desarrollados (Europa) como a países en vías de desarrollo (China). De hecho, el gran peso que ha ganado China en los últimos años en las exportaciones de cerdo españolas, se debe precisamente a que el país asiático está culminando ahora su transición nutricional, algo que Espala hizo en los años 80. La culminación de la transición nutricional en España implicó un fuerte incremento en el consumo de carne, que posteriormente fomentó la productividad del sector gracias a la creación de fuertes economías de escala. A su vez, los acuerdos comerciales, como es la entrada de España en la UE, fomentó todavía más este proceso, convirtiendo a España en el primer exportador mundial de cerdo. De nuevo, y al igual que en la parte del consumo, la industrialización con mayor o menor fuerza de cada tipo de carne ha marcado su competitividad en la actualidad. Por lo tanto, el proceso *Home Market Effect* y la entrada de España en la Unión Europea es un factor clave para explicar el éxito de las exportaciones agroalimentarias españolas (Serrano *et al.*, 2015).

Una de las principales ventajas que se ha ido mencionando a lo largo de la tesis es el análisis de un único producto. Sin embargo, esto también puede ser una limitación. A saber, centrarse solamente en la carne permite comprender matices a nivel desagregado que no pueden tenerse en cuenta si se adopta una perspectiva más amplia (por ejemplo, si se analiza alimentación en su conjunto). No obstante, centrarse solamente en un producto implica la pérdida de perspectiva en los cambios en la dieta. Es decir, además de los lácteos, que sí han estado presentes en el trabajo, la transición nutricional y los cambios en los modelos de consumo también están caracterizado por otros productos alimentarios como, por ejemplo, el pescado, un producto clave en la alimentación española a nivel histórico. Sin embargo, el pescado solo se ha tenido presente de forma muy secundaria en el primer capítulo. Lo mismo ocurre cuando se trata de comprender los determinantes del consumo de carne, ya que no se han tenido en cuenta cómo ha influido el consumo de otros productos en las decisiones del consumidor. Otra de las

limitaciones de la parte de consumo ha sido la falta de datos entre 1964/65 y 1980/81. Aunque es cierto que en esta tesis se les ha dado más importancia a los cambios estructurales en la dieta o en el largo plazo, lo cierto es que hubiese sido interesante conocer las tendencias en el consumo de carne durante dichos años. Es decir, se asume una linealidad en la tendencia que no tiene por qué ocurrir. Además, en el capítulo 3, se utiliza como variable cuantitativa la renta familiar, pero otras variables como las tasas de urbanización o el crecimiento demográfico solo se tienen en cuenta desde un punto de vista cualitativo. Por otro lado, otra limitación es la ausencia de estudios comparativos con otros países o regiones. Aunque en algunas partes de la tesis se comparan tendencias en el consumo o comercio entre España y otros países, la realidad es que falta una perspectiva más amplia del caso español con respecto a otros países desarrollados.

Sin embargo, una tesis no debe considerarse como la culminación de una obra de investigación, sino el inicio de una investigación futura. Por este motivo, el presente trabajo abre la puerta a diversas investigaciones futuras. En primer lugar, se puede llevar a cabo una investigación similar con otros productos alimentarios o en otros países. ¿Cuál es la evolución, en términos medios y por grupos de consumidores del consumo de pescado, huevos, pan, vino o cerveza? ¿Tiene similitudes con el caso de la carne? ¿Se pueden distinguir dos modelos alimentarios como en el caso de la carne? ¿Qué determina el consumo de estos productos? Lo mismo ocurre a nivel de país: ¿Cómo han sido las tendencias en el consumo de carne en países relativamente similares a España como Portugal, Italia o Francia?

El capítulo 1 ha mostrado una clara discrepancia en el consumo real de carne ofrecido por las encuestas y el panel y el consumo aparente de la FAO. Sería interesante observar si esto ocurre también para otros productos alimentarios. Con respecto al capítulo 2 y 3, una posible investigación futura sería hacer un análisis similar, pero con productos que han perdido peso en la dieta durante la transición nutricional en España, tales como el pan. Es decir, observar las desigualdades en un producto considerado “menor” y ver los determinantes de su peso en la dieta.

Con respecto al comercio, buena parte de la investigación sobre las dinámicas comerciales de la primera globalización se centran en los cereales. En el caso de la carne, hemos visto importantes diferencias. En línea con esto, una posible investigación futura sería ver el comportamiento del comercio de otros productos, como, por ejemplo, los lácteos. Por

ejemplo, la mantequilla ha sido estudiado especialmente en países del norte de Europa (Lampe and Sharp, 2019), pero no en perspectiva internacional. Además, también es un producto perecedero y Gran Bretaña era un monopsonio absoluto de su comercio, por lo que podría hacerse un estudio comparativo con el caso de la carne. Otra opción es profundizar en las dinámicas empresariales del comercio internacional de carne. Aunque esto se ha hecho para Argentina (Lluch, 2019), se podría hacer para aquellos países que no tuvieron tanto peso en el comercio mundial, tales como Chile, Brasil, Venezuela, etc.

Por último, el capítulo 5 también abre la puerta a una investigación futura sobre los determinantes de las exportaciones españolas de otros productos agroalimentarios (Serrano *et al.*, 2015) desde la mitad del siglo XX, como por ejemplo, las frutas y hortalizas. En relación a esto, también se podría profundizar en por qué el pollo, el primer tipo de carne en industrializarse y con unos mayores niveles de productividad, no ha tenido el mismo éxito que el cerdo en los mercados internacionales. Aunque Clar (2022) plantea esta cuestión, se podría profundizar en ella a nivel cuantitativo.

CONCLUSIONS

This dissertation provides an analysis of the evolution of meat consumption and trade from a historical perspective. The analysis spans from the 19th century to the Second World War, focusing on an international context, and from the second half of the 20th century to the present, with a specific focus on the Spanish case. The latter perspective has taken a central role in this study. Furthermore, a descriptive and causal approach has been combined.

In the first part of the thesis, dedicated to meat consumption in Spain since the second half of the 20th century, one of the contributions has been the presentation of homogeneous series of meat consumption. This has been done in a disaggregated manner, both by types of meat and by type of consumer. This approach has revealed two trends in consumption over the past 70 years. On the one hand, there has been a significant increase in meat consumption from the 1950s to the 1990s, accompanied by a reduction in inequality in its access. On the other hand, there has been a saturation in consumption followed by a decline, coinciding with a resurgence of inequalities. These consumption patterns are framed within two models of food consumption, during a period in which Spain transitioned from completing its nutritional transition to adopting consumption patterns typical of affluent and modern societies. Another important contribution of this first part has been the analysis of the determinants of the massification of meat consumption in the second half of the 20th century. This has been achieved by quantifying the role of income, prices, and preferences in the capacity to consume meat.

In the second part of the thesis, dedicated to the meat trade, contributions have been made to the literature in two ways. The first contribution has been a descriptive analysis of the configuration, evolution, and consolidation of the international market for meat and live cattle from the 19th century to the Second World War. Therefore, this historical journey has spanned from a poorly integrated international meat market in the 19th century to an integrated and dynamic market since the early 20th century. Emphasis has been placed on the importance of the invention of mechanical refrigeration and England as the primary importer of global meat. The second contribution has been a quantitative analysis of the determinants of meat exports in Spain from the 1960s to 2019. The significance of this contribution lies in the impressive growth of exports within a relatively short period. Additionally, two aspects have been emphasized. Firstly, quantifying the Home Market

Effect process, thus linking this final chapter to the first three chapters on consumption. Secondly, quantifying the importance of Spain's entry into the European Union in meat exports.

Returning to meat consumption, the conclusions of the first part of the thesis are contextualized within broader debates on long-term dietary change in societies. As noted by Grigg (1995), between the 19th century and the early 20th century, consumers in Western Europe tended to decrease their consumption of plant-based products and adopt a greater variety of food products, including livestock products. Spain, as a Mediterranean country with a lower level of development compared to these countries, also experienced these structural changes in the diet. In the first third of the 20th century, in line with the trend towards industrialization, the consumption of livestock products tended to increase (Langreo and Germán, 2018). However, even during this period, the Spanish diet was still characterized by the consumption of Mediterranean products (Garrabou Segura and Cussó Segura, 2009). Nevertheless, this trend towards Westernized consumption patterns was interrupted by the civil war and the long post-war period, leading to a re-agrarization of the Spanish economy and a subsequent decline in the consumption of livestock products (Martinez-Carrion, 2016). It was not until the late 1950s and particularly the 1960s and 1970s that the diet in Spain underwent structural changes, moving away from Mediterranean patterns and completing its nutritional transition. As a result, meat consumption increased significantly until the 1990s, followed by saturation and a downward trend.

However, Chapter 1 has demonstrated that in order to understand changes in diets, it is necessary to first understand the sources. In fact, it is important to clarify the definition of food consumption being used because different definitions can lead to different interpretations of dietary changes. This becomes evident when examining trends in meat consumption using either actual consumption or available meat. From the 1990s onward, available meat in Spain continued to increase, but actual consumption did not. This does not imply that one source is better than the other; it means they serve different purposes. Actual consumption can be used to understand changes in diet and their health consequences. On the other hand, available meat provides a broader picture of the value chain, which is suitable for environmental studies. Understanding the average level of actual consumption in the long term also reveals that within meat, there are different products with distinct consumption trends. In the 1950s and 1960s, meat consumption in

Spain was diversified, meaning there was a relatively similar consumption of beef, lamb, chicken, and pork. However, the significant increase in consumption led to a trend of homogenization in meat intake. In other words, a large portion of the consumption increase can be attributed to chicken and pork, both produced in intensive livestock farming. Therefore, the rise in income in Spain during the 1960-70 period was met by the production of standardized meat from a Fordist livestock system, thus forming a model of food consumption. On the other hand, processed meat gained prominence in the second model of food consumption. In other words, if the majority of pork and chicken consumed until the 1990s was in the form of fresh meat, the saturation in meat consumption in that decade led to the prominence of processed pork (mainly cold meats). Therefore, the increase in consumption of processed meat, which is more detrimental to health and the environment, is better understood from a long-term perspective.

However, Chapter 2 also shows that in order to understand structural changes in diets in each society, it is not only necessary to examine consumption patterns at an aggregate level but also among different consumer groups (Collantes, 2015b). Meat consumption in the 1960s was relatively low on average, but not for all consumer groups. In fact, higher-income individuals consumed the same amount of meat in the 1960s as the current average consumption in Spain. The same variation existed among regions, where Andalusia had much lower consumption while the Mediterranean region had consumption levels not far below those of today. Therefore, when discussing major changes in consumption patterns, whether from a perspective of consumption models or nutritional transition, average consumption hides significant disparities with different periodizations.

On the other hand, the reappearance of certain levels of income-related inequalities in the access to meat in recent decades raises several questions. Firstly, these new inequalities are clearly smaller than those of the 1960s, and their well-being consequences are likely to be less significant than the inequalities in pre-industrial times. Therefore, despite the presence of discussions and concerns about inequalities and their resurgence since the 1980s, both at the scientific and social-political levels, a longer-term perspective offers a certain degree of optimism. Furthermore, in the specific case of meat, the reappearance of inequalities triggers a debate on the well-being of more and less disadvantaged groups. In other words, if excessive meat consumption is linked to a higher prevalence of non-communicable diseases, lower-income groups may benefit from this relative decrease in

consumption. This argument is further reinforced if we consider that processed meat is the main driver of these inequalities. However, it is highly likely that higher-income consumer groups consume higher-quality processed meat, which may also have an impact on their health. If the policy objective is to continue reducing meat consumption, inequalities among consumer groups also imply a potential discrimination in such a policy. Alongside this, Chapter 2 also highlights the importance of measuring inequality, particularly when focusing on well-being. A suitable indicator, especially in economic history, is the access to a specific food product, in this case, meat. This can be complemented with other well-being indicators, such as anthropometric measures (Martinez-Carrion, 2016).

A simple search of the term "nutritional transition" in any academic article database yields a variety of descriptive studies showing how societies have tended to increase their consumption of animal products over the long term. However, especially in economic history, there are fewer studies that quantitatively analyze the respective roles of income and prices in this process, and even fewer that attempt to quantify preferences. Chapter 3 of this thesis demonstrates that, prima facie, income plays a more important role than prices, but disaggregating by meat types nuances this argument significantly. In fact, by doing so, it becomes evident that prices seems to determine changes in consumption capacity, a finding suggested by other studies (Nicolau and Pujol-Andreu, 2005; Clar, 2008). If prices are determinant for the evolution of consumption capacity in the long term, economic policy, especially in developing countries currently undergoing their nutritional transition, should likely focus on the supply side to mitigate the negative effects of this transition.

Throughout the various chapters on meat consumption, there has been a tendency to compare it with the evolution of dairy consumption within the same temporal framework. This comparison is appropriate since both products, despite having different levels of transformation, play a significant role in the nutritional transition. The comparison reveals both similarities and differences.

At an aggregate level, both meat and dairy products exhibit a similar trend in consumption. At an aggregate level, both meat and dairy products exhibit a similar trend in consumption. In the 1950s, both products had low levels of consumption in Spain, but experienced a significant increase until the final two decades of the 20th century. Since

then, Spanish society reached a saturation point in the consumption of both products, leading to a decline that persists to this day (although more pronounced in the case of dairy). Additionally, towards the end of the 20th century, there was a relative increase in the consumption of more processed forms of meat and dairy products. Processed meat products, such as industrially produced cold meats, and more prepared/elaborated meat (e.g., chicken fillets), gained prominence in the diet. Similarly, there was an increase in dairy products such as refrigerated desserts, yogurts, and cheese (Collantes, 2014).

Furthermore, inequalities also undergo a journey of back and forth in both products: starting from high levels of inequality in the 1960s, they completely disappear in the 1980s only to reappear in the early 21st century (Collantes, 2015b). However, when examining the determinants of consumption capacity for both products in the second half of the 20th century, important differences emerge. On one hand, in the case of dairy, income plays a more significant role than prices in the massification of its consumption. On the other hand, and related to the previous point, preferences for each product are distinct. In other words, in the 1950s, there was a distrust in the consumption of raw milk in Spain, which was not the case for meat. This likely explains the greater State efforts to promote milk consumption in schools during this period. The diffusion of processed cow's milk is what allowed the recovery of the average consumer's trust and facilitated its mass consumption. In the case of meat, industrially processed meat was what increased the preferences of the average consumer, who came from rural areas and was accustomed to consuming traditionally processed meat. However, there was no distrust in the consumption of meat. Therefore, the differences between meat and dairy, two products often grouped under "animal products," highlight the importance of conducting a disaggregated analysis by product to understand the determinants of significant dietary changes.

Regarding the trade of meat, the last two chapters are also contextualized within a broader literature on international trade of agri-food products. This literature encompasses the first globalization, the deglobalization period between the wars, and the second globalization until the present day (O'Rourke and Findlay, 2007). This is done from both an international perspective with a descriptive character and a national perspective with a more causal character. In both chapters, the evolution of trade has been influenced by supply variables (technological innovations, production improvements, etc.), demand variables (increases in income and urbanization rates, changes in preferences, etc.), and

institutional variables (trade agreements). However, in both chapters, special emphasis has been placed on the supply side to understand the behavior of international trade. In other words, both the diffusion of mechanical refrigeration in the first globalization and the technological change (intensification of livestock production) in the second globalization explain a significant portion of meat trade.

Chapter 4 has shown that the first globalization did not exhibit homogeneous behavior across all agri-food products, and the periodization of each product is distinct. While international markets for cereals were integrated in the second half of the 19th century (O'Rourke, 1997), other products such as meat and dairy integrated somewhat later. In the case of meat, for instance, the diffusion of mechanical refrigeration was necessary for distant countries with a comparative advantage in production to enter the dynamics of the first globalization. Furthermore, this process also entailed significant changes at the enterprise level. Specifically, as the United States lost ground in meat exports due to reduced competitiveness and lower quality beef, its companies penetrated countries like Argentina and Uruguay (Lluch, 2019). This chapter has thus demonstrated that while external trade statistics provide a macroeconomic perspective on international behavior, companies play a fundamental role in global trade patterns at the micro level. Finally, the importance of changes in trade policy when a country becomes the largest global importer of a specific product has also been highlighted. The early industrialization of Britain led to an increased demand for meat, resulting in the country accounting for 60 to 90 percent of global meat imports during the first globalization. Therefore, when Britain shifted from a free trade to a protectionist stance starting in 1931, there was a significant geographical reconfiguration of the meat trade (de Bromhead et al., 2017). Specifically, countries within its empire, especially New Zealand and Australia, gained market shares at the expense of Argentina and Uruguay.

The final chapter of the thesis has revealed trade patterns associated with the second globalization. Specifically, global trade is no longer characterized by the export of agri-food products from developing countries to industrial core countries in exchange for manufactured goods. In this case, we observe a developed country (Spain) exporting an agri-food product like meat to both developed countries (Europe) and developing countries (China). In fact, the significant weight that China has gained in Spanish pork exports in recent years is precisely due to the fact that the Asian country is now completing its nutritional transition, something that Spain achieved in the 1980s. The

completion of the nutritional transition in Spain involved a sharp increase in meat consumption, which subsequently fostered sector productivity through the creation of strong economies of scale. Furthermore, trade agreements such as Spain's entry into the EU further facilitated this process, making Spain the world's leading exporter of pork. Once again, similar to the consumption aspect, the level of industrialization for each type of meat has played a significant role in its competitiveness today. Therefore, the Home Market Effect and Spain's entry into the European Union are key factors in explaining the success of Spanish agri-food exports (Serrano et al., 2015).

One of the main advantages that has been mentioned throughout the thesis is the analysis of a single product. However, this can also be a limitation. Specifically, focusing solely on meat allows for a nuanced understanding at a disaggregated level that cannot be achieved when adopting a broader perspective (e.g., considering the entire diet). However, focusing solely on one product implies a loss of perspective on changes in the overall diet. In addition to dairy products, which has been addressed in the study, the nutritional transition and changes in consumption patterns are also characterized by other food products such as fish, a key product in the Spanish diet historically. However, fish has only been marginally considered in the first chapter. The same applies when trying to understand the determinants of meat consumption, as the influence of the consumption of other products on consumer decisions has not been taken into account. Another limitation in the consumption section has been the lack of data between 1964/65 and 1980/81. Although the thesis emphasizes structural changes in the diet or long-term trends, it would have been interesting to know the trends in meat consumption during those years. In other words, it assumes linearity in the trend that may not necessarily be the case. Additionally, in Chapter 3, family income is used as a quantitative variable, while other variables such as urbanization rates or population growth are only considered from a qualitative perspective. On the other hand, another limitation is the absence of comparative studies with other countries or regions. Although certain parts of the thesis compare consumption or trade trends between Spain and other countries, there is a lack of a broader perspective on the Spanish case in relation to other developed countries.

However, a dissertation should not be considered as the culmination of research, but rather as the beginning of future investigations. For this reason, this work opens the door to various future research endeavors. Firstly, a similar investigation can be conducted with other food products or in other countries. What is the evolution, in terms of average

consumption and consumer groups, of fish, eggs, bread, wine, or beer? Do they exhibit similarities with the case of meat? Can two models of food consumption be distinguished, as in the case of meat? What determines the consumption of these products? The same applies at the country level. What have been the consumption trends for meat in countries relatively similar to Spain, such as Portugal, Italy, or France?

Chapter 1 has revealed a clear discrepancy between the actual meat consumption reported in surveys and the panel, and the apparent consumption reported by FAO. It would be interesting to observe if this also occurs for other food products. Regarding chapters 2 and 3, a potential future investigation could involve a similar analysis but with products that have lost significance in the Spanish diet during the nutritional transition, such as bread. In other words, examining inequalities in a considered "minor" product and understanding the determinants of its importance in the diet.

In terms of trade, a significant portion of research on the trade dynamics of the first globalization has focused on cereals. However, we have observed significant differences in the case of meat. In line with this, a possible future investigation would be to examine the trade behavior of other products, such as dairy products. For example, butter has been studied particularly in Northern European countries (Lampe and Sharp, 2019), but not from an international perspective. Additionally, it is also a perishable product, and Great Britain was an absolute monopsony in its trade, making a comparative study with the case of meat possible. Another option is to delve deeper into the business aspects of international meat trade. Although this has been done for Argentina (Lluch, 2019), it could be extended to countries that did not have as much weight in world trade, such as Chile, Brazil, Venezuela, etc.

Lastly, Chapter 5 also opens the door to future research on the determinants of Spanish exports of other agri-food products (Serrano et al., 2015) since the mid-20th century, such as fruits and vegetables. In relation to this, further investigation could be conducted to explore why chicken, the first type of meat to be industrialized and with higher levels of productivity, has not achieved the same success as pork in international markets. Although Clar (2022) raises this question, a quantitative analysis could provide deeper insights.

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