




Review

# Food Loss and Waste in Meat Sector—Why the Consumption Stage Generates the Most Losses?

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**Abstract:** The aim of this paper is to present data on the scale of food waste in the meat sector and to emphasize the need to disseminate measures to reduce the number of losses in this sector. The article discusses food loss and waste in the meat sector as a current, widespread and serious problem. The Web of Science database was searched up to March 2021 to find publications reporting studies of the food loss and waste with particular emphasis on the meat sector. Due to the relatively high consumption of meat and meat products, the level of losses during production and of product waste by consumers in consumer stage becomes significant. It is estimated that as much as 23% of production in the meat sector is lost and wasted. The largest share is generated at the consumption level, representing 64% of the total food waste, followed by manufacturing (20%), distribution (12%) and primary production and post-harvest (3.5%). Data on food losses and wastage in the meat sector are very limited, and at the same time the production of meat and meat products is characterized by an unfavorable impact on the environment (meat has the highest emissions per kilogram of food compared to other food products), which requires rational management of these products in the entire chain (production, processing, transport and consumer stage). Therefore, determining the size and causes of formation as well as the methods of reducing food losses and food waste throughout the meat sector is important both for economic and environmental reasons. The idea behind food loss and waste reduction should be as an opportunity to improve efficiency within businesses, redirect food to those who need it and reduce environmental impacts.



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**Keywords:** food loss; food waste; meat sector

## 1. Introduction

Food losses and wastage are one of the most important problems of the modern world. The scale of this phenomenon is so large that it should be treated as a global problem. Food losses occur at every stage of the agri-food chain, from primary production (ag-riculture), through storage, processing, transport, distribution and consumption. The Food Waste Index report prepared by the United Nations (UNEP) shows that 931 million tons of edible food are wasted annually worldwide, or 17% of the food that was available to consumers in 2019. On the one hand, there is an overproduction of food and its waste all over the world, on the other hand, the problem of hunger is growing [1]. Food is a basic human need; however, the Food and Agriculture Organization of the United Nations (FAO) estimates that currently nearly 690 million people are hungry, which is 8.9 percent of the world population. The trend continues to indicate that the number of people affected by hunger globally has been slowly on the rise since 2014 therefore the burden of malnutrition in all its forms continues to be a challenge [2]. Moreover, there are serious concerns that the current pandemic worsens the overall prospects for food security. As reported by Laborte et al. [3] and Torero [4] the spread of COVID-19 and introducing measures to increase

social distancing have drawn further attention to the risks of food loss due to supply chain disruptions and demand to drop in many countries. This mainly applies to such foods as dairy, meats, fruits and vegetables.

In this context, food waste generation is becoming particularly important as it means missing opportunities to feed the growing world population and consuming scarce resources, such as land, water and energy used in the production, processing, distribution and consumption of food. Increasing food waste has serious negative implications for the global environment, the climate, water and land resources [5,6]. The ecological significance of food losses depends not only on the quantity, but also on the type of food, the place in the food chain where it is lost and the way it is recycled or disposed of [7]. It is estimated that the products which are characterized by the highest consumption of natural resources and potentially the greatest negative effect on the environment include beef and dairy products [8]. The problem of the impact of food waste on the climate and greenhouse gas emissions is constantly being raised [7]. However, studies by Bryngelsson et al. [9] indicate that reducing food waste can only reduce emissions by 1%–3%, which is of little importance in achieving climate goals. Cattaneo et al. [10] emphasizes that the environmental dimension of benefits is also difficult to assess. They provided an assessment of the benefit of food loss and waste reduction in three environmental dimensions including greenhouse gas emission. They find that reducing food losses can lead to an increase in greenhouse gas emission from domestic production. Similarly, Kuiper and Cui [11] find greenhouse gas emissions increase when food losses in animal products are reduced in primary production within a single region. However, according to these authors this increase could be nullified if reductions in primary animal production losses happen concurrently across all regions. Given that most food waste in Europe arises at the consumption level, reducing it at the food service and household stage can make a significant contribution to achieving part of sustainable development 12.3, i.e., halving global food waste by 2030 [12].

Therefore, reducing food losses and wastage is widely recognized as a way to meet the challenges of global food security, global warming, the protection of natural resources and ecosystems and access to food for those in need [13]. Food waste and losses has become an important political issue as the demand for food on a global scale is steadily increasing due to the increase in population and consumption [5,14]. According to the literature, the generation of food waste along the food value chain occurs in most stages from field to fork, including in agricultural production, postharvest handling and trade, manufacture processing, food services, wholesale, retail and final household consumption [15,16]. Literature shows a number of solutions that may be implemented in the appropriate management of food waste, among which the most sought-after solutions are currently represented by avoidance and donation of edible fractions to social services. There was a lot of public interest in initiatives related to the sharing economy model, which can lead to more efficient use of resources while reducing the amount of waste generated [17]. Morone et al. showed that the adoption of food-sharing practices by households does not mean that food waste is reduced. Numerous factors, such as environmentally friendly behavior, economic awareness, home skills and cooperative behavior, can act as “enablers” to increase the effectiveness of sharing and thus reduce waste [18]. Other solutions are the use of food waste for the production of biofuels and biopolymers, the recovery of nutrients and fixation of carbon by composting, incineration and land filling [19]. Lin et al. [20] indicate that it is necessary to combine the reduction of waste during food processing with the valorization of waste, including the saving of water and energy and the use of biodegradable packaging materials. Food processors and consumers can benefit not only from the development of sustainable processes, but also from the production of food products with better quality, safety, properties and shelf life, as well as the use of food waste to produce, e.g., biomaterials, fuels, biogas [20].

The aim of the article is to present data on the scale of food waste in the meat sector and to emphasize the need to disseminate measures to reduce the number of losses in this

sector. The article discusses food waste in the meat sector as a current, widespread and serious problem.

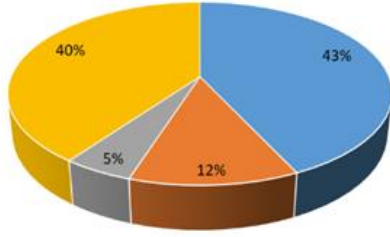
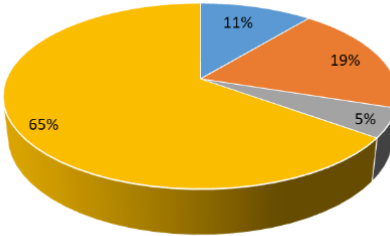
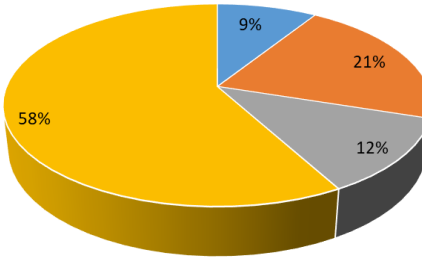
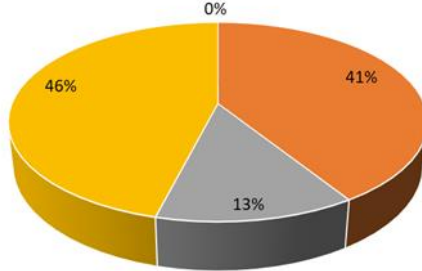
## 2. An Overview of the Food Loss and Waste Problem

Even though in recent years the topic of food loss and waste has been placed at the forefront of political and research agendas, and at the same time the literature on the problem and its associated environmental and economic impacts has become rich, reliable dates on food loss and waste in supply chains are still limited. Moreover, due to different definitions, scope and methods of data collection, they are often difficult to compare. In the literature, a large variation in the results for the total amount of food losses and wasted food published by various authors [21–27]. Selected data presented in Table 1 indicate that the total amount of food losses and waste range from 173 kg/person/year to 290 kg/person/year. The share of losses generated in various stages of the food supply chain also varies. According to Bräutigam et al. [21], a significant proportion of the losses in primary and post-harvest production (43%) have been partially ignored in the FUSIONS study [22] and in the study by van Holsteijn et al. [23]. Bräutigam et al. [21] and FUSIONS [22] indicated a similar amount of waste at the production stage, although they considered different types of materials: data from Bräutigam et al. [21] only included the edible parts of the food, while the FUSIONS [22] data also included the non-edible parts. Differences in outcomes may be due to different definitions of food loss and waste, data sources and quantification methods. In addition, the method used to retrieve the data (e.g., surveys, mass balance, etc.), the representativeness of the data, and the data analysis techniques used (e.g., statistical methods, assumptions) also contribute to the observed differences. However, despite the differences, available research shows that at the end of the food supply chain, final consumption (including commercial and household) accounts for as much as 40% or even much more of total food losses. The smallest losses occur at the stage of food distribution (Table 1). The amount of food loss and waste varies between countries due to the society's income, urbanization and economic growth [28].

In recent years, the studies have been published [29,30] in which improved methodologies for measuring food loss and waste have been proposed. These have had a significant impact on the development of new accounting and reporting standards protocols for food loss and waste to be implemented by companies, governments and others. In May 2019, the European Commission (EC) adopted a delegated act establishing a common methodology for measuring food losses and waste. It aims to help Member States quantify food waste at all stages of the food production and supply chain. The methodology is designed to ensure consistent monitoring of food waste levels across the European Union [31].

The research conducted in the scope of the project “Development of Monitoring System of Food Waste as well as Efficient Program of Rationalization and Reduction of Loss and Waste of Food” (PROM project) shows that 4,840,946 thousand jobs are wasted in Poland. t of food per year. The obtained results indicate that primary production and processing are responsible for approx. 30% of wasted food in the entire food chain. Consumers waste the most, as much as 60% of food thrown away comes from households [32,33]. There is little data available on food loss and wastage for the meat sector, although the production of meat and meat products is characterized by an unfavorable impact on the environment, which requires rational management of these products in the entire chain (production, processing, transport and consumer stage). Determining the size and causes of formation as well as the methods of reducing food losses and food waste throughout the meat sector is important both for economic and environmental reasons. As the waste of food of animal origin cannot be managed or used for any other purpose and should be disposed of in accordance with the regulations, the primary focus should be on reducing the amount of this waste. For example, active packaging and radio frequency identification (RFID) technologies can be used to extend the shelf life of meat products and minimize losses along the food supply chain due to inadequate handling and storage conditions [20].

**Table 1.** Quantification of the total amount of food wasted in kg per capita per year ( $\text{kg p}^{-1} \text{y}^{-1}$ ) taking into account the share of losses generated at each stage of the food chain.

Quantification Including Zones and Year of Data Collection	Share of Food Waste in the Stages of the Food Supply Chain	References
289 $\text{kg p}^{-1} \text{y}^{-1}$ (data from EU27 in 2006)		[21]
173 $\text{kg p}^{-1} \text{y}^{-1}$ (data from EU28 in 2012)		[22]
290 $\text{kg p}^{-1} \text{y}^{-1}$ (data from EU in 2011)		[23]
223 $\text{kg p}^{-1} \text{y}^{-1}$ (global data from 48 world regions in 2007)		[24]

■ Primary production and post-harvest   ■ Manufacturing   ■ Distribution   ■ Consumption

A systematic and comprehensive article retrieval strategy that provided a general impression of the food loss and waste with particular emphasis on the meat sector. The Web of Science was searched up to March 2021 using search terms for English publications. Many relevant articles were obtained by combing the keywords (food loss, food waste, meat sector) in a more detailed retrieval strategy. Moreover, a manual search of the references of relevant articles has been done. The methodology framework consists of three distinct phases (Figure 1). In the first phase, a literature review was performed to discuss the problem of the food loss and waste on a European and global scale. In the second phase, food loss and waste in the meat sector was estimated, the causes were recognized. In the third phase, waste generated at the stage of consumption was estimated taking into account their causes.

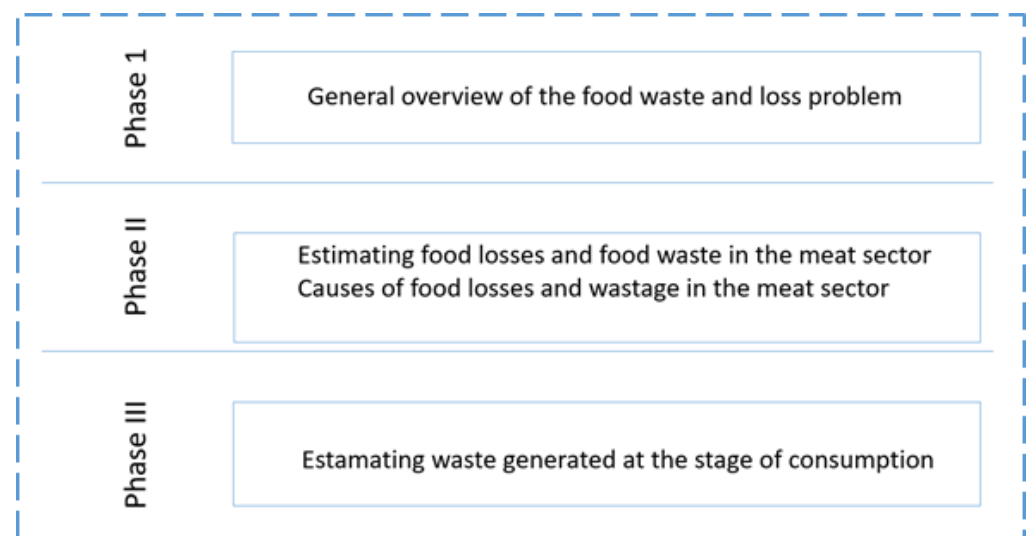


Figure 1. Methodology framework for review process.

### 3. Food Loss and Waste in Meat Sector

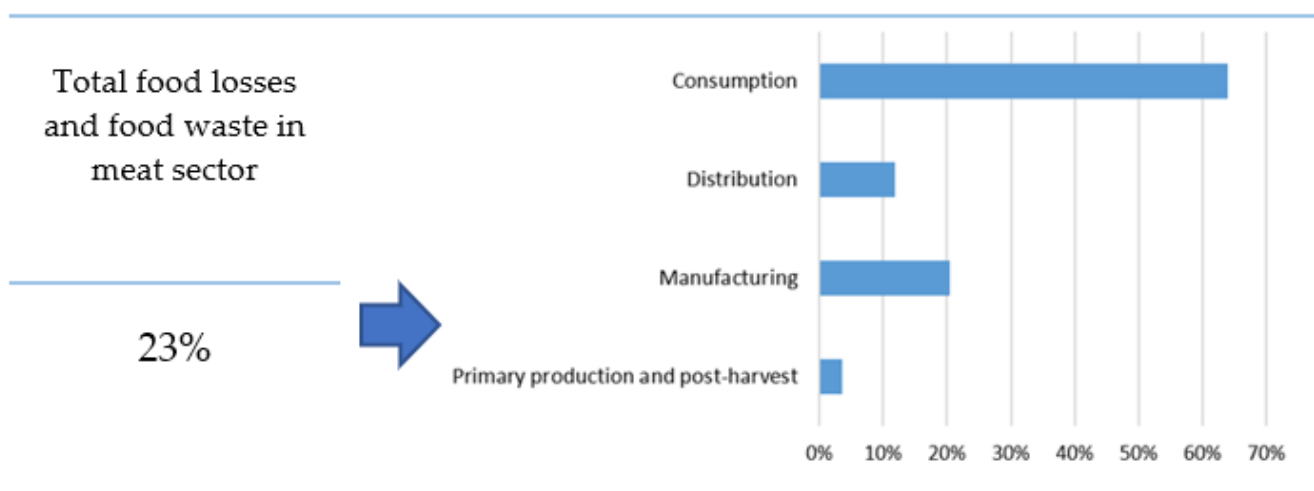
Among the various food items, meat products constitute a significant share in the diet of modern man. In line with the demand, meat production in the world is steadily increasing. In 2018, the world meat production was around 340 million tons, which corresponds to more than three times the quantity of meat produced fifty years ago. Within Europe, large variations in meat production can be observed. According to the FAO [34], in 2018, the main pork producer in 2018 was Germany (22.4%), in the case of lamb and goat, 37.2% of the production came from the United Kingdom, Poland was the main poultry producer (16.7%) and the Netherlands veal. The consumption of meat per capita also changed. Overall, there has been an increasing global trend in meat consumption. As a global average, per capita meat consumption has increased approximately 20 kg since 1961; the average person consumed around 43 kg of meat in 2014 [35].

The production of meat and meat products is characterized by an unfavorable impact on the environment, which requires rational management of these products in the entire chain—production, processing, transport and consumer stage. Reducing food losses and food waste throughout the meat sector is important both for economic and environmental reasons. As indicated by Gerber et al. [36] food animal production all over the world contributes about 14.5% of the total human-induced GHG emissions per year, which is 7.1 gigatons of CO<sub>2</sub> equivalent. The largest share in the formation of greenhouse gases has beef production (35.3%) and dairy cattle (30.1%), followed by swine (9.5%) and poultry (8.7%). In addition, the authors report that of the total greenhouse gas emissions attributed to global food animal production, almost half are related to the production, processing and transport of feed. The enteric methane emissions from ruminants and methane and N<sub>2</sub>O emissions from manure storage are responsible for about 39.1% and 9.5% of the total greenhouse gas emissions attributed to food animal production, respectively.

#### 3.1. How Much Food Is Lost or Wasted in Meat Sector?

The available literature lacks studies that would adopt a systematic approach to accounting for food waste in the meat sector, providing disaggregated values according to the stage of the food supply chain. Caldeira et al. [37] presented a top-down approach to accounting for food waste in the European Union. The method for accounting is the mass flow analysis. Based on these data, Figure 2 illustrates the amount of food waste generated in the meat sector at each stage of the food supply chain expressed as a percentage of the amount of meat entering the food supply chain (defined as ‘EU available’ and calculated as production plus import minus exports of primary commodities minus non-food uses). It is estimated that as much as 23% of production in the meat sector, taken together at all

stages of the food chain, is lost and wasted [38]. Loss and waste arise throughout the meat supply chain. The largest share is generated at the consumption level, representing 64% of the total food waste, followed by manufacturing (20%), distribution (12%) and primary production and post-harvest (3.5%). This confirms the well-known relationship that in more developed regions such as Europe, most of the loss and waste occurs toward the end of the food supply chain, at the retail and consumer levels [39]. According to data presented by Flanagan et al. [40], in developing regions (North Africa, West and Central Asia, Latin America, South and Southeast Asia, Sub-Saharan Africa), most of the loss and waste occurs at the production and storage levels. Similarly, Hodges et al. [39] reported that the amount of losses depends on the wealth of the society. In industrialized regions, they are most severe at the end of the food chain (distribution and household), which is explained by the high consumption of meat by consumers. Less developed regions tend to suffer losses equally along the supply chain, with insufficient infrastructure and a lack of investment in on-farm storage technologies tend to result in greater losses at the primary production stage.



**Figure 2.** Food losses and food waste in the EU in the meat sector in the stages of the food chain in 2011.

Data presented by Flanagan et al. [40] shows that meat only comprise about 4% of global food loss and waste, however it has a higher economic value compared to other groups of food. Thus, although the amount of meat wasted is lower than that of other product groups such as cereals, fruits and vegetables, the economic and environmental impacts are significant. As shown by Ranganathan et al. [41], meat has the highest emissions per kilogram of food compared to other food products.

Buzby and Hyman [42] estimated the total value of meat product waste in the USA at US\$ 83,127 million. According to their study, consumers were responsible for around 35% of the total waste produced. A study carried out by Abdulla et al. [43] indicated that in Canada red meat accounted for 39.73% of the total waste and poultry waste was estimated to be around 40.74%.

### 3.2. What Are the Causes of Food Loss and Waste in Meat Sector?

There are many reasons for food loss and waste throughout the supply chain, including in the meat sector. The reasons vary depending on the stage of food supply chain. Losses observed in the meat sector at the stage of primary production are mainly due to the farming/rearing conditions and the conditions of transport to slaughter. Depending on the transport conditions (duration and climatic conditions during transport, rest time in the slaughterhouse), mortality rates vary greatly. Gustavsson et al. [44] estimated that 0.1% of pigs are killed during transport for slaughter and 0.1% are rejected during slaughter, therefore around 0.2% are considered losses. According to Danish research [45], 3.7% of pigs are killed before slaughter. In Finland, the amount of livestock losses during

primary production, according to statistics, is 3.5% [46]. Another cause unique to primary production in meat sector is animal sickness, which can spread quickly through livestock and lead to unnecessary animal deaths [38]. The meat from unhealthy animals due to diseases is removed from the supply chain to protect consumers and to help eradicate certain diseases [47]. The outbreak of food-borne diseases often leads to the rejection of animals during breeding, generated food loss and waste [48].

Losses at the stage of processing and production amount to 20% of losses generated in all production stages for the meat sector. Dora et al. [49] pointed to a few basic causes of food losses at the processing stage: incorrect transport, product changes, human error and product defects. One of the inevitable reasons for food waste is the removal of samples that producers collect and store to ensure quality and safety [50]. Moreover, Lipinski [38] suggests that one frequent cause of loss or waste in the animal-based food industry is spoilage during storage. Meat and meat products are relatively perishable food and require to be kept at cold temperatures. Any disruption of a cold storage environment leading to uncontrolled increase of temperature can lead to spoilage. Additionally, the shelf life of meat and meat products is relatively short. It is one of the reason that meat products immediately go to waste if not sold within the labelled expiry date and this is the main reason for wastage at the retail stage. Losses at the meat processing stage may also result from inadequate quality of the obtained meat and products, especially if they do not meet safety requirements or inadequate hygienic conditions during processing. In 2015–2019, a total of 934 notifications were submitted in the RASFF system for meat and meat products (other than poultry). In the case of poultry meat and poultry products, the total number of notifications in the indicated period was 1457. The most frequent threat was pathogenic microorganisms, most often caused by the presence of Salmonella [51]. Action taken when such hazards are detected in food is to withdraw products from the market to protect the health and life of consumers. Products that endanger the health of the consumer are most often disposed of and constitute a loss for food producers.

Improper packaging has a significant impact on the amount of damage occurring during transport, as well as the exposure of the cargo to the adverse effects of weather conditions during loading/unloading and transport of products. The problem of risk reduction in the meat supply chain with redirection options was taken up by Bogataj et al. [52]. Other authors [53,54] also point to the impact of inadequate packaging on the level of food loss and waste. The design and the material of the packaging and the atmosphere, in which the product is kept, influence the mechanical damage and the microbial contaminations suffered by the product, thus conditioning its quality.

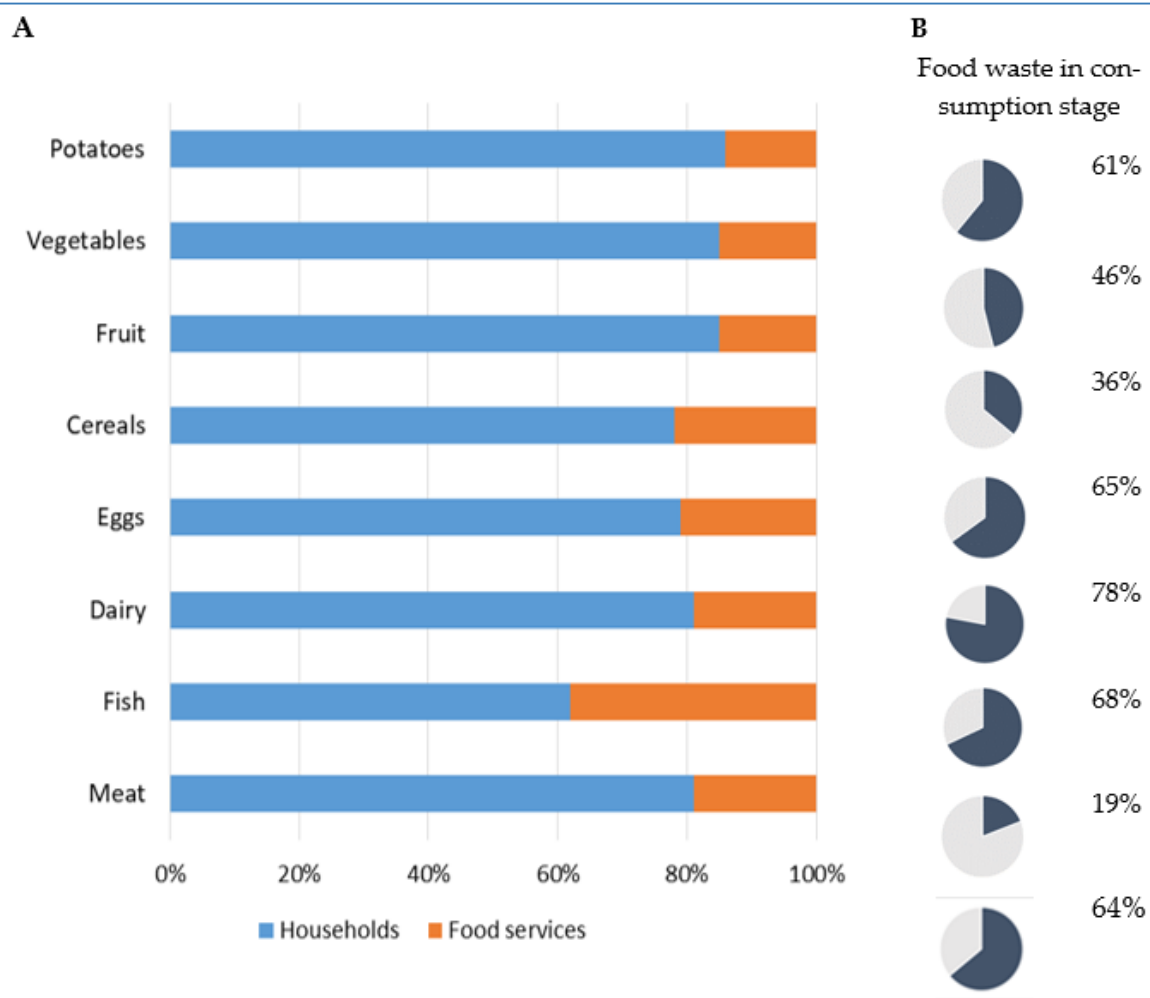
The results of published studies indicate that poor organization of food distribution is an important cause of waste. The most common cause of food losses at the stage of trade and distribution is the storage of too many goods. The main factors influencing the observed food losses related to the mentioned stage are expiring shelf life, too short shelf life, mechanical damage to unit packages related to the breach of the protective barrier of products and without breach of unit packages crease, cavity or other deformation deteriorating the quality of the product. The authors also pay attention to the human factor in the form of ignorance of the FIFO procedure, insufficient knowledge or experience [55]. Katajajuuri et al. [56] estimates the total amount of food wasted in Finnish wholesale and retail trade is 65–75 million kilograms per year. Analysis of the distribution process of meat products carried out by Krajewski et al. [57] indicated the occurrence of losses of these products due to defects in product management processes (organization of deliveries, improper packaging and standardization of expiry dates). The total annual loss of meat products in the distribution process in the examined distribution center was estimated at 1.25% of distributed products. The total mass of product losses was estimated at 853 kg, of which 60.3% were considered suitable for further consumption by the authors and can be donated to charity. The factors disqualifying these products were most often incorrectly prepared label and external damage to collective packaging. An important reason that eliminated products from the food chain were serious quality defects resulting

from exceeding the use by date (41% loss of these products). According to the authors, the key area of product management in the context of minimizing their losses in the supply chain (trade and distribution) is therefore to prevent exceeding the use-by dates, which at the same time will prevent the elimination of these products for consumption purposes.

Magalhães et al. [58] analyzed 16 causes of food loss and waste in the Brazilian beef supply chain using an integrated interpretive structural modeling and matrix impact of cross-multiplication applied to classification methodology. The analysis highlights the “Lack of transportation infrastructures”, “Inadequate handling”, “Poor operational performance”, “Variety of products available in supermarkets” and “Unhealthy animals and outbreaks of disease” as the most influential causes.

#### 4. Food Waste Generated at the Stage of Consumption

The stage of consumption in food supply chain is very important in the context of food losses as the greatest losses are generated at the stage of consumption (households and catering services) in Europe [37]. The consumption stage is responsible for the largest share of food waste generation for most food groups (cereals, potatoes, eggs, dairy, meat) as illustrated by Figure 3. Meat food waste in household and food services represents 64% of total food waste in food supply chain for this food group. However, households generate much more food waste compared to food service for all of the above-mentioned food groups.



**Figure 3.** Food waste in the EU for several food group in the consumption stage for 2011. (A)—share of households and food services in food losses at the consumption stage; (B)—share of food waste at the consumption stage in relation to total food waste.



Martin-Rios et al. [59] reported that companies from HORECA, which include hospitality, restaurant and catering represent a considerable share of total food waste. According to the authors, these companies are generally characterized by low sense of awareness about the sustainability-oriented innovation opportunities and challenges of minimizing food waste. Researchers [60–62] highlighted the scale of the problem of food waste in restaurants. They highlighted the scale of the problem of food waste in restaurants. They observed that a significant proportion of the food purchased by restaurant leaders never ends up at the customer and is wasted. On the other hand, according to data provided by Vogliano and Brown [63], approximately 31%–40% of meals served to customers are not consumed.

Various causes of food waste at the consumption stage are mentioned by the authors as showed in Table 2. One of the factors is food presented, including the size of the portion [61]. Freedman and Brochado [64] related that decreasing portion size resulted in significant decrease of freshmen’s food consumption in all-you-can-eat dining facilities. Other authors researching this factor have published similar observations. Ofei et al. [65] while conducting research in the hospital kitchen found that larger portion size encourages more food intake thus creates more plate waste. Vermote et al. [66] found similar results from on-campus restaurants in Belgium. The data published by Sakaguchi et al. [67] suggests that the attitudes and behaviors around food waste in restaurants play major roles in the amounts of food discarded therefore access to information about how to prevent and manage food waste is according to these researchers the optimal strategy in reducing waste. Varela et al. [68] estimated the amount of food loss in the restaurant of the Federal University of Rio Grande do Norte, in Brazil at 11% of all meals. According to these authors, food waste in popular and institutional restaurants results from inadequate meal planning, daily user frequency, food preferences and employee training in preparing and portioning foods.

**Table 2.** The causes of food waste at consumption stage.

Stage	Causes	References
Consumption	Misunderstanding/lack of knowledge about labeling	[69]
	Improper storage, kitchen preparation, service, leftovers and consumer plate waste	[60]
	Consumer confusion over “use-by” and “best before” dates so that food is discarded in packaging	[71]
	Preparation of too much food Inadequate staff qualifications The purchase of poor-quality products	[70]
	Psychological tastes, attitudes and preferences leading to plate waste/scrapings, e.g., human aversion, such as “I don’t eat that,” or refusal to eat a food for religious reasons.”	[72]
	Inadequate meal planning, daily user frequency, food preferences and employee training in preparing and portioning foods	[68]

On the consumer stage meat and meat products food loss and waste tends to be due to improper storage condition such as failure to maintain the proper low temperature, failure to freeze food before it spoils or insufficient knowledge about how to prepare food. The latter reason may lead to the preparation of a dish that does not meet the expectations of the consumer and therefore may be treated as waste [38]. The mentioned reasons for meat product waste include packaging size and date confusion among consumers as well as misunderstandings of the meaning of food date labels [69,70].

With regard to food waste in households, Qi et al. [73] explored the interaction between household food waste and home livestock production. Based on the obtained results, the

authors indicated that intensified livestock production caused less uneaten food being used as animal feed. Thus, there was less discarded food in these households.

Awareness and knowledge of the places where food is wasted and lost in the food supply chain gives the opportunity to plan and implement actions to reduce them, especially in the stages that generate the most food loss and waste. Generally, countries around the world promulgate policies and initiatives aimed at food supply chain actors (from farmers to consumers) that directly address food loss and waste perceptions, attitudes and behaviors. The recent study by Martin-Rios et al. [74] presents a range of waste management initiatives including the distinction between revolving around work processes and technologies named incremental innovations and innovations exploring opportunities to significantly change waste management approaches as radical innovations. The mentioned study also showed different approaches to food waste related to management practices and management's beliefs, knowledge and awareness. Bilska et al. [70] proposed a risk management model for food waste, based on the ISO 31000: 2018 standard, which can be used in companies from various segments of the foodservice industry. The authors recommend that companies use a risk management model in their activities. The assumption of the model is to include the generation of food waste, included in their operational processes can contribute to a reduction in food waste in foodservice.

Reynolds et al. [75] identified interventions that can be implemented at the consumption stage in the supply chain to prevent food waste through a quick review of the global scientific literature from 2006–2017. Interventions that changed the size or type of plates were shown to be effective, leading to a 57% reduction in food waste. Revision of the school nutrition guidelines was reported to have reduced vegetable waste by up to 28%. This means that a healthy diet can be part of your food waste reduction strategy. The authors also pointed to the effectiveness of information campaigns in reducing food waste (up to 28% in a small sample).

## 5. Conclusions

Despite the growing ecological awareness of societies and progress in the field of environmental protection, it seems that the abundance and over-consumption of Europeans have not been criticized by consumers about the consequences of such a widespread and growing phenomenon of food waste. The problem of food losses and wastage is indeed global, but it is the cultural, social, legal and economic conditions of the country that affect the quantity and quality of wasted and lost food. The problem of food losses and waste in the meat sector seems to be of particular importance in terms of economic and environmental aspects. As indicated in the literature, the production of meat and meat products is characterized by an unfavorable impact on the environment (meat has the highest emissions per kilogram of food compared to other food products), which requires rational management of these products in the entire chain (production, processing, transport and consumer stage). At the same time, the increasing production and consumption of meat observed in recent years means that the losses and wastage of food in this sector also increase. The most recent comprehensive results relate to losses in 2011 and indicate that 23% of production in the meat sector is lost and wasted while the largest share is generated at the consumption level (64%), followed by manufacturing (20%), distribution (12%) and primary production (3.5%). Due to the lack of detailed and up-to-date data it is necessary to develop specific methods of determining losses at individual stages of the food chain for the meat sector and indicating methods of their prevention.

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