

UNIVERSITAT
JAUME·I

Master Economics

Master Thesis Project

COOPERATION IN THE AGROFOOD
INDUSTRY: THE CASE OF TERNERA DEL
MAESTRAZGO

Author:

Marta Solsona Gil

Supervisor:

Eva Camacho Cuenca

Reading Date:

Curso académico: 2017/2018

Acknowledgement.

To my family for unconditional support.

To my father for transmitting his passion for animals and their knowledge.

To my friends for all the moments of laughter and confessions.

To all the people in the sector that have given me information.

To Eva Camacho Cuena, tutor of my project, thank you for your advice and corrections and especially for structuring my ideas. I really enjoyed working with you.

Summary

This paper describes the importance of the agrofood sector and cooperatives in Europe, with particular interest in Spain. This part gives a framework to the analysis of a representative farm in the beef sector located in Puertomingalvo. Using real data we compute the profit function of the farm and propose diverse scenarios. Our study shows that this kind of firms depend mostly on subsidies. A proposal is to create a cooperative that allows farmers to sell their product charging higher prices following a strategy of vertical integration. In particular we focus in a cooperative in Cantavieja, "Carnes del Maestrazgo" that is making efforts oriented to this objective but had many difficulties in keeping cooperation from farmers. As a tool to analyze the difficulties for cooperation we design a framed field experiment to observe the attitude of farmers.

Keywords

Agrofood sector, cooperatives, case study.

INDEX

Chapter 1	Introduction: Motivation and objectives.....	9
Chapter 2	A perspective on the bovine Agrofood Sector.....	11
2.1.	Bovine Agrofood sector in Europe.....	11
2.1	The bovine Agrofood Sector	23
2.2.1	The Agrofood sector in Aragon	30
Chapter 3	The role of cooperatives in the Agro-Food sector	35
3.1.	Role of cooperativvves in Europe	35
3.2	Coopeativism in Spain	37
3.2.1.	Comparative with others countries.....	38
3.2.2.	Cooperative in Aragon “Ternera del Maestrazgo”	39
Chapter 4	Analysis and description of a cattle farm in Puertomingalvo	41
4.1	Description of the livestock.....	41
4.2	Farm profit: cost and revenue.....	41
4.2.1	Cost and income of farm	42
4.2.2.	SCENARIOS.....	45
Real situation of the farm.....		45
SCENARIO 1:	Increase in the quality of the meat	46
SCENARIO 2:	Without subsidies	47
SCENARIO 2.1	Initial situation.....	47
SCENARIO 2.2	Higher quality.....	47
SCENARIO 3.	Minimize cost of fodder (Cooperation).....	48
SCENARIO 3.1	With discounts in fodder in the initial situation	49
SCENARIO 3.2	With discounts in fodder without subsidies	50
SCENARIO 4.	SALE DIRECTLY CONSUMER	50
SCENARIO 4.1	Sales directly consumer in the initial situation.....	50
SCENARIO 4.2	Sales directly consumer without subsidies	51
4.3	Proposal for further research.	52
Chapter 5	Experimental test	53
5.1	Experimental design.....	53
Chapter 6	Conclusions	55
Biografia.....		56
Anexes.....		58

INDEX OF FIGURES

Figure 1 Total Cattle census (December 2016/2017). Thousands head (Animals).....	12
Figure 2. Non-Dairy cows and animals younger than year, for slaughter, census 2017.	12
Figure 3. Bovine meat (Slaughtering) measured in thousands of tons.	13
Figure 4. Evolution Trade Meet of European Union. Measured in thousands €.	14
Figure 5. Evolution Trade Meet of European Union. Measured in tons.	14
Figure 6. Exports and imports of bovine meet, by type of product. (Measured in tons).....	14
Figure 7. Exports and imports of bovine meet, by type of product. (Measured in thousands of €.)	15
Figure 8. Exports and imports of live animals (tons and thousands of €.).....	15
Figure 9. Exports and Imports EU. Frozen beef (Tons and Thousands €).....	16
Figure 10. Total exports in 2007 by country (Intra-Community and outside Europe).....	16
Figure 11. Frozen beef exports in 2017 by country € (Intra-commnity and outside-exports)....	17
Figure 12. Export Ranking by country(Thousands of €) 2017.....	18
Figure 13. Fresh beef exports in 2017 by country € (Intra-commnity and outside exports).	19
Figure 14. Live animals exports 2017 by country € (Intra-commnity and outside-exports).....	19
Figure 15. Top ten destination of exports (2017).....	20
Figure 16. Total imports in 2007 by country (Intra-Community and outside Europe imports) ..	20
Figure 17. Price of meat in each country & Average price of meat in Europe (2017).....	21
Figure 18. Positive and negative differences in valued at the average price (Total sector).	21
Figure 19. Positive and negative differences in exports valued at the average price (Fresh beef).	22
Figure 20. Positive and negative differences in exports value at the average price (Frozen beef).	22
Figure 21. Positive and negative differences in exports value at the average price (Live animals).	23
Figure 22. Evolution of Census in Spain. (Thousands of animals.).....	23
Figure 23. Total cattle census (May - 2017). Thousands of head.	24
Figure 24. Census Non-Dairy cows & Animals younger than year, for slaughter. (Thousands of heads)	24
Figure 25. Value of Bovine production by Region. (Thousands of Tons.).....	25
Figure 26. Evolution of slaughter animals by type (Thousands of tons).....	25
Figure 27. Evolution Trade Meet in Spain. Measured in thousands €.	26
Figure 28. Evolution Trade Meet in Spain. Measured in tons.	26
Figure 29. Evolution of exports and imports measured in €.	27
Figure 30. Evolution Live animals exports and imports. Measured in € and tons.	27
Figure 31. Evolution Fresh beef exports and imports. Measured in € and tons.	27
Figure 32. Evolution Frozen beef exports and imports. Measured in € and tons.....	28
Figure 33. Total exports in 2007 by Region (Intra-Community and outside Europe)	28
Figure 34. Price of meat in each country & Average price of meat in Spain (2017).	29
Figure 35. Positive and negative differences in exports valued at the average price. (Total sector).....	30
Figure 36. Census of Bovine animals in Aragon. (Thousands of Animals).....	30
Figure 37. Census of cows compared with census of animals younger than one year for Slaughter in Aragon. (Thousands of Animals).....	31
Figure 38. Production in Aragon. (Thousands of tons).....	31
Figure 39. Evolution of exports and imports in Aragon. (Thousands of €)	32
Figure 40. Evolution of exports in Teruel, Zarragoza and Huesca. (Thousands of €)	32
Figure 41. Evolution of exports in Aragon by type of product. (Thousands of €).....	32
Figure 42. Evolution of exports of Fresh beef in Zaragoza, Huesca and Teruel. (Thousands of €)	33

Figure 43. Evolution of exports of Frozen beef in Zaragoza, Huesca and Teruel. (Thousands of €)	33
Figure 44. Evolution of exports of Frozen beef in Zaragoza, Huesca and Teruel. (Thousands of €)	33
Figure 45. Destinations of the exports in Aragon (Total trade)	34
Figure 46. Number of cooperatives in Europe (Agro-Food sector)	35
Figure 47. Cooperatives anual turnover in Europe. (Agro-Food sector).....	36
Figure 48. Turnover, number of cooperatives and number of members. Ranking by countries (2012).....	36
Figure 49. Number of cooperatives by Region in Spain (2016).....	37
Figure 50. % Turnover by Region regarding Total Turnover.	38
Figure 51. Quality Brand Logo. Source. The cooperative.	40

INDEX OF TABLES

Table 1. Average growths of exports (2010/2017).....	19
Table 2. Cooperativism in Spain.....	37
Table 3. Structure of cooperatives in Spain (2016).....	38
Table 4. Number of animals in the farm.	42
Table 5 Fixed Cost.	42
Table 6. Total variable cost of cows and Bulls (in €).....	42
Table 7 Variable cost of calves.	43
Table 8 Variable cost of female calves	43
Table 9 Variable cost of male calves.	43
Table 10 Subsidies.	43
Table 11 Sales revenue of cows, heifer and Bulls.....	44
Table 12 Sales revenue of male calves.....	44
Table 13 Sales revenue of female calves.....	44
Table 14 Sales revenue of cows, heifer and Bulls with high quality.	44
Table 15 Sales revenue of male calves with high quality.	44
Table 16 Sales revenue of female calves with high quality.	44
Table 17 Sales revenue of cows, heifer and Bulls revenue directly to the consumer.	45
Table 18 Sales revenue of male calves, revenue directly to the consumer.	45
Table 19 Sales revenue of female calves, revenue directly to the consumer.	45
Table 20 Profit function in the initial situation of the farm.....	45
Table 21 Profit function with quality price of the sales.	46
Table 22 Profit function in the initial situation of the farm without subsidies.....	47
Table 23 Profit function with high quality price of the sales and without subsidies.....	48
Table 24 Table of discount in "De Heus Animal Nutrition S.A.U."	48
Table 25 Farmer to cooperate to obtain a discount	49
Table 26 Real cost of fodder and supposed discounts.....	49
Table 27 Profit function in the initial situation with discount in the fodder	49
Table 28 Profit function in the initial situation with discount in the fodder	50
Table 29. Profit function in the initial situation, revenues directly consumer.....	51
Table 30 Profit function without subsidies, revenues directly consumer.....	51

Chapter 1

Introduction: Motivation and objectives

This research includes the analysis of a representative bovine cattle company which located in Puertomingalvo (Teruel). This farm has cows and bulls which live freedom in the mountain and once a year approximately the cows give birth calves. Moreover, the farm has feeding place where the calves can eat and when they have the correct weight, they are sold to meat companies.

This farm has a small size. The most significant of all costs is the purchase for the feeding place (calves food). The farm can reduce this cost purchasing food of lower quality or obtaining discounts per volume if the firm cooperates with other farmers. On the other hand, the farm has almost no bargaining power with meat companies, in practice the farmer accepts the established price by them. Even so, this type of companies are mainly dependent on government's subsidies.

The objective of our research is to study the main characteristics of the sector in general and a representative farm in particular and propose different solutions to their dependence problem.

In order to describe the sector in Sapin we use data from MAPAMA between 2004 and 2016 for the production and datacomex between 1995 and 2017 to describe the trading per region, both intra-community and outside European Union.

In order to complement the analysis of the sector, we obtain information about the cooperativism in the agrifood sector in Europe and Spain. However, we did not find any reliable database and therefore we collected information using different reports on cooperatives in Europe and Spain. Finally, in the cooperativism analysis, we contact a real cooperative in Cantavieja (Teruel) and in an interview with the head of the cooperative collected information about the main characteristics of the cooperative.

As a final step in the process of gathering information on the sector and the farms, we interviewed the owner of a farm about the main characteristics of his firm and how it operates. We also collected information on the main components of the production and cost function of the farm in order to construct a realistic profit function of the representative farm. We analyzed then different scenarios varying the different components of the farm's profit function:

We create six scenarios to analysis:

1. Initial situation.
2. Sell at a high quality price
3. Initial situation without subsidies
4. High quality price without subsidies
5. Obtaining discounts in the feed purchases in the initial situation.
6. Obtaining discounts in the feed purchases without subsidies.
7. Sale directly to the consumer in the initial situation.
8. Sale directly to the consumer without subsidies.

Concludes with the subsidies the business is profitable in all scenarios but without subsidies is only profitable when the farmer sells directly to the final consumer.

The analysis of the different scenarios allows us to conclude that the farm is highly dependent on subsidies to be profitable. We propose then different alternatives to increase the product price in sales. We consider that if the farmers could cooperate with strategies oriented to the sale, they would be able to increase the selling priced for their products.

However, until now, the farmers from the area did not make efforts to cooperate and to invest in a common project, we do not know why. In the interviews the farmers explain that this lack of cooperation is due to a low level of trust among them or maybe it is just a cultural or traditional issue. Therefore, we propose as further research an experimental study which reproduces the cooperative characteristics and it is able to give us some clues about the possibility to achieve some cooperative behavior. Would cooperate they or not? If they cooperate, they would be selfish or not?

Chapter 2

A perspective on the bovine Agrofood Sector

As an introduction to the Agro-Food sector we will include in this section a detailed description of Europe and Spain as a general framework for our study and to convey the importance of this sector for the economic activity.

In the Agri-Food sector there are five sub-sectors, the raw materials sector, the agrarian sector (livestock, fishing and agriculture), the Agri-Food industry (product transformation), the transport and the distribution.

According to Drink Europe, in 2015 the Agro-Food sector in Europe is the first activity of the manufacturing industry, with a turnover of 1,098,000 million euros. The country with the highest turnover is France, followed by Germany, Italy, the United Kingdom and Spain.

The Agro-Food Spanish sector has a turnover of 98.163,40 millions of euros and represents 21.7% of the industrial sector. In particular, the meat industry has a turnover of 21,897 million euros and represents the 22.30% of the industry.

Inside the meat industry, the pig sector holds the first position representing 36,40% followed by the milk sector that represents 17.50%, the beef sector 17.10%, the birds sector with 13.50%.

Next, we will describe in detail the main data on the bovine sector in Europe and Spain.

2.1. Bovine Agrofood sector in Europe

We collect data from bovine sector in Europe such as the census, production, exports and imports. The objective is to show the most relevant countries, the main differences across countries, as well as, the trend of the variables in different European countries.

We downloaded from Eurostat the census of animals from 2000 to 2017, we focus on these data for live bovine animals, bovine animals, younger than one year, for slaughter, bovine animals, younger than one year, not for slaughter, dairy cows and non-dairy cows in European countries. (See Tables I.1, I.2, I.3. and I.4. in Appendix 1).¹

Figure 1 shows the total live bovine in thousands of animals in each country. During 2017, the country with the highest number of animals is France, followed by Turkey, Germany, United Kingdom, Iceland, Italy and Spain. Spain holds the seventh position. In Turkey, Belgium, Italy and Spain the number of animals increased in 2017 with respect to 2016. While in France and Germany the number of animals decreased in the same period.

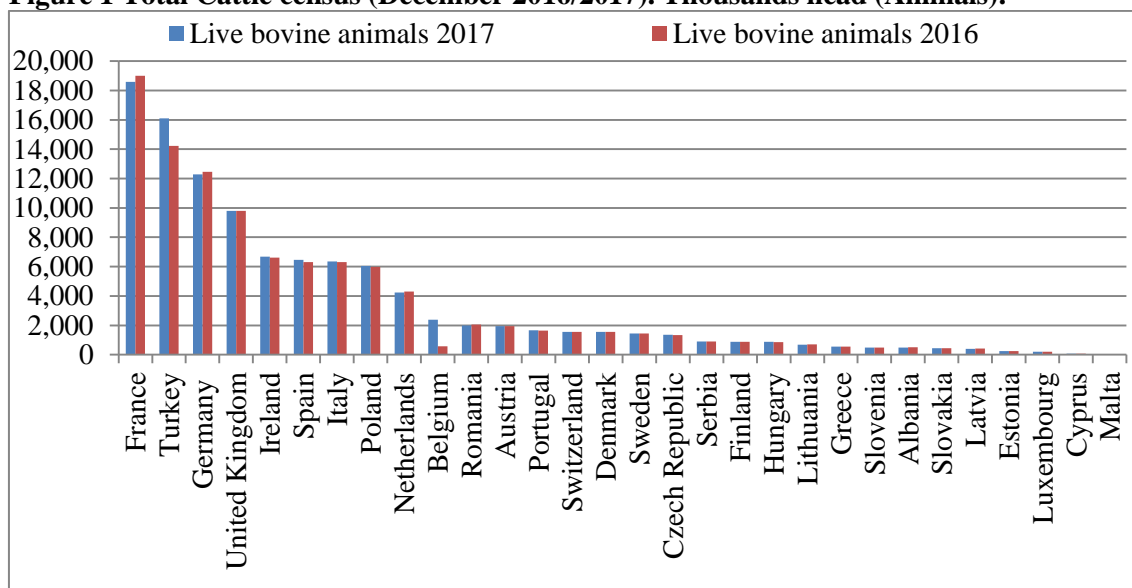
¹ Bovine animals, younger than one year, for slaughter: Animals for the meat trade.

Bovine animals, younger than one year, not for slaughter: Animals for the replacement of suckler cows.

Dairy cows: Animals for the trade of dairy products.

Non-dairy cows: Suckler cows to raise calves.

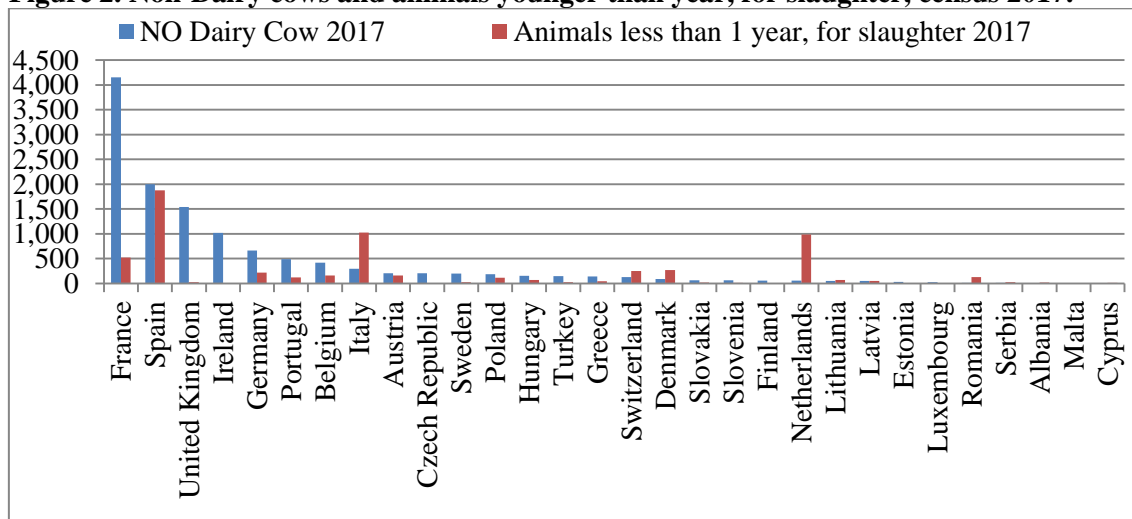
Figure 1 Total Cattle census (December 2016/2017). Thousands head (Animals).



Source. Eurostat. Elaborated by the author using data from Table I.1 in Appendix I.

Regarding the census of non-dairy cows, the country with the highest population is France, followed by Spain, United Kingdom, Ireland, Germany, Portugal and Belgium. The remaining countries have a weaker population. Whereas in France, Belgium and United Kingdom the population decreased in the last year, in Spain it has increased. (See Figure I.1. in Appendix I). Concerning dairy cows, we observe that most of the European countries have a larger population than Spain, which occupies the tenth position (See Figure I.2. in Appendix I). Finally, regarding to the census of bovine animals, younger than one year, for slaughter. Spain holds the first position, followed by Italy, Netherlands and France. (See Appendix Figure I.3. in Appendix I).

Figure 2. Non-Dairy cows and animals younger than year, for slaughter, census 2017.



Source. Eurostat. Elaborated by the author using data from Tables I.3 and I.4 in Appendix I.

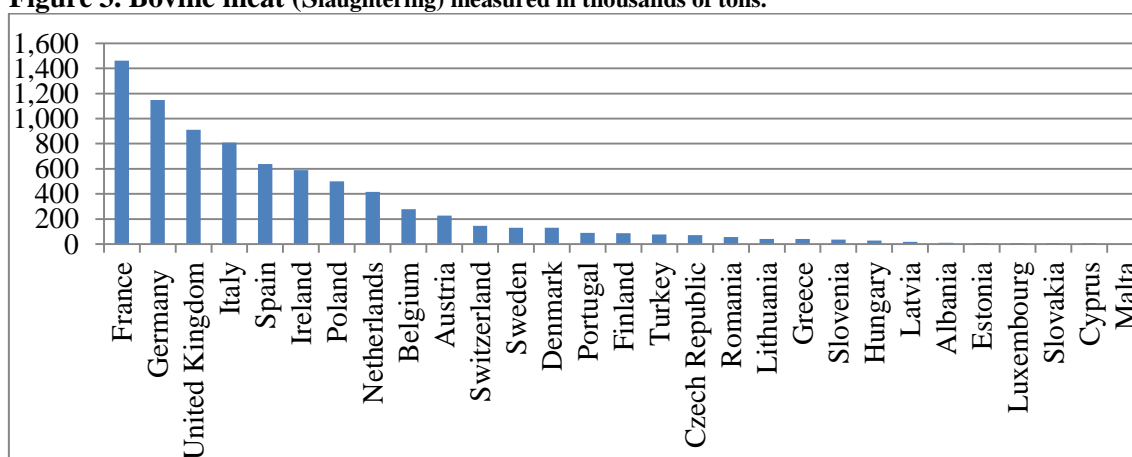
Figure 2 compares the census of non-dairy cows and animals younger than one year, for slaughter in each country. We can see differences between countries. Whereas some of them are specialized in suckler cows as France, United Kingdom, Portugal Ireland, Belgium and Greece. That is, the number of suckler cows is much larger than the number of animals younger than one year, for slaughter. This countries sale the calves to the other countries when they have four or five months. Countries as Spain, Italy, Netherlands and Switzerland are specialized in slaughter farms. In that case, the number animals younger than one year, for slaughter is larger than the number of non-dairy cows or very similar.

After analyzing the trend of census of bovine animals in Europe, we observed that these reduced considerably from 2000 to 2011 and increased slowly until 2017. Following a similar trend along the considered period, the census of dairy cows have decreased from 2000 to 2011, and increased slowly until 2012. Instead, non-dairy cows have remained fairly constant. (See Figure I.4 in Appendix I).

Figure 3 shows the bovine meat measured in thousands of tons for 2016. The country with the highest slaughtered animals measured in tons is France, followed by Germany, United Kingdom, Italy, Spain, Ireland and Poland. Spain holds the fifth position. Compared with the live animals census, the main differences are that Italy and Spain have more tons slaughtered than Ireland while, Ireland has more live animals than Italy and Spain. The reason may be that Ireland is specialized in suckler cows. On the other hand Turkey holds the second position regarding the number of animals and holds the sixteenth position regarding the tons slaughtered. The reason may be that Turkey is specialized in dairy cows.

Next, we study the data of slaughtered animals in tons by type of animal. The type adult cattle represents the majority of the slaughter bovine meat, in this type of animals France holds the first position followed by Germany, United Kingdom, Italy and Ireland. This ranking is similar to the total cattle census. In the data of calves and young cattle², Spain holds the first position, same as for census of animals younger than one year, for slaughter. Another particularity is that Italy holds the fourth position in thousands of tons while in the census of animals younger than one year hold the second position. The reason may be that Italy sells live calves to other countries. (See Table II.1, Figure II.1, II.2 and II.3 in Appendix II).

Figure 3. Bovine meat (Slaughtering) measured in thousands of tons.



Source. Eurostat. Elaborated by the author using data from Table II.1 in Appendix II.

Finally, we study the value of the production measured in €, and this ranking is the same than for slaughter animals measured in tons but is not correlated with number of animals. We could find some examples where a country is ranked in a high position according to the number of animals but is ranked lower in terms of production. For example, Ireland has a higher number of animals than Italy and Spain, but Spain and Italy have a higher volume of production. We find something similar comparing Germany and UK. (See Appendix III).

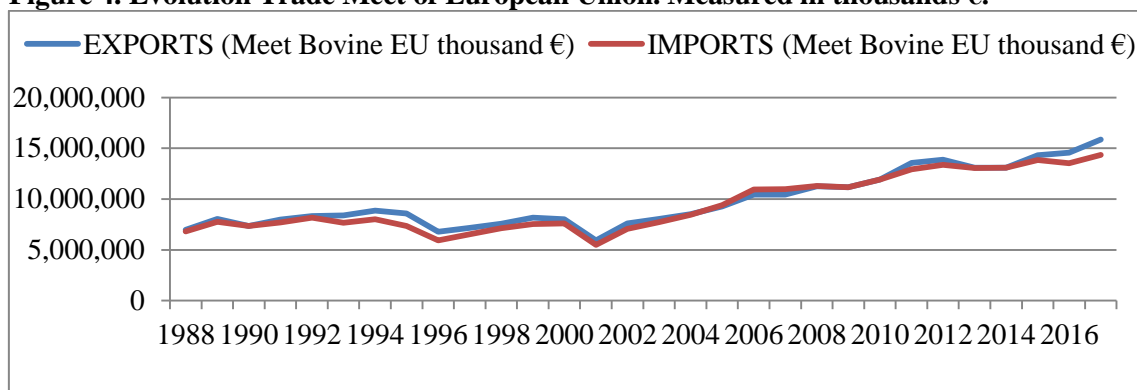
To better describe the sector, we use the data base Datacomex about exports and imports measured in thousands of € and tons, for European Union Members between 1988 and 2017.

Figure 4 shows exports and imports measured in thousands of €. Exports in € are higher than imports practically the whole period, but in the period between 2005 and 2009 imports are

² Calf (singular) or Calves (plural): young bovine animals which breastfeed.
Young cattle: Bovine animals which weaned, yearling and 2-year old-cattle.

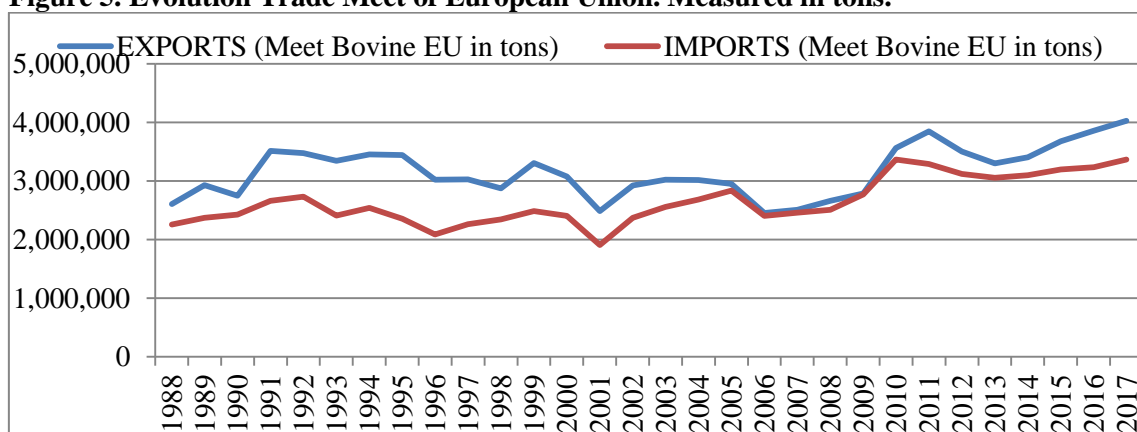
higher than exports. Figure 5 shows exports and imports measured in tons. For these years, exports in tons are higher than imports. Exports in tons have had three recessions, in 1996, 2001 and 2006. Clearly, exports and imports measured in tons and € show an upwards trend.

Figure 4. Evolution Trade Meet of European Union. Measured in thousands €.



Source. datacomex. Elaborated by author using data from Table IV.1 in Appendix IV.

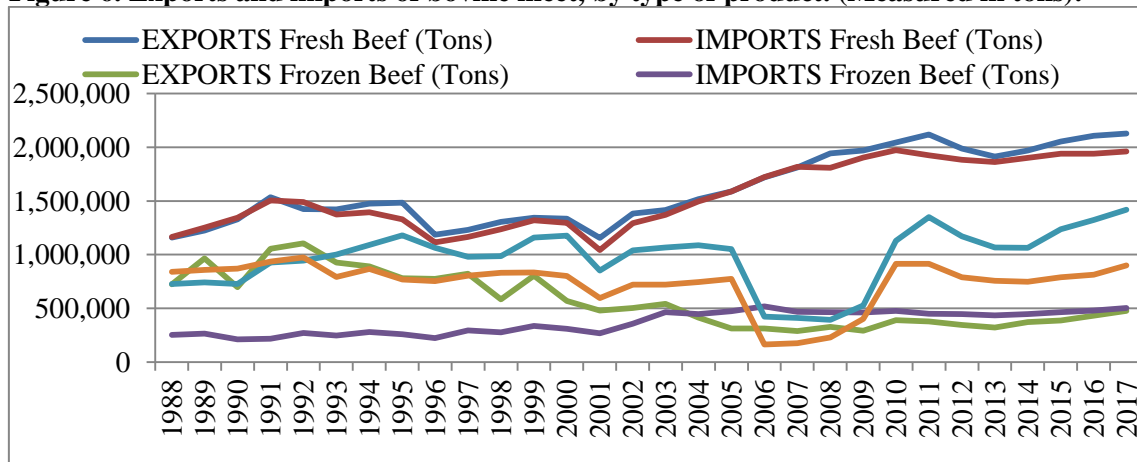
Figure 5. Evolution Trade Meet of European Union. Measured in tons.



Source. Datacomex. Elaborated by author using data from Table IV.1 in Appendix IV.

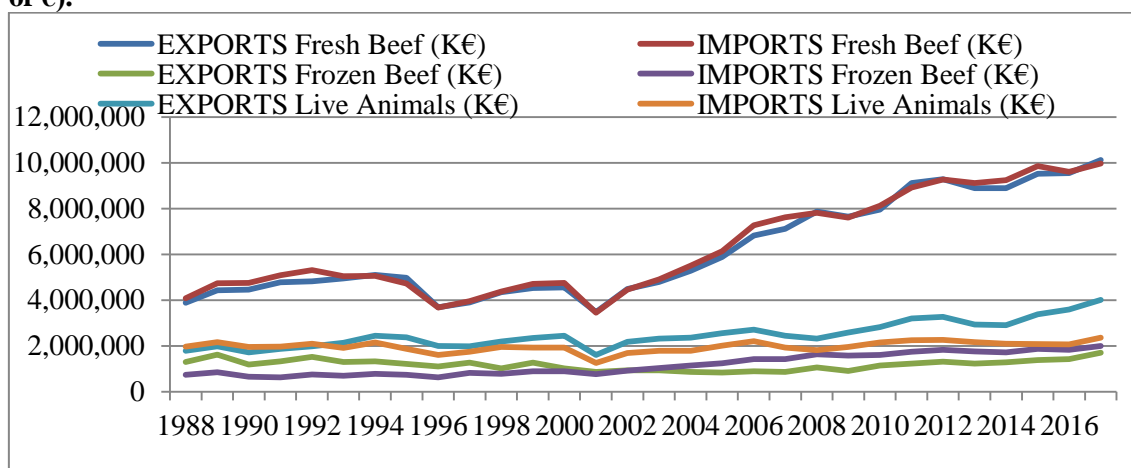
Figures 6 and 7 show exports and imports measured in tons and € by type of products, fresh beef, frozen beef and live bovine animals between 1988 and 2017. Fresh beef trade increased faster than the trade of frozen beef and live bovine animals. Also, for fresh beef and live bovine animals exports are higher than imports in most of the years but exports are smaller than imports in the case of frozen beef.

Figure 6. Exports and imports of bovine meet, by type of product. (Measured in tons).



Source. Datacomex. Elaborated by author using data from Table IV.2 in Appendix IV.

Figure 7. Exports and imports of bovine meat, by type of product. (Measured in thousands of €).

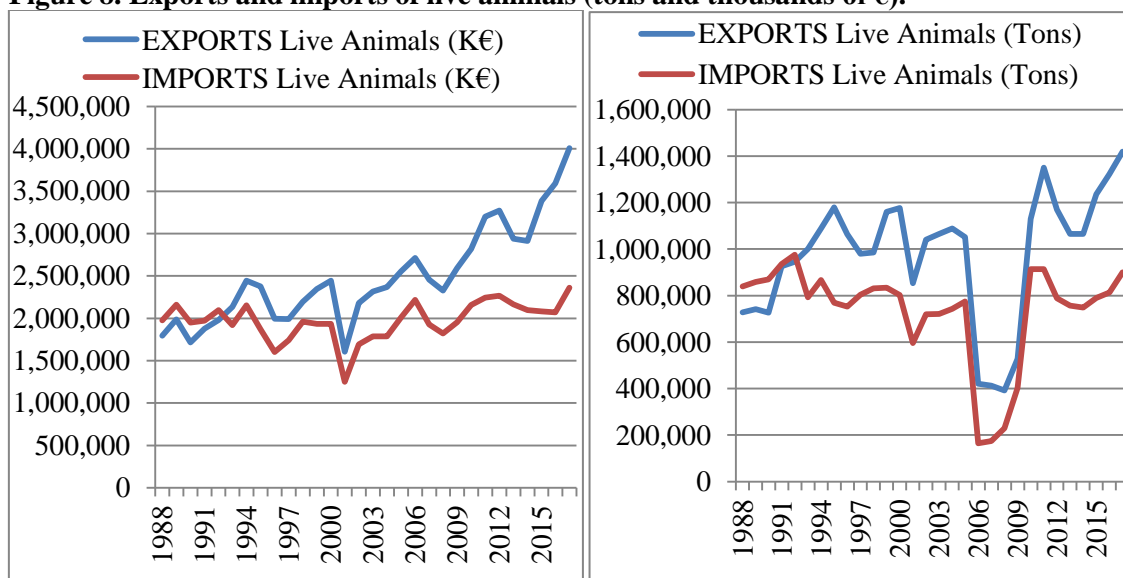


Source. Datacomex. Elaborated by author using data from Table IV.3 in appendix IV.

Figure 8 represents the evolution of exports and imports of live bovine animals measured in tons and thousands of €. Between 2006 and 2008, exports and imports measured in tons showed a greater recession than exports and imports measured in euros. Figure 9 represents the evolution of exports and imports of frozen beef measured in tons and thousands of €. Exports are smaller than imports since 2003 in the case of € and since 2004 the case of tons.

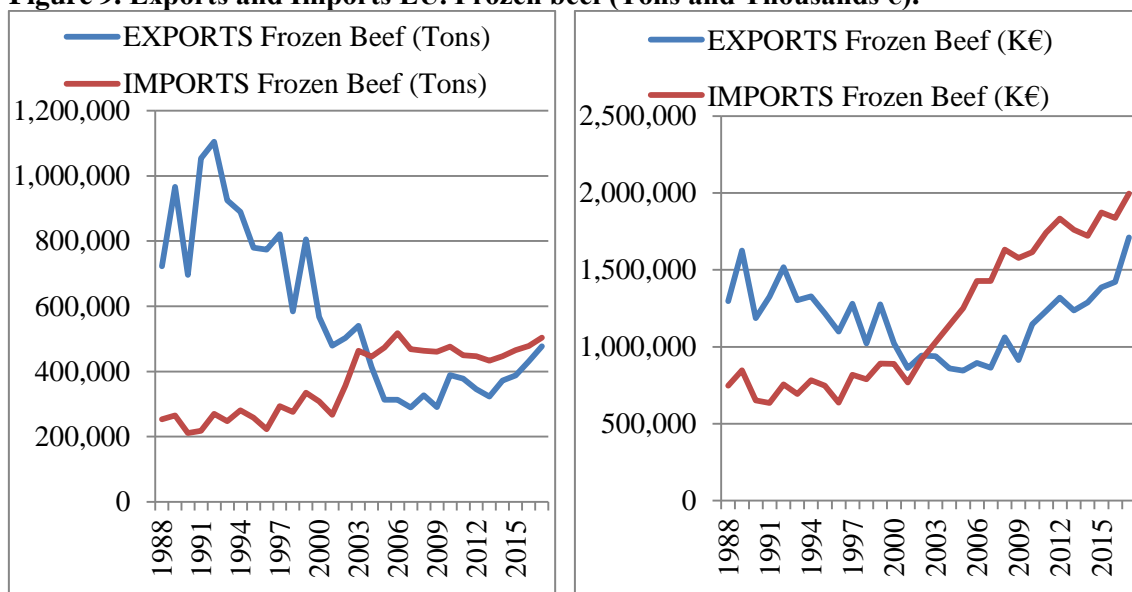
Figure 10 compares exports measured in thousands of € in the year 2017 in different European countries. Regarding the total exports of the sector, the country with highest level of exports is Netherlands followed by France, Ireland, Germany, Poland, Spain, Belgium and Italy. If we collect information by type of product, the results are different in the case of exports of live animals, France holds the first position followed by Netherlands, Germany, Spain and Romania. In the case of exports of fresh beef, the highest position is for Poland followed by Netherlands Ireland, Germany Italy and Spain. And finally, in the exports of frozen beef, France holds the first position followed by Netherlands, Germany, Spain and Romania.

Figure 8. Exports and imports of live animals (tons and thousands of €).



Source. datacomex. Elaborated by author using data from Tables IV.2 and IV in appendix IV.

Figure 9. Exports and Imports EU. Frozen beef (Tons and Thousands €).

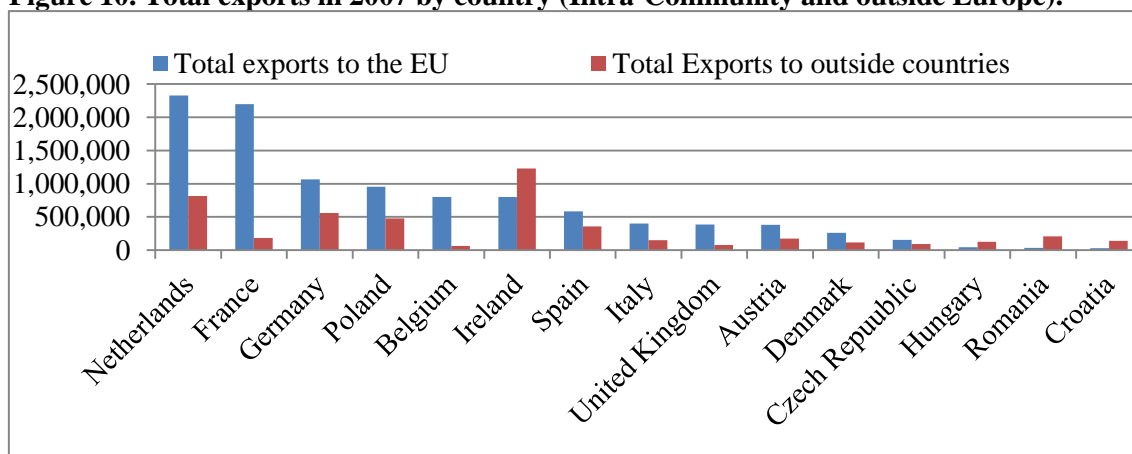


Source. Datacomex. Elaborated by the author using data from Tables IV.2 and IV.3 in Appendix IV.

Figure 11 shows the total Intra-Community exports and the total outside Europe exports of the most significant countries. First, we indicate that exports outside Europe are smaller than exports to Europe. The country with highest level of Intra-Community exports is Netherlands followed by France, Germany, Poland, Belgium, Ireland and Spain. On the other hand, the country with highest level of exports to outside of Europe is Ireland follow by Netherlands, Germany, Poland and Spain.

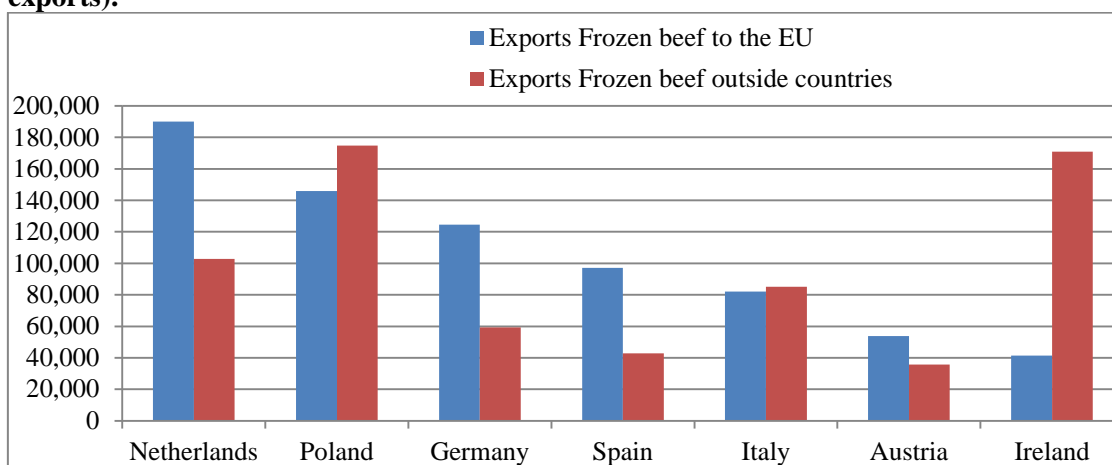
Figures 12, 13 and 14 show the Intra-Community exports and outside Europe exports for each type of product. As curiosity, Netherlands have the highest Intra-Community exports for frozen and fresh beef. Regarding the exports outside Europe of frozen and fresh beef, the countries exporting more are Ireland, Poland, Netherlands and Italy. Finally, France is the first country exporting of live animals to Europe, and Spain is the first exporting of live animals to others countries.

Figure 10. Total exports in 2007 by country (Intra-Community and outside Europe).



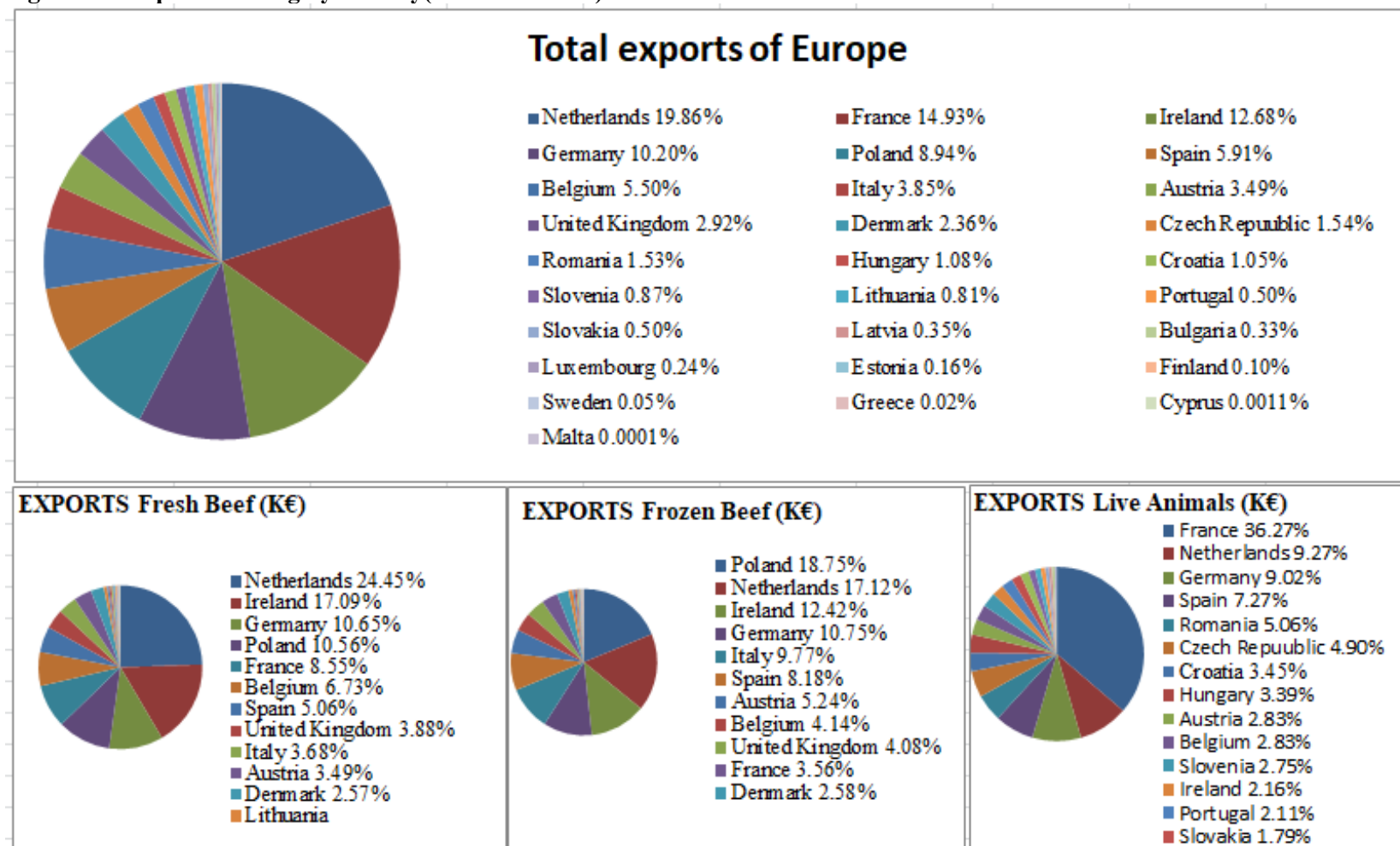
Source. Datacomex. Elaborated by the author using data from Table IV.4 in Appendix IV.

Figure 11. Frozen beef exports in 2017 by country € (Intra-commnity and outside-exports).



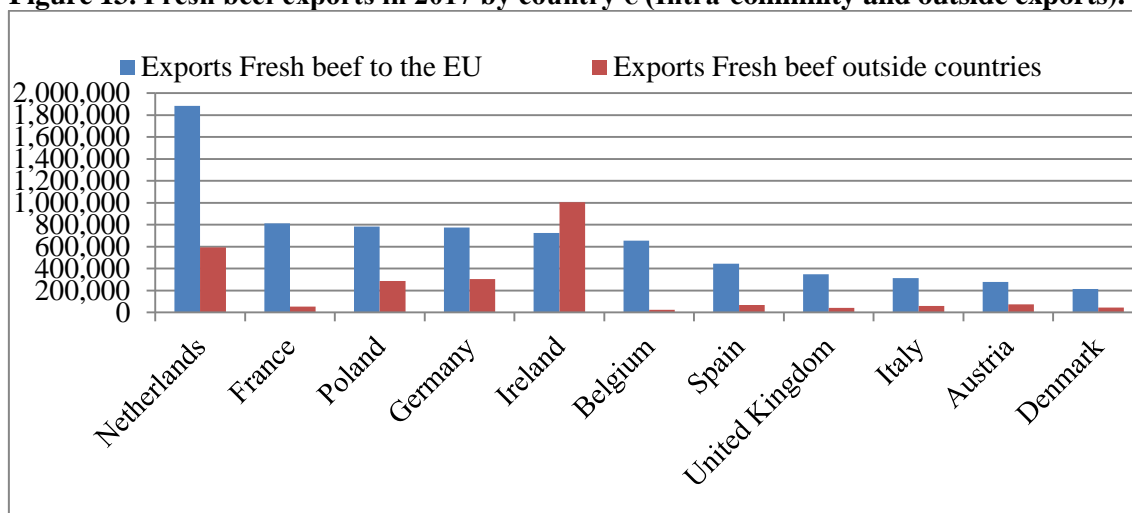
Source. Datacomex. Elaborated by authour with the data in Table IV.4 in Appendix IV.

Figure 12. Export Ranking by country(Thousands of €) 2017.



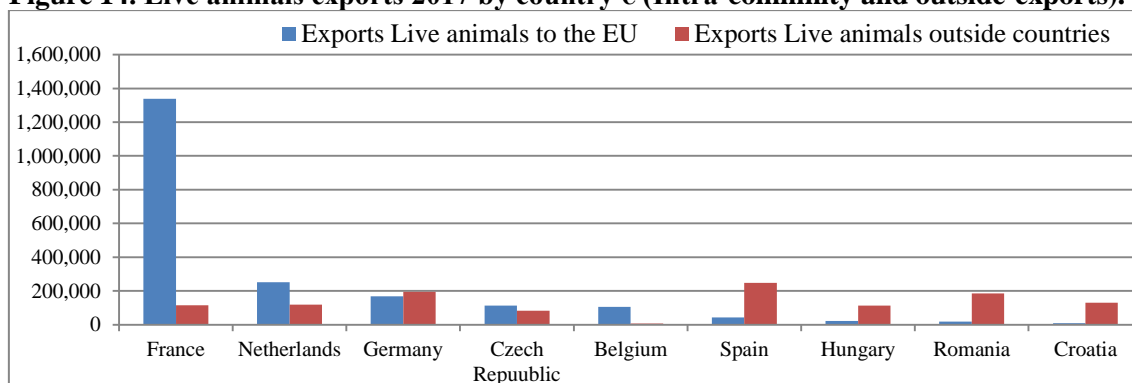
Source. Datacomex. Destination of exports. Total world. Elaborated by author using data from Table IV.4 in Appendix IV.

Figure 13. Fresh beef exports in 2017 by country € (Intra-community and outside exports).



Source. Datacomex. Elaborated by author with the data in Table IV.4 in Appendix IV.

Figure 14. Live animals exports 2017 by country € (Intra-community and outside exports).



Source. Datacomex. Elaborated by author with the data in Table IV.4 in Appendix IV.

We calculate the average percentage of variation of exports for each country. In Table 1, we show the average growth of exports from the most significant countries. (See Table IV.5 in Appendix IV).

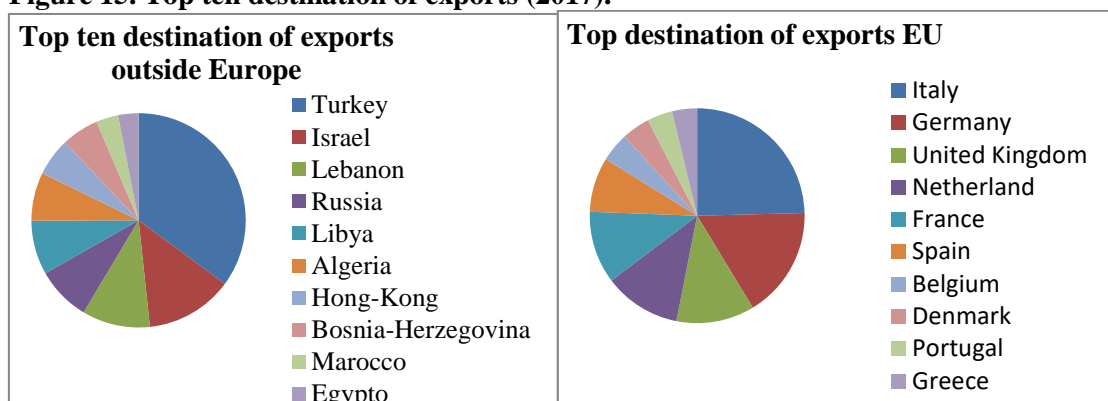
Table 1. Average growths of exports (2010/2017).

	Romania	Spain	Poland	Sweden	Netherlands	Ireland	Belgium	Italy	France	Denmark	Germany
Mean Var (2010-2017)	14.90%	12.23%	8.16%	7.65%	6.67%	5.01%	3.54%	2.48%	1.04%	0.83%	-1.03%

Source. Datacomex. Elaborated by author using data from Table IV.5 in Appendix IV.

Figure 15 shows the top ten destinations of exports. We elaborate separately the first ten European countries and the first ten countries outside Europe.

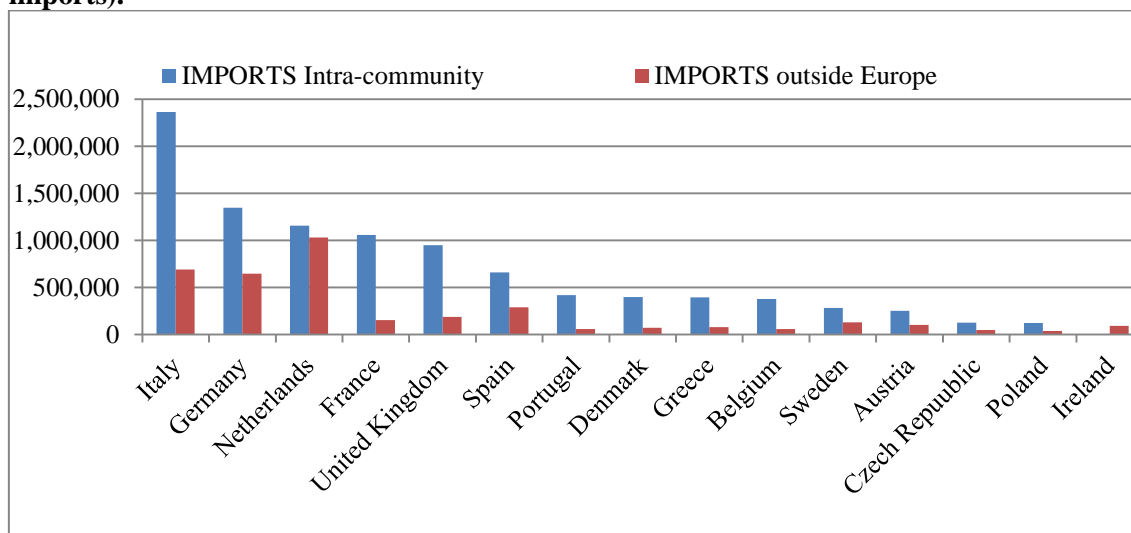
Figure 15. Top ten destination of exports (2017).



Source. Datacomex. Elaborated by the author using data from Table IV.6 in Appendix IV.

Figure 16 shows Intra-Community imports and outside Europe imports. The country with highest level of Intra-Community imports is Italy followed by Germany, Netherlands, France, United Kingdom, and Spain. On the other hand, the country with highest level of imports from other countries is Netherlands followed by Italy, Germany, Spain and United Kingdom. We collect the same information for each product. In the case of imports from countries outside Europe, Netherlands, Germany and Italy are the countries with highest imports of fresh beef. Italy, Netherlands and Spain have the highest level of imports of frozen beef. And Austria holds the first position in imports of live animals. In the case of imports from Europe, Italy, Germany, France and Netherlands are the countries with highest imports of fresh beef. Italy, Spain and Netherlands hold the highest positions with respect to the live animals imports. Finally, Germany, France, United Kingdom and Netherlands are the countries with highest imports of frozen beef. (See Table IV.7 and Figures IV.1, IV.2 and IV.3 in Appendix IV).

Figure 16. Total imports in 2007 by country (Intra-Community and outside Europe imports).



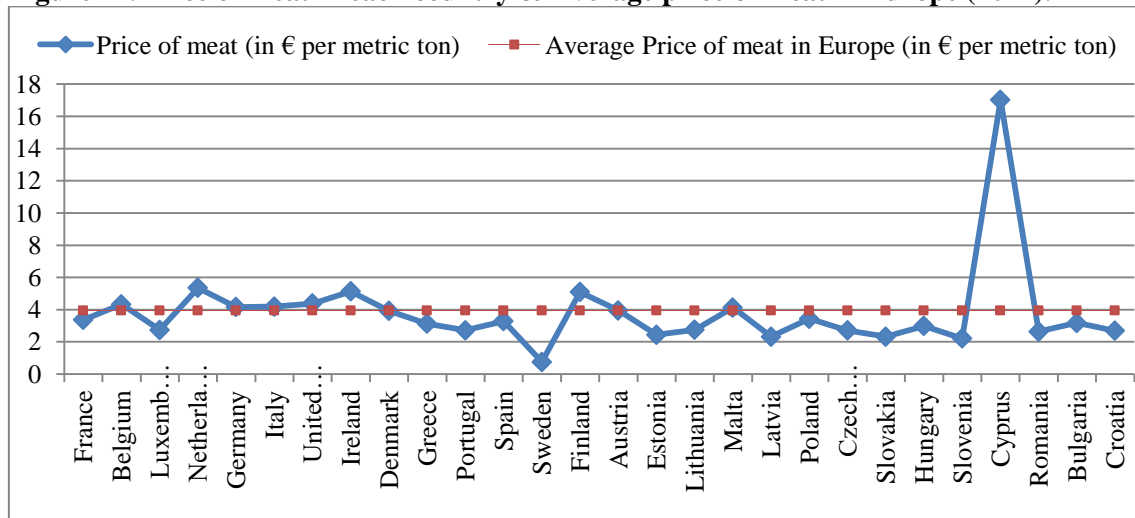
Source. Datacomex. Elaborated by the author using data from Table IV.7 in Appendix IV.

The next Figures show that the exports price per ton is different for each country. For example, the price per ton in Netherlands is higher than the price per ton in France.

Figure 17 compares the average price of one ton in Europe, 3.93 € /ton, with the average price per one ton in each country. We observe that countries like Netherlands, Belgium, Ireland, Finland and United Kingdom have slightly higher prices than the average price in Europe and in an uptrend we find Cyprus that stands out with a significant positive difference

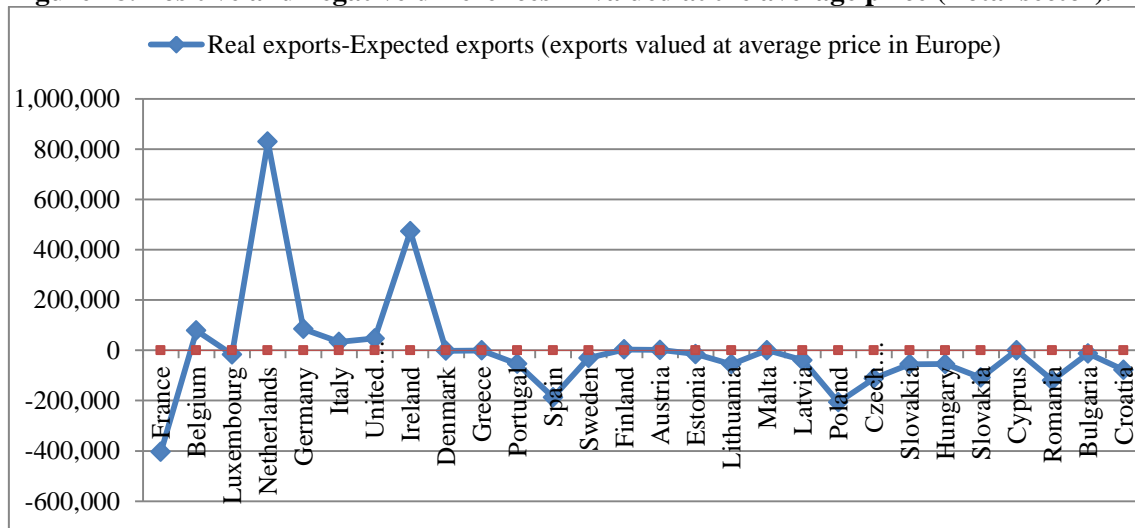
Figure 18 shows the amount of exports (in absolute terms) that have been sold at a price higher or lower than the European average price. This amount is the difference between the real exports of each country and expected exports (tons exported in each country by the average price per ton in Europe). Unlike the previous figure, Cyprus has a positive difference although very small while Netherlands and Ireland show a very significant positive difference. This is because Cyprus has a very low market share and Netherlands and Ireland have a high market share. In this Figure, France, Spain and Portugal have a significant negative difference because have a high market share.

Figure 17. Price of meat in each country & Average price of meat in Europe (2017).



Source. Datacomex. Elaborated by the author using data from Table IV.8 in Appendix IV.

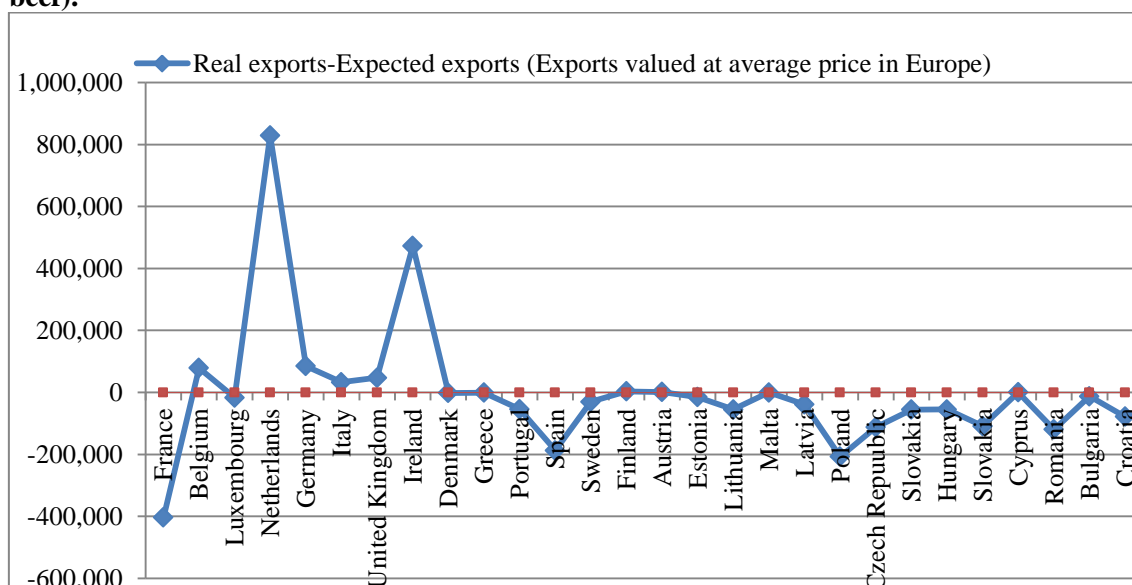
Figure 18. Positive and negative differences in valued at the average price (Total sector).



Source. Datacomex. Elaborated by the author using data from Table IV.8 in Appendix IV.

Figure 19 shows the expected exports of fresh beef according average price of fresh beef per ton in Europe. Countries like Netherlands and Ireland exhibit a significant positive difference. That is, they sell fresh meat at a price above the average price in Europe and also their market share is significant. On the other hand, France, Spain and Portugal exhibit negative differences, they sell fresh meat at a price below the average price in Europe. (See Figure IV.4 and Table IV.9 in Appendix IV).

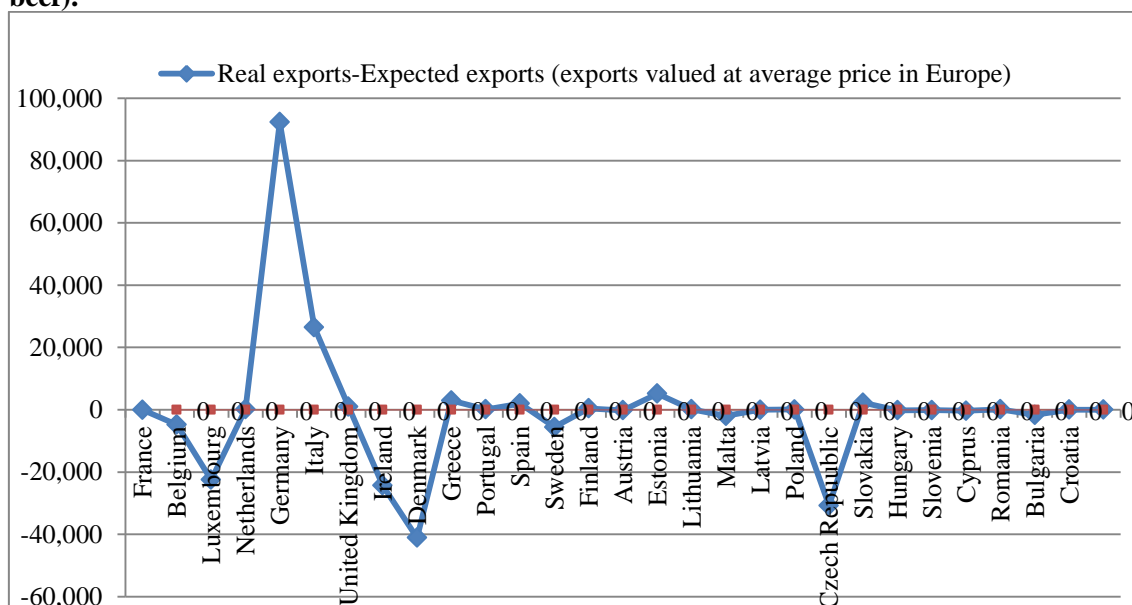
Figure 19. Positive and negative differences in exports valued at the average price (Fresh beef).



Source. Datacomex. Elaborated by the author using data from Table IV.9 in Appendix IV.

Figure 20 shows the same calculation but for frozen meat. Netherlands stands out with a significant positive difference above the average. On the other hand, Belgium, Ireland and Poland reflect significant negative differences. (See Figure IV.5 and Table IV.10 in Appendix IV).

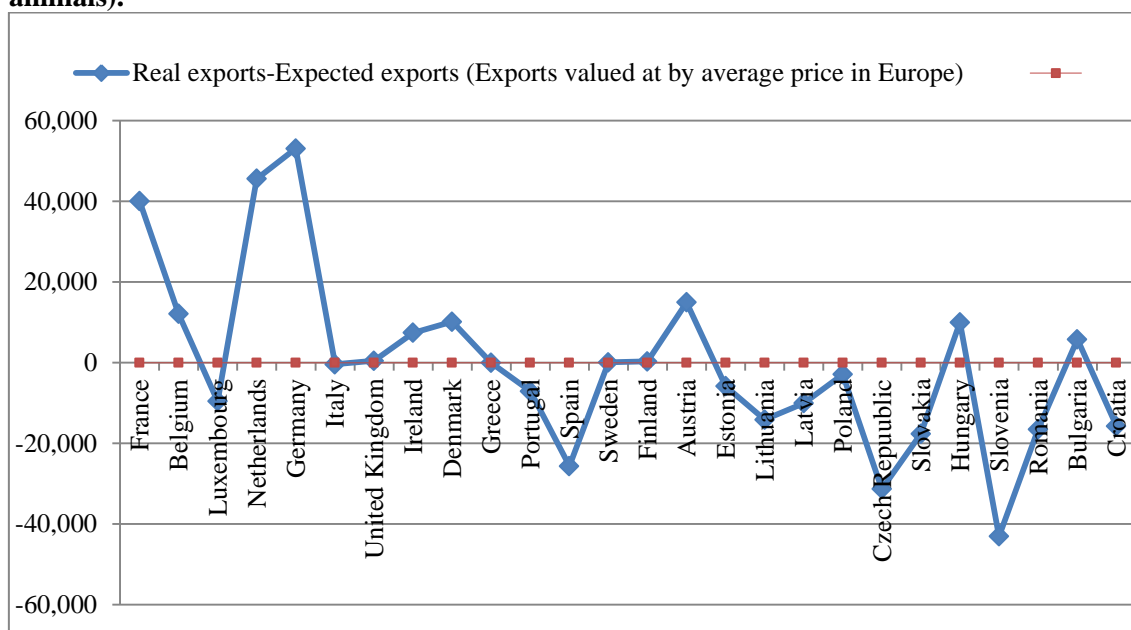
Figure 20. Positive and negative differences in exports value at the average price (Frozen beef).



Source. Datacomex. Elaborated by the author using data from Table IV.10 in Appendix IV.

Figure 21 shows the same calculation for the live animal market. Countries like France, Netherlands, Germany, Ireland, Denmark, Austria and Hungary stand out for having significant positive differences. That is, they sell live animals at a price above the average price in Europe. On the contrary, Luxembourg, Portugal, Spain, Lithuania, Czech Republic, Slovenia and Croatia exhibit significant negative differences. We observe that these countries sell live animals at a price below the average price in Europe. (See Figure IV.6 and Table IV.11 in Appendix IV).

Figure 21. Positive and negative differences in exports value at the average price (Live animals).



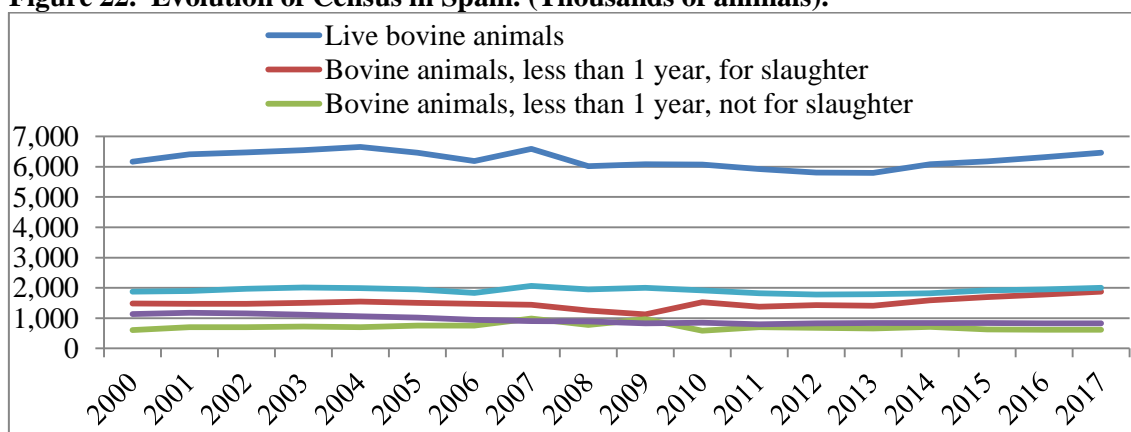
Source. Datacomex. Elaborated by the author using data from Table IV.11 in Appendix IV.

2.1 The bovine Agrofood Sector

In this section we will describe the cattle sector in Spain. Figure 22 shows the evolution of the census in Spain between 2000 and 2017 by type of animal. The census for live bovine animals was stable showing a moderate upwards-trend. The numbers of animals younger than one year, for slaughter, have increased in the last decade. Finally, in Spain the number of non-dairy cows is higher than that for dairy cows. Also, the number of non-dairy cows exhibit and increasing trend, while the number of dairy cows show a decreasing trend.

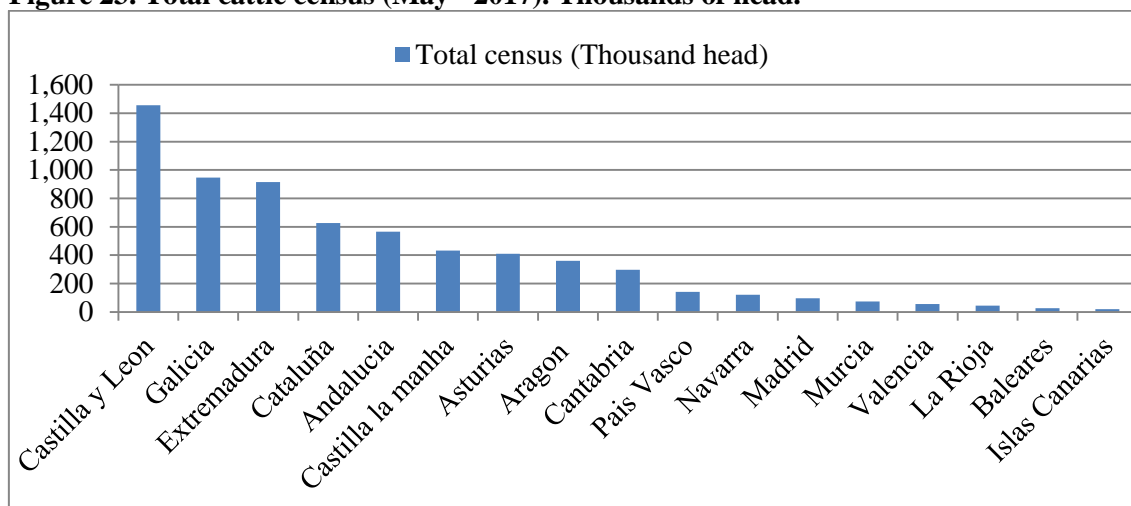
Figure 23 shows the number live bovine in thousands of animals in each Region. During 2017, the Region with the highest number of animals is Castilla y Leon, followed by Galicia, Extremadura, Catalonia, Andalucía and Castilla la Mancha.

Figure 22. Evolution of Census in Spain. (Thousands of animals).



Source. MAPAMA. Elaborated by the author using data from Table V.1 in Appendix V.

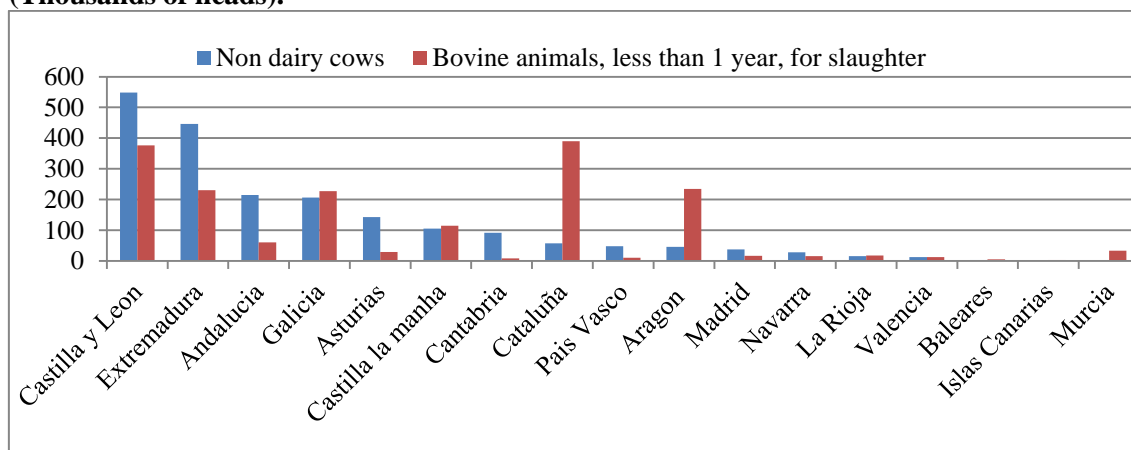
Figure 23. Total cattle census (May - 2017). Thousands of head.



Source. MAPAMA. Elaborated by the author using data from Table V.1 in Appendix V.

In Figure 24, we can see the difference between non-dairy cows and animals for slaughter and we observe that there are some Regions specialized in slaughter farms. Clearly, this is the case of Cataluña, Aragón, Galicia, Castilla la Mancha and Murcia, where the number of bovine animals, younger than one year, for slaughter is higher than number of non-dairy cows. So these Regions buy small animals and fatten them for selling them later on the market.

Figure 24. Census Non-Dairy cows & Animals younger than year, for slaughter (Thousands of heads).

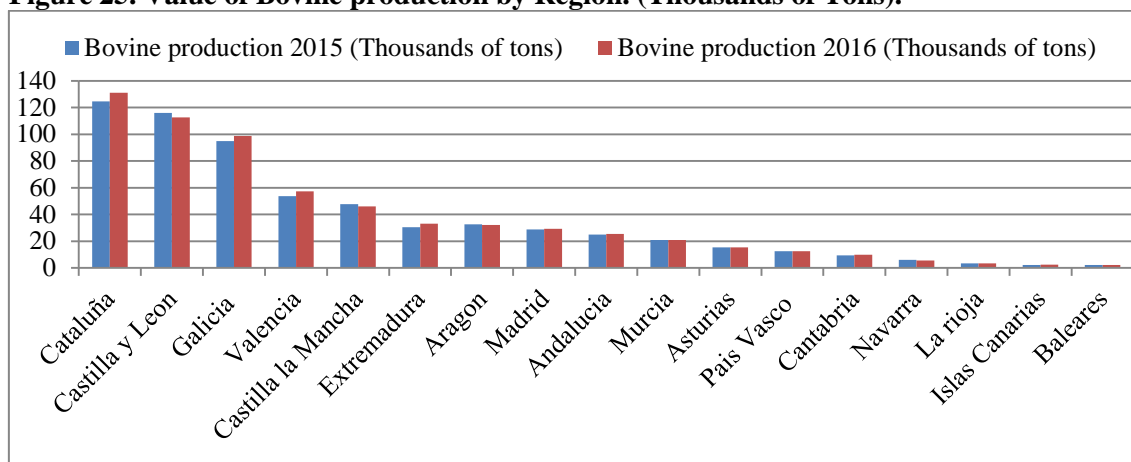


Source. MAPAMA. Elaborated by the author using data from Table V.1 in Appendix V.

Figure 25 shows the value of bovine production by Regions, the Region with the highest volume of slaughtered tons is Cataluña followed by Castilla y Leon Galicia, Valencia, Castilla la Mancha, Extremadura and Aragón.

However, we should note that the Regions with more animals are not the same as the Regions with the largest amount of meat slaughtered. We could find some examples where a Region is ranked in a high position according to the number of animals but is ranked in a lower in terms of the amount of meat slaughtered. For example, Castilla y Leon has a higher number of animals than Cataluña, but Cataluña have a higher volume of tons slaughtered. We find something similar in Valencia and Madrid, regions better positioned in volume of slaughtered tons compared to the number of animals. This means that, Cataluña, Valencia and Madrid buy and slaughter animals from other regions.

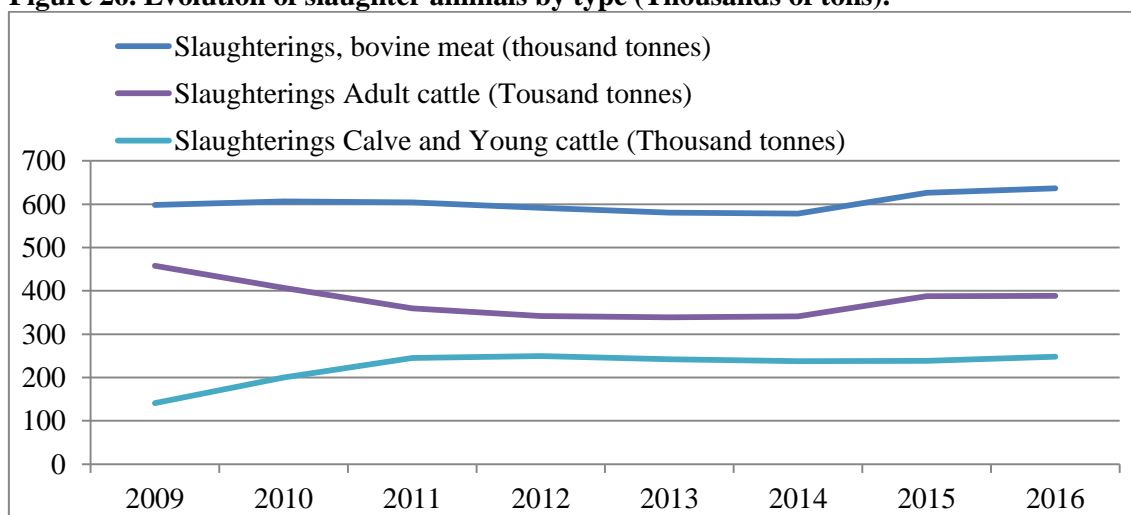
Figure 25. Value of Bovine production by Region. (Thousands of Tons).



Source. MAPAMA. Elaborated by the author using data from Table V.2 in Appendix V.

Figure 26 shows evolution of slaughter meat by type of animal measured in thousands of tons. In Spain, the tons of animals slaughtered have increased in recent years. In particular, the tons of slaughtered adult animals have had a decreasing trend. And the tons of young cattle and calve animals have had an increasing trend.

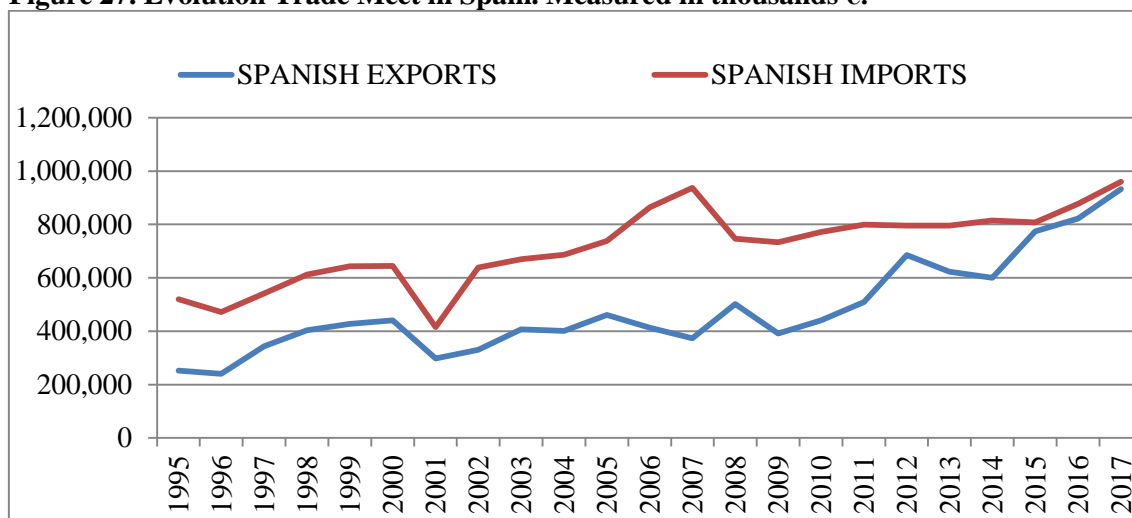
Figure 26. Evolution of slaughter animals by type (Thousands of tons).



Source. Eurostat. Elaborated by the author using data from Table V.3 in Appendix V.

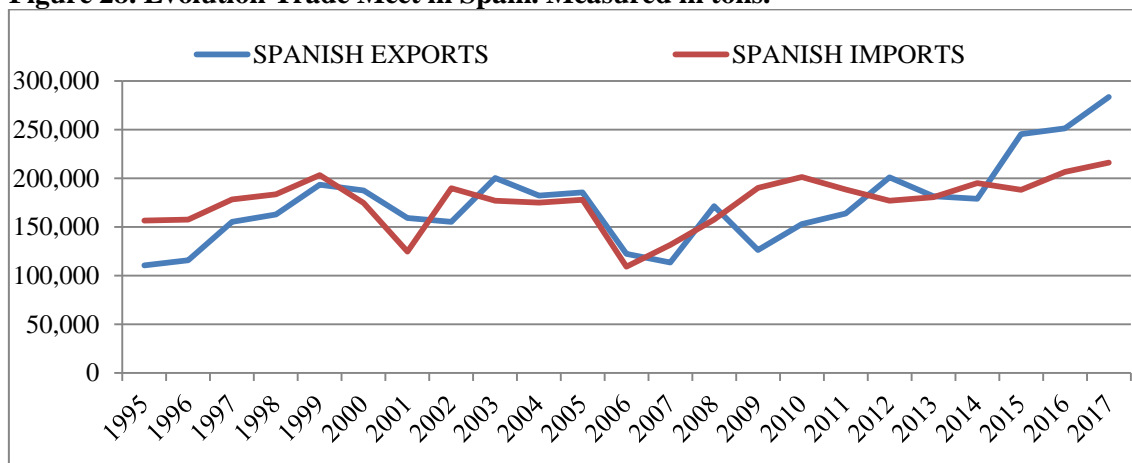
Figures 27 and 28 show the exports and imports measured in thousands of € and tons between 1995 and 2017. For these years, imports measured in € are higher than exports but in recent years exports have grown rapidly and in 2017 the two quantities are now very close. The evolution of exports and imports measured in tons is different. During the period there are some years that exports are larger and other years the opposite is observed. On aggregated, we observe that Spanish exports are higher than imports. In general, when exports in tons exceeded imports in tons, this signals that the value of exports is lower than imports.

Figure 27. Evolution Trade Meet in Spain. Measured in thousands €.



Source. Datacomex. Elaborated by the author using data from Table V.4 in Appendix V.

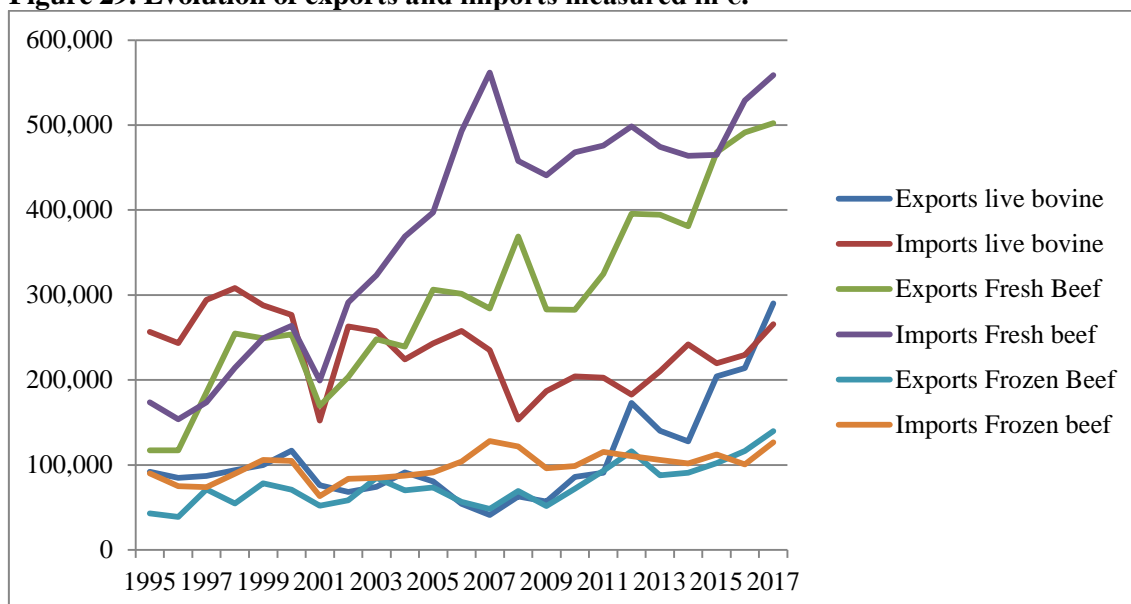
Figure 28. Evolution Trade Meet in Spain. Measured in tons.



Source. Datacomex. Elaborated by the author using data from Table V.4 in Appendix V.

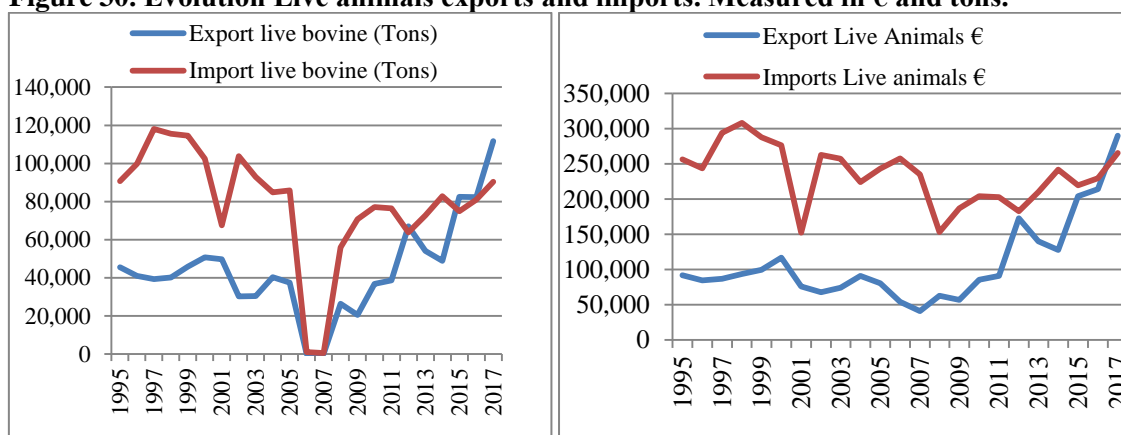
Figures 29, 30, 31 and 32 show exports and imports by type of products between 1995 and 2017 and measured, both in tones and €. The highest exports and imports are fresh beef followed by live animals and finally frozen beef. The highest growth percentage is for exports of live animals followed by imports of live animals, frozen meat imports and frozen meat exports, imports of fresh meat an exports of fresh beef. Regarding live animals, exports and imports measured in tons and € are correlated. In both measures, imports are higher than exports until 2015, next year's exports are higher than imports. Regarding the market of fresh and frozen meat, in almost during all the period, imports in € are larger than exports in € and imports in tons are smaller than exports in tons. This means that, for these products the value of exports is lower than value of imports. (See, Table V.6 and Figures V.6, V.7 and V.8 in Appendix V).

Figure 29. Evolution of exports and imports measured in €.



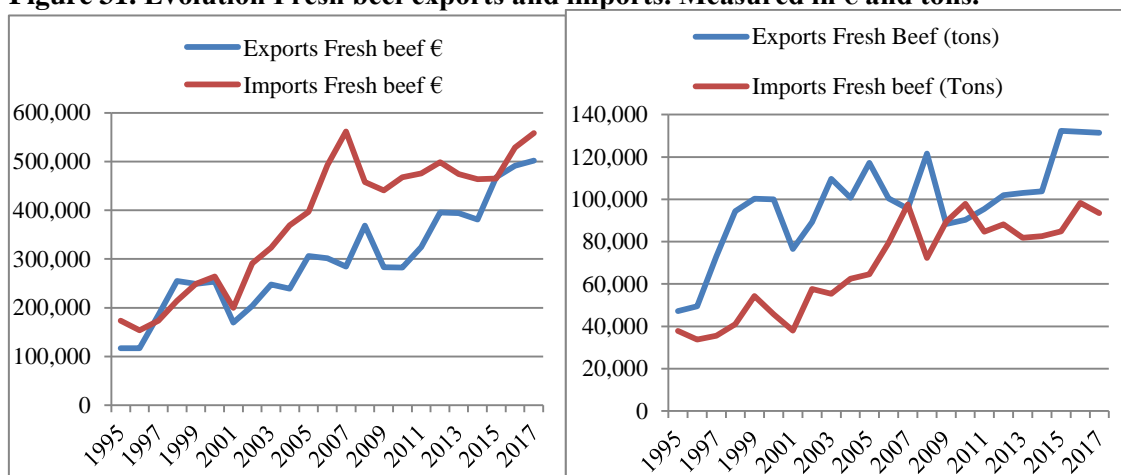
Source. Datacomex. Elaborated by author with the data in Tables V.5 and V.6 in Appendix V

Figure 30. Evolution Live animals exports and imports. Measured in € and tons.



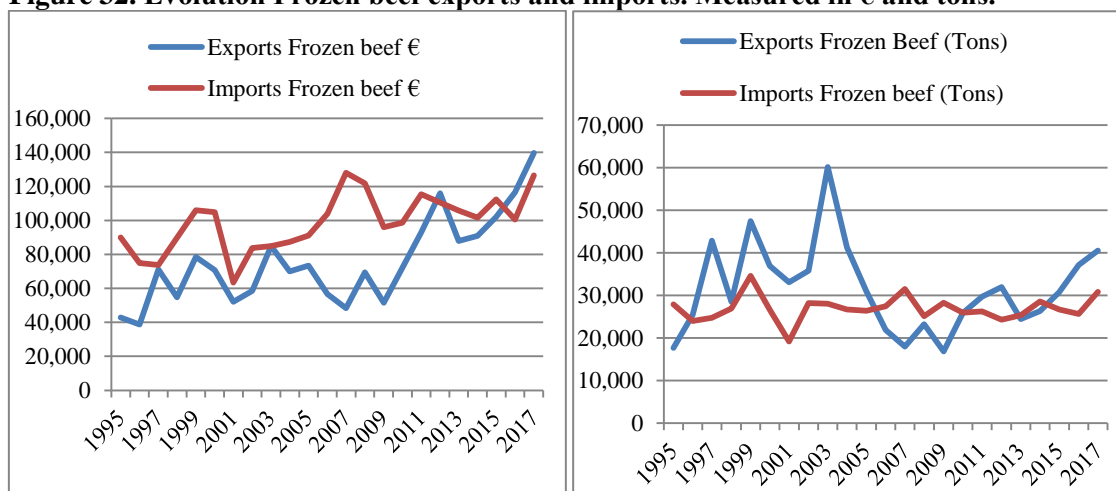
Source. Datacomex. Elaborated by author with Tables V.5 and V.6 in Appendix.

Figure 31. Evolution Fresh beef exports and imports. Measured in € and tons.



Source. Datacomex. Elaborated by the author with the data in Tables V.5 and V.6 in Appendix V.

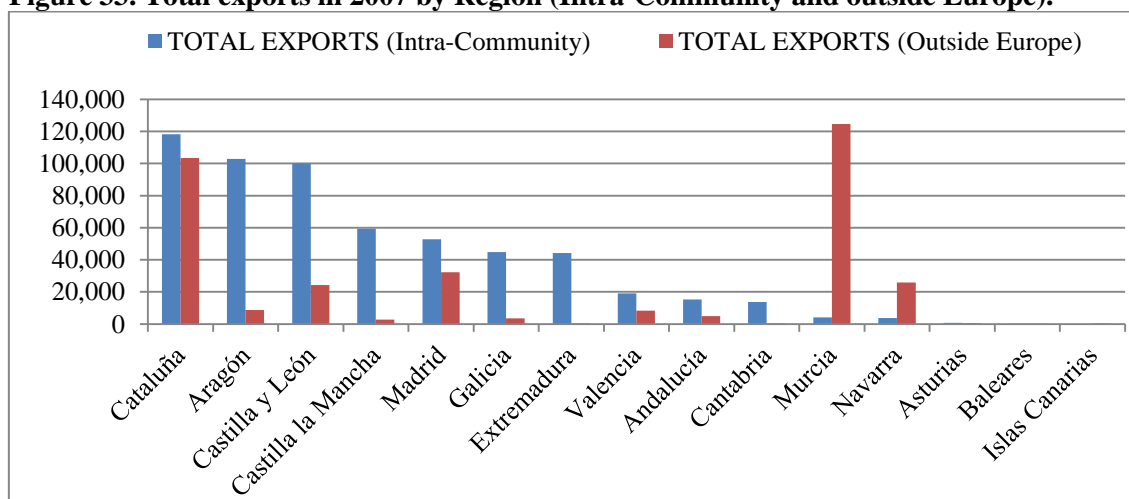
Figure 32. Evolution Frozen beef exports and imports. Measured in € and tons.



Source. Datacomex. Elaborated by the author with data in Tables V.5 and V.6 in Appendix V.

Figure 33 shows Intra-Community exports and outside Europe exports. In general, the Intra-Community exports are higher than exports outside Europe. The Regions that mainly export to Europe are Cataluña, Aragón and Castilla y León. And the Regions with the highest levels of exports abroad are Cataluña, Murcia and with much difference Madrid. The Regions with highest level of Intra-Community live animals exports is Murcia follow by Cataluña, Navarra and Aragón. On the other hand, the Region with highest level of intra-community fresh beef exports is Cataluña, Castilla y Leon and Aragón. The exports outside Europe are not very important for fresh beef and live animals. Finally, Regions with highest level of Intra-Community exports of frozen beef is Madrid followed by Castilla la Mancha, Cataluña and Valencia. The exports outside Europa are important for Madrid and Cataluña. (See Table V.8 and Figures V.1, V.2 and V.3 in Appendix V.)

Figure 33. Total exports in 2007 by Region (Intra-Community and outside Europe).



Source. Datacomex. Elaborated by the author using data from Table 25 in Appendix V.

Analyzing the main destinations of Spanish exports. We observe that for live animals, the main destinations are Arab countries. On the other hand, the destination of fresh meat is mainly Europe. However, for frozen meat, we find destinations as Asia or South America. (See Table V.7 in Appendix V).

Next we analyze imports from Europe and outside Europe. On aggregate, we see the imports from Europe are higher than imports from other countries. Madrid followed by Cataluña, País Vasco, Valencia are the Regions with high levels of imports. Islas Canarias has high imports

from countries outside of Europe. Now, we distinguish by product. Cataluña purchases a lot of live animals from Europe. Imports of frozen beef from outside of Europe are higher than frozen beef imports from Europe and Islas Canarias have the first place. The Regions with significant imports of fresh beef are Madrid, Cataluña and Valencia, while Islas Canarias purchases fresh beef outside Europe. (See Table V.9 and Figures V.4, V.5, V.6 and V.7. in appendix V).

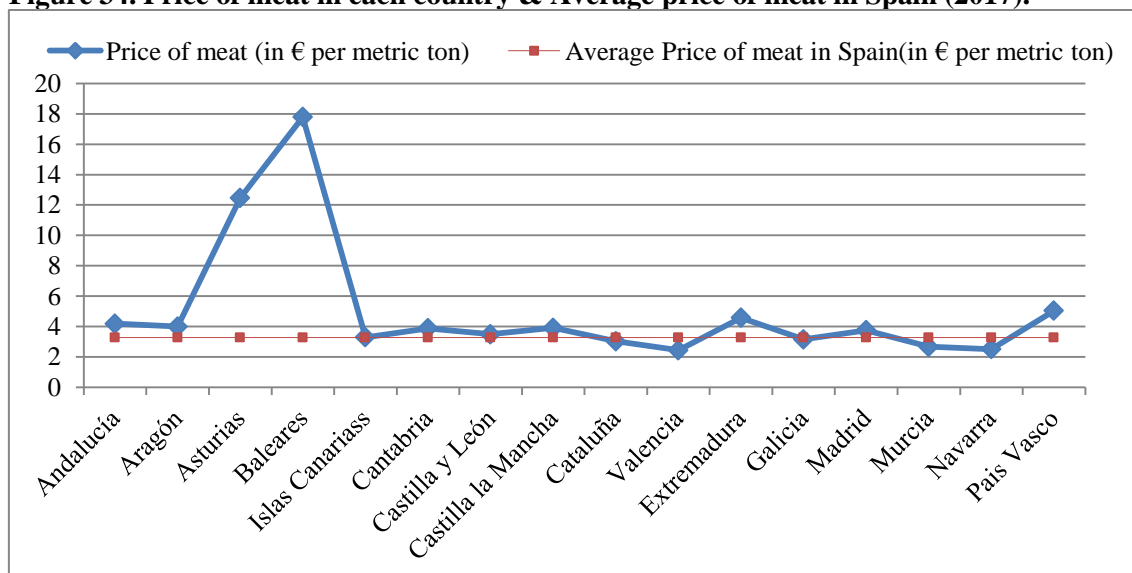
The main countries of origin of the Spanish imports are France, Portugal and Germany for live animals, Netherlands, Poland and Germany for fresh beef and Poland, Germany and Uruguay for frozen meat. (See Table V.10 in Appendix V).

The next Figures show that the exports price by ton is different for each Region. For example, the price per ton in Asturias is higher than the price per ton in Valencia.

Figure 34 compares the average price per one ton in Spain, 3.28 € per ton, with the average Price of one ton in each Region. We observe Regions like Andalucía, Cantabria, Castilla la Mancha, Castilla y León, Islas Canariass, Extremadura, Madrid and País Vasco that have slightly higher prices than the average and we find Asturias and Baleares that stands out with a significant positive difference. On the contrary, we find Regions like Cataluña, Valencia, Galicia, Murcia and Navarra with lower prices compared to the average price in Spain.

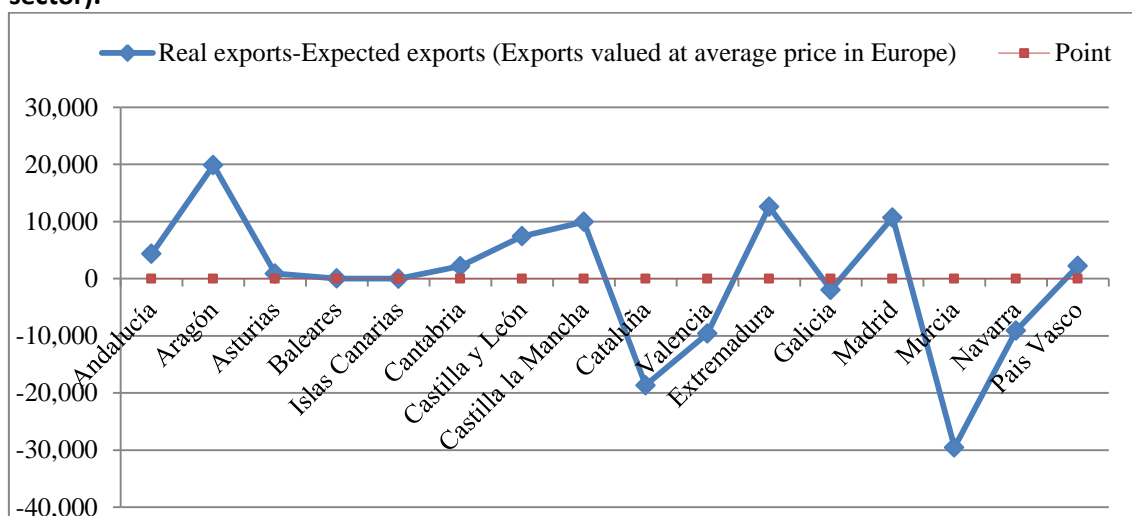
Figure 35 shows the amount of exports (in absolute terms) that have been sold at a price higher or lower than the European average. This amount is the difference between the real exports of each country and expected exports (tons exported in each country by the average price per ton in Europe). Unlike the previous figure, Baleares and Asturias has a positive difference very small while Aragón, Extremadura y Madrid a very significant positive difference. This is because Baleares and Asturias have a very low market share and Aragón, Extremadura and Madrid have a high market share. In this Figure, Valencia, Cataluña and Navarra have a significant negative difference because have a high market share.

Figure 34. Price of meat in each country & Average price of meat in Spain (2017).



Source. Datacomex. Elaborated by the author using data from Table V.11 in Appendix IV.

Figure 35. Positive and negative differences in exports valued at the average price. (Total sector).



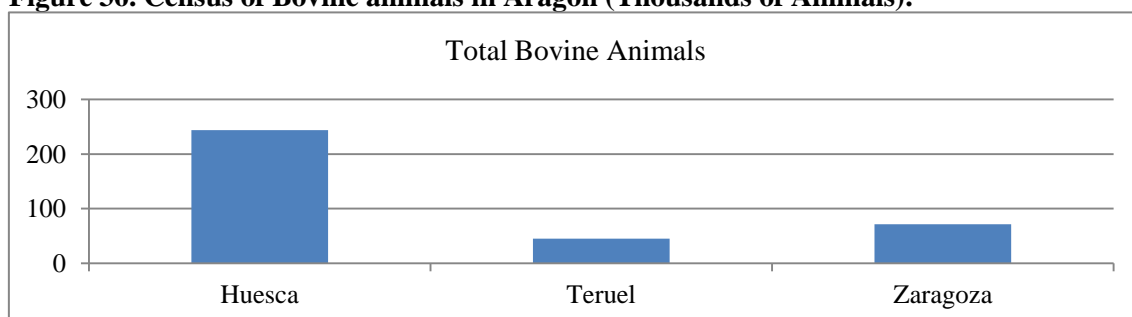
Source. Datacomex. Elaborated by the author using data from Table V.11 in Appendix V.

Finally, we perform the same analysis for type of product. According exports of live animals, the region with positive differences (The price per ton is higher than the average price) are Castilla y León, Aragón and Murcia. On the contrary the regions with negative difference are Catalonia and Navarra. On the other hand, for fresh meat, the regions with differences positives are Aragón, Extremadura and Madrid. And Valencia has a significant negative difference. Finally, regarding frozen meat, Andalucía, Castilla la Mancha and Madrid exhibit a positive difference, whereas for Catalonia, Castilla y León, Galicia and Aragón we observe negative differences. (See Tables V.12, V.13 and V.14 and Figures V.8, V.9 and V.10 in appendix V).

2.2.1 The Agrofood sector in Aragón

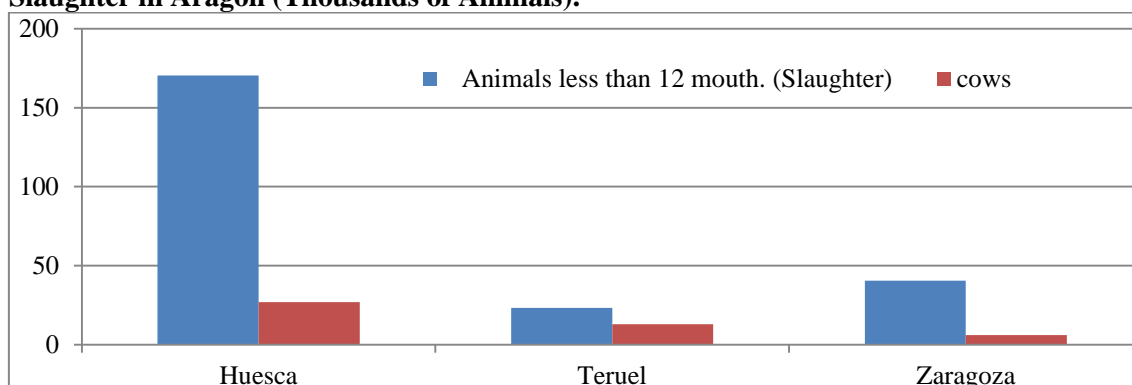
We pay attention to the bovine sector in Aragón. Figure 36 show the number of animals in each Region of Aragón. The region with the largest number of animals is Huesca, followed by Zaragoza and Teruel. Figure 37 shows census of cows and census of animals younger than one year for Slaughter. In all Regions of Aragón the numbers of cows are smaller than the number of animals younger than one year for slaughter. This mean that, Aragón buys and slaughter animals from others regions.

Figure 36. Census of Bovine animals in Aragón (Thousands of Animals).



Source. Datacomex. Elaborated by the author using data from Table V.14 in Appendix V.

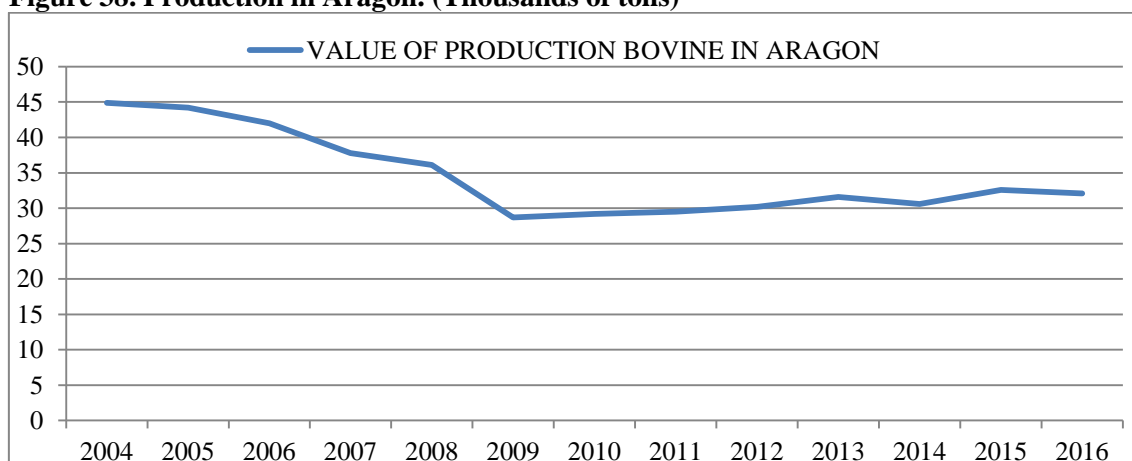
Figure 37. Census of cows compared with census of animals younger than one year for Slaughter in Aragon (Thousands of Animals).



Source. MAPAMA. Elaborated by the author using data from Table V.14 in Appendix V.

On the other hand, Figure 38 shows the evolution of value of production bovine measured in thousands of tons between 2004 and 2016. The production has decreased since 2004 to 2009. After that, the production has increased showing a moderate upward-trend.

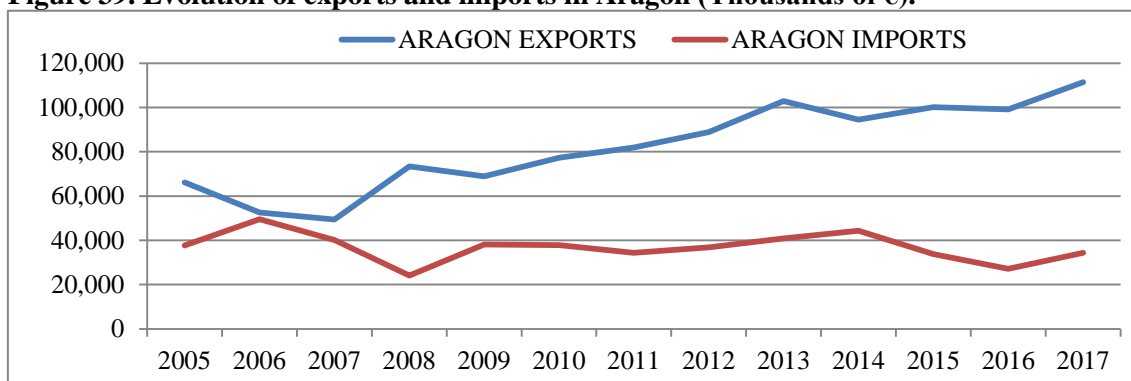
Figure 38. Production in Aragon. (Thousands of tons)



Source. MAPAMA. Elaborated by the author using data from Table V.15 in Appendix V.

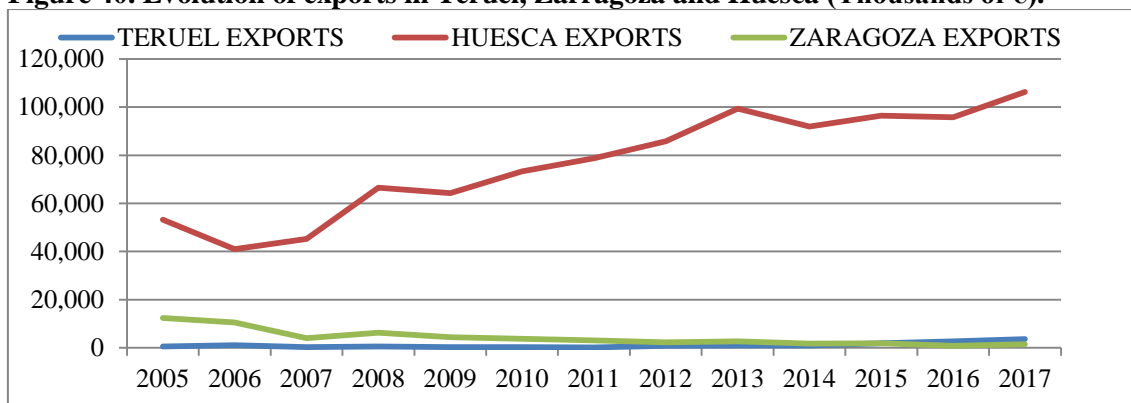
Figure 39 shows the value of exports and imports measured in thousands of € between 2005 and 2017 in the trade of bovine sector. For these years, the value of exports is higher than the value of imports. Exports have increased in the last decade. And imports have decreased since 2005 to 2017. Figure 40 shows the exports in thousands of € in Zaragoza, Huesca and Teruel. Huesca has the highest exports and have increased considerably in the last decade. In the first years Zaragoza have higher exports than Teruel, but in the last three years Teruel has higher exports than Zaragoza.

Figure 39. Evolution of exports and imports in Aragon (Thousands of €).



Source. Datacomex. Elaborated by the author using data from Table V.16 in Appendix V.

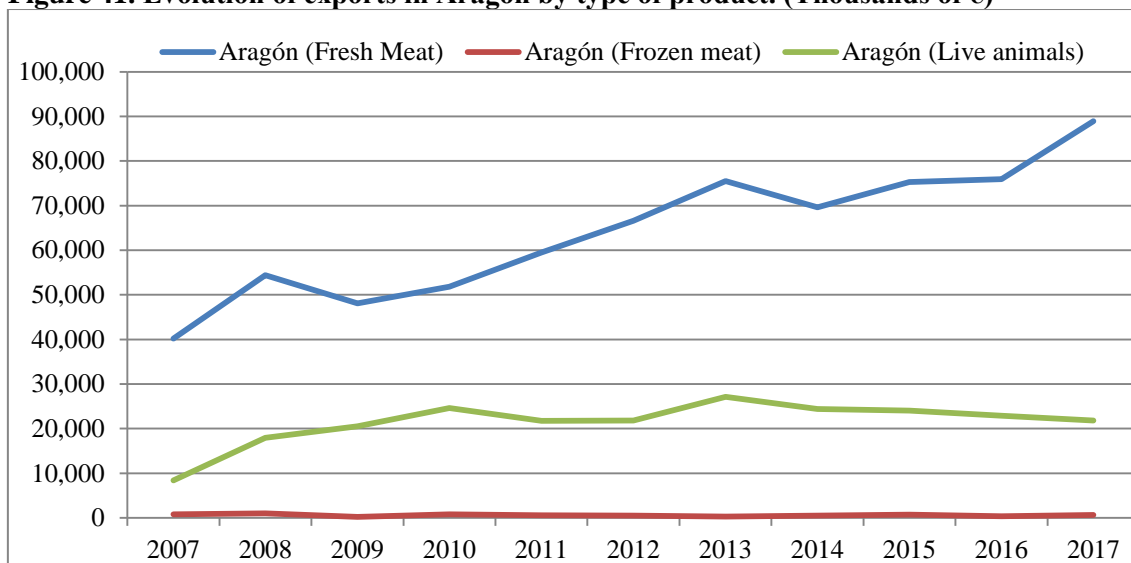
Figure 40. Evolution of exports in Teruel, Zarragoza and Huesca (Thousands of €).



Source. Datacomex. Elaborated by the author using data from Table V.16 in Appendix V.

Figure 41 shows evolution of exports in Aragon by type the product. The exports of fresh meat have increased considerably and exports of live animals have increased between 2007 to the 2013 and the last four year the exports of live animals have decreased. The exports of frozen beef are almost zero. The exports of Fresh beef are the highest.

Figure 41. Evolution of exports in Aragon by type of product. (Thousands of €)

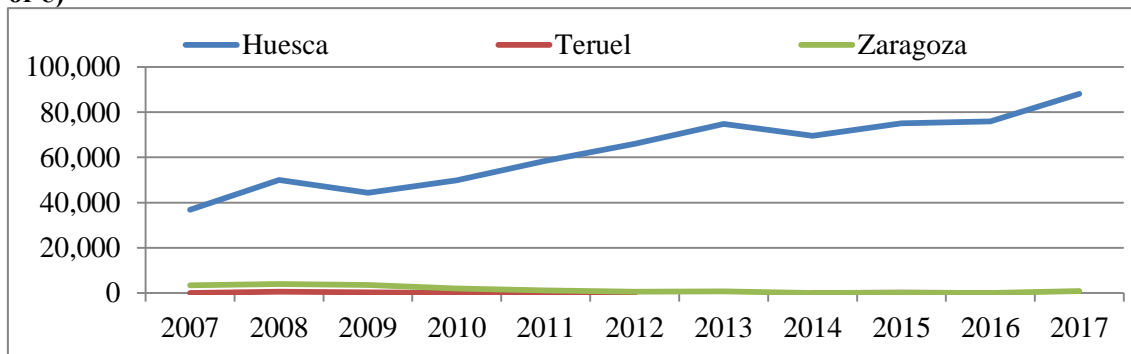


Source. Datacomex. Elaborated by the author using data from Table V.17 in Appendix V.

After that, we compare the exports by product and province Zaragoza, Huesca and Teruel. Figure 42 shows exports of fresh beef in Zaragoza, Huesca and Teruel. Huesca has the highest

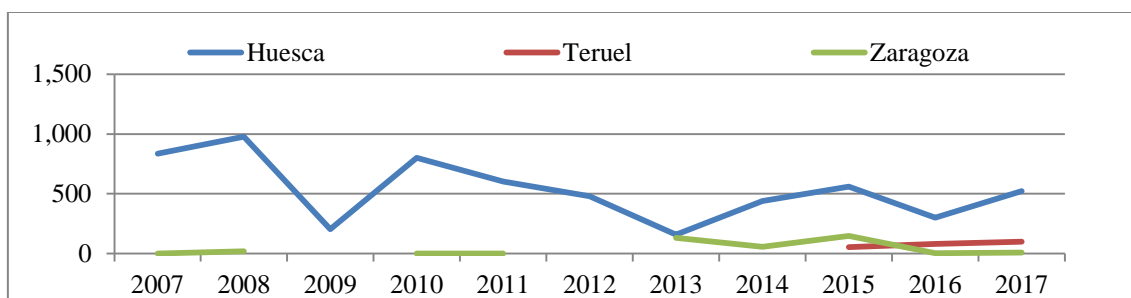
exports. Figure 43 shows exports of frozen beef in Zaragoza, Huesca and Teruel. Huesca has the highest exports. Teruel have increased exports in the las three years. Figure 44 shows exports of frozen beef in Zaragoza, Huesca and Teruel. Huesca has the highest exports. Teruel have increased exports in the las four years.

Figure 42. Evolution of exports of Fresh beef in Zaragoza, Huesca and Teruel (Thousands of €)



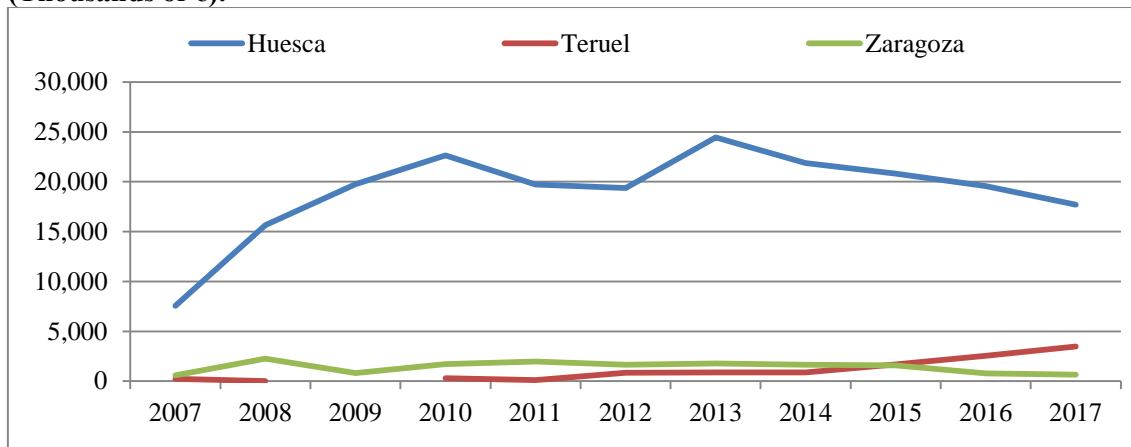
Source. Datacomex. Elaborated by the author using data from Table V.18 in Appendix V.

Figure 43. Evolution of exports of Frozen beef in Zaragoza, Huesca and Teruel (Thousands of €).



Source. Datacomex. Elaborated by the author using data from Table V.18 in Appendix V.

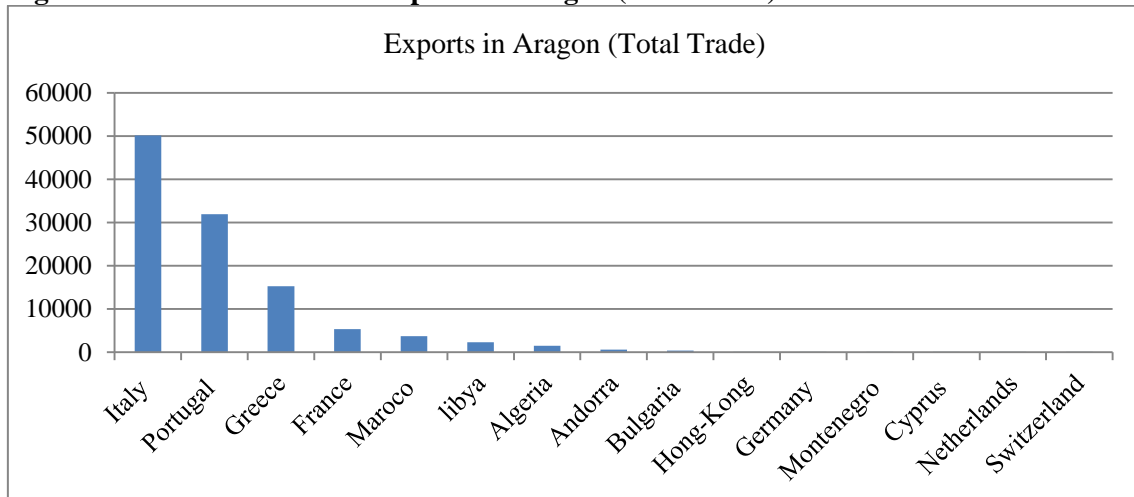
Figure 44. Evolution of exports of Frozen beef in Zaragoza, Huesca and Teruel (Thousands of €).



Source. Datacomex. Elaborated by the author using data from Table V.18 in Appendix V.

Figure 45 shows the main destinations of exports in Aragon. Italy is the country that received a highest quantity of product from Aragon followed by Portugal, Greece, France and Morocco.

Figure 45. Destinations of the exports in Aragon (Total trade).



Source. Datacomex. Elaborated by the author using data from Table V.18 in Appendix V.

Chapter 3

The role of cooperatives in the Agro-Food sector

In this chapter we study the sector of cooperativism in Europe and Spain. Finally, we explain a specific cooperative in a rural localization of Cantavieja, Teruel.

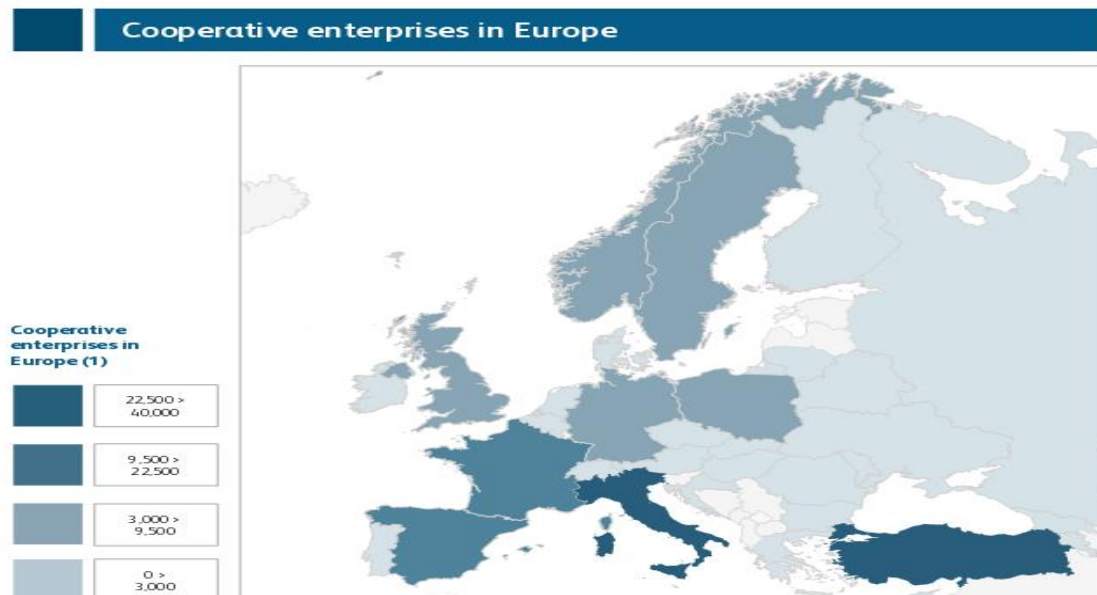
We define a cooperative as “*A cooperative is an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise.*” (Wikipedia).

3.1. Role of cooperatives in Europe

The objective of this section is to provide a view on cooperatives in the beef sector. However, since we do not find specific data for the cattle sector, we decided to include the data of the cooperatives in the Agro-Food sector.

Figure 46 shows the number of cooperatives in Europe. We can divide the different countries into four groups. The first group included countries that register between 22.500 and 40.000 cooperatives. Italy and Turkey are in this group. A second group includes countries that register between 9.500 and 22.500 cooperatives. Spain and France are in this group. The next group, are countries that register between 3000 and 9.500 cooperatives, where we find Germany, Poland and United Kingdom. Finally the last group includes countries that register less than 3000 cooperatives, and we find Ireland, Norway, Finland among others in this group.

Figure 46. Number of cooperatives in Europe (Agro-Food sector)

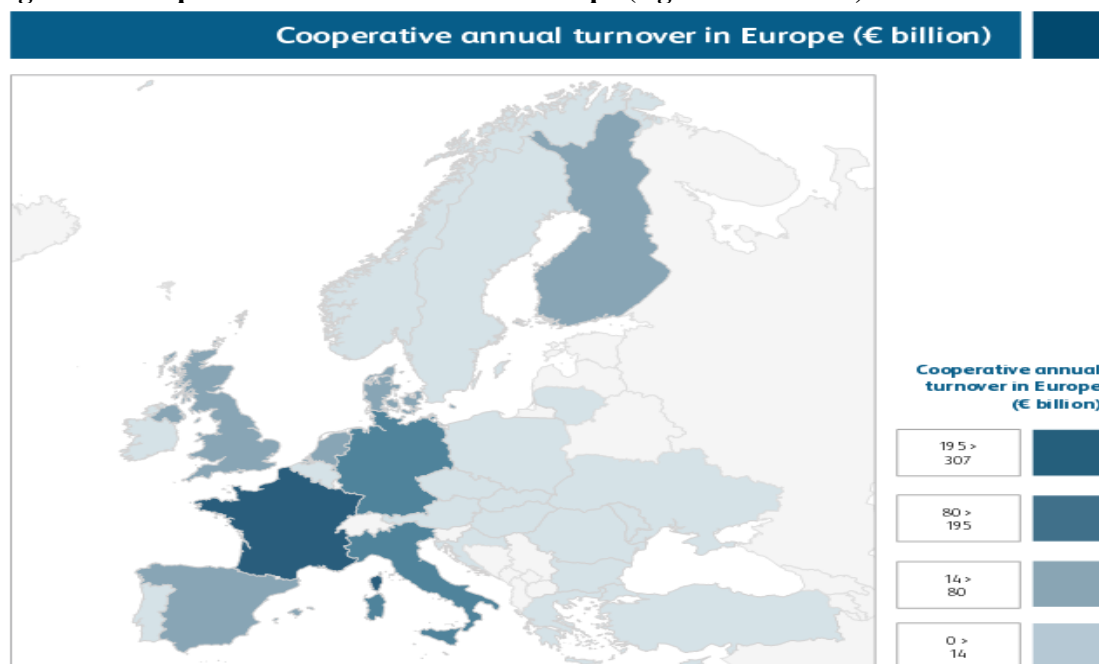


Source. Elaborated by Carmen Quintana Cocolina, with cooperatives Europe’s team, published in April of 2016.

Figure 47 shows the turnover of cooperatives in each country of Europe. In a first group we find Countries that register between 195 and 307 billion of € of turnover, France is in this group. In the second group we find the countries that register between 80 and 195 billion of € of turnover. Germany, Italy and Finland are in this group. The next group, are countries that register between 14 and 80 billion of € of turnover, Spain, United Kingdom and Netherlands are in this group.

Finally the last group represents countries that register less than 14 billion of € of turnover, where we find countries like Norway, Ireland, Belgium or Sweden.

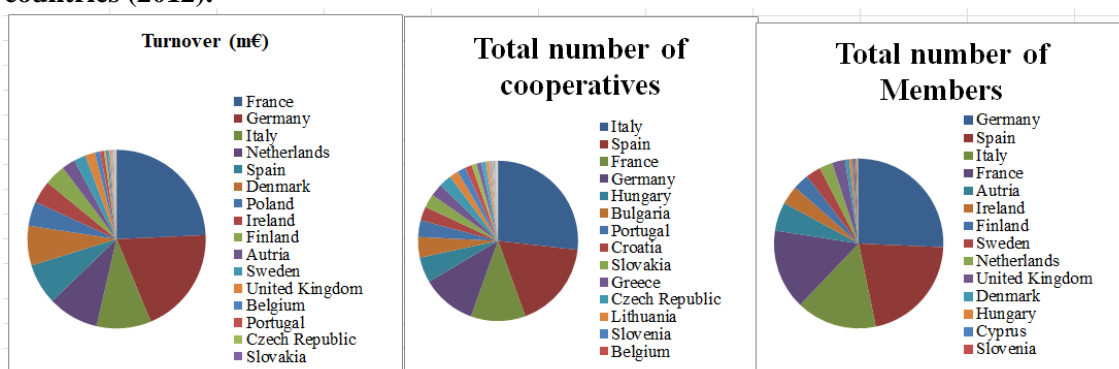
Figure 47. Cooperatives annual turnover in Europe (Agro-Food sector).



Source. Elaborated by Carmen Quintana Cocolina, with cooperatives Europe’s team, published in April of 2016.

We will focus now in the characteristics of cooperatives in the European Agro-Food sector. In Figure 48, we show the most important countries concerning the number of members, number of cooperatives and turnover. These three parameters are not correlated. For example, Italy is first with respect to number of cooperatives but third if we consider turnover and number of members. Another example is France, first in turnover but in third position with respect to the number of cooperatives and fourth position if we consider the number of members.

Figure 48. Turnover, number of cooperatives and number of members. Ranking by countries (2012).



Source: Elaborated by the author using data from Table 29 in Appendix VI, from COGECA (2014).

The average turnover by cooperative is different for each country, there are countries whose average turnover by cooperative is low, while other countries have a high average turnover by cooperative. Countries in North Europe like Denmark, Finland, Sweden, Ireland, Netherlands have a high average turnover by cooperative. While countries like Germany, Estonia, France,

Latvia, Malta, Austria, and United Kingdom have a lower average turnover by cooperative. Finally, Spain, Belgium, Greece, Portugal and others exhibit a very low average turnover by cooperative. (See Table VI.1 in Appendix VI).

Table VI.2 in Appendix VI, shows the turnover of the top 20 EU Agri-Cooperatives. In the top of the list we find Germany, Netherlands, Denmark, France, Ireland and Sweden. Table VI.3 in Appendix VI shows the turnover of the top 10 meat cooperatives. In this case, the main places of cooperatives with high level of turnover are Denmark, Netherlands, Italy, Germany Finland, France and Spain.

3.2 Coopeativism in Spain

In this point we analyze the cooperatives in Spain. We obtain the data from “Socioeconomic Observatory of Spanish Agro-Alimentary Cooperativism OSCAE”. Cooperatives Agro-Alimentary promotes a cooperative business model, profitable, competitive, professionalized, generator of value, thus contributing to the sustainability of the sector. The organization has 16 Federations in Spain and the 90% of cooperatives are registered in the territorial federation where they are located. After each federation is registered in National Federation and finally each National Federation is registered in Europe Federation. In a way, organizations try to prioritize decision making and service provision

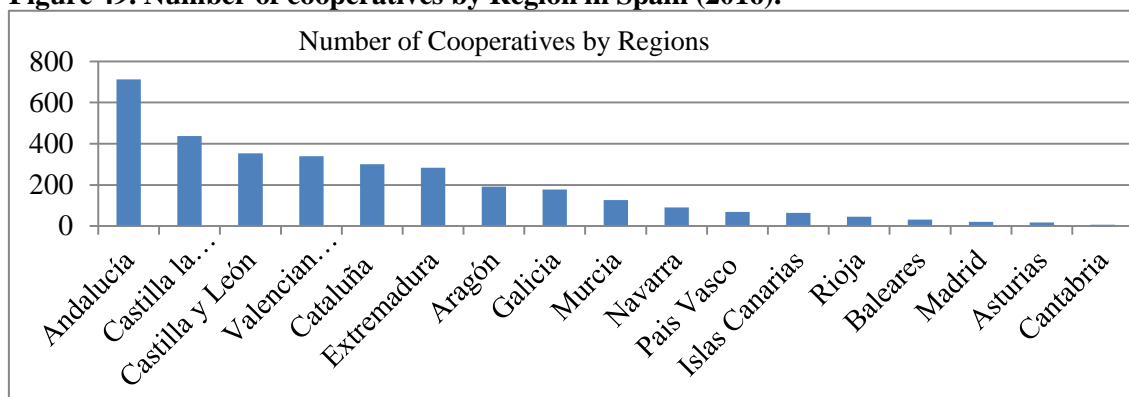
Table 2. Cooperativism in Spain.

	2,007	2,013	2,014	2,015	2,016	Var 2015/2016	Var 2007/2016
Number of cooperatives	3,996	3,838	3,780	3,762	3,740	-0.6%	-6.4%
Number of members	1,160,337	1,175,074	1,187,308	1,182,346	1,150,341	-2.7%	-0.9%
Turnover	20,875	25,688	26,929	26,198	28,993	10.7%	38.9%
Employees	91,454	63,220	97,297	97,824	100,831	3.1%	10.3%

Source: Elaborated by cooperatives Agro-Food in Spain.

Table 2 shows the evolution of the number of cooperatives, members and employees, as well as turnover. In Spain the number of cooperatives and members has decreased in the last years. However, the turnover and the number of employees has increased in the last years.

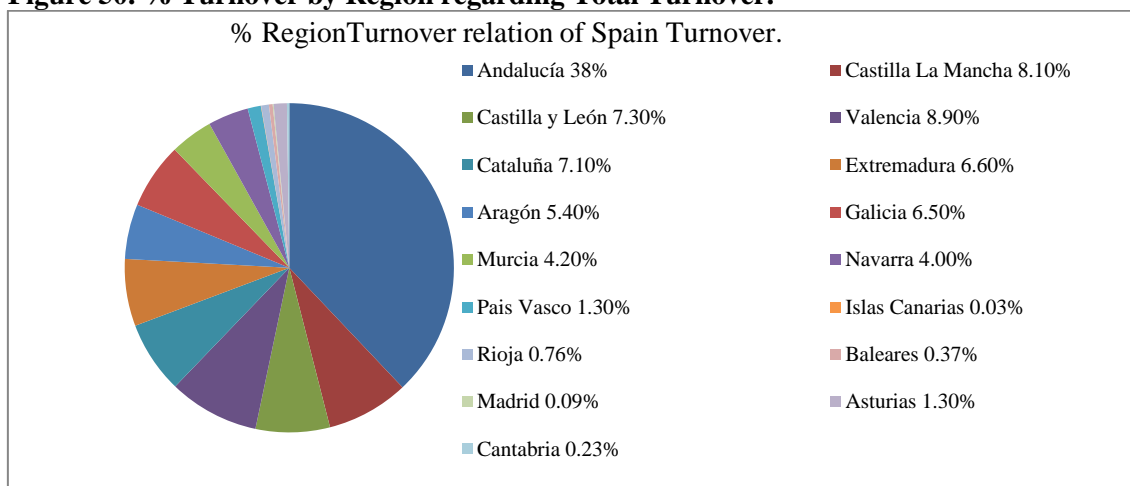
Figure 49. Number of cooperatives by Region in Spain (2016).



Source: Elaborated by author using data from Table V.15 in Appendix VI.

Figure 49, shows the number of cooperatives per Regions in Spain. Andalucía is the Region with highest number of cooperatives followed by Castilla la Mancha, Castilla y Leon, Valencia and Cataluña. In Figure 50 we calculate the percentage of turnover of each Region with respect to the total turnover. This ranking is the same that for number of cooperatives.

Figure 50. % Turnover by Region regarding Total Turnover.



Source: Elaborated by the author using data from Table VI.5.

The five sectors with the highest turnover are Fruits and vegetables with 27% of turnover, Olive Oil with 16% of turnover, supplies with 12% of turnover, animal feeding with 9% of turnover and wine with 9% of turnover. Regarding the bovine sector his turnover represents only 1%. (See Tables VI.6, VI.7 and VI.8 in Appendix VI).

Regarding the size of cooperatives, Table 3 shows clearly that the distribution of the size of cooperatives is skewed, since 4% of the cooperatives represent 46% of the turnover.

Table 3. Structure of cooperatives in Spain (2016).

Type of business	Number cooperatives	% Total	Thousand/€	% Turnover
Big	105	4%	9427	46%
Medium	389	15%	6435	31%
Little	935	36%	3863	19%
MICRO	1143	44%	716	4%

Source: Elaborated by cooperatives Agro-Food in Spain.

The Organization of Cooperatives Agro-Food in Spain states that 32% of Spain cooperatives in 2016 export their products, The exports of Spain cooperatives in 2016 represent 33% of total turnover of Spain cooperatives and Exports of Spain cooperatives represent 18% of total exports in the Agro-Food sector in 2016.

3.2.1. Comparative with others countries

In the previous section we observe differences in the sector of Agro-Food cooperatives across European countries. We compare the Spanish cooperatives with the cooperatives in Germany and Italy whose cooperatives have a higher turnover. In our comparative study we will focus on the main strengths, weaknesses, opportunities and threats from two reports elaborated by European agri-cooperatives (COGECA), “Development of Agricultural cooperatives in the EU 2014” published 2015 and “Agricultural Cooperatives in Europe, Main Issues and Trends” published in 2010.

According to the strengths, Spain is characterized by creating economy of scales, improving their productions. Also, the cooperatives are applying professional and educational programs. In the case of Italy a strong point is that the cooperatives are linked with their territories of

origin and with farmers. Also, Legislation could take better into account cooperative specificities, but it is not an obstacle. Finally, Germany is characterized by having competitive cooperatives, they concentrate the supply of agricultural production, create increased added value through processing and collective purchase of inputs. Also, the legal framework does not present any major obstacles to the activities of cooperatives and in general, agricultural cooperatives in Germany have no problem accessing financing cooperative banks.

Comparing the main weaknesses in these countries we find that, the structure of cooperatives in Spain is still based in production and cooperatives are characterized by their little participation along the food chain. In Spain Agricultural cooperatives are facing problem with access to financing because the members are responsible for debts of the cooperative and the financial sector it is not willing to provide credit this kind of cooperatives. Moreover, since their capital is not divided into shares, Spanish cooperatives have no easy way of access-external investors. Finally, Spain has a specific national law for cooperatives (Law 27/1999 on cooperatives), however there are 14 other different cooperative laws (of each Region) which suppose an obstacle to sign agreements between cooperative of different regions.

The cooperatives in Italy are characterized by have a small size and they have difficulties in accessing international market. The financial system in Italy does not providedoesn't credit to cooperative.

Finally, the weaknesses of cooperatives in Germany are characterized also by their difficulties in financing agricultural cooperatives.

Next, we speak of the opportunities of the cooperatives of each country. An opportunity for cooperatives in Spain would be a new strategy based in sales and this strategy allows them to integrate along distribution chain, that is, vertical integration. An opportunity for cooperatives of Italy would be value high quality typical and local products. Finally, the opportunities of the Germany cooperatives are cooperatives that use renewable energies and find markets for this product and increase the exports of processed products.

Finally, we study of threats of cooperatives. The threats of Spain are that globalization imposes fast changes in front of rigid and slow process on cooperative life. Continuous changes in the CAP policies give less legal security. Short terms strategy are incompatible with globalization, this is mainly an internal problem, since the cooperative members prefer good price in their productions instead a long term investment strategy. The threats of Italy are that the cooperatives are not efficient and competitive. Finally, the threats of Germany are the increasing of costs, as energy, are not always successfully transferred to buyers. Increasing volatility on the global agricultural commodities markets expose cooperatives which market their products to greater price risks.

3.2.2. Cooperative in Aragon “Ternera del Maestrazgo”

In Aragon, there are four cooperatives of bovine sector, three of them are in Huesca and the fourth one in Cantavieja, a village in the province of Teruel. In the next section we will study a specific farm located in Puertomingalvo. “Cooperativa Comarcal Carnes del Maestrazgo S. Coop” is the beef cooperative closest to the farm and also the farm is similar in size and characteristics to the members of the cooperative

The members of “Cooperativa Comarcal Carnes del Maestrazgo S. Coop” are farmers who have created a cooperative to carry out a common activity. The cooperative counts with 37 cooperative partners from different villages of the region, such as Cantavieja., Mirambel, Villarluengo, Cañada de Benatanduz, Fortanete, Iglesiasuela del Cid, Tronchon, Mosqueruela and Aliaga.

The members of this cooperative have created on July 2006 a quality brand for their meat. The General Direction of Food of the Government of Aragon approved "Etiquetado facultativo" for beef guarantee brand, called "TERNERA DEL MAESTRAZGO". Figure 51 shows the logo of the brand. The cooperative have contracted the services for certification entity (LDG-CER), this entity has to verify the control Plan. (See Point 1 in Appendix VII, the norms of quality and certification.)

Figure 51. Quality Brand Logo.



Source. The cooperative.

The cooperative has implemented a vertical integration strategy. That is, it has full control of the production and distribution cycle of their products. In the first phase, that is, the production phase, the farmers must take care of their animals and comply with regulations satisfying some characteristics of the cooperative. For example, all farmers have to buy a specific feed or so that the animals have to be registered in the Region. In the second phase, the transformation phase, the cooperative subcontracts to the slaughterhouse in Tortosa and the cutting and filleting in Vinaroz. Finally, in the commercialization phase, the cooperative follows a direct sales strategy upon request. They have a refrigerated van and they distribute the orders customers directly.

To improve the commercialization phase, the cooperative has carried out dissemination strategies and positioning of the brand "CARNE DEL MAESTRAZGO". The main destinations of sales are Castellón and Teruel but also they sale to Madrid, Barcelona and Cádiz. In that case, they subcontract the transport.

In the next chapter we will describe a representative farm close to this cooperative and build its profit function to study different strategies.

Chapter 4

Analysis and description of a cattle farm in Puertomingalvo

In chapter 4 we analysis and describe and study a real farm located in Puertomingalvo, Teruel. We should be aware that the farms in the area are small size firms and, as a consequence, collecting information on this firms it is a difficult task. We will use one farm as representative for the farms that could belong to the cooperative. Nowadays, this firm does belong by any cooperative. We collected the data of the farm through an interview with the owner. The farmer gives as the information of their costs and profits of three years and he explain him the characteristics of production of the farm.

Initially, we want know the number of cows and calves, optimal, to maximize the profit of the firm. If exist a dependence with subsidies, the quality of the meat sold and the bargaining power over the price of raw material purchases.

4.1 Description of the livestock

First, we explain the characteristic of our extensive farm. The farm counts with 56 cows, 4 heifer and 3 bulls³, this firm has more cows than most of the Spanish farms. The extensive livestock means that the cows and bulls graze freely in the mountains. In normal conditions, from May to October the cows graze in the hills, and normally they do not need complementary food, while between November and April, the hills do not provide enough food and they need complementary food. This food is bought or cultivated each year. The food of cows depends on weather conditions, since during dry years farmers need to give complementary food during the spring and summer period.

The farm has three bulls, because each bull lives with a group of cows in different hills. The function of the bull is to cover the cows and one cow gives birth to a calf approximately every year, the farmer sells the calves to meat firms. Calves live with their mother until they are four months old and during this period, the cows breastfeed their calves, and also, the calves start to graze in the hills. After that, the calves go to the farmyard, where the farmer feeds the calves until their sacrifice. In this moment we find the main differences between calf and veal concerning the cost. The veal is sacrificed when she is 12 months, so, she lives eight months in the farmyard, whereas a calf is sacrificed when he is 15 months, so, he lives eleven months in the farmyard.

On the other hand, the useful life of a cow is between 15 and 18 years. For continuity with same numbers of cows, the firm buys new cows or keeps the female calves born in the farm. Other characteristic is that in a farmyard only can live eighty calves.

We will describe now the “profit function” of the different animals for each scenario.

4.2 Farm profit: cost and revenue

³ According to the REGA database, in August 2017 in Spain, the number of livestock farms for meat production is 87,192. It should be noted that 16,141 of these farms (18.5% of the total), do not have registered suckler cows; that is to say, they are exploitations that are dedicated solely to fatten calves. On the other hand, 71.20% of the farms register census of less than 25 cows, and only 3.90% of the farms exceed 100 suckler cows.

4.2.1 Cost and income of farm

First, we will describe the cost using the data of a farm for years 2014, 2015 and 2016. We obtain the annual cost by animal, divided the annual cost between the number of animals of the farm.

Table 4. Number of animals in the farm.

Heifer (CBH)	4.00
Bull (CBH)	3.00
Cows (CBH)	56.00
Male calves (MC)	17.00
Female calves (FC)	20.00
TOTAL	100.00

A) FIXED COST

Table 5 illustrates the different components of the average fixed cost. The annual cost per animal is the mean fixed cost between the animals of the farm.

Table 5 Fixed Cost.

	2014	2015	2016	Mean	Annual cost per animal
Cuote autonomous	2,112	2,106	2,127	2,115	21.15
Salary	9,071	9,071	9,071	9,071	90.72

Source. Elaborated by the author with real data of the farm.

B) VARIABLE COST

VARIABLE COST OF COWS AND BULLS

Table 6 illustrates the main components of the variable cost of cows, heifer and bulls. These animals live in the hills and their main cost is the renting of the hills and the feed of animals.

Table 6. Total variable cost of cows and Bulls (in €).

Type of cost	2014	2015	2016	Mean	Annual cost per animal
Straw, Grass	5,525	5,089	6,144	5,586	88.67
Seed	400	400	400	400	6.35
Renting	8,500	8,500	8,500	8,500	134.92
Insurance	1,537	793	1,858	1,396	22.17
Car and petrol	2,200	2,200	2,200	2,200	34.92
Medicine/Veterinary	1,066	479	574	706	11.22
Tax	200	74	60	111	1.77

Source. Elaborated by the author with real data of the farm.

The cost of straw and grass depend of the climatic conditions. There will be years with higher cost and other years with lower cost.

VARIABLE COST OF CALVES

The variable costs of the calves are linear, although different between veal and calf. It is linear because each animal needs a specified quantity of food, and the main cost is the price of the fodder and this price changes according to brand and purchase volume.

Tables 7, 8 and 9 illustrate the cost of calves distinguishing between female and male calves. These costs are related with farmyard, place where calves live since their 4 months until they are sold. The main cost is fodder.

Table 7 Variable cost of calves.

Type of cost	2014	2015	2016	Mean	Annual cost per calves
Fodder	19,310	18,006	19,605	18,974	512.82
Straw	1,500	1,500	1,500	1,500	40.54
Medicine/ Veterinary	394	177	212	261	7.07
Amortization farmyard	1,8000	1,800	1,800	1,800	48.65
Water	60	60	60	60	1.62

Source. Elaborated by the author with real data of the farm.

The female cattle are in the farmyard 8 month and the male cattle are in farmyard 11 months. The female cattle consume the 42% of the total costs and male cattle consume the 58% of the total costs. When we calculate the variable cost for male and the variable cost for female and divide between number of cattle male and number of cattle female.

Table 8 Variable cost of female calves.

	2014	2015	2016	Mean	Annual cost per female calve
Fodder	8,110	7,562	8,234	7,969	398.46
Straw	630	630	630	630	31.50
Medicine/ Veterinary	165	74	89	109	5.49
Amortization farmyard	756	756	756	756	37.80
Water	25	25	25	25	1.26

Source. Elaborated by the author with real data of the farm.

Table 9 Variable cost of male calves.

	2014	2015	2016	Mean	Annual cost per male calve
Fodder	11,200	10,443	11,371	11,005	647.36
Straw	870	870	870	870	51.18
Medicine/ Veterinary	228	102	123	151	8.92
Amortization farmyard	1,044	1,044	1,044	1,044	61.41
Water	34	34	34	34	2.05

Source. Elaborated by the author with real data of the farm.

C) REVENUE

In the following we will introduce the different components of the income: sales revenue distinguish between type of animals and subsidies.

Table 10 shows subsidies, farmer received per registered cows.

Table 10 Subsidies.

Income	2014	2015	2016	Mean	Year per cows
Subsidies	22,516.79	12,256.52	33,319.00	22,697.44	360.28

Source. Elaborated by the author with real data of the farm.

Table 11 shows the revenue of cows and bulls, the farmer sell these animals when they are not useful for the farmer.

Table 11 Sales revenue of cows, heifer and Bulls.

Income	2014	2015	2016	Mean	Annual income per cow, heifer and bull
Sales revenue	5,294.19	1,744.85	3211.91	3,420.32	54.29

Source. Elaborated by the author using data from Figure VIII.3 in Appendix VIII.

Tables 12 and 13 show the sales of female and male calves. We have separated the sales of female and male calves. The sale prices are different, the prices of the females higher. But the weight of the male is greater than that of the females.

Table 12 Sales revenue of male calves

Income	2014	2015	2016	Mean	Annual income per male calves
Sales revenue	23,720.99	19,910.95	20,051.99	21,227.98	1,248.70

Source. Elaborated by the author using data from Figure VIII.1 in Appendix VIII.

Table 13 Sales revenue of female calves

Income	2014	2015	2016	Mean	Annual income per female calves
Sales revenue	15,087.46	19,730.50	18,041.69	17,619.88	880.99

Source. Elaborated by the author using data from Figure VIII.2 in Appendix VIII.

EXPECTED INCOME OF AN INCREASE IN QUALITY OF THE MEET

Following we calculate the income per sales of animals if the farmer had sold the animals a high price. We recalculate the income using the high price (Quality E) (See Table VIII.1 in Appendix VIII.)

Table 14 Sales revenue of cows, heifer and Bulls with high quality.

Income	2014	2015	2016	Mean	Annual income per cow, heifer and bulls
Sales revenue	5,842.85	2,133.96	4,253.44	4,076.75	64.71

Source. Elaborated by the author using data from Table VIII.4 in Appendix VIII.

Table 15 Sales revenue of male calves with high quality.

Income	2014	2015	2016	Mean	Annual income per male calves
Sales revenue	25,656.66	21,900.08	22,103.90	23,220.21	1,365.89

Source. Elaborated by the author using data from Table VIII.2 in Appendix VIII.

Table 16 Sales revenue of female calves with high quality.

Income	2014	2015	2016	Mean	Annual income per female calves
Sales revenue	16,834.13	22,271.72	20,728.77	19,944.87	997.24

Source. Elaborated by the author using data from Table VIII.3 in Appendix VIII.

EXPECTED REVENUE IS THE FARMER SELL DIRECTLY TO THE FINAL CONSUMER.

Following we calculate the income per sales of animals if the farmer had sold the animals a directly to the consumers. We consider that the average price is 7.9, this data obtain of "Observatorio de precios de alimentos MARM" published in 2009. (See Table VIII.1 in Appendix VIII).

Table 17 Sales revenue of cows, heifer and Bulls revenue directly to the consumer.

Income	2014	2015	2016	Mean	Annual income per female cales
Sales revenue	16,664.96	5,676.18	11,313.87	11,218.34	178.07

Source. Elaborated by the author using data from Table VIII.7 in Appendix VIII.

Table 18 Sales revenue of male calves, revenue directly to the consumer.

Income	2014	2015	2016	Mean	Annual income per male calves
Sales revenue	50,070.21	44,139.41	41,168.16	45,125.93	2,654.47

Source. Elaborated by the author using data from Table VIII.5 in Appendix VIII.

Table 19 Sales revenue of female calves, revenue directly to the consumer.

INCOME	2014	2015	2016	Mean	Annual income per cows, heifers and Bulls.
Slaes revenue	29,711.62	42,808.21	39,885.15	37,468.33	1,873.42

Source. Elaborated by the author using data from Table VIII.6 in Appendix VIII.

4.2.2. SCENARIOS

Once we have described the cost and revenue of the farm we will compute the firm profit function under different assumptions describing various scenarios for the farm. This exercise will help to better understand de situation of this kind of firms and propose different strategies to increase the firms' profitability.

Real situation of the farm

In this scenario we study the real situation of the farm in Puertomingalvo.

The profit function is equal income function less cost function. We calculate income and cost for female calves, male calves and the last group englobe cows, bulls and heifer.

Table 20 Profit function in the initial situation of the farm.

	Female Calves	Male Calves	Cows, bulls and heifer
Sales revenue.	880.99	1,248.70	54.29
Subsidies.			360.28
Unit Total income	880.99	1,248.70	414.57
Unit Fixed cost	111.87	111.87	111.87
Unit Variable cost	474.51	770.91	300.02
Unit Total cost	586.38	882.78	411.89
Profit function	294.61	365.92	2.67

Source. Elaborated by the author.

We can write the profit function in the current situation of the farm as:

$$\pi = 294.61FC + 365.92MC + 2.67CBH \quad (1)$$

Where MC describes the number of male calves, FC the number of female calves and CBH number of cows, bulls and heifer.

Once we have the current situation of the farm we can compute the number of cows and calves that maximizes the firm's profit. We use a linear programming model using the SOLVER, tool that provides Excel. A first step is to determine the main constraints:

- 1. Maximum number of calves.** In the farmyard because of its size, only can live 80 calves, independently on whether they are females or males. We use the following:

$$MC+FC \leq 80 \quad (2)$$

- 2. Maximum number of cows.** The calves born can not higher cows for three main reasons: First, on average, each cow will have a calf every 14 months. Second, the probability of obtaining one calf per cow is 98,82% and probability of two calves per cow is 0.18%. Third, the farmer does not buy calves to the others farms.

$$MC+FC \leq C \quad (3)$$

Also, the number average of animals in the farm are 56 cows, 3 bulls, 4 heifer and 37 calves. This means that the calves are at least 66% of the sum of cows, the heifer and bulls.

$$(MC+FC) \geq 0.59*C \quad (4)$$

- 3. Probability of having male.** In general term the probability to be male calf is a 50%, For this reason we consider that the 50% of calves are male.

$$MC \leq 0.5*(MC+FC) \quad (5)$$

According the current number of animals that there are in the farm (See Table 4), the profit in the farm is 12,281.36€. And the number of animals that maximize the profit is 40 female calves, 40 male calves and 136 cows, bulls and heifers, with a profit of 26,784.99€. (See Figure VIII 1 in Appendix VIII).

SCENARIO 1: Increase in the quality of the meat

In this scenario we study what happen with income of farm if the farmer had can sold the calves at high quality price. We use the price with quality E published by Lonja de Binefar (See Table VIII.1 in Appendix VIII).

Table 21 Profit function with quality price of the sales.

	Female Calves	Male Calves	Cows, bulls and heifer
Sales revenue	997.24	1,365.89	64.71
Subsidies.			360.28
Unit Total income	997.24	1,365.89	424.99
Unit Fixed cost	111.87	111.87	111.87
Unit Variable cost	474.51	770.91	300.02
Unit Total cost	586.38	882.79	411.89
Profit function	410.86	483.11	13.10

Source. Elaborated by the author.

The profit function increasing the quality for the meat and therefore the price can be expressed as follows:

$$\pi = 410.86FC + 483.11MC + 13.10CBH \quad (6)$$

According to the current number of animals in the farm (See Table 4), the profit in the farm is 17,255.02 €. We observe that the profit increases by 40.50%. And the number of animals that maximize the profit is the same: 40 female calves, 40 male calves and 136 the sum of cows, bulls and heifers with a profit of 37,539.64€. (See Table VIII.2 in Appendix VIII).

SCENARIO 2: Without subsidies

We calculate the profit function, supposing that the farm could not obtain income per subsidies.

SCENARIO 2.1 Initial situation

We calculate the profit function with costs and income of sales of real situation but without subsidies.

Table 22 Profit function in the initial situation of the farm without subsidies.

	Female Calves	Male Calves	Cows, bulls and heifer
Sales revenue	880.99	1,248.70	54.29
Subsidies			
Unit Total income	880.99	1,248.70	54.29
Unit Fixed cost	111.87	111.87	111.87
Unit Variable cost	474.51	770.91	300.02
Unit Total cost	586.38	882.78	411.89
Profit function	294.61	365.92	-357.60

Source. Elaborated by the author.

Equation (7) describes the profit function in the initial situation of the farm but without subsidies.

$$\pi = 294.61FC + 365.92MC - 357.60CBH \quad (7)$$

We conclude that if the farm does not receive subsidies, the activity of the farm is not any more profitable. The losses with the current amount of animals amount 10,416.07€. (See Figure VIII.3 in Appendix VIII)

SCENARIO 2.2 Higher quality

We calculate the profit function selling the meat at a high quality Price without subsidies.

Table 23 Profit function with high quality price of the sales and without subsidies.

	Female Calves	Male Calves	Cows, bulls and heifer
Sales revenue	997.24	1,365.89	64.71
Subsidies			
Unit Total income	997.24	1,365.89	64.71
Unit Fixed cost	111.87	111.87	111.87
Unit Variable cost	474.51	770.91	300.02
Unit Total cost	586.38	882.79	411.89
Profit function	410.86	483.11	-347,18

Source. Elaborated by the author.

Equation (8) describes the profit function with quality of the meat in the farm but without subsidies.

$$\pi = 410.86FC + 483.11MC - 347.18CBH \quad (8)$$

There are positive profit with 40 male calves, 40 female calves and 80 cows. But this result is improbable because the cows have a birth each 14 month proximity and sometimes they have abortions or the calves die. Once more, even increasing the quality of the meat and its price it is not profitable without subsidies. (See Figure VIII.4 in Appendix VIII).

SCENARIO 3. Minimize cost of fodder (Cooperation)

We analyze the most important cost, the feed. For that, we contact with a feed manufacturing company "De Heus Animal Nutrition S.A.U." to estimate a discount table by volume. The discounts are for the purchase volume in the same month, for example if the farm buys more than 50 tons of feed in some month, there is a discount of €/Tone. See next table. (See Information VIII.1 in Appendix VIII).

Table 24 Table of discount in "De Heus Animal Nutrition S.A.U."

X = Tons	Discount
[50, 100]	1€/tone
[100,150]	2€/tone
[150,200]	3€/tone
[200,250]	4€/tone
[250,300]	5€/tone
More than 300	6€/tone

Source. Elaborated by the author.

In our farm analyzed 11.47 tons are the average of tons purchased in each order. The place where our farms store the food has a capacity of 15 tons. We assume that other farms located in Puertomingalvo could cooperate. These farms have a similar capacity to store food. Table 22 shows how many farms should cooperate to obtain a discount.

Table 25 Farmer to cooperate to obtain a discount.

Discount	Number farms cooperating
1 € per tons	5-8 farmers
2 € per tons	9-13 farmers
3 € per tons	14-17 farmers
4 € perTons	18-21 farmers
5 € per Tons	22- 26 farmers
6 € per Tons	More than 27 farmers

Source. Elaborated by the author with information of the farm.

Table 23 describes the cost of fodder, consumption of tons and the average price of ton in the farm of Puertomingalvo. After that, we calculate each discount.

Table 26 Real cost of fodder and supposed discounts.

	2014	2015	2016	Mean Years
Real cost of Fodder	19,310.98	18,006.54	19,605.25	18,974.26
Total tones	61.83	57.93	75.36	65.04
Unit Price by ton (Average)	312.35	310.83	260.15	291.74
	Mean years	Discount		
Cost of Fodder with discount of 1€	18,909.22	65.04		
Cost of Fodder with discount of 2€	18,844.18	130.08		
Cost of Fodder with discount of 3€	18,779.14	195.11		
Cost of Fodder with discount of 4€	18,714.10	260.15		
Cost of Fodder with discount of 5€	18,649.07	325.19		
Cost of Fodder with discount of 6€	18,584.03	390.23		

Source. Elaboration by the author.

SCENARIO 3.1 With discounts in fodder in the initial situation

We calculate the new profit function in the initial situation of the farm with the discount in fodder of 6€ per ton.

Table 27 Profit function in the initial situation with discount in the fodder.

	Female Calves	Male Calves	Cows, bulls and heifer
Sales revenue	880.99	1,248.70	54.29
Subsidies			360.28
Unit Total income	880.99	1,248.70	414.57
Unit Fixed cost	111.87	111.87	111.87
Unit Variable cost	466.32	757.60	300.02
Unit Total cost	578.19	869.47	411.89
Profit function	303.81	379.23	2.68

Source. Elaborated by the author.

Equation (9) describes the profit function in the initial situation with discount in the fodder.

$$\pi = 303.81FC + 379.23MC + 2.68CBH \quad (9)$$

According to the real number of animals that there are in the farm (See Table 4), the profit in the farm is 12,671.59€. Comparing this new situation with the profit in the initial situation, the farm saves 390.23€. And the profit with the animals that maximize the result is 27,643.57€, 40 male calves, 40 female calves and 63 cows, heifer and bulls. (See Figure VIII.5 in Appendix VIII).

SCENARIO 3.2 With discounts in fodder without subsidies

In this scenario the farm has discounts in the initial situation without subsidies.

Table 28 Profit function in the initial situation with discount in the fodder

	Female Calves	Male Calves	Cows, bulls and heifer
Sales revenue	880.99	1,248.70	54.29
Subsidies			
Unit Total income	880.99	1,248.70	54.29
Unit Fixed cost	111.87	111.87	111.87
Unit Variable cost	466.32	757.60	300.02
Unit Total cost	578.19	869.47	411.89
Profit function	303.81	379.23	-357.60

Equation (10) describes the profit function in the initial situation with discount in the fodder.

$$\pi = 303.81FC + 379.23MC - 357.60CBH \quad (10)$$

If the farm does not receive subsidies, our results tell us that the farm is not profitable and we must not perform the activity. The farm obtains a negative result of -10,025,85€. (See Table VIII 6 in Appendix VIII).

SCENARIO 4. SALE DIRECTLY CONSUMER

In the next scenario we calculated the sales revenue if we sell directly to the final consumer. We recalculate our sales with the new price, 7.90 €/kg. We chose this price using data from reports of "Observatorio de alimentos MARM" about distribution of bovine meat, they consider that 7.90€/kg is the average price per kg.

SCENARIO 4.1 Sales directly consumer in the initial situation

We calculate the new profit function in the initial situation of the farm with the new price of revenues.

Table 29. Profit function in the initial situation, revenues directly consumer.

	Female Calves	Male Calves	Cows, bulls and heifer
Sales revenue	1,873.42	2,654.47	178.07
Subsidies.			360.28
Unit Total income	1,873.42	2,654.47	538.35
Unit Fixed cost	111.87	111.87	111.87
Unit Variable cost	474.51	770.91	300.02
Unit Total cost	586.38	882.79	411.89
Profit function	1,287.03	1,771.68	126.45

Source. Elaborated by the author.

Equation (11) describes the profit function in the initial situation with discount in the fodder.

$$\pi = 1,287.03FC + 1,771.68MC + 126.45CBH \quad (11)$$

According the real number of animals that there are in the farm (See Table 4), the profit in the farm would be 68,825.78€. If we compare it with the initial situation the profit increase in 46,570.76€. If the investment to enter the distribution chain is less than 46,570.76€ it is profitable to invest.

And if we calculate the profit using the number of animals that maximize the profit, the result would be 139,546.17€, it would be increase in 102,006.53 of the initial situation. In that case . farms could afford an higher distribution cost. (See Figure VIII 7 in Appendix VIII).

SCENARIO 4.2 Sales directly consumer without subsidies

We calculate the new profit function in the farm with news price of revenues but without subsidies.

Table 30 Profit function without subsidies, revenues directly consumer.

	Female Calves	Male Calves	Cows, bulls and heifer
Sales revenue	1,873.42	2,654.47	178.07
Subsidies.			
Unit Total income	1,873.42	2,654.47	178.07
Unit Fixed cost	111.87	111.87	111.87
Unit Variable cost	474.51	770.91	300.02
Unit Total cost	586.38	882.79	411.89
Profit function	1,287.03	1,771.68	-233.82

Source. Elaborated by the author.

Equation (12) describes the profit function in the initial situation with discount in the fodder.

$$\pi = 1,287.03FC + 1,771.68MC - 233.82CBH \quad (12)$$

According the real number of animals that there are in the farm (See Table 4), the profit in the farm would be 41,128.34€. In that case, consider that the farmer want to be the same income that the initial situation, the farmer would have 23,873.32€ for investment.

And if we calculate the result with the animals that maximize the income, the result would be 90644.16€. In that case, consider that the farmer want to be the same income that the initial situation, the farmer would have 53,008.89 € for investment. (See Figure VIII 8 in Appendix VIII).

4.3 Proposal for further research.

This type of firm must make greater efforts to be profitable by themselves. The solution that we propose is that the farmers enter the chain of distribution through the cooperation between the farmers. The cooperative "carnes el maestrazgo" has followed a strategy of integration forward, selling meat directly. However, the investment of the farmers in the cooperative has been very minimal. Therefore, the cooperative has a small size and its sales are not the subsistence of current farmers.

The proposal is for the cooperative "carnes el maestrazgo" to increase its size and sell enough meat to be the subsistence of the farmers. For this, it is necessary increase investments in the cooperative.

Chapter 5

Experimental test

In this study we have shown that a farm can be independent from public subsidies if the farm success in selling the meet at a higher prices. Therefore we recommend a vertical integration of the farms to ensure their sustainability and profitability without subsidies. Selling directly to the final consumer of the meet would increase their bargaining power and allow to charge higher prices to their products, instead of selling their product to large distributors. However, distribution to the final consumer requires some investment and this is affordable only if farmers cooperate to share the required investment.

In order to test the possibility to implement such strategy given the actual situation of the farms in this sector, as further research we plan to conduct a framed field experiment, that is to conduct a controlled experiment framed in the activity of farmers concerning the distribution of the meat and using real farmers as subject pool. The objective of the proposed experiment is to test the sustainability of cooperation among farmers.

In the following we will describe the main elements of our experimental design.

5.1 Experimental design

A) Role of subjects

Each subject will be member of the cooperative. For simplicity and availability of subjects we will consider cooperatives with 5 members. One of the members will play also the role of cooperative president. Each cooperative member should decide how much of the total meet production he/she wants to sell through the cooperative to the final consumer and how much to the large distributors of the market. The president of the cooperative decides the cooperative's strategy, that is, the amount of meet the cooperative purchases from each one of the members (including his/her own farm) to distribute later on to the final consumer. The president has a clear advantage to the other farm members because he/she knows the cooperative strategy when deciding whether to distribute his/her product using the cooperative.

When deciding how to distribute their production, through the cooperative or selling to the large distributors, each one of the cooperative members should consider the different prices they could charge for the product:

- If a farmer sells to the large distributors she/he sells at a price P_M per kg.
- If a farmer sells to the cooperative the price she/he can obtain is:
 - P_C per kg the cooperative president decides to purchase and sell to the final consumer through the cooperative, where $P_C > P_M$.
 - P_m per kg the cooperative president does not purchase and the farmer has to sell later on to the large distribution, where $P_C > P_M > P_m$.

B) The choice environment

We will consider two treatments. Since one of the main problems for the sustainability of cooperatives is related to the trust in the cooperative strategy we will implement two treatment where we change the period a member of the cooperative can also play the role of president of the cooperative, that is, she/he has power to decide the purchasing cooperative strategy.

In one treatment the president will be chosen randomly and keep the role of president during 5 decision periods. In the second treatment, each period a president will be chosen randomly (without replacement) and she/he will keep the role only one period, knowing that next period someone else will be the president.

Each session will consist in a repetition of decision games lasting 5 periods each. Each decision game will be then repeated 3 times to capture some dynamics in the farmers' decisions. Since the experiment will be conducted using pencil and paper, a long experiment is difficult to implement given our subject pool.

C) Experimental parameters and payoff

The timing of decisions are as follows:

- We will consider that each farmer produces 20 kg of meet per period.
- Farmers are informed that the cooperative has a maximum capacity of 50 kg to be distributed to the final consumer and that to keep its activity the cooperative should sell at least 40 kg.
- We will choose randomly the president of the cooperative (for 5 periods in treatment 1 and each period in treatment 2)
- Each period the farmer should decide how much to sell to the final consumer using the cooperative and how much to sell to the large distributor.
- Once the decision of each one of the farmers is announced, the president of the cooperative decides how much to buy from each one of the farmers.
- Once the president announces the cooperative purchasing strategy the final payoffs for each farmer are computed and announced.

This procedure will be repeated 5 periods. In total 3 sets of 5 periods will be conducted.

Chapter 6

Conclusions

Compared with the European countries the Spanish bovine sector holds a significant position. Spain holds the sixth position in relation the number of bovine animals and the fifth position in number of bovine animals younger than 1 year for slaughter. In relation to the trade of bovine products, the Spanish exports represent 5.91% of total exports of Europe, the sixth position in Europe. In particular for exports of live bovine animals, Spain increases its position, in this type of product Spain and holds the fourth position. With all the above we conclude that the bovine sector is important in Spain.

In relation to the turnover of cooperatives in Europe in Agro-Food sector, Spain ranks fifth position; whereas if we focus our attention on the number of cooperatives and the number of cooperators, Spain occupies second place. Therefore, comparatively, the average of the turnover per cooperative in Spain is lower than in other countries. The main reason is that many of the Spanish cooperatives are oriented to production and not to sale. Another fact is that 46% of the turnover is concentrated in cooperatives considered large. Within this spectrum, the turnover of cooperatives in the bovine sector represents only 1%.

In the analysis of a representative farm in Puertomingalvo with a size common in this sector. The result of the analysis of the economic situation of the business is that the farm is dependent on subsidies. We study several scenarios increasing the results of the farm and the only scenario that allows the farm to be independent of the subsidies is to sell directly to the consumer. In the project, the necessary investment to enter the chain of distribution has not been analyzed, we only contribute the limit of the investment so that the farm is still profitable.

Near of the farm there are a cooperative “Carnes del Maestrazgo” whose objective is trade the meat of theirs cooperating members, they sale the product customers directly. Nowadays, the size and sales of the cooperative is still small. For cooperating farmers the meat they sell to the cooperative is insignificant, they still have to sell their calves to meat companies that act as large distributors. To increase the sales of the cooperative it is necessary that the members invest in it and thus carry out specific marketing strategies.

The current members of the cooperative have not made a considerable investment in the cooperative. Among the voices heard, there are several opinions about the unwillingness to cooperate, distrust, lack of cooperative culture or the current members of the cooperative have not made a considerable investment in the cooperative.

We propose to conduct an experiment using the members of the cooperative as subject pool to obtain more information about their real willingness to cooperate and analyze what is the ideal structure of the cooperative for members to cooperate.

Biografía

[1] PARLAMENTO EUROPEO Y DEL CONSEJO: *Reglamento (CE) nº 178/2002 del Parlamento Europeo y del Consejo, de 28 de enero de 2002, por el que se establecen los principios y los requisitos generales de la legislación alimentaria, se crea la Autoridad Europea de Seguridad Alimentaria y se fijan procedimientos relativos a la seguridad alimentaria*: January 2002.

[2] MINISTERIO DE AGRICULTURA, PESCA Y ALIMENTACIÓN: *Real Decreto 225/2008, de 15 de febrero, por el que se completa la aplicación del modelo comunitario de clasificación de las canales de vacuno pesado y se regula el registro de los precios de mercado*: March 2008.

[3] MINISTERIO DE LA PRESIDENCIA: *Real Decreto 1698/2003, de 12 de diciembre, por el que se establecen disposiciones de aplicación de los Reglamentos comunitarios sobre el sistema de etiquetado de la carne de vacuno*: December of 2003.

[4] EL CONSEJO DE LA UNIÓN EUROPEA: *Reglamento (CE) nº 834/2007 del Consejo, de 28 de junio de 2007, sobre producción y etiquetado de los productos ecológicos y por el que se deroga el Reglamento (CEE) nº 2092/91*: July of 2007.

[5] UNION EUROPEA: *Reglamento (CE) nº 889/2008 de la Comisión, de 5 de septiembre de 2008, por el que se establecen disposiciones de aplicación del Reglamento (CE) nº 834/2007 del Consejo sobre producción y etiquetado de los productos ecológicos, con respecto a la producción ecológica, su etiquetado y su contro*: September 2008.

[6] COMUNIDAD EUROPEA. *Reglamento (CE) No 510/2006 DEL CONSEJO de 20 de marzo de 2006 sobre la protección de las indicaciones geográficas y de las denominaciones de origen de los productos agrícolas y alimenticios*: March 2006.

[7] MINISTERIO DE AGRICULTURA, PESCA Y ALIMENTACIÓN: Available on the web: <<https://www.mapama.gob.es/>>

[8] MINISTERIO DE INDUSTRIA, COMERCIO Y TURISMO: Datacomex, Estadísticas del comercio exterior: Available on the web: <<http://datacomex.comercio.es>>

[9] EUROPEAN COMMISSION: Eurostat: Available on the web: <<https://ec.europa.eu/eurostat>>

[10] BAVERA G.A: *Partos múltiples: december 2000*. Available on the web: <http://www.produccion-animal.com.ar/genetica_seleccion_cruzamientos/bovinos_en_general/47-partos_multiples.pdf>

[11] JOSE LUIS CARVAJAL RAMOS: *Problemas reproductivos de las vacas de carne*: August 1998. Available on the web: <<https://www.mapama.gob.es>>

[12] MINISTERIO DE AGRICULTURA, PESCA, ALIMENTACION Y MEDIO AMBIENTE. *Estudio del sector español de las vacas nodrizas, DATOS :SITRAN*: February 2018. Available on the web: <http://www.upa.es/upa/_depot/_documentos/86961412cf316141519223974.pdf>

[13] MINISTERIO DE AGRICULTURA, PESCA, ALIMENTACION Y MEDIO AMBIENTE: *Boletín oficial de estadística: Febrero 2018*: Available on the web: <<http://www.agro-alimentarias.coop>>

- [14] MINISTERIO DE AGRICULTURA, PESCA, ALIMENTACION Y MEDIO AMBIENTE: *El sector de la carne de vacuno en cifras. Principales indicadores económicos*: May 2017: Available on the web: <<http://www.agro-alimentarias.coop/ficheros/doc/05363.pdf>>
- [15] COGECA. EUROPEAN AGRI-COOPERATIVES: *Agricultural Cooperatives in Europe, main issues and trend*: September of 2010: Available on the web: <<http://www.agro-alimentarias.coop>>
- [16] SONSOLES PACHO JIMÉNEZ AND FELIPE JOSÉ CALAHORRA FERNÁNDEZ. *Calidad de la carne de vacuno*: December of 2009: Available on the web: <http://core.ac.uk/download/pdf/38809915.pdf>
- [17] GABRIEL TRENZADO, Cooperativas Agro-Alimentarias de España: *Las cooperativas en la UE, el modelo nórdico y el modelo mediterráneo*: December 2012: Available on the web: <<http://www.publicacionescajamar.es/pdf/publicaciones-periodicas/mediterraneo-economico/24/24-615.pdf>>
- [18] COGECA. EUROPEAN AGRI-COOPERATIVES: *Development of Agricultural cooperatives in the EU 2014*: February 2015. Available in the web: <<http://www.vilt.be/application/public/upload/40/default/40223.pdf>>>
- [19] OSCAE COOPERATIVISMO AGROALIMENTARIO ESPAÑOL: *El cooperativismo agroalimentario Macromagnitudes del Cooperativismo Agroalimentario Español*: 2016: Available on the web: < www.agro-alimentarias.coop>
- [20] COGECA. EUROPEAN AGRI-COOPERATIVES: *The power of cooperation 2015*: April of 2016. Available on the web: <<https://coopseurope.coop>>
- [21] MINISTERIO DE AGRICULTURA, PESCA, ALIMENTACION Y MEDIO AMBIENTE: *Estudio de la cadena de valor y formación de precios del sector de vacuno de carne*: Decenber of 2009: Available on the web: <<https://www.mapa.gob.es>>

Anexes

APPENDIX I. BOVINE POPULATION EUROPE. – ANUAL DATA.

Table I 1. Live bovine animals. Thousands of head (animals).

GEO/TIME	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
EU (28)	:	94,234.56	92,780.27	91,610.30	90,730.94	90,365.20	89,329.03	89,898.55	90,407.69	89,828.81	87,831.49	87,054.22	87,296.95	87,734.43	88,405.62	:	89,152.16	:
EU (27)	:	93,796.13	92,363.15	91,165.98	90,265.00	89,894.17	88,846.12	89,431.47	89,954.09	89,381.71	87,387.19	86,607.72	86,844.95	87,292.43	87,964.62	:	88,690.16	:
EU (25)	:	90,355.23	88,786.35	87,532.68	86,777.35	86,403.08	85,276.01	86,001.45	86,696.36	86,321.55	84,832.39	84,051.29	84,300.52	84,684.48	85,333.35	:	86,070.32	85,621.27
EU (15)	80,014.90	79,981.84	78,554.27	77,522.34	77,002.68	76,463.07	75,405.49	76,040.39	76,653.20	76,288.23	74,898.50	74,144.92	74,327.16	74,598.78	75,066.48	:	75,541.01	75,015.42
Belgium	3,001.06	2,907.72	2,758.46	2,684.07	2,656.87	2,603.56	2,606.90	2,573.35	2,538.30	2,535.44	2,509.54	2,471.60	2,438.18	2,441.32	2,477.24	2,503.26	2,501.35	2,385.99
Bulgaria	652.20	641.10	699.00	736.20	679.55	630.00	636.52	611.02	574.13	547.87	553.70	567.53	535.32	585.55	562.36	561.04	570.14	:
Czech Republic	1,582.00	1,520.00	1,462.00	1,427.00	1,367.60	1,351.60	1,389.60	1,366.71	1,357.80	1,355.58	1,319.41	1,339.48	1,321.06	1,332.08	1,373.07	1,366.33	1,339.60	1,366.36
Denmark	1,891.00	1,840.00	1,740.00	1,681.00	1,616.00	1,572.00	1,579.00	1,545.00	1,599.00	1,621.00	1,630.00	1,612.00	1,607.00	1,583.00	1,553.00	1,566.00	1,554.00	1,558.00
Germany	14,567.74	14,226.64	13,731.96	13,385.77	13,031.34	12,918.64	12,676.75	12,707.30	12,987.54	12,897.17	12,706.23	12,527.84	12,506.77	12,685.99	12,742.19	12,635.46	12,466.59	12,281.20
Estonia	252.80	260.50	253.90	257.20	249.80	252.20	245.00	240.50	237.90	234.70	236.30	238.30	246.00	261.40	264.70	256.20	248.20	251.30
Ireland	6,330.19	6,408.07	6,332.82	6,223.40	6,211.51	6,390.21	6,340.16	6,247.58	6,303.86	6,231.68	5,917.70	5,925.32	6,253.24	6,309.05	6,243.05	6,422.23	6,613.43	6,673.59
Greece	568.00	559.00	613.00	651.00	640.00	665.16	682.66	682.00	682.00	675.00	679.00	681.00	685.00	653.00	659.00	582.00	554.00	555.00
Spain	6,163.89	6,410.78	6,477.90	6,548.38	6,653.09	6,464.00	6,184.00	6,584.98	6,020.16	6,082.44	6,075.08	5,923.11	5,812.61	5,802.22	6,078.73	6,182.91	6,317.64	6,467.16
France	20,088.93	20,320.06	19,777.00	19,168.00	18,948.00	18,929.95	18,902.00	19,124.00	20,028.00	19,842.00	19,599.00	19,129.00	19,052.00	19,129.00	19,271.00	19,406.00	19,004.00	18,580.00
Croatia	426.57	438.42	417.11	444.32	465.94	471.03	482.91	467.08	453.60	447.10	444.30	446.50	452.00	442.00	441.00	455.00	462.00	:
Italy	:	:	:	:	:	:	:	:	:	:	5,832.46	6,251.93	:	:	:	:	6,314.89	6,349.81
Cyprus	53.98	53.43	58.16	58.65	60.31	57.58	56.11	55.92	55.59	54.10	54.72	56.92	56.92	57.08	59.54	58.86	63.14	66.94
Latvia	366.70	384.70	388.10	378.60	371.10	385.20	377.08	398.70	380.23	378.21	379.49	380.61	393.10	406.49	422.02	419.08	412.31	405.82
Lithuania	748.30	751.70	779.10	812.10	792.00	800.30	838.80	787.90	770.90	759.40	748.00	752.40	729.20	713.50	736.60	722.60	694.80	676.30
Luxembourg	199.64	198.35	189.85	184.84	184.25	184.25	186.31	193.14	196.30	194.86	194.01	188.09	188.30	198.24	201.15	200.64	202.41	198.07
Hungary	805.00	783.00	770.00	739.00	723.00	708.00	702.00	705.00	701.00	700.00	682.00	697.00	760.00	782.00	802.00	821.00	852.00	870.00
Malta	:	19.00	18.77	17.94	19.41	19.74	19.12	19.44	17.78	16.26	14.95	15.07	15.59	15.22	14.88	15.02	14.36	14.18
Netherlands	3,890.00	3,842.00	3,780.00	3,734.66	3,759.00	3,746.00	3,673.00	3,820.00	3,996.00	3,998.00	3,960.00	3,912.00	3,985.00	4,090.00	4,169.00	4,315.00	4,294.00	4,239.00
Austria	2,155.45	2,118.45	2,066.94	2,052.03	2,050.99	2,010.68	2,002.92	2,000.20	1,997.21	2,026.26	2,013.28	1,976.53	1,955.62	1,958.28	1,961.20	1,957.61	1,954.39	1,943.48
Poland	5,723.00	5,498.79	5,420.99	5,276.81	5,200.17	5,384.98	5,280.97	5,405.55	5,563.56	5,590.22	5,561.75	5,500.94	5,520.35	5,589.54	5,660.27	5,762.50	5,970.20	6,035.50
Portugal	1,396.86	1,420.54	1,422.08	1,432.31	1,488.15	1,494.73	1,451.70	1,491.50	1,495.28	1,446.51	1,502.76	1,519.11	1,497.55	1,470.50	1,548.61	1,605.86	1,635.01	1,670.02
Romania	2,870.40	2,799.80	2,877.80	2,897.10	2,808.10	2,861.10	2,933.60	2,819.00	2,683.60	2,512.30	2,001.10	1,988.90	2,009.10	2,022.40	2,068.90	2,092.40	2,049.70	1,989.30
Slovenia	493.67	477.08	473.24	449.85	451.14	452.52	454.03	479.53	470.01	472.88	470.15	462.30	460.06	460.58	468.25	484.19	488.60	479.56
Slovakia	646.15	625.19	607.84	593.18	540.15	527.89	507.82	501.82	488.38	471.97	467.13	463.36	471.08	467.82	465.54	457.46	446.11	439.89
Finland	1,035.10	1,019.40	1,011.75	977.48	951.88	945.10	929.09	902.71	906.87	908.15	908.93	902.68	901.39	903.36	907.40	903.41	887.25	874.52
Sweden	1,617.60	1,617.30	1,576.30	1,553.30	1,551.60	1,532.89	1,515.85	1,516.65	1,505.42	1,481.98	1,474.50	1,449.73	1,443.58	1,443.52	1,436.49	1,428.40	1,436.05	1,448.59
United Kingdom	10,877.51	10,160.87	10,381.21	10,518.93	10,745.00	10,546.00	10,335.00	10,075.00	9,911.00	9,901.00	9,896.00	9,675.00	9,749.00	9,682.00	9,693.00	9,816.00	9,806.00	9,791.00
Iceland	:	:	:	:	:	:	:	:	:	:	:	73.60	72.80	73.20	73.70	75.90	:	:
Switzerland	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	1,567.14	1,560.09	1,558.46
Montenegro	:	:	:	:	:	:	:	:	:	:	:	:	85.00	89.00	94.00	92.00	89.00	:
Yugoslav	:	:	:	:	:	:	:	:	:	:	:	:	251.00	238.00	242.00	253.00	255.00	:
Albania	:	:	:	:	:	:	:	:	:	:	:	:	:	:	499.69	505.77	496.99	475.22
Serbia	:	:	:	:	:	:	1,106.00	1,087.00	1,057.00	1,002.00	938.00	937.00	921.00	913.00	920.00	916.00	893.00	899.00
Turkey	:	:	:	:	:	:	:	:	:	:	:	:	14,022.35	14,532.85	14,244.67	14,127.84	14,222.23	16,105.03
Bosnia	:	:	:	:	:	:	:	:	:	:	462.00	455.00	446.00	447.00	444.00	455.00	455.00	:

Source. Datacomex.

Table I 2. Dairy cows. Thousands of head (animals).

GEO/TIME	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
EU (28)	:	:	:	:	:	:	:	24,286.79	24,405.80	23,870.55	23,313.92	23,052.72	23,192.94	23,467.96	23,558.64	:	23,524.75	:
EU (27)	:	26,896.42	26,399.51	:	25,195.75	24,746.38	24,192.61	24,061.38	24,193.20	23,658.35	23,107.42	22,868.02	23,011.94	23,299.96	23,399.64	:	23,377.75	:
EU (25)	:	24,918.32	24,413.91	23,923.17	23,260.63	22,773.23	22,203.10	22,152.60	22,395.24	21,942.60	21,615.22	21,384.84	21,554.75	21,817.81	21,909.53	:	21,906.23	21,935.69
EU (15)	19,883.94	19,969.38	19,509.36	19,217.43	18,690.64	18,230.25	17,861.73	17,785.41	18,051.97	17,783.48	17,552.54	17,409.28	17,702.89	18,029.46	18,176.12	:	18,363.69	18,388.82
Belgium	629.40	611.32	591.01	572.14	570.61	548.15	531.91	524.29	517.77	517.68	517.74	510.65	503.54	515.99	519.09	528.78	530.59	519.16
Czech Republic	529.00	496.00	464.00	449.00	429.30	437.10	417.30	407.37	399.67	383.82	375.38	374.07	367.07	375.33	372.39	369.06	367.31	365.46
Denmark	644.00	628.00	613.00	589.00	569.00	558.00	555.00	551.00	566.00	574.00	573.00	579.00	579.00	567.00	547.00	570.00	565.00	575.00
Germany	4,563.60	4,474.90	4,373.39	4,337.55	4,286.60	4,163.58	4,054.41	4,087.33	4,229.14	4,169.35	4,181.68	4,190.10	4,190.49	4,267.61	4,295.68	4,284.64	4,217.70	4,199.01
Estonia	131.00	128.60	115.60	116.80	116.50	113.10	108.90	103.00	100.40	96.70	96.50	96.20	96.80	97.90	95.60	90.60	86.10	86.40
Ireland	1,152.78	1,147.95	1,128.75	1,135.70	1,121.82	995.81	1,022.76	1,017.29	1,024.12	1,022.41	1,006.90	1,035.64	1,060.26	1,082.46	1,127.72	1,239.89	1,295.23	1,343.30
Greece	180.00	172.00	152.00	149.00	150.00	152.26	167.75	150.00	154.00	145.00	144.00	130.00	132.00	130.00	135.00	111.00	106.00	103.00
Spain	1,140.57	1,181.99	1,154.21	1,117.67	1,056.92	1,017.93	942.00	903.29	888.29	828.35	845.29	797.89	827.21	844.06	844.79	844.11	834.45	823.99
France	4,153.27	4,197.23	4,134.00	4,026.00	3,947.00	3,895.44	3,799.00	3,759.00	3,857.00	3,748.00	3,718.00	3,664.00	3,644.00	3,697.00	3,699.00	3,661.00	3,630.00	3,595.00
Croatia	:	:	:	:	:	:	:	225.41	212.60	212.20	206.50	184.70	181.00	168.00	159.00	152.00	147.00	:
Italy	:	:	:	:	:	:	:	:	:	:	1,746.14	1,754.98	:	:	:	:	2,060.47	2,040.11
Cyprus	23.51	24.37	26.23	26.61	26.08	24.59	23.93	23.70	23.64	23.20	23.42	24.07	24.20	24.55	25.33	26.19	28.46	30.23
Latvia	204.50	209.10	204.60	186.30	186.20	185.20	182.38	180.42	170.40	165.51	164.06	164.10	164.56	165.01	165.87	162.41	154.02	150.36
Lithuania	438.40	441.80	443.30	448.10	433.90	416.50	399.00	404.50	394.70	374.60	359.80	349.50	331.00	315.70	314.00	300.50	285.80	272.80
Luxembourg	43.60	43.99	42.07	41.24	41.07	41.07	46.19	40.19	45.93	45.90	45.98	44.48	45.00	48.27	46.78	49.13	51.97	52.12
Hungary	355.00	345.00	338.00	310.00	304.00	285.00	268.00	266.00	263.00	248.00	239.00	252.00	255.00	250.00	255.00	250.00	244.00	244.00
Malta	:	8.24	8.03	7.61	7.84	7.83	7.45	7.55	7.25	6.93	6.36	6.31	6.32	6.33	6.50	6.37	6.50	6.14
Netherlands	1,532.00	1,551.00	1,546.00	1,551.43	1,502.00	1,486.00	1,443.00	1,490.00	1,587.00	1,562.00	1,518.00	1,504.00	1,541.00	1,597.00	1,610.00	1,717.00	1,794.00	1,860.00
Austria	621.00	597.98	588.97	557.88	537.95	534.42	527.42	524.50	530.23	532.98	532.74	527.39	523.37	529.56	537.74	534.10	539.87	543.42
Poland	2,982.40	2,929.65	2,934.62	2,816.14	2,730.45	2,754.81	2,636.96	2,677.28	2,696.92	2,584.75	2,529.43	2,446.14	2,346.10	2,299.08	2,247.80	2,134.10	2,129.90	2,152.80
Portugal	328.99	304.99	299.06	288.40	296.71	284.97	270.37	269.26	264.82	255.41	243.24	241.95	236.56	230.84	233.83	243.26	238.91	238.63
Romania	:	1,619.50	1,627.40	:	1,566.40	1,625.40	1,639.36	1,572.90	1,483.30	1,419.00	1,178.60	1,170.00	1,162.70	1,168.90	1,188.40	1,190.70	1,192.60	1,159.10
Slovenia	140.24	135.81	139.98	130.71	134.01	120.27	112.51	117.17	113.45	113.10	109.47	109.07	111.02	109.57	107.84	112.84	107.84	108.82
Slovakia	242.50	230.38	230.18	214.47	201.73	198.58	184.95	180.21	173.85	162.50	159.26	154.11	149.79	144.88	143.08	139.26	132.61	129.86
Finland	357.90	351.82	343.05	327.98	317.85	312.95	298.48	287.53	288.35	285.83	284.28	281.53	279.87	282.01	282.91	282.23	275.38	270.64
Sweden	425.80	425.33	403.40	403.70	401.12	390.68	384.69	365.73	365.58	354.22	348.56	347.65	345.53	346.12	344.19	336.80	326.12	323.44
United Kingdom	2,339.04	2,203.27	2,229.45	2,206.74	2,054.00	2,007.00	2,005.00	1,977.00	1,903.00	1,864.00	1,847.00	1,800.00	1,786.00	1,817.00	1,883.00	1,918.00	1,898.00	1,902.00
Iceland	:	:	:	:	:	:	:	:	:	:	:	25.40	25.40	25.80	26.00	27.00	:	:
Switzerland	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	579.88	572.34	567.13
Montenegro	:	:	:	:	:	:	:	:	:	:	:	:	59.00	61.00	63.00	63.00	59.60	:
Yugoslav	:	:	:	:	:	:	:	:	:	:	:	:	123.00	129.00	127.00	124.00	125.00	:
Albania	:	:	:	:	:	:	:	:	:	:	:	:	:	:	357.78	357.52	353.05	346.41
Serbia	:	:	:	:	:	:	607.00	584.00	542.00	501.00	482.00	477.00	455.00	429.00	437.00	430.00	426.00	429.00
Turkey	:	:	:	:	:	:	:	:	:	:	:	:	5,385.54	5,563.14	5,529.97	5,509.36	5,406.52	5,938.15
Bosnia	:	:	:	:	:	:	:	:	:	:	243.00	231.00	217.00	222.00	216.00	217.00	215.00	:

Source. Datacomex.

Table I 3. NO dairy cows. Thousands of head (animals).

GEO/TIME	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
EU (28)	:	:	:	:	:	:	:	12,511.90	12,405.89	12,412.97	12,379.56	12,190.34	12,034.44	11,934.22	12,036.77	:	12,342.23	:
EU (27)	:	:	:	:	12,142.08	12,122.55	12,116.79	12,502.63	12,392.89	12,402.37	12,368.06	12,179.14	12,020.44	11,921.22	12,015.77	:	12,322.23	:
EU (25)	:	:	12,046.49	12,044.27	12,103.91	12,083.41	12,079.94	12,458.07	12,349.10	12,363.93	12,329.22	12,136.91	11,974.90	11,863.75	11,948.35	:	12,224.66	12,152.70
EU (15)	11,961.63	11,889.24	11,782.62	11,729.91	11,787.38	11,758.11	11,707.89	12,058.73	11,923.94	11,890.11	11,828.39	11,591.61	11,422.40	11,257.74	11,282.46	:	11,474.46	11,354.90
Belgium	541.78	533.92	502.26	496.46	502.47	500.92	525.01	510.39	512.34	501.70	495.11	488.65	441.18	429.15	436.48	444.97	457.37	418.85
Czech Republic	82.00	100.00	114.00	130.00	136.00	121.90	150.50	151.93	154.10	172.25	166.57	182.66	175.48	177.55	193.85	197.26	193.47	205.85
Denmark	121.00	123.00	113.00	109.00	102.00	95.00	99.00	105.00	108.00	108.00	106.00	102.00	100.00	97.00	96.00	94.00	92.00	89.00
Germany	823.79	804.43	762.99	748.27	730.54	731.50	742.13	741.21	733.17	729.46	707.28	683.75	672.27	673.11	673.60	681.34	669.53	660.17
Estonia	0.70	0.80	1.60	2.00	2.70	5.10	5.90	8.50	8.20	10.30	12.10	14.50	15.40	19.80	22.80	25.10	27.80	29.50
Ireland	1,155.24	1,159.65	1,150.85	1,144.20	1,150.79	1,113.68	1,159.12	1,162.96	1,174.98	1,134.92	1,090.82	1,083.00	1,127.92	1,085.09	1,041.22	1,053.19	1,042.03	1,018.30
Greece	96.00	116.00	134.00	135.00	134.00	136.94	138.43	145.00	153.00	165.00	164.00	160.00	146.00	159.00	169.00	163.00	135.00	141.00
Spain	1,880.03	1,894.71	1,971.40	2,017.32	1,993.59	1,953.90	1,832.00	2,070.55	1,945.24	2,002.28	1,919.78	1,820.88	1,780.34	1,789.17	1,824.20	1,918.66	1,950.44	1,998.95
France	4,214.13	4,218.39	4,095.00	4,018.00	4,002.00	4,028.65	4,077.00	4,163.00	4,251.00	4,204.00	4,220.00	4,148.00	4,114.00	4,106.00	4,142.00	4,211.00	4,225.00	4,151.00
Croatia	:	:	:	:	:	:	:	9.27	13.00	10.60	11.50	11.20	14.00	21.00	19.00	19.00	20.00	22.00
Italy	:	:	:	:	:	:	:	:	:	:	372.09	390.02	:	:	:	:	304.72	297.88
Cyprus	:	:	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.06	0.05	0.05	0.14	0.13
Latvia	2.10	2.50	2.70	3.80	4.60	8.00	9.51	15.21	12.71	15.54	18.69	21.96	25.58	29.19	34.23	38.87	44.70	48.63
Lithuania	3.10	4.20	4.30	5.20	5.60	7.00	11.90	10.30	13.90	15.50	17.50	18.30	21.10	29.30	36.50	42.60	47.30	50.00
Luxembourg	32.59	31.90	31.01	30.16	30.03	30.03	28.37	33.07	31.81	31.73	31.80	30.23	29.26	29.88	28.55	28.17	27.80	26.30
Hungary	25.00	23.00	24.00	41.00	42.00	49.00	53.00	56.00	61.00	64.00	70.00	77.00	83.00	96.00	104.00	117.00	138.00	151.00
Malta	:	0.17	0.00	0.00	0.00	0.00	0.19	0.23	0.20	0.19	0.13	0.11	0.10	0.94	0.10	0.13	0.12	0.14
Netherlands	80.00	85.00	82.00	84.96	88.00	71.00	72.00	89.00	88.00	85.00	118.00	107.00	102.00	86.00	84.00	85.00	70.00	58.00
Austria	252.79	257.73	244.95	243.10	261.53	270.47	271.31	271.33	266.45	264.55	260.88	256.83	248.44	236.66	229.99	224.35	216.68	207.01
Poland	64.70	60.96	32.57	45.72	47.42	46.31	46.83	61.28	75.07	93.43	106.83	121.89	122.57	142.86	155.17	168.70	173.60	187.80
Portugal	353.72	363.13	370.39	382.68	394.91	413.52	422.44	435.94	436.93	435.88	442.40	441.47	441.69	446.48	462.77	475.80	484.88	489.54
Romania	:	:	:	:	27.40	27.60	25.78	30.60	28.10	22.50	20.20	19.10	17.00	17.80	18.30	16.70	11.70	11.50
Slovenia	53.90	52.78	55.01	55.17	48.07	56.96	60.51	60.44	62.53	60.97	63.89	61.67	56.50	56.21	60.48	57.04	63.50	59.90
Slovakia	28.69	28.89	29.69	31.34	30.15	31.03	33.70	35.45	37.46	41.63	45.13	47.20	52.72	54.10	58.71	60.29	61.58	64.86
Finland	28.10	28.16	28.69	28.29	31.64	35.70	40.07	44.57	48.93	52.54	55.23	55.81	56.02	55.70	56.78	57.14	57.40	58.01
Sweden	153.40	157.57	158.20	157.00	160.89	164.10	166.93	182.73	181.04	179.19	184.99	181.98	178.30	175.44	173.22	175.80	187.62	198.90
United Kingdom	1,783.07	1,673.13	1,693.89	1,702.47	1,753.00	1,741.00	1,715.00	1,663.00	1,621.00	1,622.00	1,660.00	1,642.00	1,603.00	1,554.00	1,536.00	1,551.00	1,554.00	1,542.00
Iceland	:	:	:	:	:	:	:	:	:	:	:	2.10	1.70	1.70	1.80	2.00	2.10	2.30
Switzerland	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	121.85	124.43	126.83
Montenegro	:	:	:	:	:	:	:	:	:	:	:	:	1.00	1.00	1.00	0.00	0.40	:
Yugoslav	:	:	:	:	:	:	:	:	:	:	:	:	23.00	12.00	16.00	21.00	21.00	:
Albania	:	:	:	:	:	:	:	:	:	:	:	:	:	:	0.00	4.34	2.49	2.79
Serbia	:	:	:	:	:	:	15.00	18.00	36.00	47.00	49.00	32.00	25.00	22.00	23.00	26.00	12.00	8.00
Turkey	:	:	:	:	:	:	:	:	:	:	:	:	134.84	139.29	138.46	137.94	135.37	148.68
Bosnia	:	:	:	:	:	:	:	:	:	:	16.00	19.00	14.00	14.00	14.00	14.00	14.00	:

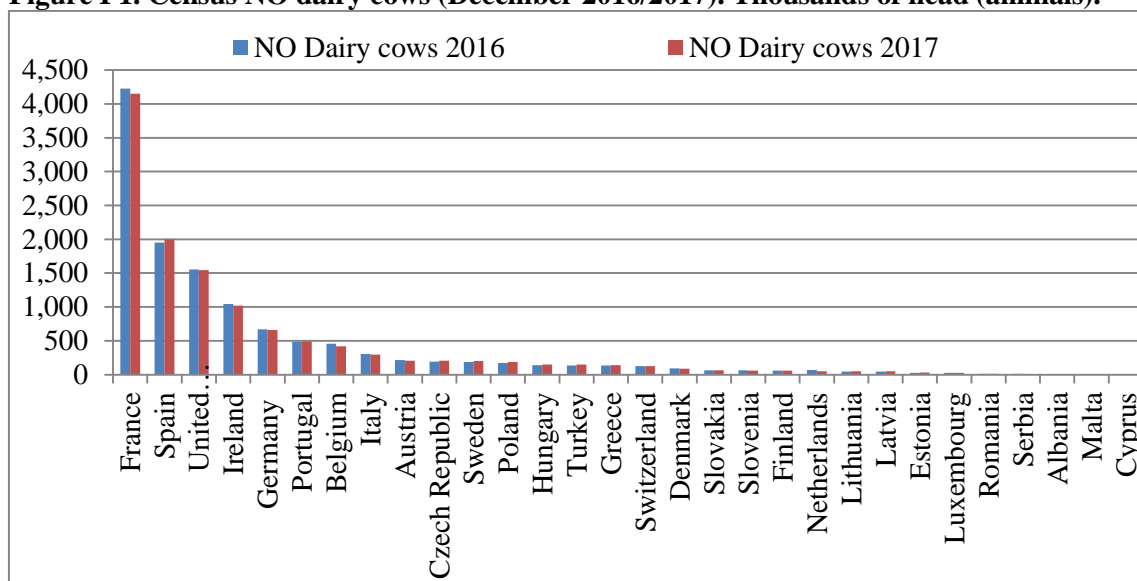
Source. Datacomex.

Table I.4. Bovine animals, young than 1 year, for slaughter. Thousands of head (animals).

GEO/TIME	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
EU (28)	:	:	:	:	5,010.21	5,006.85	4,923.29	4,909.31	5,055.47	4,980.63	5,341.40	5,171.74	5,120.26	5,334.05	5,455.53	5,927.71	5,862.75	:
EU (27)	:	:	:	:	4,992.89	4,993.65	4,903.77	4,890.00	5,038.07	4,960.53	5,326.10	5,150.04	5,096.26	5,315.05	5,442.53	5,907.71	5,842.75	:
EU (25)	:	:	4,477.19	4,563.70	4,625.18	4,656.59	4,563.75	4,559.71	4,735.56	4,693.31	5,134.94	4,936.51	4,889.75	5,072.62	5,240.38	5,712.39	5,682.28	5,776.68
EU (15)	4,040.02	4,138.09	4,035.96	4,078.22	4,199.17	4,200.20	4,162.88	4,187.54	4,373.89	4,306.07	4,795.42	4,624.78	4,538.37	4,565.10	4,708.56	5,331.79	5,321.38	5,427.67
Belgium	179.75	180.22	169.08	162.64	155.81	176.11	160.56	166.90	161.23	170.12	170.85	166.01	166.26	165.12	178.62	183.12	167.70	161.13
Czech Republic	:	:	56.00	63.00	50.20	54.60	63.30	58.44	59.73	61.71	25.08	17.34	9.01	8.73	4.46	3.95	1.72	0.43
Denmark	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	279.00	276.00	281.00	268.00	265.00	255.00	255.00	259.00	258.00	268.00
Germany	126.96	104.32	127.48	122.00	124.94	113.51	116.60	111.86	129.97	203.75	210.96	221.13	230.03	214.60	213.08	213.96	224.27	216.64
Estonia	10.50	16.80	6.00	7.30	3.50	3.70	2.90	3.00	3.20	3.20	3.10	3.20	3.10	3.40	4.20	3.30	3.30	3.30
Ireland	0.00	0.00	0.00	0.00	0.00	0.20	0.10	0.90	3.40	6.60	8.30	4.50	5.60	5.34	8.27	7.20	7.28	7.31
Greece	116.00	106.00	134.00	149.00	145.00	72.35	65.27	146.00	62.00	69.00	71.00	66.00	74.00	48.00	63.00	54.00	38.00	40.00
Spain	1,483.12	1,470.24	1,475.94	1,510.42	1,550.23	1,501.33	1,475.00	1,443.15	1,252.84	1,127.21	1,529.95	1,379.93	1,436.42	1,408.53	1,585.23	1,693.87	1,781.85	1,876.32
France	678.92	762.00	704.00	633.00	646.00	638.51	622.00	575.00	685.00	677.00	658.00	650.00	635.00	635.00	635.00	632.00	554.00	519.00
Croatia	14.49	14.01	7.36	10.07	17.32	13.20	19.52	19.31	17.40	20.10	15.30	21.70	24.00	19.00	13.00	20.00	20.00	:
Italy	361.00	496.26	410.00	413.00	445.00	500.00	540.22	519.00	502.38	494.45	507.45	509.90	443.25	485.48	498.41	992.39	1,015.59	1,022.11
Cyprus	:	:	9.83	9.84	9.64	10.04	8.24	8.56	7.31	8.84	9.44	9.54	9.34	9.48	10.49	9.11	9.83	10.19
Latvia	24.70	68.60	64.70	64.30	63.50	60.40	52.51	52.64	49.22	52.08	51.19	50.37	52.58	52.99	57.40	55.07	54.79	52.46
Lithuania	81.20	81.30	79.90	83.70	84.10	90.60	88.90	71.50	68.00	64.90	65.20	61.40	56.30	55.20	57.80	64.60	60.60	68.10
Luxembourg	2.20	3.29	2.65	2.55	2.62	2.62	5.20	4.51	4.53	4.15	4.34	5.52	5.29	3.95	4.37	5.59	5.15	5.04
Hungary	63.00	67.00	72.00	71.00	62.00	71.00	64.00	61.00	61.00	66.00	52.00	60.00	66.00	53.00	50.00	56.00	62.00	67.00
Malta	:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Netherlands	876.00	790.00	791.00	848.00	878.00	920.00	918.00	960.00	1,011.00	979.00	1,008.00	1,005.00	940.00	1,026.00	939.00	955.00	941.00	983.00
Austria	68.05	68.08	58.56	57.67	62.84	61.04	84.07	105.33	126.90	151.70	170.27	164.77	164.80	162.85	161.06	159.51	160.84	157.25
Poland	182.20	126.93	110.08	138.84	113.35	128.53	85.94	79.15	75.30	89.40	90.73	77.95	120.86	289.98	313.21	159.90	137.80	114.30
Portugal	69.51	78.96	76.70	89.50	107.63	112.79	101.92	109.52	115.10	104.14	122.39	133.07	120.00	105.70	117.77	115.19	110.28	117.73
Romania	:	:	:	:	281.80	263.20	262.76	260.30	236.90	207.90	134.00	147.00	157.60	153.60	154.40	161.80	133.70	127.90
Slovenia	17.87	14.14	9.57	10.04	10.39	8.88	10.76	14.65	15.47	21.96	24.76	13.29	12.82	14.15	14.18	10.87	11.05	13.13
Slovakia	48.59	68.98	33.16	37.45	29.33	28.64	24.32	23.23	22.43	19.15	18.02	18.66	21.37	20.59	20.08	17.80	19.83	20.10
Finland	9.00	9.40	9.30	8.00	2.50	2.80	3.94	3.88	3.65	3.66	3.63	3.64	3.61	2.71	2.74	2.77	2.72	2.69
Sweden	22.30	25.17	22.80	22.60	22.61	21.95	22.00	21.50	21.90	21.30	21.30	21.31	21.11	20.83	21.02	30.19	27.70	24.45
United Kingdom	41.21	38.15	48.45	53.85	50.00	71.00	42.00	14.00	15.00	18.00	28.00	26.00	28.00	26.00	26.00	28.00	27.00	27.00
Iceland	:	:	:	:	:	:	:	:	:	:	:	0.50	0.50	0.50	0.50	0.50	:	:
Switzerland	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	248.72	252.85	248.16
Montenegro	:	:	:	:	:	:	:	:	:	:	:	8.00	8.00	8.00	7.00	7.00	:	:
Yugoslav	:	:	:	:	:	:	:	:	:	:	:	8.00	4.00	10.00	9.00	7.00	:	:
Albania	:	:	:	:	:	:	:	:	:	:	:	:	:	11.32	11.75	11.55	14.49	:
Serbia	:	:	:	:	:	:	182.00	97.00	48.00	35.00	38.00	47.00	21.00	24.00	24.00	28.00	15.00	25.00
Turkey	:	:	:	:	:	:	:	:	:	:	:	:	19.60	20.59	19.99	19.75	20.29	24.60
Bosnia	:	:	:	:	:	:	:	:	:	:	30.00	27.00	35.00	37.00	36.00	37.00	36.00	:

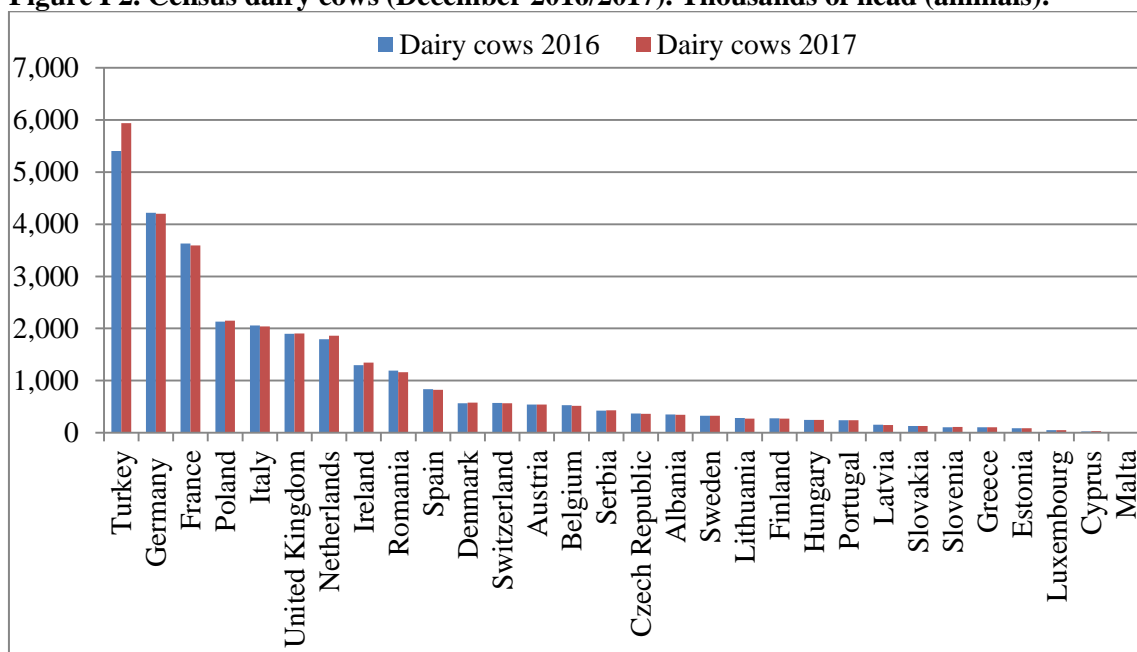
Source. Datacomex.

Figure I 1. Census NO dairy cows (December 2016/2017). Thousands of head (animals).



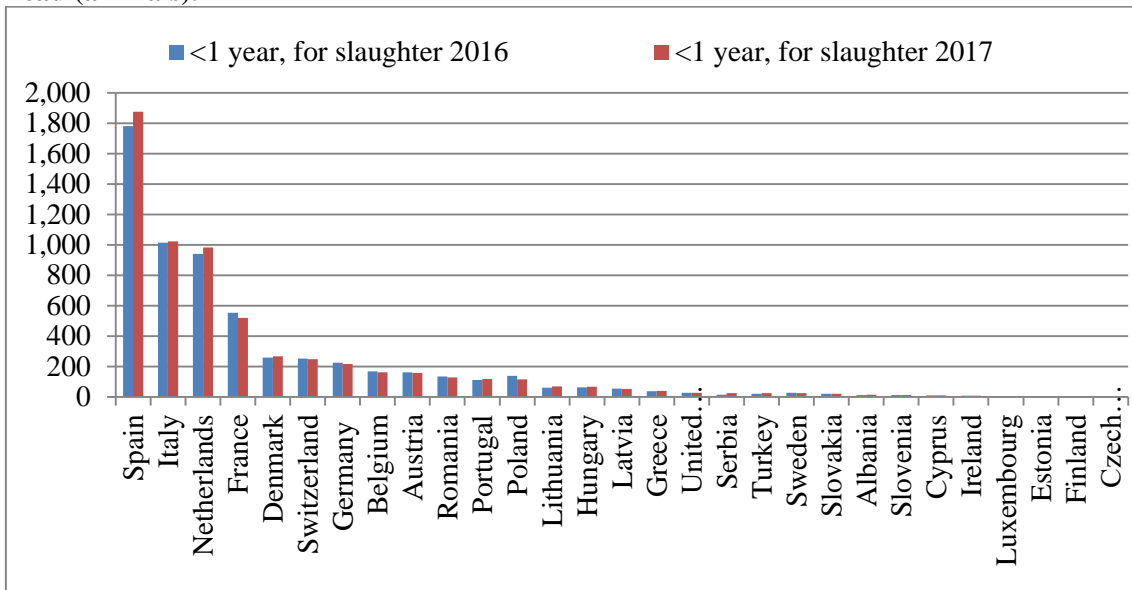
Source. Eurostat. Elaborated by author using data from Table I.3.

Figure I 2. Census dairy cows (December 2016/2017). Thousands of head (animals).



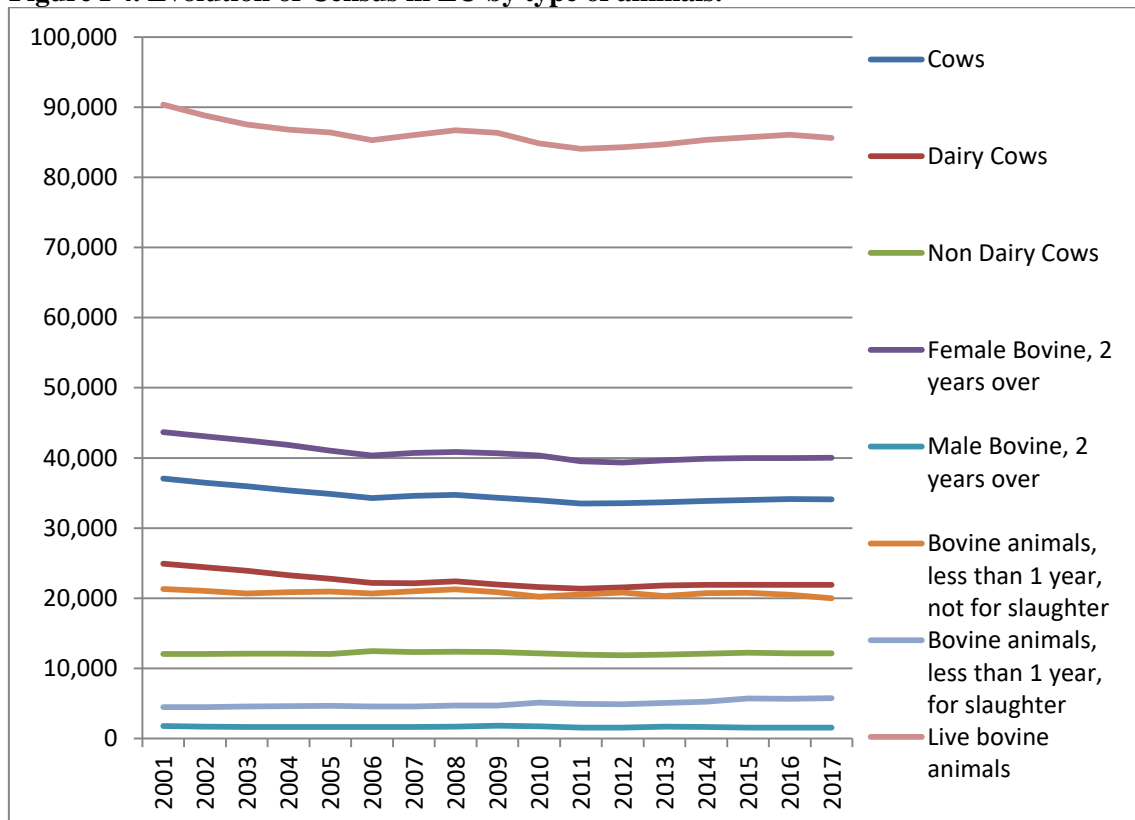
Source. Eurostat. Elaborated by author using data from Table I.2.

Figure I 3. Bovine animals, younger than 1 year, for slaughter (2016/2017). Thousands of head (animals).



Source. Eurostat. Elaborated by author using data from Table I.4.

Figure I 4. Evolution of Census in EU by type of animals.



Source. Eurostat. Elaborated by author using data from Tables I.1, I.2, I.3 and I.4.

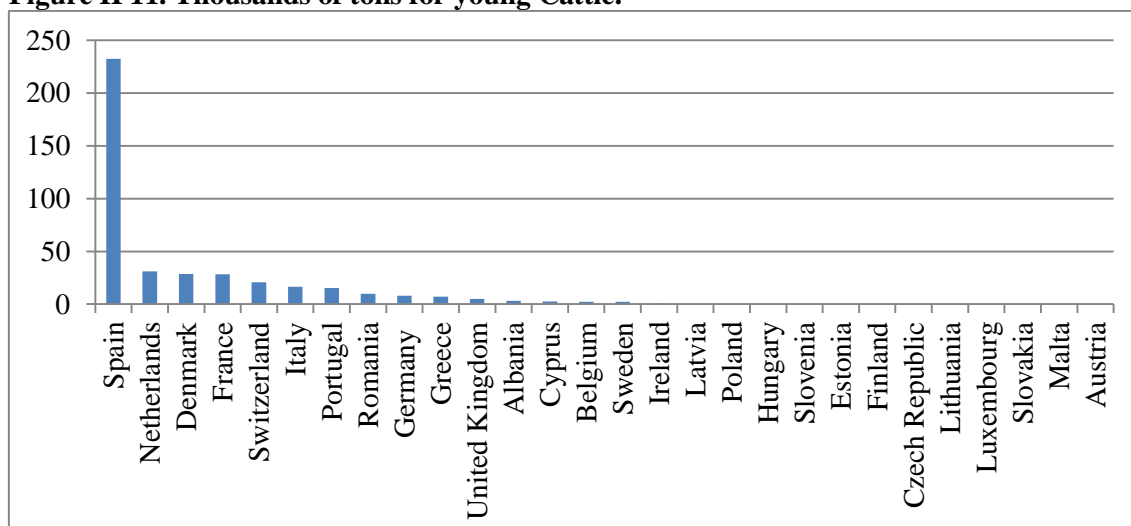
APPENDIX II. SLAUGHTERED ANIMALS MEASURED IN THOUSANDS OF TONS.

Table II 1. Thousands of tons slaughtered animals.

2016					
GEO/TIME	Bovine meat	Adult cattle	Calves and young cattle	Calves	Young cattle
Belgium	278.36	215.62	62.75	60.51	2.24
Czech Republic	71.93	71.21	0.73	0.47	0.26
Denmark	129.40	100.30	28.80	0.00	28.80
Germany	1,148.00	1,092.00	56.00	48.00	8.00
Estonia	9.43	9.05	0.37	0.07	0.30
Ireland	588.36	587.38	0.99	0.21	0.78
Greece	40.17	31.86	8.31	1.27	7.03
Spain	637.01	388.64	248.38	15.77	232.61
France	1,461.72	1,251.19	210.54	182.10	28.44
Italy	809.66	700.63	109.03	92.59	16.44
Cyprus	7.71	3.88	2.55	0.09	2.45
Latvia	17.70	16.58	1.12	0.54	0.58
Lithuania	42.29	41.75	0.54	0.36	0.18
Luxembourg	9.42	9.25	0.16	0.07	0.09
Hungary	28.07	27.45	0.62	0.19	0.43
Malta	1.15	1.13	0.02	0.00	0.02
Netherlands	416.06	177.73	238.33	207.15	31.19
Austria	227.44	221.37	6.07	6.07	0.00
Poland	501.46	497.72	3.73	3.25	0.48
Portugal	91.10	68.90	22.20	6.96	15.24
Romania	57.53	45.91	11.62	1.67	9.95
Slovenia	35.66	33.84	1.82	1.46	0.36
Slovakia	8.29	8.16	0.12	0.08	0.04
Finland	86.37	85.64	0.40	0.10	0.30
Sweden	131.25	128.59	2.66	0.54	2.13
United Kingdom	911.66	903.77	7.89	2.85	5.04
Switzerland	145.15	95.72	49.43	28.63	20.81
Albania	11.37	5.21	7.37	4.23	3.14
Turkey	76.81	76.81	:		
EU (28 countries)	7,798.27	6,765.24	1,031.08	636.57	394.52
EU (27 countries)	7,753.84	6,725.44	1,026.49	632.47	394.03
EU (25 countries)	7,689.65	6,673.63	1,014.11	630.70	383.42
EU (15 countries)	6,965.98	5,962.85	1,002.50	624.18	378.32

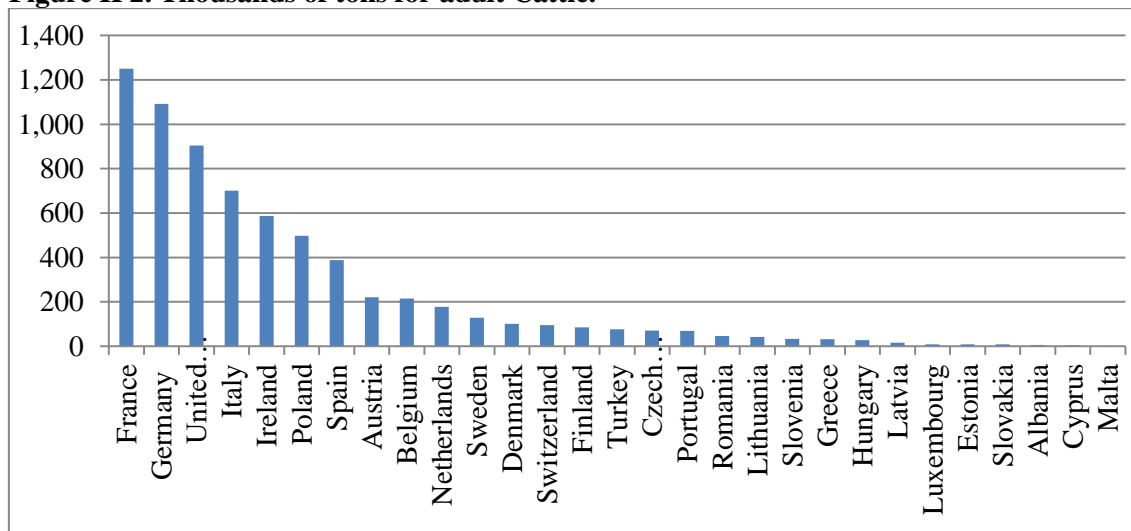
Source. Eurostat.

Figure II 11. Thousands of tons for young Cattle.



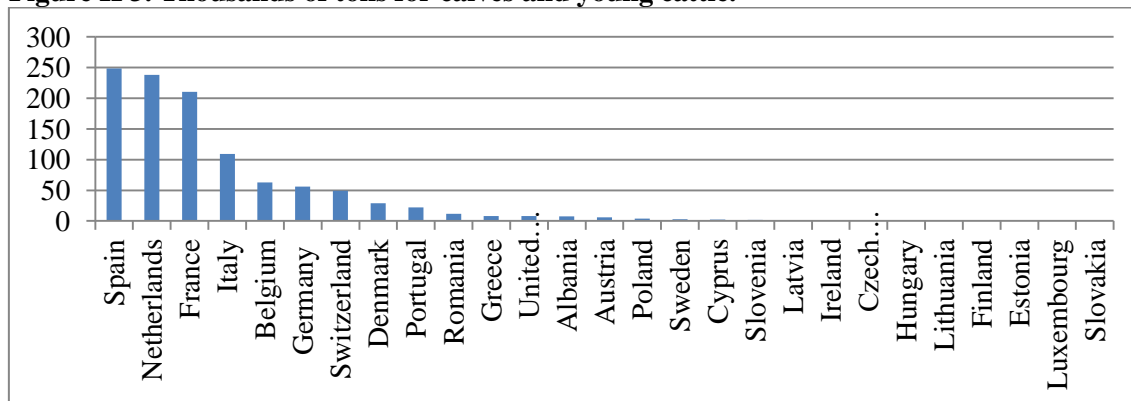
Source. Eurostat. Elaborated by author using data from Table II.1.

Figure II 2. Thousands of tons for adult Cattle.



Source. Eurostat. Elaborated by author using data from Table II.1.

Figure II 3. Thousands of tons for calves and young cattle.



Source. Eurostat. Elaborated by author using data from Table II.1.

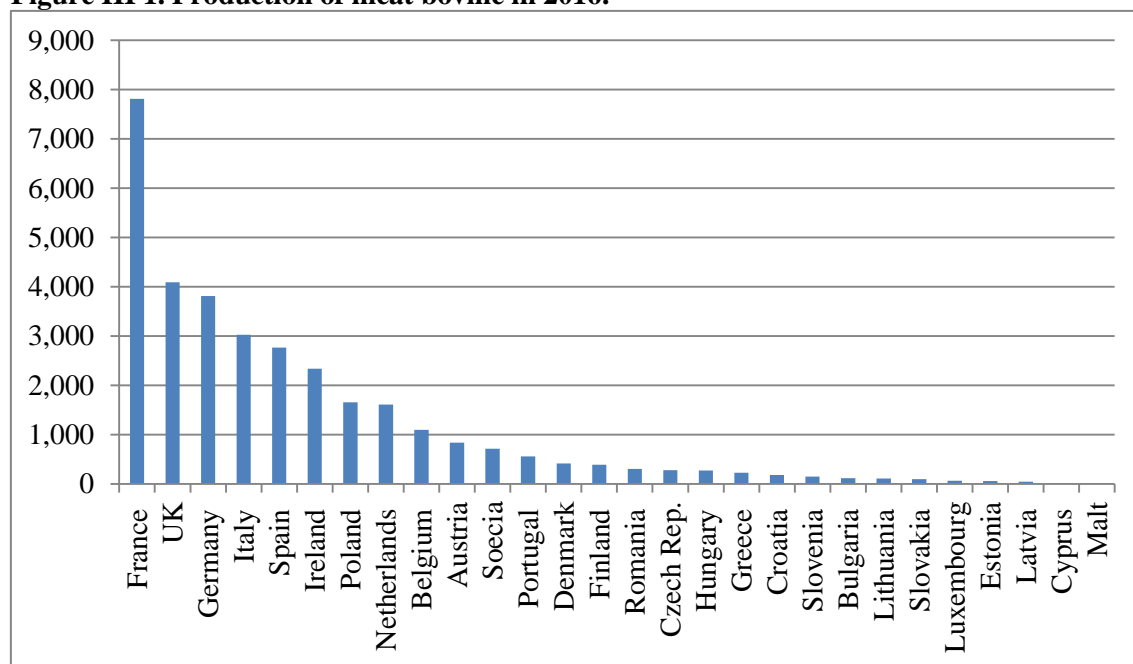
APPENDIX III. PRODUCTION BOVINE IN EU (Millions of €).

Table III 1. Production bovine in EU.

COUNTRY	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	% var 16/15
France	8,100.30	7,894.30	7,290.20	7,175.10	7,482.70	8,005.30	8,249.70	7,958.50	8,073.30	7,816.92	-3.2%
UK	3,042.80	3,387.49	3,259.58	3,368.34	3,717.33	4,526.42	4,502.25	4,412.22	4,790.67	4,090.89	-14.6%
Germany	3,544.18	3,977.64	2,875.00	3,162.00	4,074.00	4,644.00	4,475.01	4,022.51	4,029.94	3,813.31	-5.4%
Italy	3,352.11	3,359.88	3,249.03	3,199.48	3,449.71	3,580.95	3,373.09	3,185.95	3,077.44	3,028.37	-1.6%
Spain	2,735.14	2,196.21	2,268.99	2,325.12	2,494.93	2,642.71	2,700.54	2,717.99	2,717.63	2,764.87	1.7%
Ireland	1,488.01	1,704.16	1,490.59	1,517.67	1,811.02	2,134.88	2,139.00	2,017.59	2,378.45	2,340.46	-1.6%
Poland	929.33	1,086.49	951.05	968.85	1,100.63	1,155.16	1,107.46	1,197.08	1,605.41	1,655.34	3.1%
Netherlands	1,552.00	1,423.00	1,423.00	1,333.00	1,407.00	1,447.00	1,547.00	1,483.00	1,623.00	1,609.03	-0.9%
Belgium	1,182.88	1,224.04	1,171.68	1,184.76	1,192.62	1,161.59	1,108.32	1,060.02	1,132.32	1,097.19	-3.1%
Austria	834.38	876.10	830.72	800.61	904.97	949.77	945.52	899.49	853.83	839.99	-1.6%
Soecia	406.06	429.53	379.54	455.36	500.41	508.67	549.69	564.53	653.23	712.04	9.0%
Portugal	516.36	602.65	474.37	528.40	577.23	536.07	481.54	559.81	567.91	555.87	-2.1%
Denmark	335.41	370.71	333.86	365.37	398.31	434.07	431.03	404.96	415.18	415.84	0.2%
Finland	316.30	327.30	332.70	344.40	339.42	356.60	383.30	380.83	394.18	389.61	-1.2%
Romania	500.55	401.98	447.99	210.93	254.71	287.58	303.11	271.05	331.05	303.10	-8.4%
Czech Rep.	279.38	306.44	281.56	247.23	264.06	265.39	256.09	240.68	244.89	277.21	13.2%
Hungary	119.77	136.43	124.84	133.46	206.05	198.18	177.67	158.61	277.17	274.41	-1.0%
Greece	229.30	244.62	251.60	203.77	233.22	240.49	267.13	248.89	235.54	224.46	-4.7%
Croatia	224.57	256.67	237.63	241.57	239.39	222.70	168.98	183.06	192.68	183.02	-5.0%
Slovenia	136.03	136.86	138.74	138.05	154.46	150.89	143.09	141.15	147.02	149.98	2.0%
Bulgaria	118.30	114.81	119.58	110.49	125.83	131.80	121.14	126.55	154.95	114.57	-26.1%
Lithuania	106.70	121.80	88.10	105.30	118.90	111.40	96.50	108.88	115.69	111.24	-3.8%
Slovakia	118.91	234.15	193.52	190.05	175.27	155.77	153.77	155.13	119.75	93.61	-21.8%
Luxembourg	50.20	58.51	55.90	54.85	56.83	74.58	64.02	69.86	69.33	67.25	-3.0%
Estonia	29.27	35.07	34.29	33.04	40.70	39.80	51.37	36.95	50.88	54.77	7.6%
Latvia	45.72	34.45	40.27	36.20	41.95	46.69	42.98	41.83	43.91	44.72	1.8%
Cyprus	10.02	10.18	9.58	10.12	10.23	11.28	15.44	17.35	17.63	13.28	-24.7%
Malt	4.11	3.97	3.91	3.56	3.37	3.56	3.51	3.19	2.93	3.11	6.1%
Total EU-28	30,308.09	30,955.44	28,357.82	28,447.08	31,375.25	34,023.30	33,858.25	32,667.66	34,315.91	33,044.46	-3.7%

Source. Eurostat.

Figure III 1. Production of meat bovine in 2016.



Source. Eurostat. **Elaborated by author using data from Table III.1.**

APPENDIX IV. TRADE OF BOVINE MEET IN EUROPEAN UNION.

Table IV 1. Imports and Export (Total Beef Meat Trade.)

Year	EXPORTS (Meet Bovine EU in tons)	IMPORTS (Meet Bovine EU in tons)	EXPORTS (Meet Bovine EU thousand €)	IMPORTS (Meet Bovine EU thousand €)
1988	2,609,959.30	2,258,924.50	6,976,931.75	6,806,208.57
1989	2,932,187.10	2,375,733.20	8,039,746.65	7,745,485.44
1990	2,752,020.20	2,425,675.60	7,361,018.34	7,351,154.58
1991	3,514,971.90	2,660,353.50	7,987,073.85	7,698,061.89
1992	3,474,981.70	2,734,694.30	8,319,146.37	8,170,042.16
1993	3,346,549.70	2,413,141.00	8,386,716.47	7,659,628.04
1994	3,453,181.00	2,543,449.70	8,874,306.68	7,999,282.83
1995	3,444,217.00	2,357,132.30	8,578,131.98	7,344,359.72
1996	3,022,450.40	2,089,945.20	6,785,989.63	5,925,429.12
1997	3,030,666.60	2,264,089.00	7,176,489.87	6,522,175.13
1998	2,873,986.90	2,346,423.40	7,571,620.29	7,134,446.12
1999	3,307,492.40	2,489,845.00	8,158,118.72	7,544,656.89
2000	3,078,595.40	2,408,702.70	8,027,875.71	7,589,237.15
2001	2,487,869.40	1,907,603.30	5,945,165.73	5,481,898.63
2002	2,926,905.40	2,371,101.10	7,617,912.05	7,068,871.55
2003	3,021,361.10	2,558,317.30	8,055,889.54	7,735,702.31
2004	3,018,908.40	2,686,780.80	8,517,676.77	8,456,077.69
2005	2,951,538.80	2,838,787.50	9,288,184.25	9,412,793.79
2006	2,454,062.50	2,406,374.10	10,431,345.07	10,929,088.67
2007	2,511,937.30	2,462,213.70	10,432,297.45	10,990,253.22
2008	2,661,610.40	2,508,774.00	11,262,953.18	11,285,023.58
2009	2,789,748.20	2,771,980.20	11,158,581.97	11,158,586.86
2010	3,563,599.70	3,365,359.90	11,929,994.19	11,908,938.59
2011	3,848,095.00	3,291,854.10	13,549,082.33	12,924,492.04
2012	3,503,187.70	3,122,930.00	13,877,646.02	13,378,587.61
2013	3,302,424.50	3,056,132.70	13,073,131.36	13,059,164.57
2014	3,407,213.10	3,099,559.30	13,098,459.42	13,074,727.21
2015	3,678,498.32	3,200,433.20	14,300,359.94	13,829,070.63
2016	3,860,921.87	3,235,970.15	14,574,300.30	13,536,802.13
2017	4,027,099.38	3,369,657.21	15,865,867.47	14,353,853.03

European Union Members. France, Belgium, Luxembourg, Netherlands, Germany, Italy, United Kingdom, Ireland, Denmark, Greece, Portugal, Spain, Sweden, Finland, Austria, Estonia, Lithuania, Malta, Latvia, Poland, Czech Republic, Slovakia, Hungary, Slovakia, Cyprus, Romania, Bulgaria and Croatia.

Beef Meat Trade*. Trade of Frozen beef, Fresh beef, Live bovine animals and Bovine meat without bone-in, salt, dried or smoked.

Taric Code. 0202.0201, 0102 and 02102010.

Source, Datacomex.

Table IV 2. Export and Import of European Union by different type of products (Tons.)

Years	EXPORTS Fresh Beef (Tons)	IMPORTS Fresh Beef (Tons)	EXPORTS Frozen Beef (Tons)	IMPORTS Frozen Beef (Tons)	EXPORTS Live Animals (Tons)	IMPORTS Live Animals (Tons)	EXPORTS NO Bone-in, salt, dried or smoled (Tons)	IMPORTS NO Bone-in, salt, dried or smoled (Tons)	EXPORTS Bone-in (Tons))	IMPORTS NO Bone-in (Tons)
1988	1160200.8	1165490.3	722520.2	253902.3	727181.3	839511.3	57	20.6	2026.7	1378
1989	1224722.1	1251838	966358.5	264951.9	741014.6	858928.4	91.9	14.9	2243.3	1527.5
1990	1329215	1344985.7	695772.7	210989	726898.4	869699.9	134.1	1	2732.7	1837.6
1991	1535398.9	1506045.6	1053589.4	218130.5	925830.2	936151.6	153.4	25.8	2802.9	1956.6
1992	1423749.6	1489746	1104916.9	269755.7	945634	975139.2	681.2	53.4	2526.3	1833.9
1993	1420487.1	1372954.2	925395.6	247327.5	1000217.2	792417.1	449.8	442.2	2519.6	1999.5
1994	1473882.7	1395286.7	890120.2	280597.9	1089170	866932.7	8.1	632.4	2596.7	5176.8
1995	1484803.1	1328958.3	779873.5	258780.6	1179495.2	768815.7	45.2	577.7	2483.6	3236.4
1996	1184760.1	1113893.8	774119.6	222820.7	1063372.8	752254.3	197.9	976.4	1256.5	3574.1
1997	1230485.7	1165063.5	820805.1	293929.6	979361.2	803535.8	14.6	1560.1	1032.1	3015.1
1998	1304230.7	1236874.7	584362.9	276325.2	985360.6	831491.1	32.7	1732.4	1382	3465.7
1999	1342535	1319033.2	805032.4	335073.3	1159850.9	833720.4	74.1	2018.1	1685.2	4661.2
2000	1333983	1296100.9	568027.3	308776.1	1176510.8	801945	74.3	1880.7	2020.2	3495.1
2001	1155665.4	1043623.9	479211.8	267366.2	852794.7	595332.4	197.5	1280.8	2018.4	3504
2002	1383709.3	1293514.9	502393.2	356531.4	1040767.5	719502.9	35.4	1551.9	2236.8	4184.2
2003	1415196.7	1371532.4	540617.5	463818	1065291.5	721181.8	255.4	1785.1	2972.3	4238.4
2004	1516882	1494593.9	413746.8	445932.8	1088033	743356.1	246.6	2898	4739.5	6790.9
2005	1586836.1	1588480.9	312935.1	473284.1	1051684.2	774021.5	83.4	3001	4829.8	5590.2
2006	1719027.3	1721520.8	313476.1	517554.5	421408.5	164009.3	150.6	3289.5	10987.2	6432
2007	1810321.4	1816181.3	289336.5	468652.3	412006.1	174146.4	273.3	3233.7	10683.4	10412.8
2008	1941499.3	1809152.9	327224.8	463212.3	392478.9	229860.5	407.4	6548.3	11226.6	9809.4
2009	1970075.8	1903633.4	290517	461086.3	528335.5	403349.9	819.9	3910.6	12864.4	19547.3
2010	2043323.5	1971210.7	388826.8	476796	1130434.1	914383.5	1015.3	2969.7	14074.2	10479.2

2011	2118438.5	1925675.5	377910.2	449503.2	1350640	913372.9	1106.3	3302.5	26225.7	10215.9
2012	1987135.5	1883935.8	346186.6	447284.7	1169477.1	789039	388.5	2670.5	20356.1	11972.3
2013	1913728.6	1863661.3	322798.6	433328.9	1065282.2	756252.3	615.1	2890.2	21128	10531
2014	1969480.4	1899871	372001.2	446870.7	1065030.8	749036	700.7	3781.6	28888.8	9559.9
2015	2053629.62	1939648.7	388161.15	465803.54	1235780.98	789959.13	926.57	5021.83	20506.21	8564.63
2016	2105573.17	1941099.92	431624.17	478047.91	1322551.07	812724.89	1173.46	4097.43	21522.45	10393.55
2017	2127853.26	1960657.71	476922.45	503342.99	1419432.64	899811.47	2891.03	5845.04	21558.94	10432.63

Source. Datacomex. Destination of exports. Total world. Measure. Tons. Elaborated by author.

Table IV 3. Export and Import of European Union by different type of products (Thousands of €.)

Years	EXPORTS Fresh Beef	IMPORTS Fresh Beef	EXPORTS Frozen Beef	IMPORTS Frozen Beef	EXPORTS Live Animals	IMPORTS Live Animals	EXPORTS NO Bone- in, salt, dried or smoked	IMPORTS NO Bone- in, salt, dried or smoked	EXPORTS NO Bone-in	IMPORTS NO Bone- in
1988	3,885,954.49	4,081,945.75	1,296,535.08	747,781.08	1,794,288.18	1,976,423.23	154.00	58.51	27,137.76	12,852.90
1989	4,427,455.24	4,735,771.79	1,624,825.06	847,164.91	1,987,296.45	2,162,495.79	169.90	52.95	38,974.52	14,814.42
1990	4,458,282.11	4,748,398.32	1,186,551.95	651,467.52	1,715,776.54	1,951,286.75	407.74	1.99	36,587.11	17,876.20
1991	4,780,629.92	5,088,100.65	1,326,623.32	636,020.28	1,879,319.61	1,973,789.68	501.00	151.28	30,596.76	18,857.41
1992	4,821,087.44	5,318,824.10	1,517,376.60	755,834.41	1,980,110.20	2,095,246.77	572.13	136.88	23,819.49	17,361.33
1993	4,949,214.91	5,045,007.89	1,302,612.04	694,257.10	2,134,264.34	1,918,436.80	625.18	1,926.25	18,217.40	16,105.45
1994	5,100,766.02	5,060,271.15	1,327,293.64	782,885.03	2,446,198.76	2,153,362.03	48.26	2,764.62	23,908.93	23,051.74
1995	4,982,886.56	4,725,315.33	1,217,235.98	746,469.58	2,377,882.97	1,870,506.00	126.47	2,068.81	18,195.70	23,579.35
1996	3,691,659.54	3,685,052.89	1,098,184.09	636,268.79	1,995,693.92	1,601,371.64	452.08	2,735.80	11,801.00	25,186.53
1997	3,906,898.65	3,956,009.77	1,279,332.98	818,120.88	1,990,212.60	1,742,798.58	45.64	5,245.90	11,616.57	22,681.50
1998	4,355,430.94	4,379,768.58	1,022,699.84	789,360.86	2,193,230.61	1,959,236.14	258.90	6,080.54	13,553.49	26,449.96
1999	4,536,668.16	4,711,151.45	1,276,057.28	891,172.53	2,345,052.72	1,935,882.49	340.56	6,450.42	16,480.91	27,174.89
2000	4,562,556.57	4,760,128.78	1,022,424.00	888,515.49	2,442,649.12	1,934,526.09	246.02	6,066.79	18,234.69	29,829.99
2001	3,476,016.20	3,458,270.78	861,279.42	768,862.18	1,607,188.19	1,251,956.34	681.92	2,809.33	15,387.88	26,451.72

2002	4,494,117.79	4,455,593.55	943,149.94	917,215.42	2,180,423.80	1,690,653.76	220.52	5,408.82	21,387.83	31,525.69
2003	4,801,527.69	4,910,520.23	938,190.90	1,030,123.14	2,315,379.51	1,787,595.02	791.44	7,463.92	25,706.68	33,827.55
2004	5,285,852.72	5,514,416.56	860,432.02	1,140,409.62	2,370,086.41	1,788,704.13	1,305.62	12,547.38	38,107.17	50,159.18
2005	5,888,547.07	6,138,815.72	844,246.98	1,251,047.88	2,554,960.96	2,009,778.36	429.24	13,151.83	42,132.28	44,193.30
2006	6,821,125.47	7,270,344.80	895,242.99	1,426,896.27	2,714,329.82	2,215,920.03	646.79	15,927.57	66,131.74	51,538.21
2007	7,112,982.36	7,619,666.68	864,230.12	1,427,399.11	2,454,152.94	1,926,884.81	932.03	16,302.62	68,270.59	57,997.22
2008	7,873,282.45	7,813,687.56	1,060,877.74	1,630,957.20	2,327,393.76	1,821,290.85	1,399.23	19,087.97	75,206.12	75,034.27
2009	7,651,776.49	7,610,317.56	914,648.10	1,576,883.86	2,591,434.60	1,954,539.78	722.78	16,845.66	79,215.28	111,334.57
2010	7,963,171.06	8,128,490.56	1,147,125.49	1,614,663.02	2,818,726.50	2,155,351.21	971.14	10,433.80	88,354.74	103,003.32
2011	9,117,359.18	8,922,274.89	1,231,499.82	1,741,378.83	3,198,998.65	2,245,617.61	1,224.68	15,220.71	115,707.20	130,911.35
2012	9,283,582.63	9,266,750.35	1,320,368.40	1,832,634.28	3,272,705.08	2,266,111.00	989.91	13,091.98	132,588.56	139,133.53
2013	8,896,389.84	9,119,935.88	1,236,225.55	1,760,476.02	2,939,473.68	2,165,780.89	1,042.29	12,971.78	129,965.40	111,303.17
2014	8,896,300.99	9,243,770.62	1,288,136.31	1,721,251.83	2,912,889.95	2,095,382.04	1,132.17	14,322.72	143,903.42	103,226.44
2015	9,524,758.47	9,855,883.86	1,386,937.48	1,871,938.63	3,385,878.56	2,082,359.67	2,785.43	18,888.47	130,709.14	105,354.89
2016	9,554,422.41	9,603,762.60	1,420,737.06	1,836,528.51	3,593,518.05	2,068,536.30	5,622.78	27,974.72	142,876.89	114,322.01
2017	10,130,526.84	9,973,580.72	1,710,758.99	1,995,997.55	4,009,357.22	2,362,784.70	15,224.42	21,490.06	143,633.84	115,762.19

Source. Datacomex. Destination of exports. Total world. Measure. Thousands €.

Table IV 4. Exports 2017 measured in thousands of €. Datas by products and destination of exports.

Country	TOTAL EXPORTS (Total World)	TOTAL EXPORTS (Intra-Community)	TOTAL EXPORTS (Outside Europe)	EXPORTS Fresh Beef (Total world)	EXPORTS Fresh Beef (Intra-community)	EXPORTS Fresh Beef (Outside Europe)	EXPORTS Frozen Beef (Total world)	EXPORTS Frozen Beef (Intra-Community)	EXPORTS Frozen Beef (Outside Europe)	EXPORTS Live Animals (Total world)	EXPORTS Live Animals (Intra-community)	EXPORTS Live Animals outside Europe
France	2,381,224.58	2,197,021.35	184,247.58	865,906.91	811603.53	54303.38	60,933.05	46,593.20	14,339.85	1,454,384.62	1338822.44	115562.18
Belgium	866,073.21	802,527.26	63,571.66	681,838.09	656413.43	25424.66	70,768.08	39,461.82	31,306.26	113,467.04	106640.19	6826.85
Luxembourg	38,126.10	36,507.35	1,618.75	13,661.82	13611.84	49.98	674.35	670.78	3.57	23,789.93	22224.73	1565.2
Netherlands	3,141,294.89	2,326,774.88	814,592.56	2,476,845.32	1884136.02	592709.3	292,891.57	190,036.01	102,855.56	371,558.00	252530.59	119027.41
Germany	1,624,518.67	1,065,627.55	559,158.60	1,078,993.71	773608.04	305385.67	183,931.95	124,615.93	59,316.02	361,593.01	167398.69	194194.32
Italy	551,049.45	400,016.51	151,218.11	372,882.77	313542.72	59340.05	167,176.62	82,063.11	85,113.51	10,990.06	4230.61	6759.45
United Kingdom	466,886.32	388,340.12	78,763.02	392,628.05	349508.33	43119.72	69,879.41	34,452.83	35,426.58	4,378.86	4165.03	213.83

Ireland	2,030,483.09	800,234.45	1,230,248.64	1,731,459.02	726063.51	1005395.51	212,424.70	41,442.43	170,982.27	86,599.37	32728.51	53870.86
Denmark	367,630.54	260,258.85	116,844.59	259,938.50	213996.97	45941.53	44,076.90	17,319.01	26,757.89	63,615.14	20715.59	42899.55
Greece	3,166.15	1,885.35	1,280.80	1,649.63	1124.72	524.91	1,489.76	760.63	729.13	26.76		26.76
Portugal	119,401.25	56,935.60	62,467.27	27,151.82	26503.06	648.76	7,515.72	1,357.86	6,157.86	84,733.71	29073.06	55660.65
Spain	943,728.58	584,726.71	359,222.31	512,362.19	444070.47	68291.72	139,905.33	97,120.00	42,785.33	291,461.06	43332.64	248128.42
Sweden	7,071.88	5,934.94	1,138.19	5,167.84	4524.68	643.16	1,801.07	1,409.13	391.94	102.97		102.97
Finland	15,847.70	561.3	15,286.55	13,263.26	235.16	13028.1	1,660.73	326.14	1,334.59	923.71		923.71
Austria	558,082.87	382,695.35	175,387.52	353,866.05	279094.04	74772.01	89,586.80	53,904.14	35,682.66	114,630.02	49697.17	64932.85
Estonia	24,873.01	9,667.41	15,207.02	3,016.80	1663.3	1353.5	3,094.09	1,336.41	1,757.68	18,762.12	6666.28	12095.84
Lithuania	127,692.58	67,680.06	60,012.52	68,039.47	43714.98	24324.49	16,408.90	11,518.72	4,890.18	43,244.21	12446.36	30797.85
Malta	17.51	1.1	16.41			0	17.51	1.1	16.41			0
Latvia	56,126.34	35,794.87	20,331.47	26,342.43	21945.92	4396.51	3,013.40	2,695.33	318.07	26,770.51	11153.62	15616.89
Poland	1,425,124.79	952,833.90	476,997.57	1,070,181.73	783743.1	286438.63	320,757.62	145,976.23	174,781.39	34,185.44	19760.01	14425.43
Czech Republic	246,113.80	152,532.74	93,583.30	42,727.77	36041.71	6686.06	6,888.03	2,566.62	4,321.41	196,498.00	113922.17	82575.83
Slovakia	79,141.15	17,489.35	61,657.44	7,353.24	1609.71	5743.53	155.23	19.46	135.77	71,632.68	15860.16	55772.52
Hungary	172,940.11	46,505.04	126,435.07	32,053.84	23157.3	8896.54	4,892.42	1,107.81	3,784.61	135,993.85	22239.93	113753.92
Slovenia	139,119.07	54,989.74	84,129.33	27,401.59	9208.46	18193.13	1,576.93	173.52	1,403.41	110,140.55	45607.76	64532.79
Cyprus	168.78	168.78	0.00			0	168.78	168.78	0.00			0
Romania	244,297.07	35,744.22	208,552.85	38,374.10	16744.57	21629.53	3,179.08	811.48	2,367.60	202,743.89	18188.17	184555.72
Bulgaria	52,586.05	2,079.60	50,506.45	2,406.08	1283.87	1122.21	1,509.54	428.88	1,080.66	48,670.43	366.85	48303.58
Croatia	167,857.51	29,273.97	138,583.54	25,014.81	18123.47	6891.34	4,381.42	2,744.50	1,636.92	138,461.28	8406	130055.28

Destination of exports. Total world, Intracommunity trade (EU – EUROZONE (d.2015-01) **Taric Code.** 0202.0201, 0102 and 02102010. **Source.** Datacomex.

Table IV 5. Evolution of exports by country €. Percentage of variation.

	Total exports 2010	Total exports 2011	Total exports 2012	Total exports 2013	Total exports 2014	Total exports 2015	Total exports 2016	Total exports 2017	var 10-11	var 11-12	var 12- 13	var 13-14	var 14-15	Var 15-16	var 16-17	Mean Var.
France	2,258,176.20	2,574,063.30	2,484,937.16	2,239,588.12	2,121,591.05	2,278,014.83	2,275,342.70	2,381,224.58	13.99%	-3.46%	-9.87%	-5.27%	7.37%	-0.12%	4.65%	1.04%
Belgium	683,377.28	720,921.91	730,637.17	701,845.18	737,885.08	788,012.76	784,747.08	866,073.21	5.49%	1.35%	-3.94%	5.14%	6.79%	-0.41%	10.36%	3.54%
Luxembourg	33,431.64	44,071.41	37,572.48	32,040.85	35,777.37	38,656.10	33,911.15	38,126.10	31.83%	-14.75%	-14.72%	11.66%	8.05%	-12.27%	12.43%	3.17%
Netherlands	2,026,951.09	2,345,880.28	2,461,745.79	2,373,598.65	2,414,371.84	2,612,120.75	2,707,331.41	3,141,294.89	15.73%	4.94%	-3.58%	1.72%	8.19%	3.64%	16.03%	6.67%
Germany	1,766,574.25	1,944,861.98	1,800,043.65	1,674,604.55	1,647,171.28	1,659,765.25	1,592,513.63	1,624,518.67	10.09%	-7.45%	-6.97%	-1.64%	0.76%	-4.05%	2.01%	-1.03%
Italy	470,527.53	515,017.63	541,913.65	511,715.54	498,079.29	563,475.21	551,831.35	551,049.45	9.46%	5.22%	-5.57%	-2.66%	13.13%	-2.07%	-0.14%	2.48%
United Kingdom	384,553.11	501,145.31	475,860.72	437,177.64	460,954.82	469,029.55	448,832.55	466,886.32	30.32%	-5.05%	-8.13%	5.44%	1.75%	-4.31%	4.02%	3.44%
Ireland	1,452,768.97	1,645,545.68	1,691,641.21	1,673,247.07	1,846,273.96	1,849,121.04	1,896,941.23	2,030,483.09	13.27%	2.80%	-1.09%	10.34%	0.15%	2.59%	7.04%	5.01%
Denmark	352,588.67	352,145.39	386,813.43	350,856.37	336,663.02	328,945.87	329,346.01	367,630.54	-0.13%	9.84%	-9.30%	-4.05%	-2.29%	0.12%	11.62%	0.83%
Greece	7,743.87	14,296.25	5,576.31	2,235.62	1,562.45	1,725.49	2,853.59	3,166.15	84.61%	-60.99%	-59.91%	-30.11%	10.43%	65.38%	10.95%	2.91%
Portugal	40,260.60	40,812.87	58,221.31	53,721.45	50,368.83	80,543.35	121,227.28	119,401.25	1.37%	42.65%	-7.73%	-6.24%	59.91%	50.51%	-1.51%	19.85%
Spain	446,640.61	518,815.92	693,658.21	633,362.49	609,357.39	784,392.21	833,479.56	943,728.58	16.16%	33.70%	-8.69%	-3.79%	28.72%	6.26%	13.23%	12.23%
Sweden	6,623.44	10,467.31	13,414.84	7,285.71	10,131.66	8,731.18	5,860.56	7,071.88	58.03%	28.16%	-45.69%	39.06%	-13.82%	-32.88%	20.67%	7.65%
Finland	7,336.42	9,648.06	8,735.59	6,250.91	7,306.26	13,677.67	15,774.29	15,847.70	31.51%	-9.46%	-28.44%	16.88%	87.20%	15.33%	0.47%	16.21%
Austria	447,100.31	541,534.76	561,302.61	534,703.55	522,783.73	540,434.95	511,800.84	558,082.87	21.12%	3.65%	-4.74%	-2.23%	3.38%	-5.30%	9.04%	3.56%
Estonia	14,470.87	20,989.59	18,852.37	18,697.75	17,622.28	28,275.41	34,765.42	24,873.01	45.05%	-10.18%	-0.82%	-5.75%	60.45%	22.95%	-28.45%	11.89%
Lithuania	107,858.75	132,643.18	125,594.36	95,838.72	100,707.75	111,301.86	117,450.85	127,692.58	22.98%	-5.31%	-23.69%	5.08%	10.52%	5.52%	8.72%	3.40%
Malta	126.81	42.58	329.01	16.87	395.46	69.49	95.28	17.51	-66.42%	672.69%	-94.87%	2244.16%	-82.43%	37.11%	-81.62%	375.52%
Latvia	26,804.96	42,878.23	45,261.36	35,103.53	35,424.49	48,487.04	54,700.12	56,126.34	59.96%	5.56%	-22.44%	0.91%	36.87%	12.81%	2.61%	13.76%
Poland	846,725.67	899,343.29	996,473.53	1,012,078.61	1,008,494.80	1,261,590.83	1,204,915.72	1,425,124.79	6.21%	10.80%	1.57%	-0.35%	25.10%	-4.49%	18.28%	8.16%
Czech Republic	118,501.77	146,239.42	185,193.01	180,550.23	179,952.50	222,994.49	242,041.13	246,113.80	23.41%	26.64%	-2.51%	-0.33%	23.92%	8.54%	1.68%	11.62%
Slovakia	57,678.81	64,769.65	76,316.66	67,279.12	63,709.00	79,675.31	92,977.14	79,141.15	12.29%	17.83%	-11.84%	-5.31%	25.06%	16.70%	-14.88%	5.69%
Hungary	174,191.71	236,573.24	198,082.43	142,328.11	107,762.99	175,433.62	216,914.19	172,940.11	35.81%	-16.27%	-28.15%	-24.29%	62.80%	23.64%	-20.27%	4.75%
Slovenia	55,887.10	55,637.18	61,715.62	86,215.02	90,001.24	93,193.82	104,974.99	139,119.07	-0.45%	10.93%	39.70%	4.39%	3.55%	12.64%	32.53%	14.75%
Cyprus	25.46	187.58	606.73	1,634.89	1,294.05	2,662.78	231.97	168.78	636.76%	223.45%	169.46%	-20.85%	105.77%	-91.29%	-27.24%	142.30%
Romania	104,015.62	118,628.72	169,442.76	147,414.54	124,707.10	145,741.31	186,706.48	244,297.07	14.05%	42.83%	-13.00%	-15.40%	16.87%	28.11%	30.85%	14.90%
Bulgaria	13,864.93	10,205.05	10,514.34	9,884.00	9,481.70	17,614.82	41,105.13	52,586.05	-26.40%	3.03%	-6.00%	-4.07%	85.78%	133.36%	27.93%	30.52%
Croatia	24,216.60	40,491.88	36,199.80	42,813.98	57,495.86	93,887.52	160,005.87	167,857.51	67.21%	-10.60%	18.27%	34.29%	63.29%	70.42%	4.91%	35.40%

Source. datacomex. **Detined of exports.** total world. **Taric cod.** 0202.0201, 0102 and 02102010.

Table IV 6. Top ten destination of European exports (2017).

Destination of exports in Europe	EXPORTS €	Destination of exports outside Europe.	EXPORTS €
Italy	2,862,344.37	Turkey	541,306.58
Germany	1,948,082.53	Israel	203,847.21
United Kingdom	1,369,259.61	Lebanon	158,399.89
Netherlands	1,349,911.65	Russia	126,527.80
France	1,267,070.40	Libya	125,988.96
Spain	958,962.88	Algeria	112,391.29
Belgium	508,902.67	Hong-Kong	88,275.06
Denmark	492,274.61	Bosnia-Herzegovina	86,887.45
Portugal	442,085.78	Marocco	51,391.35
Greece	438,696.19	Egypto	47,488.84

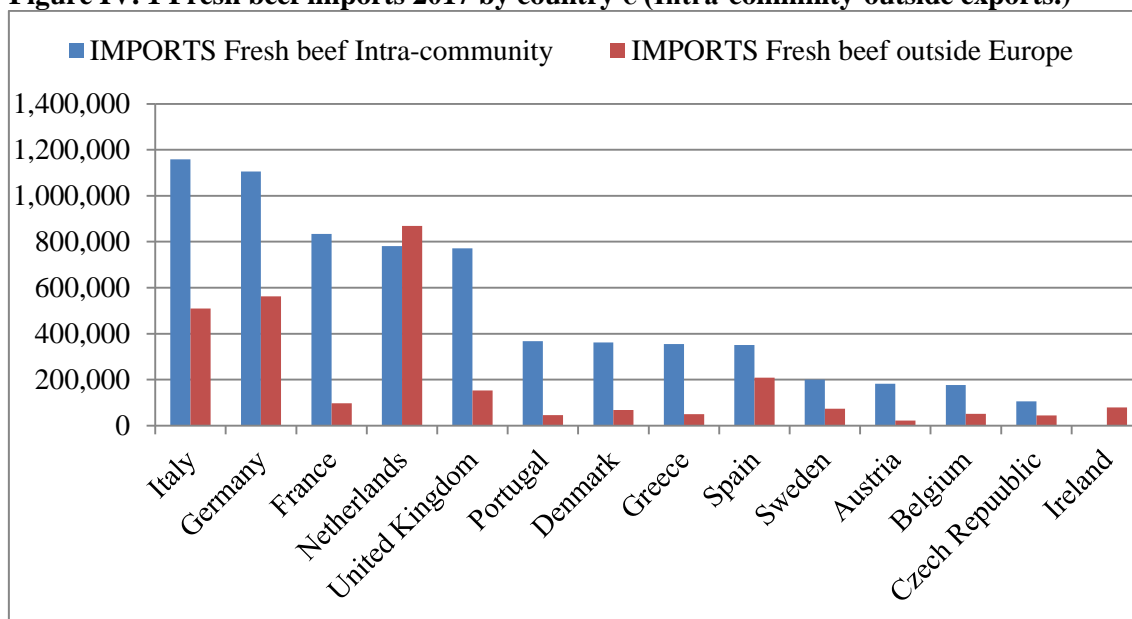
Source. Datacomex. **Detined of exports.** total world. **Taric cod.** 0202.0201, 0102 and 02102010.

Table IV 7. Imports 2017 measured in thousands of €. Datas by products and destination of imports.

Country	IMPORTS Total world	IMPORTS Intra-community	IMPORTS outside Europe	IMPORTS Live animals Total world	IMPORTS Live animals Intra-community	IMPORTS Live animals outside Europe	IMPORTS Fresh beef Total world	IMPORTS Fresh beef Intra-community	IMPORTS Fresh beef outside Europe	IMPORTS Frozen beef Total world	IMPORTS Frozen beef Intra-community	IMPORTS Frozen beef outside Europe
France	1,214,243.79	1,060,008.67	154,235.12	27,686.35	27,179.38	506.97	930,899.66	834,425.76	96,473.90	255,657.78	198,403.53	57,254.25
Belgium	435,319.89	377,107.67	58,212.22	170,797.92	166,967.74	3,830.18	228,230.57	176,745.59	51,484.98	36,291.40	33,394.34	2,897.06
Luxembourg	60,334.21	57,021.39	3,312.82	3,535.24	3,535.24	0.00	52,070.41	48,990.32	3,080.09	4,728.56	4,495.83	232.73
Netherlands	2,187,627.70	1,155,547.17	1,032,080.53	261,265.05	240,746.96	20,518.09	1,650,026.97	781,008.07	869,018.90	276,335.68	133,792.14	142,543.54
Germany	1,996,658.95	1,348,118.03	648,540.92	58,594.05	35,993.34	22,600.71	1,668,546.08	1,106,089.05	562,457.03	269,518.82	206,035.64	63,483.18
Italy	3,054,751.66	2,361,933.04	692,818.62	1,135,973.81	1,114,886.02	21,087.79	1,668,085.25	1,158,738.98	509,346.27	250,692.60	88,308.04	162,384.56
United Kingdom	1,136,617.83	949,058.70	187,559.13	11,159.91	11,110.70	49.21	924,689.44	771,604.14	153,085.30	200,768.48	166,343.86	34,424.62
Ireland	97,860.85	6,047.87	91,812.98	875.67	131.43	744.24	80,153.30	1,742.32	78,410.98	16,831.88	4,174.12	12,657.76
Denmark	474,143.70	400,105.56	74,038.14	244.04	234.24	9.80	429,747.52	361,749.70	67,997.82	44,152.14	38,121.62	6,030.52
Greece	474,835.81	394,879.32	79,956.49	22,491.89	9,113.36	13,378.53	404,294.80	355,195.87	49,098.93	48,049.12	30,570.09	17,479.03
Portugal	476,197.38	418,476.72	57,720.66	1,113.27	1,113.27	0.00	412,901.61	367,345.69	45,555.92	62,182.50	50,017.76	12,164.74
Spain	950,714.05	660,884.64	289,829.41	265,498.83	255,336.63	10,162.20	558,758.38	350,796.38	207,962.00	126,456.84	54,751.63	71,705.21
Sweden	414,201.15	283,960.38	130,240.77	0.45	0.45	0.00	273,502.11	199,573.39	73,928.72	140,698.59	84,386.54	56,312.05
Finland	72,950.01	33,129.45	39,820.56			0.00	53,384.12	27,849.84	25,534.28	19,565.89	5,279.61	14,286.28
Austria	355,881.96	253,359.70	102,522.26	113,362.88	39,634.68	73,728.20	204,565.85	182,590.86	21,974.99	37,953.23	31,134.16	6,819.07
Estonia	12,550.25	8,547.56	4,002.69	475.32	374.90	100.42	4,048.42	2,844.55	1,203.87	8,026.51	5,328.11	2,698.40
Lithuania	13,407.78	9,143.71	4,264.07	5,318.04	4,809.26	508.78	2,347.68	1,340.18	1,007.50	5,742.06	2,994.27	2,747.79
Malta	28,557.34	22,924.48	5,632.86			0.00	7,572.24	5,925.12	1,647.12	20,985.10	16,999.36	3,985.74
Latvia	21,095.69	17,052.72	4,042.97	6,334.81	3,948.18	2,386.63	7,952.49	7,625.25	327.24	6,808.39	5,479.29	1,329.10
Poland	161,903.18	123,974.67	37,928.51	83,990.94	73,794.58	10,196.36	54,081.34	32,214.41	21,866.93	23,830.90	17,965.68	5,865.22
Czech Republic	175,515.95	126,787.74	48,728.21	5,999.17	5,634.96	364.21	150,036.03	106,123.87	43,912.16	19,480.75	15,028.91	4,451.84
Slovakia	66,822.05	19,139.95	47,682.10	7,910.53	4,692.94	3,217.59	51,780.39	12,286.66	39,493.73	7,131.13	2,160.35	4,970.78
Hungary	103,140.80	73,858.05	29,282.75	51,821.94	34,455.66	17,366.28	26,446.76	16,713.07	9,733.69	24,872.10	22,689.32	2,182.78
Slovenia	58,615.41	34,644.97	23,970.44	16,341.40	4,564.29	11,777.11	32,583.92	24,241.13	8,342.79	9,690.09	5,839.55	3,850.54
Cyprus	21,983.17	13,597.88	8,385.29	1,247.93	260.91	987.02	8,084.23	7,560.02	524.21	12,651.01	5,776.95	6,874.06
Romania	65,672.06	50,182.39	15,489.67	18,803.10	10,613.01	8,190.09	22,003.37	18,292.86	3,710.51	24,865.59	21,276.52	3,589.07
Bulgaria	44,705.73	24,906.76	19,798.97	17,863.60	10,766.92	7,096.68	6,853.43	4,224.20	2,629.23	19,988.70	9,915.64	10,073.06
Croatia	156,054.62	73,095.05	82,959.57	74,078.56	12,678.14	61,400.42	59,934.35	39,543.86	20,390.49	22,041.71	20,873.05	1,168.66

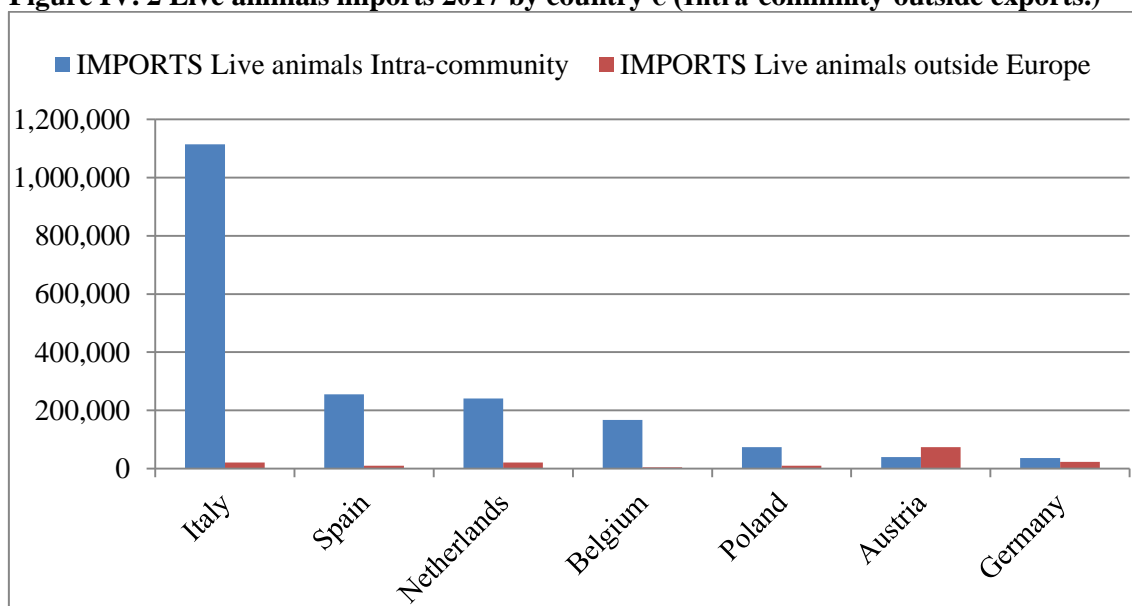
Destination of exports. Total world, Intracommunity trade (EU - EUROZONE(d.2015-01) **Taric Code.** 0202.0201 and 0102. **Source.** datacomex.

Figure IV. 1 Fresh beef imports 2017 by country € (Intra-commnity-outside exports.)



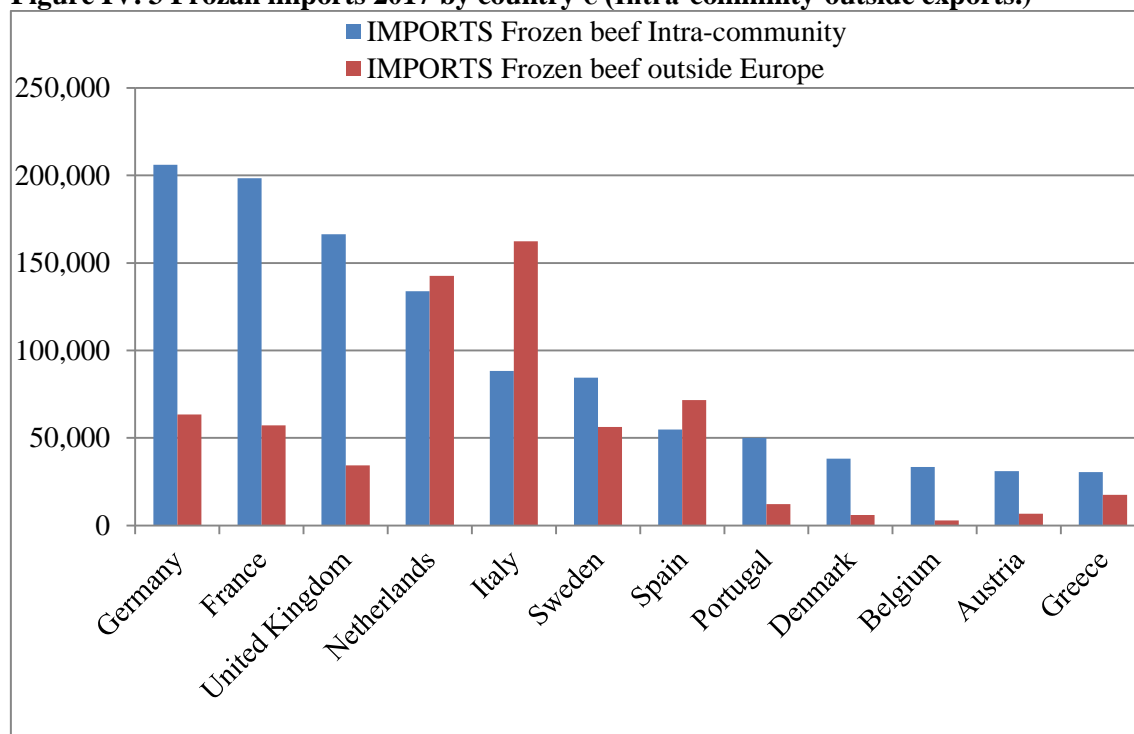
Source. datacomex. Elaborated by author using data from Table IV.7.

Figure IV. 2 Live animals imports 2017 by country € (Intra-commnity-outside exports.)



Source. datacomex. Elaborated by authour with the data in Table IV.7.

Figure IV. 3 Frozan imports 2017 by country € (Intra-commnity-outside exports.)



Source. datacomex. Elaborated by authour with the data in Table IV.7.

Table IV 8 Average Price of meat in Europe compared with average price of each country. (2017.)

Country	TOTAL EXPORTS (Thousands €)	TOTAL EXPORTS (Tons)	EXPECTED EXPORTS valued at average price in Europe	Real exports- Expected exports	Price of meat (in € per metric ton)	Average Price of meat in Europe (in € per metric ton)
France	2,381,224.58	707,017.97	2,784,818.40	-403,593.82	3.368	3.939
Belgium	866,073.21	199,925.90	787,472.67	78,600.54	4.332	3.939
Luxembourg	38,126.10	13,895.50	54,731.91	-16,605.81	2.744	3.939
Netherlands	3,141,294.89	586,966.64	2,311,957.50	829,337.39	5.352	3.939
Germany	1,624,518.67	390,854.90	1,539,508.14	85,010.53	4.156	3.939
Italy	551,049.45	131,516.46	518,020.01	33,029.44	4.190	3.939
United Kingdom	466,886.32	106,535.90	419,626.02	47,260.30	4.382	3.939
Ireland	2,030,483.09	395,472.68	1,557,696.75	472,786.34	5.134	3.939
Denmark	367,630.54	93,807.68	369,491.82	-1,861.28	3.919	3.939
Greece	3,166.15	1,012.54	3,988.22	-822.07	3.127	3.939
Portugal	119,401.25	43,958.01	173,142.81	-53,741.56	2.716	3.939
Spain	943,728.58	287,097.29	1,130,825.31	-187,096.73	3.287	3.939
Sweden	7,071.88	9,448.38	37,215.49	-30,143.61	0.748	3.939
Finland	15,847.70	3,109.41	12,247.41	3,600.29	5.097	3.939
Austria	558,082.87	141,372.49	556,841.17	1,241.70	3.948	3.939
Estonia	24,873.01	10,191.68	40,143.22	-15,270.21	2.441	3.939
Lithuania	127,692.58	46,376.11	182,667.27	-54,974.69	2.753	3.939
Malta	17.51	4.24	16.70	0.81	4.130	3.939
Latvia	56,126.34	24,166.25	95,186.57	-39,060.23	2.323	3.939
Poland	1,425,124.79	414,367.11	1,632,118.56	-206,993.77	3.439	3.939
Czech Republic	246,113.80	90,917.62	358,108.38	-111,994.58	2.707	3.939
Slovakia	79,141.15	34,102.67	134,324.37	-55,183.22	2.321	3.939
Hungary	172,940.11	57,848.95	227,856.76	-54,916.65	2.990	3.939
Slovenia	139,119.07	62,884.15	247,689.52	-108,570.45	2.212	3.939
Cyprus	168.78	9.91	39.03	129.75	17.031	3.939
Romania	244,297.07	92,405.80	363,970.06	-119,672.99	2.644	3.939
Bulgaria	52,586.05	16,535.81	65,131.62	-12,545.57	3.180	3.939
Croatia	167,857.51	62,406.30	245,807.35	-77,949.84	2.690	3.939

Source. Datacomex. **Elaborated by the author.**

* Price by ton = Total exports in € divided by total exports in tons in a specific country.

*Average price by ton in Europe = Total exports of Europe in € divided by total exports of Europe in tons.

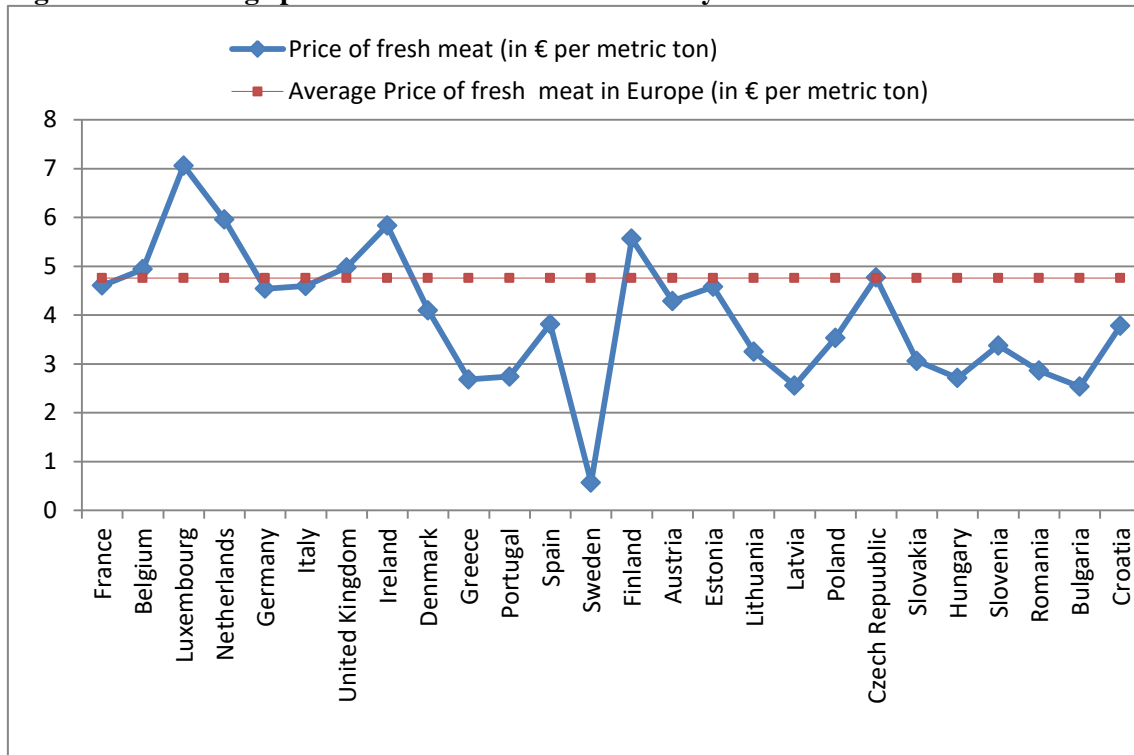
*Expected Exports = we multiply exports in tons of each country by average price by ton in Europe

Table IV 9. Average Price of fresh meat in Europe compared with average price of each country. (2017.)

Country	EXPORTS "Fresh Bovine" (Thousands €)	EXPORTS "Fresh Bovine" (Tons)	EXPECTED EXPORTS valued at average price in Europe	Real exports-Expected exports	Price of fresh meat (in € per metric ton)	Average Price of fresh meat in Europe (in € per metric ton)
France	865,906.91	187,999.18	895,047.97	-29,141.06	4.61	4.76
Belgium	681,838.09	138,052.12	657,254.30	24,583.79	4.94	4.76
Luxembourg	13,661.82	1,934.38	9,209.42	4,452.40	7.06	4.76
Netherlands	2,476,845.32	415,662.87	1,978,935.27	497,910.05	5.96	4.76
Germany	1,078,993.71	237,749.68	1,131,905.83	-52,912.12	4.54	4.76
Italy	372,882.77	81,156.63	386,379.75	-13,496.98	4.59	4.76
United Kingdom	392,628.05	78,888.81	375,582.86	17,045.19	4.98	4.63
Ireland	1,731,459.02	296,757.74	1,412,838.14	318,620.88	5.83	4.76
Denmark	259,938.50	63,420.42	301,939.18	-42,000.68	4.10	4.76
Greece	1,649.63	615.11	2,928.49	-1,278.86	2.68	4.47
Portugal	27,151.82	9,906.84	47,165.62	-20,013.80	2.74	4.76
Spain	512,362.19	134,274.28	639,268.33	126,906.14	3.82	4.76
Sweden	5,167.84	9,056.00	43,114.84	-37,947.00	0.57	4.51
Finland	13,263.26	2,384.25	11,351.21	1,912.05	5.56	4.76
Austria	353,866.05	82,554.79	393,036.27	-39,170.22	4.29	4.76
Estonia	3,016.80	658.61	3,135.59	-118.79	4.58	4.47
Lithuania	68,039.47	20,944.84	99,716.59	-31,677.12	3.25	4.76
Latvia	26,342.43	10,307.09	49,071.17	-22,728.74	2.56	4.76
Poland	1,070,181.73	303,240.48	1,443,701.91	373,520.18	3.53	4.47
Czech Republic	42,727.77	8,959.19	42,653.94	73.83	4.77	4.76
Slovakia	7,353.24	2,401.44	11,433.05	-4,079.81	3.06	4.76
Hungary	32,053.84	11,834.33	56,342.23	-24,288.39	2.71	4.58
Slovenia	27,401.59	8,115.31	38,636.29	-11,234.70	3.38	4.76
Romania	38,374.10	13,413.68	63,861.38	-25,487.28	2.86	4.76
Bulgaria	2,406.08	949.83	4,522.06	-2,115.98	2.53	4.60
Croatia	25,014.81	6,615.36	31,495.16	-6,480.35	3.78	4.76

Source. Datacomex. Elaboration by author.

Figure IV. 4 Average price of fresh meat of each country. 2017.



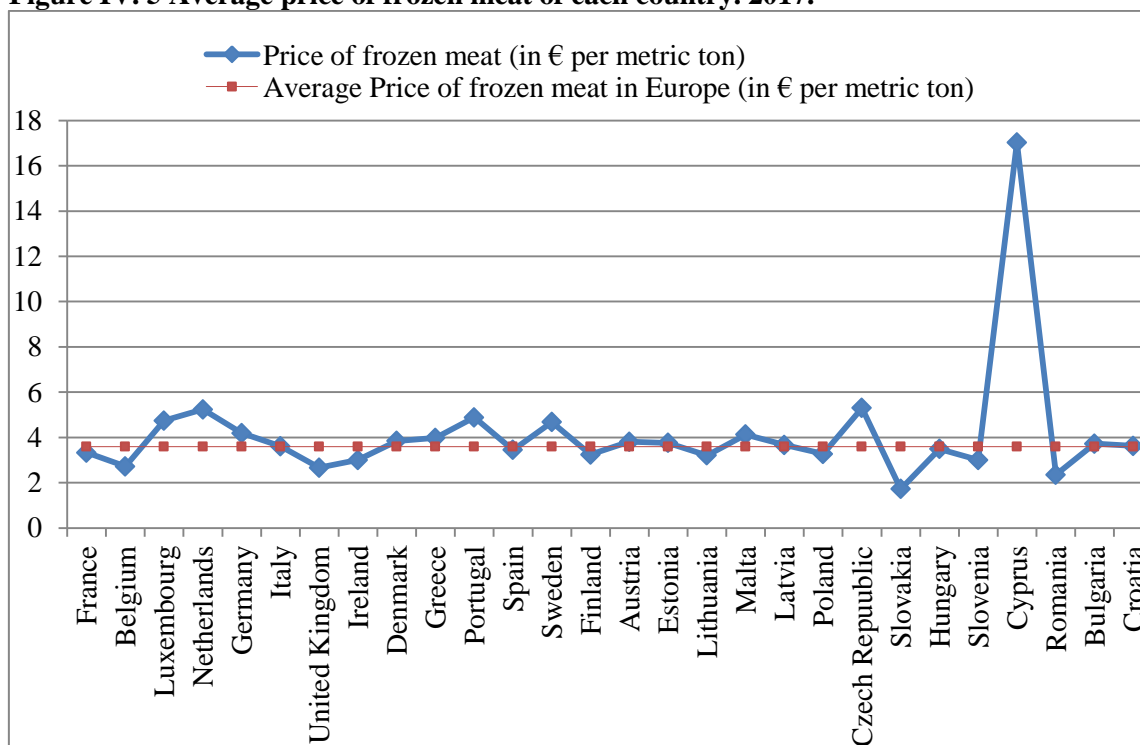
Source. Datacomex. Elaborated by author with the data in Table IV.9.

Table IV 10. Average Price of frozen meat in Europe compared with average price of each country. (2017)

Country	EXPORTS "Frozen meat" (Thousands €)	EXPORTS "Frozen meat" (Tons)	EXPECTED EXPORTS valued at average price in Europe	Real exports- Expected exports	Price of frozen meat (in € per metric ton)	Average Price of frozen meat in Europe (in € per metric ton)
France	60,933.05	18,320.08	65,715.59	-4,782.54	3.33	3.59
Belgium	70,768.08	25,990.29	93,229.25	-22,461.17	2.72	3.59
Luxembourg	674.35	142.25	510.26	164.09	4.74	3.59
Netherlands	292,891.57	55,901.83	200,524.34	92,367.23	5.24	3.59
Germany	183,931.95	43,886.51	157,424.42	26,507.53	4.19	3.59
Italy	167,176.62	46,326.00	166,175.07	1,001.55	3.61	3.59
United Kingdom	69,879.41	26,266.99	94,221.79	-24,342.38	2.66	3.59
Ireland	212,424.70	70,675.71	253,519.43	-41,094.73	3.01	3.59
Denmark	44,076.90	11,461.20	41,112.24	2,964.66	3.85	3.59
Greece	1,489.76	374.79	1,344.40	145.36	3.97	3.59
Portugal	7,515.72	1,540.09	5,524.43	1,991.29	4.88	3.59
Spain	139,905.33	40,558.53	145,486.69	-5,581.36	3.45	3.59
Sweden	1,801.07	385.08	1,381.31	419.76	4.68	3.59
Finland	1,660.73	512.28	1,837.59	-176.86	3.24	3.59
Austria	89,586.80	23,530.67	84,406.40	5,180.40	3.81	3.59
Estonia	3,094.09	823.16	2,952.74	141.35	3.76	3.59
Lithuania	16,408.90	5,117.75	18,357.78	-1,948.88	3.21	3.59
Malta	17.51	4.24	15.21	2.30	4.13	3.59
Latvia	3,013.40	822.28	2,949.58	63.82	3.66	3.59
Poland	320,757.62	97,992.16	351,505.72	-30,748.10	3.27	3.59
Czech Repuublic	6,888.03	1,299.60	4,661.77	2,226.26	5.30	3.59
Slovakia	155.23	90.28	323.84	-168.61	1.72	3.59
Hungary	4,892.42	1,402.49	5,030.84	-138.42	3.49	3.59
Slovenia	1,576.93	525.11	1,883.61	-306.68	3.00	3.59
Cyprus	168.78	9.91	35.55	133.23	17.03	3.59
Romania	3,179.08	1,350.00	4,842.56	-1,663.48	2.35	3.59
Bulgaria	1,509.54	405.37	1,454.09	55.45	3.72	3.59
Croatia	4,381.42	1,207.80	4,332.48	48.94	3.63	3.59

Source. Datacomex. Elaboration by author.

Figure IV. 5 Average price of frozen meat of each country. 2017.



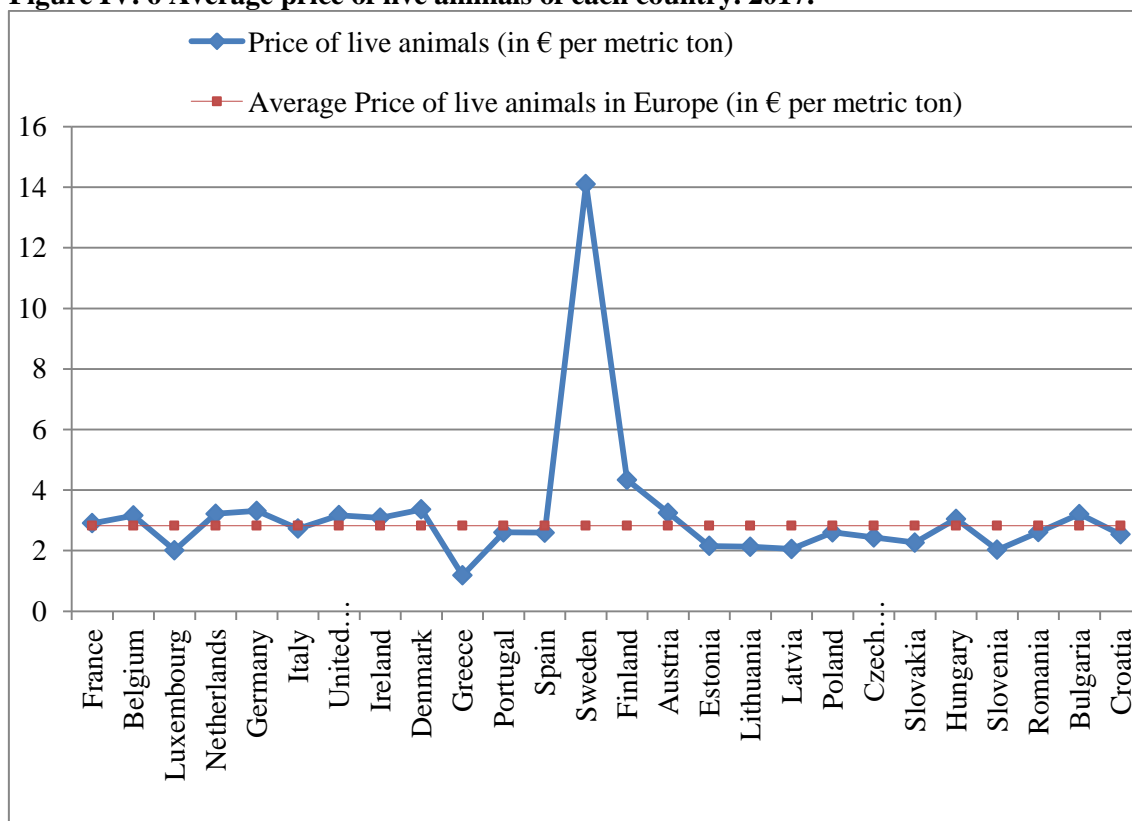
Source. Datacomex. Elaborated by authour with the data in Table IV.10.

Table IV 11. Average Price of live bovine animals meat in Europe compared with average price of each country. (2017)

Country	EXPORTS "live animals" (Thousands €)	EXPORTS "live animals" (Tons)	EXPECTED EXPORTS valued at average price in Europe	Real exports- Expected exports	Price of live animals (in € per metric ton)	Average Price of live animals in Europe (in € per metric ton)
France	1,454,384.62	500,698.71	1,414,283.38	40,101.24	2.90	2.82
Belgium	113,467.04	35,883.49	101,357.21	12,109.83	3.16	2.82
Luxembourg	23,789.93	11,818.87	33,383.81	-9,593.88	2.01	2.82
Netherlands	371,558.00	115,401.94	325,966.58	45,591.42	3.22	2.82
Germany	361,593.01	109,218.71	308,501.31	53,091.70	3.31	2.82
Italy	10,990.06	4,033.83	11,394.04	-403.98	2.72	2.82
United Kingdom	4,378.86	1,380.10	3,898.26	480.60	3.17	2.82
Ireland	86,599.37	28,039.23	79,200.16	7,399.21	3.09	2.82
Denmark	63,615.14	18,926.06	53,458.92	10,156.22	3.36	2.82
Greece	26.76	22.64	63.95	-37.19	1.18	2.82
Portugal	84,733.71	32,511.08	91,831.43	-7,097.72	2.61	2.82
Spain	291,461.06	112,264.48	317,104.45	-25,643.39	2.60	2.82
Sweden	102.97	7.30	20.62	82.35	14.11	2.82
Finland	923.71	212.88	601.31	322.40	4.34	2.82
Austria	114,630.02	35,287.03	99,672.44	14,957.58	3.25	2.82
Estonia	18,762.12	8,709.91	24,602.18	-5,840.06	2.15	2.82
Lithuania	43,244.21	20,313.52	57,377.97	-14,133.76	2.13	2.82
Latvia	26,770.51	13,036.88	36,824.23	-10,053.72	2.05	2.82
Poland	34,185.44	13,134.47	37,099.88	-2,914.44	2.60	2.82
Czech Repuublic	196,498.00	80,658.83	227,830.51	-31,332.51	2.44	2.82
Slovakia	71,632.68	31,610.95	89,288.91	-17,656.23	2.27	2.82
Hungary	135,993.85	44,612.13	126,012.30	9,981.55	3.05	2.82
Slovenia	110,140.55	54,243.73	153,217.90	-43,077.35	2.03	2.82
Romania	202,743.89	77,642.12	219,309.45	-16,565.56	2.61	2.82
Bulgaria	48,670.43	15,180.61	42,879.45	5,790.98	3.21	2.82
Croatia	138,461.28	54,583.14	154,176.61	-15,715.33	2.54	2.82

Source. Datacomex. Elaboration by author.

Figure IV. 6 Average price of live animals of each country. 2017.



Source. Datacomex. Elaborated by author with the data in Table IV.11.

APPENDIX V. TRADE OF BOVINE MEET IN SPAIN.

Table V 1. Census of Bovine animals by type of animals and Region Community. (Thousands of animals.)

Region Community	Total	Animals less than 12 month.			Animals between 12 to 24 month			Animals 2 years or over				
		Slaughter	Others		Male	Male for:		Male	Cattle		Cows	
			Male	Female		Slaughter	Reposition		Slaughter	Others	Dairy	Others
Galicia	946.35	227.06	2.79	37.18	3.47	6.15	104.28	6.41	0.25	5.21	347.45	206.10
Asturias	410.57	29.09	26.81	55.57	6.68	6.58	37.81	8.65	1.33	24.78	70.44	142.83
Cantabria	296.55	7.96	15.71	51.67	3.16	0.81	38.39	6.03	1.71	26.00	53.07	92.03
Pais Vasco	141.62	10.44	6.88	24.07	3.60	1.67	14.57	4.38	0.20	8.13	19.68	48.00
Navarra	120.99	15.71	8.59	17.87	5.19	2.06	12.23	2.27	0.08	6.33	22.13	28.54
La Rioja	43.21	17.33	0.04	1.96	0.62	1.41	1.84	0.84	0.56	0.97	2.12	15.54
Aragon	360.43	234.36	0.56	9.92	26.86	9.69	10.73	3.27	0.32	3.13	15.61	45.96
Catalonia	626.66	390.10	1.41	19.73	21.19	13.21	28.00	4.51	1.35	13.51	76.06	57.59
Balearics	26.65	5.47	0.07	3.44	1.12	0.65	2.46	0.39	0.00	0.04	10.37	2.64
Castilla y Leon	1,457.18	376.83	36.41	110.90	72.45	26.78	113.03	34.76	3.36	41.92	92.30	548.45
Madrid	95.45	16.12	5.64	8.76	4.76	6.05	4.89	3.99	0.09	1.53	6.24	37.37
Castilla la manha	432.75	114.68	25.10	35.54	62.68	33.02	14.59	9.84	3.15	4.20	24.74	105.22
Valencia	56.50	12.87	2.57	4.75	5.13	3.08	3.83	3.33	0.17	1.27	6.97	12.52
Murcia	73.85	33.65	0.05	0.83	24.96	2.92	1.50	0.72	0.00	0.00	8.27	0.95
Extremadura	913.84	230.34	26.50	45.97	24.47	15.46	59.21	25.11	5.84	31.05	3.45	446.43
Andalucia	566.09	60.69	34.77	67.53	22.30	10.90	48.54	24.33	1.82	21.21	59.46	214.55
Canary Island	19.40	3.01	1.36	2.96	0.75	0.20	1.48	0.74	0.00	0.23	6.55	2.11
Spain	6,588.11	1,785.70	195.28	498.67	289.39	140.63	497.39	139.56	20.23	189.51	824.89	2,006.86

Source. MAPAMA.

Table V 2. Bovine Production in Spain by Region (Thousands of tons.)

VALUE OF PRODUCTION BOVINE IN SPAIN BY REGIONS (Thousands of tons)															
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	% of Total	Var 16/15
Galicia	94.0	96.1	94.9	91.6	89.9	85.8	88.3	89.1	93.5	87.4	87.3	95.0	98.6	15.5	3.8%
Asturias	21.5	20.4	20.1	19.4	23.4	23.6	22.0	21.7	21.2	19.5	16.5	15.3	15.4	2.4	0.7%
Cantabria	14.6	12.4	11.5	10.7	12.0	10.6	10.7	10.1	10.3	9.0	8.8	9.5	9.9	1.6	4.2%
Pais Vasco	29.6	29.3	24.6	21.1	19.7	21.0	18.2	16.2	13.5	13.7	13.3	12.5	12.5	2.0	0.0%
Navarra	12.6	12.1	10.7	8.7	9.1	7.8	8.1	9.3	7.5	7.4	6.4	6.0	5.5	0.9	-8.3%
La rioja	2.9	3.7	4.6	4.5	4.2	3.6	4.9	4.6	3.8	3.9	3.9	3.4	3.4	0.5	0.0%
Aragon	44.9	44.2	42.0	37.8	36.1	28.7	29.2	29.5	30.2	31.6	30.6	32.6	32.1	5.0	-1.5%
Cataluña	139.7	137.5	128.8	130.5	123.9	116.4	120.9	118.2	119.0	119.1	114.8	124.5	131.1	20.6	5.3%
Baleares	3.4	4.1	3.6	3.6	3.7	3.0	3.0	3.0	2.6	2.5	2.3	2.3	2.3	0.4	0.0%
Castilla y Leon	122.7	125.9	114.8	103.7	109.6	109.5	109.2	121.5	119.6	108.0	106.6	116.0	112.6	17.7	-2.9%
Madrid	72.9	64.5	58.4	54.8	55.4	37.9	36.3	31.2	25.8	23.2	26.0	28.8	29.2	4.6	1.4%
Castilla la Mancha	60.5	62.7	63.2	56.1	59.5	50.1	52.2	55.1	50.6	47.5	44.2	47.7	46.0	7.2	-3.6%
Valencia	20.4	13.8	12.7	24.2	35.9	30.8	29.9	25.2	28.5	40.8	48.0	53.8	57.3	9.0	6.5%
Murcia	20.4	22.5	21.8	19.7	17.5	14.4	18.2	18.6	19.5	18.8	19.1	20.9	21.0	3.3	0.5%
Extremadura	23.7	27.7	24.1	24.8	26.3	23.1	23.6	22.4	22.9	22.6	25.2	30.5	33.1	5.2	8.5%
Andalucia	31.8	35.7	32.1	29.3	32.9	30.0	27.0	26.1	26.0	23.8	22.2	25.0	25.4	4.0	1.6%
Islas Canarias	2.2	2.2	2.0	1.9	2.1	2.1	2.1	2.3	2.4	2.1	2.0	2.1	2.4	0.4	14.3%
SPAIN	717.8	714.8	669.9	642.4	661.2	598.4	603.8	604.1	596.9	580.9	577.2	625.9	637.8	100.0	1.9%

Source. MAPAMA.

Table V 3. Thousands tons slaghteriting by type of animals.

	2009	2010	2011	2012	2013	2014	2015	2016
Slaughterings, bovine meat (Thousand tonnes)	598.43	606.59	604.11	591.38	580.84	578.60	626.10	637.01
Slaughterings Adult cattle (Tousand tonnes)	457.60	406.64	359.38	342.10	338.65	340.97	388.00	388.64
Slaughterings Calve and Young cattle (Thousand tonnes)	140.82	199.96	244.73	249.29	242.19	237.63	238.11	248.38

Source. Eurostat.

Table V 4. Spanish Imports and Export (Total Beef Meat Trade)

	EXPORTS	IMPORTS	EXPORTS	IMPORTS
	Thousands €		Tons	
1995	251,859.21	520,264.41	110,413.25	156,536.40
1996	240,536.02	472,303.26	115,746.26	157,502.15
1997	343,386.24	541,649.98	155,378.45	178,400.90
1998	403,518.12	612,296.44	163,007.19	183,419.90
1999	427,374.16	642,933.13	193,496.04	203,404.92
2000	441,127.05	645,203.01	187,570.98	174,829.40
2001	297,666.15	415,073.12	159,238.72	124,764.06
2002	330,010.71	638,485.04	155,207.39	189,777.46
2003	407,255.23	670,104.01	200,246.45	177,062.84
2004	400,589.88	686,931.45	182,308.83	175,064.27
2005	460,449.11	738,065.59	185,551.71	177,978.87
2006	412,711.41	863,645.23	122,348.85	109,267.80
2007	373,835.61	937,023.46	113,644.56	131,486.68
2008	501,716.11	746,362.10	171,383.87	157,502.04
2009	391,597.89	733,176.28	126,252.21	190,228.81
2010	440,472.69	772,235.59	153,005.08	201,289.17
2011	508,844.50	799,803.31	163,842.73	188,409.64
2012	684,819.55	796,363.75	200,975.51	176,991.14
2013	622,989.31	795,216.16	181,506.29	180,666.67
2014	600,082.01	814,789.34	178,915.89	195,232.35
2015	774,120.73	808,277.53	245,563.69	188,141.32
2016	822,222.33	876,970.44	251,349.55	206,656.04
2017	932,315.15	960,504.14	283,736.99	216,133.53
2018	149,398.72	150,472.19	44,108.31	34,627.82

Source. datacomex. **Beef Meat Trade***. Trade of Frozen beef, Fresh beef, Live bovine animals and Bovine meat without bone-in, salt, dried or smoked. **Taric Code.** 0202.0201, 0102 and 02102010. **Destination and origin.** All the world.

Table V 5. Export and Import of Spain by different type of products (Thousands €.)

YEAR	Exports live bovine	Imports live bovine	Exports Fresh Beef	Imports Fresh beef	Exports Frozen Beef	Imports Frozen beef
1995	91,784.14	256,563.72	117,155.41	173,722.55	42,912.63	89,950.91
1996	84,833.69	243,568.02	117,027.53	153,773.02	38,674.80	74,955.88
1997	87,045.79	294,219.80	185,211.13	173,621.33	71,129.30	73,779.06
1998	93,981.39	308,213.86	254,733.18	214,235.67	54,803.55	89,841.67
1999	99,678.84	287,974.79	249,250.13	248,907.45	78,443.65	106,045.72
2000	116,924.97	276,581.46	253,484.37	263,830.33	70,716.36	104,791.22
2001	75,965.32	152,331.44	169,694.76	199,421.86	52,004.74	63,319.82
2002	68,118.62	262,923.02	203,347.21	291,251.53	58,543.63	83,743.07
2003	74,344.25	257,528.87	247,914.03	323,302.47	84,874.13	84,799.04
2004	91,223.49	224,039.91	239,247.93	368,955.49	70,003.38	87,316.99
2005	80,607.61	243,089.69	306,226.19	397,098.11	73,323.89	91,157.90
2006	54,455.53	257,790.53	301,512.02	493,044.68	56,642.54	103,998.58
2007	40,992.88	235,115.82	284,299.35	561,641.43	48,371.95	128,040.59
2008	62,862.41	153,204.08	368,793.57	458,000.41	69,438.13	121,816.79
2009	56,873.43	187,036.26	282,978.63	440,760.14	51,622.16	96,004.25
2010	85,781.95	204,091.50	282,522.20	467,826.35	72,142.28	98,571.00
2011	90,990.06	202,729.60	324,689.26	476,025.17	93,014.88	115,400.19
2012	172,979.26	182,740.48	395,637.83	498,684.93	115,934.95	110,587.65
2013	140,302.96	210,342.81	394,559.83	474,301.13	87,962.36	105,734.45
2014	127,935.39	242,092.22	380,804.62	463,702.24	90,883.45	101,604.66
2015	204,098.88	219,549.97	467,866.52	465,143.32	101,968.02	112,476.74
2016	214,066.03	229,627.41	491,394.51	529,159.62	116,556.81	100,557.13
2017	290,107.29	265,499.06	502,330.01	558,760.60	139,657.41	126,490.44
Var 2016/2017	35.52%	15.62%	2.23%	5.59%	19.82%	25.79%

Source. datacomex. **Taric Code.** 0202.0201, 0102 and 02102010. **Destination and origin.** All the world. **Measure.** Thousands €

Table V 6. Export and Import of Spain by different type of products (Tons.)

	Exports live bovine (Tons)	Imports live bovine (Tons)	Exports Fresh Beef	Imports Fresh beef	Exports Frozen Beef	Imports Frozen beef
1995	45,463.74	90,729.48	47,262.07	37,885.86	17,687.15	27,911.32
1996	40,973.38	99,774.43	49,393.22	33,714.50	25,379.66	24,010.79
1997	39,384.14	118,129.63	73,114.39	35,535.03	42,879.91	24,720.99
1998	40,149.03	115,530.71	94,387.12	40,967.74	28,471.04	26,921.34
1999	45,814.50	114,502.70	100,237.79	54,351.42	47,443.41	34,548.26
2000	50,707.96	102,485.16	99,970.86	45,699.93	36,892.07	26,644.32
2001	49,641.82	67,535.91	76,499.32	38,028.64	33,097.49	19,199.51
2002	30,241.41	103,776.08	89,206.69	57,673.19	35,759.21	28,210.19
2003	30,429.70	92,968.90	109,621.87	55,295.60	60,183.29	28,008.91
2004	40,319.48	84,859.60	100,716.06	62,428.14	41,263.35	26,661.45
2005	37,443.17	85,890.53	117,153.06	64,575.72	30,883.29	26,379.54
2006	27.06	1,074.84	100,457.94	79,388.57	21,856.18	27,419.59
2007	48.39	444.09	95,650.55	97,528.25	17,931.52	31,509.10
2008	26,364.48	55,960.22	121,623.43	72,257.59	23,221.20	25,092.84
2009	20,417.98	70,716.86	88,359.81	89,361.56	16,868.88	28,277.30
2010	36,832.89	77,172.24	90,329.92	97,893.18	25,840.22	25,951.23
2011	38,626.41	76,470.89	95,439.70	84,767.84	29,719.87	26,210.12
2012	67,061.51	63,756.92	101,947.14	88,239.27	31,951.09	24,320.05
2013	54,127.60	72,702.75	102,928.97	81,862.11	24,435.72	25,344.03
2014	48,827.34	82,840.14	103,694.33	82,638.02	26,333.33	28,565.15
2015	82,421.45	74,908.94	132,382.64	84,823.04	30,746.51	26,681.17
2016	82,265.63	80,937.79	131,958.66	98,360.77	37,109.30	25,619.75
2017	111,766.06	90,350.90	131,451.68	93,541.67	40,501.09	30,799.77
Var 2016/2017	35.86%	11.63%	-0.38%	-4.90%	9.14%	20.22%

Source. datacomex. **Taric Code.** 0202.0201, 0102 and 02102010. **Destination and origin.** All the world. **Measure.** Tons.

Table V 7 Top fourteen destination of Spanish exports (2017.)

Total exports		Live animals		Fresh beef		Frozen beef	
DESTINATION EXPORTS	EXPORTS	DESTINATION EXPORTS	EXPORT	DESTINATION EXPORTS	EXPORTS	DESTINATION EXPORTS	EXPORTS
Portugal	260,626.70	Lybia	101,548.51	Portugal	215,238.14	Portugal	32,025.96
Italy	113,395.03	Turkey	49,363.54	Italy	89,925.62	France	25,993.11
Lybia	102,456.21	Lebanon	42,341.02	France	50,596.31	Netherlands	17,450.27
France	84,606.92	Egypt	22,796.88	Netherlands	39,023.01	Hong-Kong	8,729.20
Netherlands	56,526.08	Italy	19,585.93	Algelia	37,622.26	Marocco	8,300.65
Algeria	53,438.17	Algelia	14,688.82	Greece	32,642.91	Germania	8,089.26
Turkey	49,363.54	Portugal	13,362.60	United Kingdom	6,702.80	United Kingdom	6,362.66
Lebanon	42,921.30	Marocco	11,301.88	Andorra	5,734.34	Italy	3,883.49
Greece	34,749.58	France	8,017.49	Germany	5,604.00	Indonesia	2,693.15
Egypt	22,796.88	Hungary	4,206.74	Belgium	4,889.91	Malt	2,108.33
Marocco	19,606.45	Slovakia	1,260.58	Ireland	3,409.30	Ireland	1,995.39
Germany	14,176.96	Greece	569.66	Denmark	2,230.79	Belgium	1,908.33
United Kingdom	13,065.46	Peru	523.5	Autria	2,211.81	Greece	1,537.02
Hong-Kong	8,790.81	Germania	483.7	Israel	1,749.96	Denmark	1,424.31

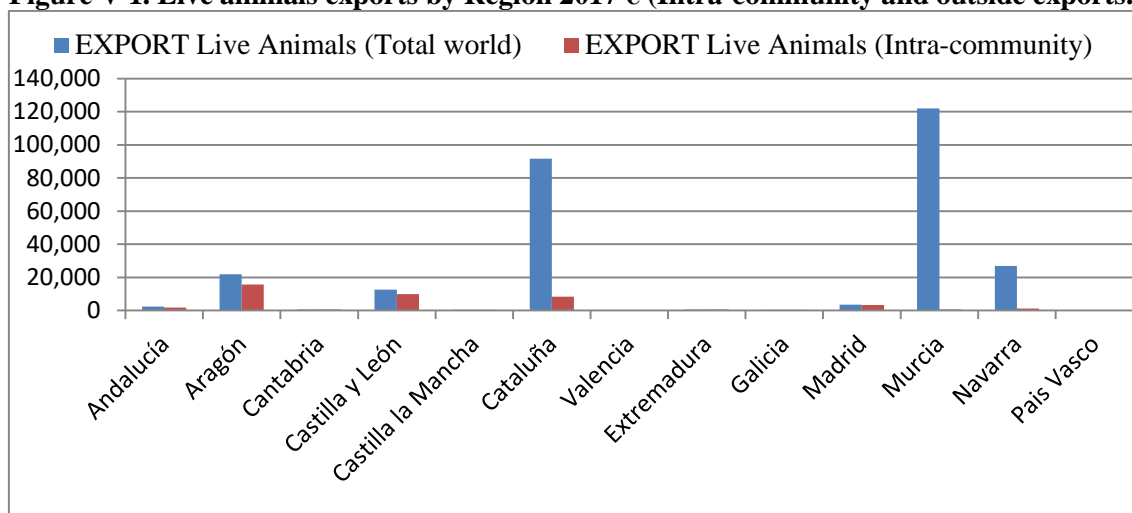
Source. Datacomex. **Detined of exports.** total world. **Taric cod.** 0202.0201, 0102

Table V 8. Exports 2017 measured in thousands of €. Datas by products and destination of exports.

Region	TOTAL EXPORTS (Total World)	TOTAL EXPORTS (Intra-Community)	TOTAL EXPORTS (Outside Europe)	EXPORTS Live Animals (Total world)	EXPORTS Live Animals (Intra-community)	EXPORTS Live Animals outside Europe	EXPORTS Fresh Beef (Total world)	EXPORTS Fresh Beef (Intra-community)	EXPORTS Fresh Beef (Outside Europe)	EXPORTS Frozen Beef (Total world)	EXPORTS Frozen Beef (Intra-Community)	EXPORTS Frozen Beef (Outside Europe)
Andalucía	20,155.14	15,224.07	4,931.07	2,288.29	1,756.26	532.03	8,101.85	6,266.55	1,835.30	9,765.00	7,201.27	2,563.73
Aragón	111,357.63	102,760.31	8,597.32	21,807.76	15,790.94	6,016.82	88,917.98	86,417.85	2,500.13	631.88	551.51	80.37
Asturias	1,233.57	655.63	577.94			0.00	1,188.62	613.13	575.49	44.95	42.5	2.45
Baleares	23.73	21.21	2.52			0.00	2.52		2.52	21.21	21.21	
Islas Canarias	278.62		278.62			0.00				278.62		278.62
Cantabria	14,034.34	13,672.99	361.35	578.75	578.75	0.00	7,517.88	7,516.26	1.62	5,937.71	5,577.99	359.72
Castilla y León	124,384.52	100,047.83	24,336.69	12,612.41	9,916.83	2,695.58	109,119.79	88,673.85	20,445.94	2,652.32	1,457.15	1,195.17
Castilla-La Mancha	62,200.81	59,450.58	2,750.23	477.27	417.27	60.00	40,201.97	37,610.98	2,590.99	21,521.57	21,422.33	99.24
Cataluña	221,781.02	118,262.99	103,518.03	91,634.71	8,301.42	83,333.29	100,048.85	89,288.18	10,760.67	30,097.47	20,673.39	9,424.08
Valencia	27,385.68	19,140.68	8,245.00	294.16		294.16	13,855.08	8,568.43	5,286.65	13,236.43	10,572.24	2,664.19
Extremadura	44,554.71	44,241.13	313.58	537.54	537.54		43,687.92	43,429.13	258.79	329.25	274.46	54.79
Galicia	48,261.14	44,793.21	3,467.93	395.68	348.54	47.14	44,281.31	43,771.78	509.53	3,584.15	672.89	2,911.26
Madrid	85,128.90	52,809.29	32,319.61	3,511.19	3,417.19	94.00	33,097.25	22,079.09	11,018.16	48,520.46	27,313.01	21,207.45
Murcia	128,604.02	4,067.61	124,536.41	121,957.50	713.5	121,244.00	3,796.86	2,029.89	1,766.97	2,849.66	1,324.23	1,525.43
Navarra	29,541.20	3,611.75	25,929.45	26,985.74	1,272.02	25,713.72	2,431.78	2,339.73	92.05	123.67		123.67
País Vasco	6,398.90	5,763.05	635.85	282.49	282.49		6,067.50	5,466.65	600.85	48.91	13.91	35.00
Rioja												
Ceuta												
Melilla												

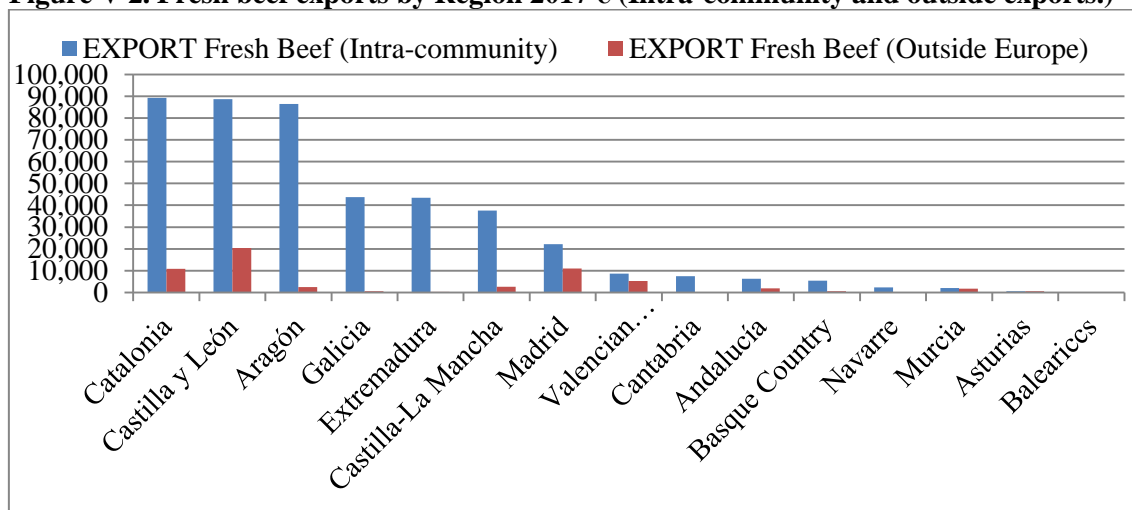
Destination of exports. Total world, Intracommunity trade (EU – EUROZONE (d.2015-01) **Taric Code.** 0202.0201, 0102. **Source.** datacomex.

Figure V 1. Live animals exports by Region 2017 € (Intra-community and outside exports.)



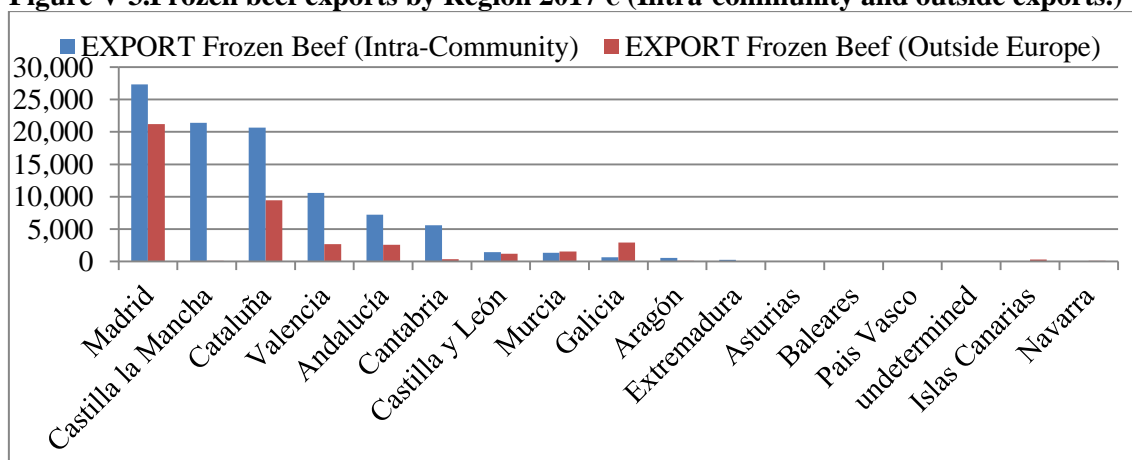
Source. Datacomex. Elaborated by the author with the data from Table V.8.

Figure V 2. Fresh beef exports by Region 2017 € (Intra-community and outside exports.)



Source. Datacomex. Elaborated by the author using data from Table V.8.

Figure V 3. Frozen beef exports by Region 2017 € (Intra-community and outside exports.)



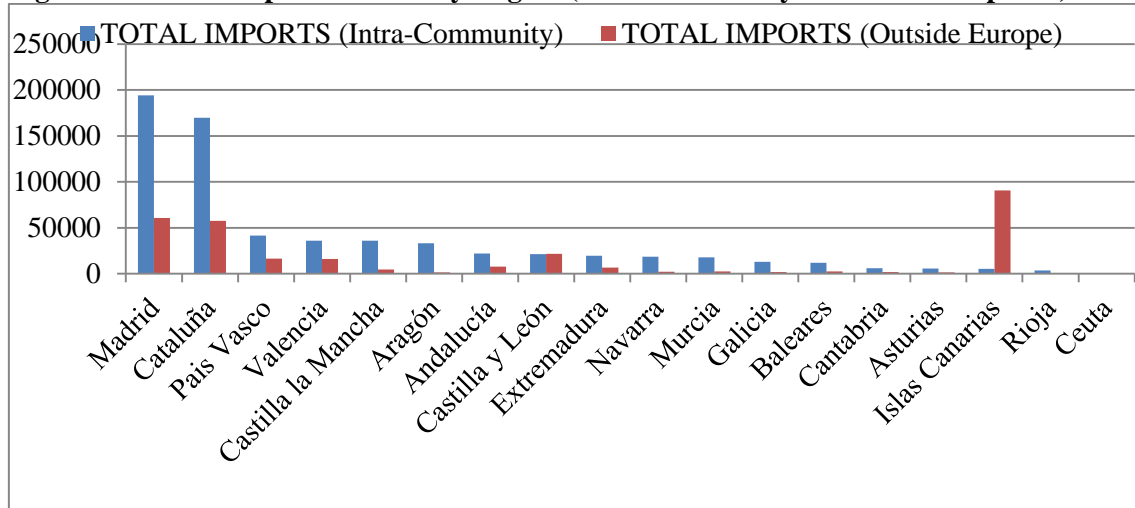
Source. datacomex. Elaborated by the author with the data in Table V.8.

Table V 9. IMPORTS 2017 measured in thousands €. Datas by products and origim of imports.

Region	TOTAL IMPORTS (Total World)	TOTAL IMPORTS (Intra-Community)	TOTAL IMPORTS (Outside Europe)	IMPORTS (Total world)	IMPORTS Live Animals (Intra-community)	IMPORTS Live Animals outside Europe	IMPORTS Fresh Beef (Total world)	IMPORTS Fresh Beef (Intra-community)	IMPORTS Fresh Beef (Outside Europe)	IMPORTS Frozen Beef (Total world)	IMPORTS Frozen Beef (Intra-Community)	IMPORTS Frozen Beef (Outside Europe)
Andalucía	29,565.93	21,922.87	7,643.06	3,078.24	3,031.22	47.02	23,279.95	16,868.84	6,411.11	3,207.74	2,022.81	1,184.93
Aragón	34,399.53	33,091.58	1,307.95	29,409.44	29,409.44	0.00	4,843.15	3,563.63	1,279.52	146.95	118.51	28.44
Asturias	7,335.97	5,737.03	1,598.94	191.16	191.16	0.00	7,106.06	5,527.26	1,578.80	38.75	18.61	20.14
Baleares	14,472.72	11,996.82	2,475.90			0.00	10,908.24	8,666.88	2,241.36	3,564.48	3,329.94	234.54
Islas Canarias	96,060.73	5,316.92	90,743.81	1,536.13	1,536.13	0.00	55,337.94	3,226.34	52,111.60	39,186.66	554.46	38,632.20
Cantabria	7,773.53	5,975.63	1,797.90	2,573.97	2,573.97	0.00	5,199.56	3,401.66	1,797.90			0.00
Castilla y León	42,945.83	21,329.37	21,616.46	9,542.55	9,542.55	0.00	31,496.35	10,184.07	21,312.28	1,906.93	1,602.74	304.19
Castilla la Mancha	40,543.01	35,905.40	4,637.61	29,062.79	28,823.77	239.02	7,339.84	4,044.12	3,295.72	4,140.38	3,037.52	1,102.86
Cataluña	227,029.45	169,541.27	57,488.18	121,892.98	110,003.65	11,889.33	75,868.95	48,132.29	27,736.66	29,267.52	11,405.33	17,862.19
Valencia	51,983.43	35,920.80	16,062.63	3,755.83	3,755.83	0.00	38,994.56	25,545.06	13,449.50	9,233.04	6,619.91	2,613.13
Extremadura	26,187.81	19,544.26	6,643.55	7,735.09	7,735.09	0.00	13,824.35	7,180.80	6,643.55	4,628.36	4,628.36	0.00
Galicia	14,584.24	12,960.13	1,624.11	9,971.04	9,955.24	15.80	3,327.46	1,783.62	1,543.84	1,285.73	1,221.27	64.46
Madrid	254,959.45	194,224.94	60,734.51	3,550.05	3,042.49	507.56	224,794.98	173,372.87	51,422.11	26,614.42	17,809.59	8,804.83
Murcia	20,339.20	17,869.93	2,469.27	12,897.13	12,897.13	0.00	6,792.83	4,699.00	2,093.83	649.24	273.8	375.44
Navarra	20,721.13	18,458.77	2,262.36	7,681.75	7,668.44	13.31	12,827.06	10,612.86	2,214.20	212.32	177.47	34.85
País Vasco	57,746.15	41,421.68	16,324.47	19,356.09	19,356.09	0.00	36,368.63	20,623.67	15,744.96	2,021.43	1,441.92	579.51
Rioja	3,938.67	3,409.14	529.53	3,264.82	3,264.82	0.00	450.69	27.65	423.04	223.16	116.67	106.49
Ceuta	32.81	5.24	27.57			0.00			0.00	32.81	5.24	27.57
Melilla			0.00			0.00			0.00			0.00

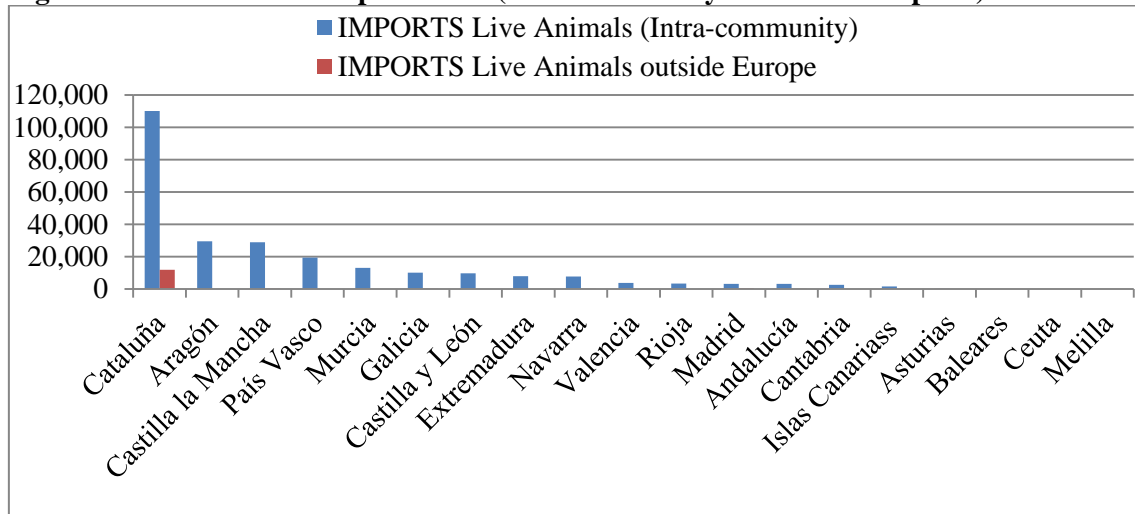
Origin of imports Total world, Intracommunity trade (EU – EUROZONE (d.2015-01) **Taric Code.** 0202.0201, 0102. **Source.** Datacomex.

Figure V 4. Total imports in 2017 by Region (Intra-community and outside imports.)



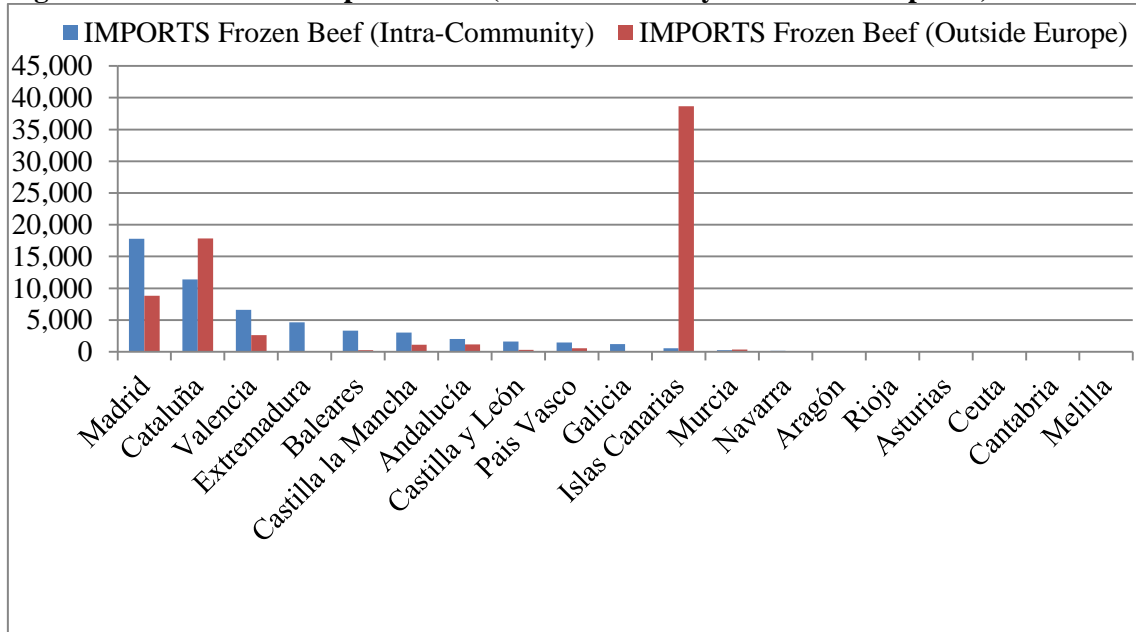
Source. datacomex. Elaborated by the author with the data in Table V.9.

Figure V 5. Live animals imports 2017 (intra-community and outside imports).



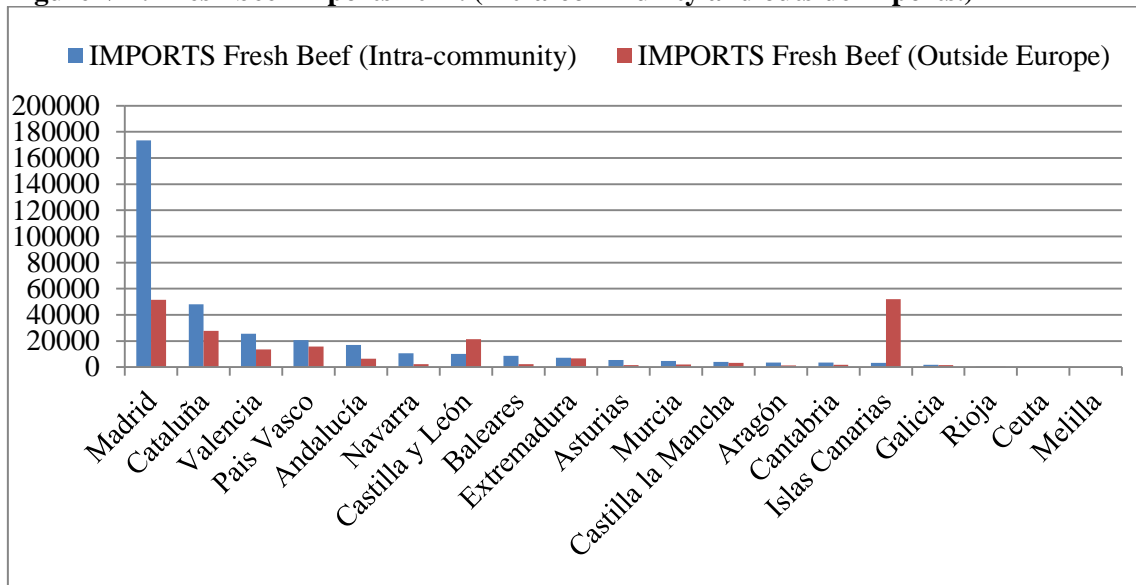
Source. Datacomex. Elaborated by the author with the data in Table V.9.

Figure V 6. Frozen beef imports 2017. (Intra-community and outside imports.)



Source. Datacomex. Elaborated by the author with the data in Table V.9.

Figure V 7. Fresh beef imports 2017. (Intra-community and outside imports.)



Source. Datacomex. Elaborated by the author with the data in Table V.9.

Table V 10 Origin of imports by products in 2017.

Total exports		Live animals		Fresh beef		Frozen beef	
DESTINATION EXPORTS	EXPORTS	DESTINATION EXPORTS	EXPORTS	DESTINATION EXPORTS	EXPORTS	DESTINATION EXPORTS	EXPORTS
France	199,250.94	France	176,186.38	Netherlands	151,627.15	Poland	20,796.96
Netherlands	170,363.54	Portugal	26,812.12	Poland	92,844.72	Germany	19,833.10
Poland	117,428.82	Germany	17,473.03	Germany	72,256.55	Uruguay	19,583.00
Germany	109,562.68	Ireland	10,350.43	Denmark	42,404.28	Brazil	17,939.11
Ireland	53,109.96	Netherlands	9,872.48	Ireland	37,215.38	France	9,312.43
Denmark	50,623.16	Belgium	5,208.75	Italy	29,603.67	Netherlands	8,863.91
Brazil	44,619.46	Czech Republic	3,919.14	Brazil	26,680.35	Denmark	8,093.92
Uruguay	42,524.77	Poland	3,787.14	Uruguay	22,941.76	Ireland	5,544.14
Portugal	41,488.32	Austria	3,770.62	Austria	17,002.99	Italy	4,770.11
Italy	35,187.57	United Kingdom	2,357.50	Belgium	14,731.38	Portugal	3,745.71
Austria	21,628.39	Romania	2,293.58	France	13,752.13	United kingdom	2,300.05
Belgium	20,811.36	Lithuania	2,046.92	United Kingdom	11,640.18	Paraguay	1,064.99
United Kingdom	16,297.73	Italy	813.79	Portugal	10,930.49	New Zealand	939.53
Argentina	7,459.78	Hungary	229.72	Argentina	7,357.33	Romania	887.31

Source. Datacomex. **Origin of imports.** Total world. **Taric Code.** 0202,0201 and 0102.

Table V 11. Average Price of meat in Spain compared with average price of each country. (2017)

Region	TOTAL EXPORTS (Thousands €)	TOTAL EXPORTS (Tons)	EXPECTED EXPORTS valued at average price in Europe	Real exports-Expected exports	Price of meat (in € per metric ton)	Average Price of meat in Europe (in € per metric ton)
Andalucía	20,155.14	4,820.89	15,812.53	4,342.61	4.18	3.28
Aragón	111,357.63	27,895.61	91,497.59	19,860.04	3.99	3.28
Asturias	1,233.57	98.90	324.39	909.18	12.47	3.28
Baleares	23.73	1.33	4.38	19.36	17.79	3.28
Islas Canarias	278.62	84.91	278.49	0.13	3.28	3.28
Cantabria	14,034.34	3,616.14	11,860.94	2,173.40	3.88	3.28
Castilla y León	124,384.52	35,656.70	116,953.97	7,430.55	3.49	3.28
Castilla la Mancha	62,200.81	15,930.24	52,251.19	9,949.61	3.90	3.28
Cataluña	221,781.02	73,299.02	240,420.79	-18,639.77	3.03	3.28
Valencia	27,385.68	11,280.48	36,999.98	-9,614.30	2.43	3.28
Extremadura	44,554.71	9,749.05	31,976.90	12,577.81	4.57	3.28
Galicia	48,261.14	15,312.77	50,225.88	-1,964.73	3.15	3.28
Madrid	85,128.90	22,687.61	74,415.36	10,713.55	3.75	3.28
Murcia	128,604.02	48,211.10	158,132.42	-29,528.40	2.67	3.28
Navarra	29,541.20	11,775.80	38,624.63	-9,083.43	2.51	3.28
País Vasco	6398.89639	1270.3845	4,166.86	2,232.04	5.04	3.28

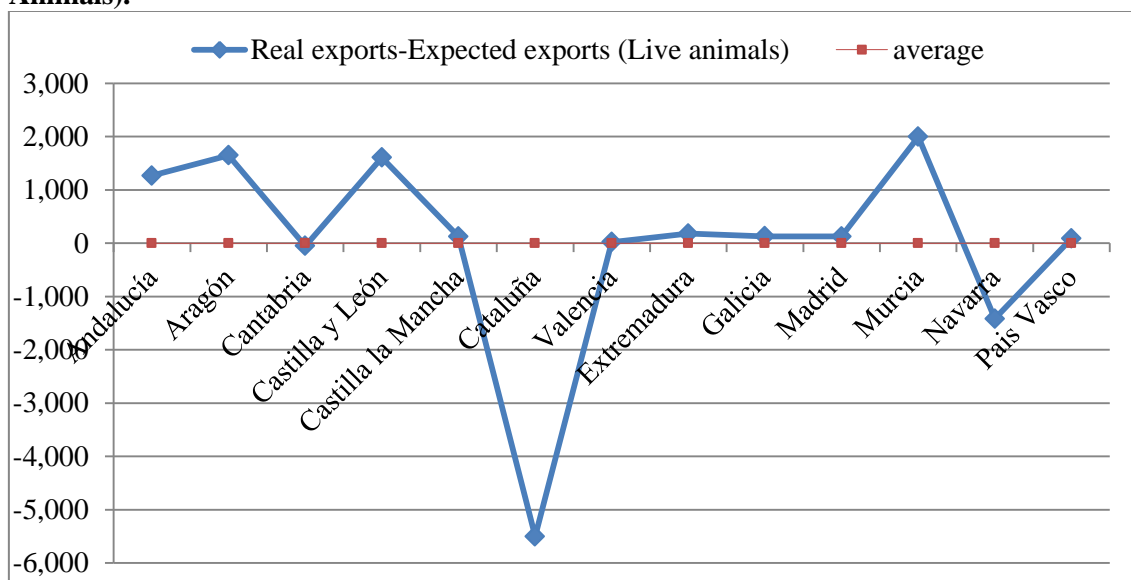
Source. Datacomex. **Elaborated by the author.**

Table V 12. Average Price of meat in Spain compared with average price of each Region. (2017)

Country	TOTAL EXPORTS "live animals" (Thousands €)	TOTAL EXPORTS (Tons)	EXPECTED EXPORTS valued at average price in Europe	Real exports-Expected exports	Price of live animals (in € per metric ton)	Average Price of live animals in Europe (in € per metric ton)
Andalucía	2288.29	395.70	1020.92	1267.38	5.78	2.58
Aragón	21807.76	7813.43	20158.64	1649.13	2.79	2.58
Cantabria	578.75	244.04	629.61	-50.86	2.37	2.58
Castilla y León	12612.41	4265.94	11006.12	1606.29	2.96	2.58
Castilla la Mancha	477.27	135.62	349.89	127.39	3.52	2.58
Cataluña	91634.71	37649.95	97136.86	-5502.16	2.43	2.58
Valencia	294.16	105.94	273.33	20.83	2.78	2.58
Extremadura	537.54	138.71	357.87	179.67	3.88	2.58
Galicia	395.68	102.78	265.17	130.51	3.85	2.58
Madrid	3511.19	1311.40	3383.42	127.77	2.68	2.58
Murcia	121957.50	46496.52	119961.01	1996.49	2.62	2.58
Navarra	26985.74	11008.40	28401.66	-1415.92	2.45	2.58
País Vasco	282.49	75.50	194.79	87.70	3.74	2.58

Source. Datacomex. Elaborated by the author.

Figure V 8. Positive and negatives differences in exports valued at the average price. (Live Animals).



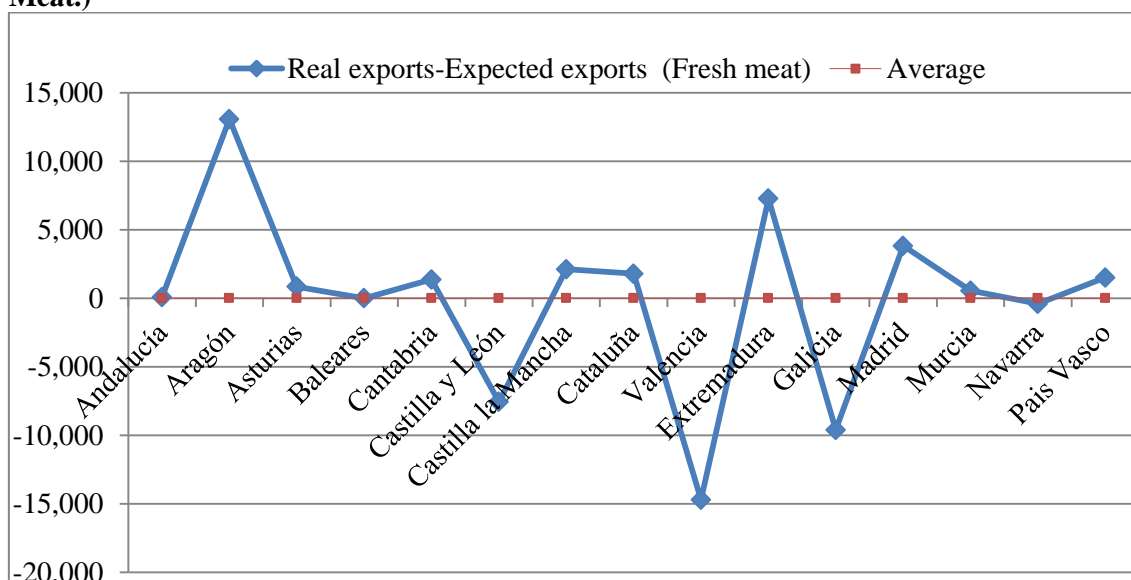
Source. Elaborated by the author with the data in Table V.12.

Table V 13 Average Price of meat in Spain compared with average price of each Region. (2017)

Country	TOTAL EXPORTS "Fresh Bovine" (Thousands €)	TOTAL EXPORTS (Tons)	EXPECTED EXPORTS valued at average price in Europe	Real exports-Expected exports	Price of fresh meat (in € per metric ton)	Average Price of fresh meat in Europe (in € per metric ton)
Andalucía	8101.85	2100.79	8025.02	76.83	3.86	3.82
Aragón	88917.98	19852.64	75837.07	13080.91	4.48	3.82
Asturias	1188.62	88.77	339.10	849.52	13.39	3.82
Baleares	2.52	0.15	0.58	1.94	16.50	3.82
Cantabria	7517.88	1610.07	6150.47	1367.41	4.67	3.82
Castilla y León	109119.79	30546.65	116688.20	-7568.41	3.57	3.82
Castilla la Mancha	40201.97	9968.63	38080.15	2121.82	4.03	3.82
Cataluña	100048.85	25721.24	98255.12	1793.73	3.89	3.82
Valencia	13855.08	7474.02	28550.76	-14695.68	1.85	3.82
Extremadura	43687.92	9533.37	36417.46	7270.45	4.58	3.82
Galicia	44281.31	14107.25	53889.69	-9608.39	3.14	3.82
Madrid	33097.25	7663.22	29273.49	3823.76	4.32	3.82
Murcia	3796.86	849.38	3244.63	552.23	4.47	3.82
Navarra	2431.78	742.59	2836.70	-404.91	3.27	3.82
País Vasco	6067.50	1191.94	4553.20	1514.30	5.09	3.82

Source. Datacomex. Elaborated by the author.

Figure V 9. Positive and negative differences in exports valued at the average price (Fresh Meat.)



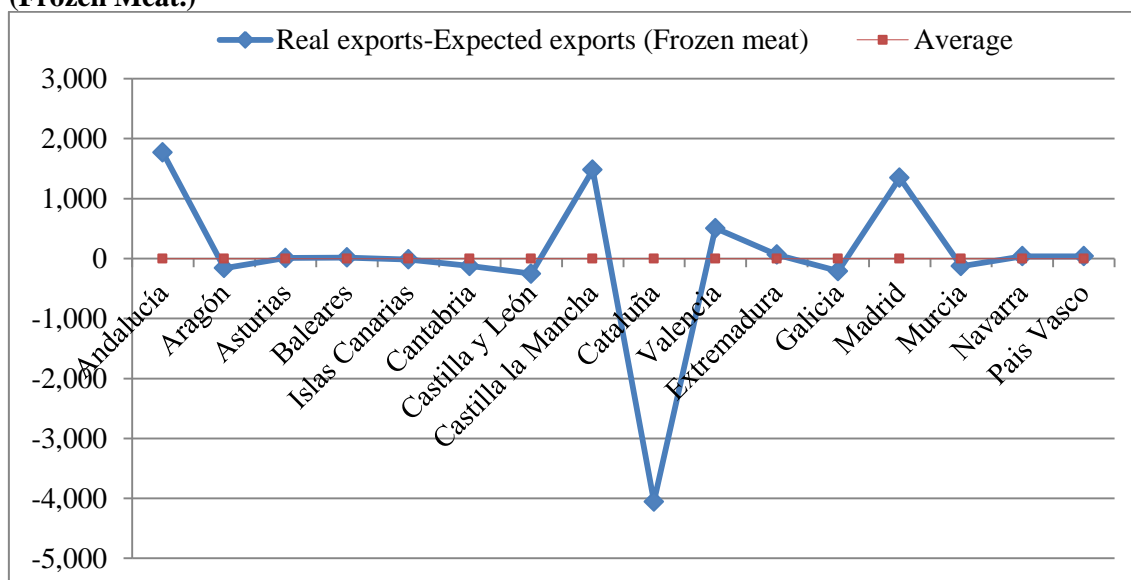
Source. Elaborated by the author with the data in Table V.13.

Table V 14. Average Price of meat in Spain compared with average price of each Region. (2017)

Country	EXPORTS "Frozen meat" (Thousands €)	EXPORTS "Frozen meat" (Tons)	EXPECTED EXPORTS valued at average price in Europe	Real exports-Expected exports	Price of frozen meat (in € per metric ton)	Average Price of frozen meat in Europe (in € per metric ton)
Andalucía	9,765.00	2,324.40	7,995.94	1,769.06	4.20	3.44
Aragón	631.88	229.54	789.62	-157.74	2.75	3.44
Asturias	44.95	10.13	34.85	10.10	4.44	3.44
Baleares	21.21	1.18	4.06	17.15	17.97	3.44
Islas Canarias	278.62	84.91	292.09	-13.47	3.28	3.44
Cantabria	5,937.71	1,762.03	6,061.38	-123.67	3.37	3.44
Castilla y León	2,652.32	844.11	2,903.74	-251.42	3.14	3.44
Castilla la Mancha	21,521.57	5,826.00	20,041.44	1,480.13	3.69	3.44
Cataluña	30,097.47	9,927.84	34,151.77	-4,054.30	3.03	3.44
Valencia	13,236.43	3,700.52	12,729.79	506.64	3.58	3.44
Extremadura	329.25	76.98	264.81	64.44	4.28	3.44
Galicia	3,584.15	1,102.74	3,793.43	-209.28	3.25	3.44
Madrid	48,520.46	13,712.99	47,172.69	1,347.77	3.54	3.44
Murcia	2,849.66	865.21	2,976.32	-126.66	3.29	3.44
Navarra	123.67	24.81	85.35	38.32	4.98	3.44
País Vasco	48.91	2.95	10.15	38.76	16.58	3.44

Source. Datacomex. Elaborated by the author.

Figure V 10. Positive and negative differences in exports valued at the average price (Frozen Meat.)



Source. Elaborated by the author with the data in Table V.13.

Table V 15. Census of bovine animals by type of animals in Aragon. (Thousands of animals)

Region Community	Total	Animals younger than 12 mouth.		Animals between 12 to 24 mouth	Animals 2 years or over							
		Slaughter	Others		Male	Male for:		Male	Cattle		Cows	
			Male	Female		Slaughter	Repositio n		Slaughter	Others	Dairy	Others
Huesca	243.51	170.43	0.32	3.55	17.66	5.73	4.71	1.14	0.18	1.74	11.05	27.01
Teruel	45.30	23.37	0.14	1.08	3.26	1.21	1.02	1.03	0.08	0.77	0.34	12.99
Zaragoza	71.62	40.55	0.10	5.29	5.94	2.76	5.01	1.10	0.06	0.62	4.23	5.97
ARAGON	360.43	234.36	0.56	9.92	26.86	9.69	10.73	3.27	0.32	3.13	15.61	45.96

Source. MAPAMA.

Table V 16 Value of Bovine Production in Aragon. (Thousand of tons)

VALUE OF PRODUCTION BOVINE IN SPAIN BY REGIONS (Thousands of tons)															
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	% of Total	Var 16/15
Aragon	44.9	44.2	42.0	37.8	36.1	28.7	29.2	29.5	30.2	31.6	30.6	32.6	32.1	5.0	-1.5%

Source. MAPAMA.

Table V 17. Evolution of exports and Imports in Aragon. Trade of bovine sector. (Thousands of €)

YEAR	ARAGON		HUESCA		TERUEL		ZARAGOZA	
	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT	EXPORT	IMPORT
2005	66,166.69	37,697.22	53,241.73	21,969.29	511.18	1,956.96	12,413.78	13,770.97
2006	52,525.89	49,530.13	40,900.57	32,383.33	1,064.31	2,097.36	10,561.01	15,049.44
2007	49,394.66	40,139.15	45,174.54	26,517.64	228.52	2,562.66	3,991.59	11,058.85
2008	73,356.63	24,161.56	66,572.90	15,645.61	507.55	1,222.23	6,276.18	7,293.71
2009	68,883.99	38,156.54	64,287.32	29,146.17	248.67	1,016.33	4,348.00	7,994.04
2010	77,289.28	37,762.99	73,254.85	28,793.77	306.37	1,118.81	3,728.06	7,850.41
2011	81,898.34	34,430.71	78,780.60	25,942.17	87.43	951.73	3,030.31	7,536.81
2012	88,903.14	36,807.09	85,856.79	29,554.84	833.83	526.44	2,212.52	6,725.81
2013	102,894.34	40,804.07	99,349.35	32,608.53	883.39	605.12	2,661.60	7,590.42
2014	94,509.72	44,269.84	91,927.37	33,340.22	865.73	1,194.00	1,716.62	9,735.62
2015	100,154.09	33,771.86	96,493.22	25,104.16	1,789.64	564.23	1,871.22	8,103.47
2016	99,176.95	27,153.47	95,751.68	20,245.94	2,637.56	922.00	787.71	5,985.52
2017	111,357.63	34,399.53	106,271.69	28,072.68	3,568.62	952.35	1,517.32	5,374.50

Source. Datacomex. Elaborated by the author.

Table V 18. Evolution of exports by type of product in Aragon. (Thousands of €).

YEAR	Aragón (Fresh Meat)	Aragón (Frozen meat)	Aragón (Live animals)
2007	40,177.49	837.39	8,379.78
2008	54,432.16	996.39	17,928.07
2009	48,119.14	204.70	20,560.16
2010	51,829.85	800.98	24,658.45
2011	59,508.60	604.67	21,785.07
2012	66,568.10	481.12	21,853.91
2013	75,498.79	292.28	27,103.27
2014	69,625.07	495.40	24,389.25
2015	75,307.56	759.57	24,086.96
2016	75,901.28	384.95	22,890.71
2017	88,917.98	631.88	21,807.76

Source. Datacomex. Elaborated by the author.

Table V 19. Evolution of exports by type of product in Zaragoza, Teruel and Huesca.

YEAR	Fresh Meat			Frozen meat			Live Animals		
	Huesca	Teruel	Zaragoza	Huesca	Teruel	Zaragoza	Huesca	Teruel	Zaragoza
2007	36,782.64	1.62	3,393.24	836.84		0.55	7,555.06	226.91	597.81
2008	49,932.82	494.85	4,004.50	978.28		18.11	15,661.80	12.70	2,253.57
2009	44,330.39	248.67	3,540.07	204.70			19,752.23		807.92
2010	49,810.76	0.02	2,019.06	799.88		1.10	22,644.20	306.34	1,707.90
2011	58,446.96	0.12	1,061.53	603.86		0.81	19,729.78	87.31	1,967.97
2012	66,000.45	0.02	567.63	481.12			19,375.22	833.81	1,644.89
2013	74,750.59		748.20	159.48		132.81	24,439.28	883.39	1,780.59
2014	69,599.62	3.99	21.46	439.33		56.08	21,888.43	861.74	1,639.09
2015	75,102.54	67.40	137.62	559.19	53.54	146.84	20,831.50	1,668.70	1,586.76
2016	75,887.24	14.01	0.04	301.34	80.98	2.63	19,563.10	2,542.58	785.04
2017	88,057.46		860.53	523.82	100.74	7.33	17,690.41	3,467.88	649.47

Source. Datacomex. Elaborated by the author.

Table V 20. Destinations of exports of Aragon by Regions and By products. (Thousands of €)

Destinations of exports	ARAGON				Huesca				Teruel				Zaragoza			
	Total Trade	Exports Live Animals	Exports Fresh beef	Exports Frozen beef	Total Trade	Exports Live Animals	Exports Fresh beef	Exports Frozen beef	Total Trade	Exports Live Animals	Exports Fresh beef	Exports Frozen beef	Total Trade	Exports Live Animals	Exports Fresh beef	Exports Frozen beef
France	5,370.41	1,666.38	3,229.74	474.29	4,701.88	1,098.59	3,229.74	373.55	554.48	453.75	100.74	114.04	114.04			
Netherlands	0.96			0.96	0.96			0.96								
Germany	30.01	30.01			30.01	30.01										
Italy	50,163.15	13,559.13	36,597.29	6.74	50,163.06	13,559.13	36,597.20	6.74				0.09		0.09		
Greece	15,255.02	535.43	14,717.19	2.40	13,860.21		13,857.81	2.40				1,394.81	535.43	859.38		
Portugal	31,935.20		31,868.07	67.13	31,935.20		31,868.07	67.13								
Switzerland	0.53		0.53									0.53		0.53		
Andorra	620.18		608.48	11.70	615.03		607.95	7.07				5.15		0.53	4.62	
Bulgaria	408.99		397.87	11.12	408.99		397.87	11.12								
Montenegro	6.62			6.62	6.62			6.62								
Maroco	3,707.17	3,707.17			693.03	693.03			3,014.14	3,014.14						
Algeria	1,493.25		1,493.25		1,493.25		1,493.25									
libya	2,309.65	2,309.65			2,309.65	2,309.65										
Cyprus	5.56		5.56		5.56		5.56									
Hong-Kong	50.94			50.94	48.24			48.24				2.70			2.70	

Source. Datacomex. **Elaborated by the author.**

APPENDIX VI. COOPERATIVISM.

Table VI 1. Agri-Cooperative data in the European Union 2012.

EU MEMBER STATE	Total number of cooperatives	Total number of Members	Turnover (m€)	Turnover/ number of cooperatives
Belgium	301		3,257	10.82
Bulgaria	900			0.00
Czech Republic	548	524	1,327	2.42
Denmark	28	45,710	25,009	893.18
Germany	2,400	1,440,600	67,502	28.13
Estonia	21	2,036	512	24.38
Ireland	75	201,684	14,149	188.65
Greece	550		711	1.29
Spain	3,844	1,179,323	25,696	6.68
France	2,400	858,000	84,350	35.15
Croatia	613	10,734	167	0.27
Italy	5,834	863,323	34,362	5.89
Cyprus	14	24,917	62	4.43
Latvia	49		1,111	22.67
Lithuania	402	12,900	714	1.78
Luxembourg	55			0.00
Hungary	1,116	31,544	1,058	0.95
Malta	18	1,815	204	11.33
Netherlands	215	140,000	32,000	148.84
Austria	217	306,300	8,475	39.06
Poland	136		15,311	112.58
Portugal	735		2,437	3.32
Romania	68		204	3.00
Slovenia	368	16,539	705	1.92
Slovakia	597		1,151	1.93
Finland	35	170,776	13,225	377.86
Sweden	30	160,350	7,438	247.93
United Kingdom	200	138,021	6,207	31.04

Source. Report of Elaborated by cooperatives Agro-Food Spain, published in 2015.

Table VI 2. Evolution of TOP 20 EU Agri-cooperatives 2014-2013 (by turnover in m€).

Ranking	Cooperative	Country	Sector	2011	2012	2013
1	Bay Wa	DE	Farm supply	9 586	10 531	15 957
2	FrieslandCampina	NL	Dairy	9 626	10 309	11 418
3	Arla Foods	DK	Dairy	7 384	8 450	9 887
4	DLG	DK	Farm supply	5 494	6 510	7 939
5	Danish Crown	DK	Meat	6 954	6 940	7 844
6	Agravis	DE	Farm supply	6 468	7 108	7 504
7	Vion Food ¹	NL	Meat	8 870	9 620	7 033
8	InVivo	FR	Farm supply	6 083	5 669	6 138
9	Kerry Group ²	IE	Dairy	4 700	5 848	5 836
10	DMK	DE	Dairy	4 575	4 438	5 310
11	Metsä Goup	FI	Forestry	5 346	5 001	4 932
12	Tereos	FR	Arable (Sugar)	4 409	5 037	4 697 ³
13	Terrena	FR	Multi-purpose	3 871	4 478	4 667
14	Sodiaal	FR	Dairy	4 021	4 421	4 616
15	FloraHolland	NL	Horticulture	4 130	4 281	4 350
16	VIVESCIA	FR	Cereals Supply	3 483	3 983	4 209
17	Agrial	FR	Multi-purpose	2 261	2 715	3 901
18	Lantmännen	SE	Multi-purpose	4 244	4 302	3 750
19	Axéreal	FR	Farm supply	3 375	3 400	3 707
20	Danish Agro	DK	Farm supply	2 130	2 263	3 400

Source. Report of Elaborated by cooperatives Agro-Food Spain, published in 2015.

Table VI 3. Evolution of TOP 0 EU meat cooperatives 2014-2013 (by turnover in m€).

Nº	Cooperative	Country	2011	2012	2013
1	Danish Crown	DK	6 954	6 940	7 844
2	Vion Food ¹	NL	8 870	9 620	7 033
3	Agricola Tre Valli SCA ²	IT	3 056	:	3 135
4	Westfleisch	DE	2 207	2 475	2 507
5	HKScan	FI	2 491	2 546	2 100
6	Cooperl Arc Atlantique	FR	1 700	1 952	2 100
7	Atria	FI	1 302	1 343	1 411
8	Gesco Consorzio Cooperativo SCA ³	IT	:	:	1 352
9	Coren	ES	1 005	:	982
10	Grandi Salumifici Italiani	IT	605	652	675

Source. Report of Elaborated by cooperatives Agro-Food Spain, published in 2015.

Table VI 4. Cooperativism in Spain by Region.

SPAIN 2016			
	Number of Cooperatives	% Cooperatives	% Turnover
Andalucía	712	21.81%	38%
Castilla la Mancha	437	13.39%	8.10%
Castilla y León	354	10.85%	7.30%
Valencia	339	10.39%	8.90%
Cataluña	301	9.22%	7.10%
Extremadura	283	8.67%	6.60%
Aragón	192	5.88%	5.40%
Galicia	178	5.45%	6.50%
Murcia	126	3.86%	4.20%
Navarra	91	2.79%	4.00%
País Vasco	68	2.08%	1.30%
Islas Canarias	64	1.96%	0.03%
Rioja	45	1.38%	0.76%
Baleares	31	0.95%	0.37%
Madrid	20	0.61%	0.09%
Asturias	17	0.52%	1.30%
Cantabria	6	0.18%	0.23%
TOTAL	3,264	100.00%	100.00%

Source: Report of Elaborated by cooperatives Agro-Food Spain, published in 2015.

Table VI 5. Cooperativism in Spain by sectors. (2016)

% Turnover/ Total			
Fruits and Vegetables	27%	Avicola	2%
Olive Oil	16%	Olive	2%
Supplies	12%	Others seervices	2%
Animal Feeding	9%	Sheep an Goat	2%
Wine	7%	bovine	1%
Herbaceous crops	6%	Nuts	1%
Dairy	5%	Rice	1%
Porcine	3%	Shops	1%

Source: Report of Elaborated by cooperatives Agro-Food Spain, published in 2015.

Table VI 6. TOP 20 Export Cooperatives.

Name of cooperative	Region	Turnover	Exports (Thousand €)	% Exports/ Total
ANECOOP	Valencia	574	456	79%
COREN	Galicia	1000	410	41%
DCOOP	Andalucia	1001	382	38%
VICASOL	Andalucia	202	172	85%
UNICA GROUP	Andalucia	197	168	85%
ONUBAFRUIT	Andalucia	193	155	80%
CASI	Andalucia	185	148	80%
ALIMER	Murcia	161	126	78%
AGRO SEVILLA ACEITUNAS	Andalucia	135	124	92%
GRANADA LA PALMA	Andalucia	139	114	82%
MURGIVERDE	Andalucia	131	96	73%
SANTA MARIA DE LA RÁBIDA	Andalucia	118	76	64%
INDASOL	Andalucia	82	70	85%
CABASC	Andalucia	82	68	83%
S.A.T. TROPS	Andalucia	78	66	85%
HORTOFRUTICOLA MABE	Andalucia	82	64	78%
AGROMOLINILLO	Andalucia	59	53	90%
CUNA DE PLATERO	Andalucia	88	53	60%
GREGAL	Murcia	59	50	85%
ACTEL	Cataluña	220	47	21%

Source: Report of Elaborated by cooperatives Agro-Food Spain, published in 2015.

Table VI 7. TOP 10 Cooperatives in Spain,

Name of cooperative	Region	EMPLOYEES	ACTIVITIES
DCOOP	Andalucía	520	Olive Oil, Wine, Supplies, services, exports
COREN	Galicia	3240	Feed, Avicola, Porcine, Dairy, services, exports
GRUPO AN	Navarre	1260	Vegetables and Fruit, Porcine, feed; shop, services, credit
SAT CENTRAL LECHERA ASTURIANA	Asturias	17	Dairy
ANECOOP	Valencia	209	Citrus, Fruit, Vegetables, wine, exports
COVAP	Andalucía	690	Feed, meat of bovine, sheet, porcine dairy, service, exports, credit
ACOR	Castilla y Leon	541	Sugar and crops. Services
COBADU	Castilla y Leon	171	Bovine, sheet, Porcine, dairy, supplies, shop and services
AGROPAL	Castilla y Leon	392	Feed, Cereal, Dairy, bovine
JAENCOOP	Andalucía	17	Olive Oil

Source: Report of Elaborated by cooperatives Agro-Food Spain, published in 2015.

APPENDIX VII. EUROPEAN NORMS.

1. NORMS OF QUALITY.

We expose the main points about the quality of the Spanish cattle sector.

Livestock farms are subject to a series of requirements that regulate their production and that are part of the EU's food security policy. These requirements include aspects of hygiene, animal health, the environment and public health, which guarantee that food products are nutritious, healthy, safe and of high quality.

The concept of traceability is clearly important from the point of origin (www.invac.org/vacuno/trazabilidad.asp). Regulation 178/2002 defines traceability as "the control in all stages of the production, transformation and distribution of food, feed, animals and any other substance intended to be incorporated into a food or feed. or with probability of doing it ". The objectives pursued are the reliable identification of the animal, the added products and the processes that the food product has carried out.

Strict checks are carried out at each stage to ensure compliance with regulations and imports from outside the EU must comply with the same regulations and same checks as food produced in the European Union.

From the professional point of view, in general terms the quality of the meat is given by parameters such as color, water retention capacity, pH, hardness or tenderness, color and consistency of the fat, flavor and bouquet.

In the slaughterhouses evaluate the meat. The carcasses and half-carcasses of heavy cattle shall be classified according to the category, conformation, degree of fatness and types of presentation and location. Bovine animals whose live weight is greater than 300 kg are required to be classified. The lower weight cattle the classification is optional.

Table VII 1. Bovine channel classification.

CONFORMATION CLASSES	DESCRIPTION
S (Higher)	All extremely convex profiles, exceptional muscle development with double muscles ("culon" type)
E(Excellent)	All profiles from convex to super convex, exceptional muscle development.
U (Very good)	Convex profiles together, strong muscular development
R (Good)	Rectilinear profiles together, good muscular development
O (Less good)	Rectilinear profiles to concave, medium muscular development.
P (Mediocre)	All profiles of concave to very convex, poor muscle development
CATEGORY	DESCRIPTION
A	Channels of uncastrated young males of younger than two years
B	Channels of uncastrated males of more than two years
C	Castrated male channels
D	Channels of females that have given birth
E	Channels others females
DEGREE OF FATNESS	DESCRIPTION
1 (Not greasy)	Coverage of nonexistent or very weak fat
2 (Little covered)	Light coverage of fat, muscles almost always apparent
3 (Covered)	Muscles, except the hip and shoulder, almost always covered, scanty accumulations of fat inside the thoracic cavity
4 (Greasy)	Muscles covered in fat but still partially visible at the level of the hip and the shoulder, some pronounced accumulations of fat inside the thoracic cavity
5 (Very greasy)	Toda la canal cubierta de grasa, acúmulos importantes de grasa en el interior de la cavidad torácica.
TYPE	DESCRIPTION
Type I	Without removal of surface fat; without kidneys, kidney fat or pelvic fat; no middle pillar of the diaphragm or pillars of the diaphragm; without tail; without spinal cord; no crown on the inner side of the leg; without fat vein
Type II	With removal of superficial grease (polishing); with tail, diaphragm and middle pillars of the diaphragm
Type III A	No removal of surface grease (polishing); with kidney and kidney fat, tail, diaphragm, middle pillars of the diaphragm and testes in category A and B males.
Type III B	No removal of surface grease (polishing); with kidney and kidney fat, tail, diaphragm, middle pillars of the diaphragm

Source. Elaborated by the author using information from RD 225/2008, of February 15.

There are certificates that guarantee quality and food safety, the Ministry of Agriculture and the different Autonomous Communities have developed quality instruments compatible with European Union regulations. Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), production, transformation and processing must originate in a specific region. The difference between the two denominations is that PDO also requires that all phases be carried out in the same region. On the other hand, the Guaranteed Quality marks (MGC), which guarantee the fulfillment of some quality requirements that appear on the labeling. And finally, the Traditional Specialty Guaranteed (TSG) does not refer to the origin, but rather aims to protect a traditional composition of the product or a traditional mode of production.

In Royal Decree 1698/2003, provisions are established on the labeling of beef and veal. In the article 4 the obligatory mentions in the labeling of the meat of bovine are indicated, except the ground meat. Code that relates the meat to the animal, country of birth of the animal, fattening country, country of slaughter, place of cutting. In article 6 the optional labeling “*Etiquetado facultativo*” is explained, companies can add complementary information, such as their logo and certain production or animal characteristics, and they must be objective and demonstrable. First, they must submit a list of conditions, which will be approved by the competent authority according to the registered office and will have a state validity. Second, they must obtain a certificate of conformity issued by an independent control body.

The companies that authorize certificates of quality guaranteed brands must be independent, impartial and technically competent and must be accredited by ENAC (National Quality Accreditation Agency), and the process must be in accordance with ISO standards (standard EN 4501).

On the other hand, ecological agriculture and livestock are governed by Regulation (EC) No. 834/2007 on production and labeling of organic products, whose implementing provisions are described in Regulation (EC) No. 889/2008. For the farm and livestock to be considered as Ecological Livestock, it is necessary to be registered in a control body, which will certify if the farm meets the necessary requirements that are included in the regulation that governs organic production.

Finally, one of the foreign markets requires Kosher certification, for the meat imported into these countries, as in the case of Israel and many other Arab countries.

APPENDIX VIII. DESCRIPTION OF THE LIVESTOCK.

Information VIII 1. Information about statistics of bovine animals.

According “*Study of the sector Spanish suckler cow*” elaborated by “Subdirección General de Productos Ganaderos”, “Dirección General de Producciones y Mercados Agrarios” and “Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente”. We obtain information about productivity of the cow. The average age of suckler cows in Spain was 6.72 years in the year 2017 and 6.92 years in 2016. We find a situation of rejuvenation of the cows (pages 13 and 14.) In 2017, the 55,20% of cows had their first birth when they are 2-3 years, the 8.70% of cows had their first birth when they are less than 2 years and the 23,30% of cows had their first birth when they are 3-4 years (Pages 20 and 21.) In August 2017, cows between the ages of 13 and 14 had an average of 9.05 registered calves throughout their lives (page 31.) 70.5% of cows gave birth between August 2016 and August 2017 (page 32.) The calving interval is the 440 days (page 34.) According “Bavera, G. A. 2000. Cursos de Producción Bovina de Carne, FAV UNRC” the probability to have two calves is about (0.25-4%). According article “problemas reproductivos de las vacas de carne” elaborated by by Jose Luis Carvajal, associate professor of UPM. The useful life of a cow is about 15-18 years and that one bull is enough to cover 50 cows. The probability of pregnancy are 96% and probability of abortion 3%.

Table VIII 1. Male and Female calves price (Lonja Binefar)

WEEKS	MALE CALVES PRICE						FEMALE CALVES PRICE					
	321/370 KGM			321/370 KGM			221/260 KGM			221/260 KGM		
	R			*E*			*R*			*E*		
	2014	2015	2016	2014	2015	2016	2014	2015	2016	2014	2015	2016
WEEK 1	3.97	3.64	3.78	4.29	3.94	4.09	4.37	4.05	3.89	4.74	4.43	4.22
WEEK 2	3.98	3.66	3.8	4.3	4	4.11	4.38	4.05	3.89	4.74	4.43	4.22
WEEK 3	3.99	3.7	3.83	4.31	4.05	4.14	4.37	4.05	3.89	4.73	4.43	4.22
WEEK 4	3.98	3.7	3.83	4.3	4.07	4.14	4.37	4.05	3.89	4.73	4.43	4.22
WEEK 5	3.98	3.73	3.83	4.3	4.07	4.15	4.37	4.05	3.89	4.73	4.43	4.22
WEEK 6	3.98	3.73	3.83	4.3	4.07	4.15	4.37	4.05	3.88	4.73	4.43	4.19
WEEK 7	3.98	3.73	3.83	4.3	4.07	4.15	4.37	4.05	3.86	4.73	4.43	4.16
WEEK 8	3.99	3.73	3.83	4.3	4.07	4.15	4.37	4.05	3.85	4.73	4.43	4.12
WEEK 9	3.98	3.73	3.83	4.3	4.07	4.15	4.35	4.05	3.83	4.73	4.43	4.08
WEEK 10	3.97	3.73	3.83	4.3	4.07	4.15	4.36	4.05	3.83	4.73	4.43	4.08
WEEK 11	3.98	3.73	3.82	4.31	4.07	4.14	4.36	4.05	3.83	4.73	4.43	4.08
WEEK 12	3.98	3.72	3.81	4.31	4.07	4.12	4.35	4.04	3.83	4.72	4.42	4.08
WEEK 13	3.96	3.72	3.8	4.29	4.07	4.11	4.34	4	3.83	4.7	4.38	4.08
WEEK 14	3.93	3.72	3.79	4.25	4.07	4.09	4.31	4	3.83	4.67	4.38	4.08
WEEK 15	3.92	3.72	3.77	4.24	4.07	4.08	4.3	3.97	3.83	4.65	4.35	4.08
WEEK 16	3.92	3.7	3.76	4.24	4.07	4.06	4.29	3.94	3.83	4.64	4.3	4.08
WEEK 17	3.89	3.68	3.75	4.18	4.04	4.05	4.25	3.87	3.83	4.62	4.25	4.08
WEEK 18	3.87	3.65	3.74	4.19	4.01	4.03	4.24	3.85	3.83	4.61	4.22	4.08
WEEK 19	3.86	3.65	3.73	4.17	4.01	4.01	4.24	3.82	3.83	4.58	4.19	4.08
WEEK 20	3.85	3.62	3.73	4.16	3.98	4.01	4.23	3.79	3.83	4.57	4.16	4.08
WEEK 21	3.82	3.59	3.73	4.11	3.95	4.01	4.22	3.77	3.83	4.55	4.13	4.08
WEEK 22	3.79	3.59	3.73	4.07	3.95	4.01	4.18	3.77	3.83	4.52	4.13	4.08

WEEK 23	3.76	3.59	3.73	4.04	3.95	4.01	4.15	3.77	3.83	4.49	4.13	4.08
WEEK 24	3.76	3.59	3.72	4.01	3.95	4	4.1	3.77	3.81	4.44	4.13	4.08
WEEK 25	3.76	3.59	3.71	4.01	3.95	3.95	4.07	3.77	3.81	4.42	4.13	4.08
WEEK 26	3.76	3.59	3.7	4.01	3.95	3.95	4.06	3.77	3.8	4.4	4.13	4.07
WEEK 27	3.76	3.59	3.69	4.01	3.95	3.93	4.01	3.77	3.8	4.37	4.13	4.07
WEEK 28	3.76	3.59	3.69	4.01	3.95	3.93	4.01	3.77	3.8	4.37	4.13	4.07
WEEK 29	3.76	3.59	3.69	4.01	3.95	3.93	4.01	3.77	3.8	4.37	4.13	4.07
WEEK 30	3.76	3.59	3.69	4.01	3.95	3.93	4.01	3.77	3.8	4.37	4.13	4.07
WEEK 31	3.76	3.59	3.69	4.01	3.95	3.93	4	3.77	3.8	4.37	4.13	4.07
WEEK 32	3.76	3.6	3.69	4.01	3.94	3.93	4	3.77	3.8	4.37	4.13	4.07
WEEK 33	3.76	3.61	3.69	4.01	3.94	3.93	4.01	3.77	3.8	4.37	4.13	4.07
WEEK 34	3.76	3.65	3.7	4.01	3.97	3.94	4.01	3.79	3.82	4.37	4.13	4.09
WEEK 35	3.74	3.67	3.7	4.04	4	3.95	4.01	3.81	3.82	4.37	4.13	4.1
WEEK 36	3.74	3.67	3.7	4.04	4	3.95	4.01	3.81	3.82	4.37	4.14	4.1
WEEK 37	3.74	3.67	3.7	4.04	4	3.95	4.01	3.82	3.83	4.37	4.14	4.12
WEEK 38	3.7	3.67	3.7	4.03	4	3.95	4.01	3.83	3.83	4.38	4.15	4.12
WEEK 39	3.66	3.67	3.7	4.03	4	3.95	4.01	3.83	3.84	4.39	4.15	4.13
WEEK 40	3.62	3.67	3.7	3.98	4	3.95	4.01	3.83	3.85	4.39	4.15	4.14
WEEK 41	3.6	3.67	3.71	3.95	4	3.96	4.01	3.94	3.85	4.39	4.16	4.14
WEEK 42	3.58	3.67	3.75	3.95	4	3.96	4.01	3.85	3.85	4.39	4.16	4.17
WEEK 43	3.58	3.67	3.76	3.95	4	3.98	4.01	3.85	3.85	4.39	4.16	4.17
WEEK 44	3.58	3.67	3.76	3.91	4	3.98	4.01	3.85	3.86	4.39	4.16	4.18
WEEK 45	3.58	3.67	3.76	3.91	4	4.03	4.02	3.86	3.87	4.4	4.18	4.2
WEEK 46	3.58	3.67	3.76	3.91	4	4.04	4.02	3.86	3.87	4.4	4.18	4.2
WEEK 47	3.58	3.67	3.79	3.91	4	4.08	4.02	3.86	3.89	4.4	4.2	4.22
WEEK 48	3.58	3.7	3.79	3.91	4	4.08	4.02	3.86	3.9	4.4	4.2	4.23
WEEK 49	3.62	3.72	3.79	3.91	4.01	4.08	4.04	3.88	3.91	4.42	4.22	4.24
WEEK 50	3.64	3.72	3.79	3.94	4.01	4.08	4.05	3.89	3.92	4.43	4.22	4.26
WEEK 51	3.64	3.72	3.79	3.94	4.01	4.08	4.05	3.89	3.92	4.43	4.22	4.26
WEEK 52	3.64	3.73	3.79	3.94	4.02	4.08	4.05	3.89	3.92	4.43	4.22	4.26
WEEK 53								3.89			4.22	
MEAN	3.79	3.67	3.75	4.10	4.01	4.03	4.15	3.89	3.84	4.51	4.24	4.13

Source. Elaborated by the author using data from “Lonja de Binef.

Table VIII 2. Sales revenues of male calves in 2014, 2015 and 2016. (Real situation & price in Lonja Binefar)

2014 MALE CALVES									
REAL SALE MALE				SUPPOSED PRICES BINEFAR (R) 321-360 KG			SUPPOSED PRICES BINEFAR (E) 321-360 KG		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)
5	1,576.33	4.027	7,014.41	(WEEK 9) 2014	3.98	6,932.54	(WEEK 9) 2014	4.3	7,489.93
8	2,568.09	3.780	10,726.66	(WEEK 23) 2014	3.76	10,669.90	(WEEK 23) 2014	4.04	11,464.47
3	984.90	3.756	4,087.71	(WEEK 47) 2014	3.58	3,896.17	(WEEK 47) 2014	3.91	4,255.31
1	292.04	3.516	1,134.63	(WEEK 47) 2014	3.58	1,155.28	(WEEK 47) 2014	3.91	1,261.77
1	366.52	3.726	1,509.05	(WEEK 35) 2014	3.74	1,514.72	(WEEK 35) 2014	4.05	1,640.27
		TRANSP ORT	-450.75		TRASPORT	-450.75		TRASPORT	-450.75
		DISCOUNT	-296.37		IRPF	-4.34		IRPF	-4.34
		IRPF	-4.34		DISCOUNT	0.00		DISCOUNT	0.00
TOTAL	5,787.88		23,720.99			23,713.52			25,656.66
Mean per Male calves				Mean per Male calves			Mean per Male calves		
18	321.55	3.76	1,317.83		3.73	1,317.42		4.04	1,425.37
2015 MALE CALVES									
REAL SALE MALE				SUPPOSED PRICES BINEFAR (R) 321-360 KG			SUPPOSED PRICES BINEFAR (E) 321-360 KG		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)
1	358.19	3.85	1,522.25	(WEEK 14) 2015	3.72	1,472.38	(WEEK 14) 2015	4.07	1,610.91
1	300.86	3.73	1,238.71	(WEEK 14) 2015	3.72	1,236.72	(WEEK 14) 2015	4.07	1,353.07
7	2,545.55	3.67	10,311.84	(WEEK 27) 2015	3.59	10,098.07	(WEEK 27) 2015	3.95	11,110.69
1	267.05	3.50	1,032.82	(WEEK 42) 2015	3.67	1,082.98	(WEEK 42) 2015	4.00	1,180.36
5	1,672.37	3.73	6,885.53	(WEEK 51) 2015	3.72	6,874.44	(WEEK 51) 2015	4.01	7,410.36
		TRANSPOR	-349.66		TRANSPORT	-349.66		TRANSPORT	-349.66
		DESCUENT	-314.89		DESCUENTO			DESCUENTO	
		IRPF	-415.65		IRPF	-415.65		IRPF	-415.65
TOTAL	5144.02		19,910.95			19,999.28			21,900.08
Mean per Male calves				Mean per Male calves			Mean per Male calves		
15	342.93	3.69	1327.40		3.68	1333.29		4.02	1460.01

2016 MALE CALVES									
REAL SALE MALE				SUPPOSED PRICES BINEFAR (R) 321-360 KG			SUPPOSED PRICES BINEFAR (E) 321-360 KG		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)
9.00	3,080.63	3.606	12,275.17	(WEEK 27) 2016	3.69	12561.11	(WEEK 27) 2016	3.93	13378.10
2.00	580.65	3.486	2,236.68	(WEEK 27) 2016	3.69	2367.57	(WEEK 27) 2016	3.93	2521.56
2.00	687.96	3.500	2,660.69	(WEEK 39) 2016	3.70	2812.72	(WEEK 39) 2016	3.95	3002.77
5.00			3,741.54			3741.54			3741.54
					TRANSPORTE	-119.34		TRANSPORTE	-119.34
					DESCUENTO			DESCUENTO	
			-119.34		IRPF	-420.73		IRPF	-420.73
			-322.16						
			-420.73						
TOTAL	4,349.24		20,051.84			20942.88			22103.90
Mean per Male calves				Mean per Male calves			Mean per Male calves		
18.00	241.62	3.53	1,113.99		3.69	1,163.49		3.94	1,227.99

Source. Elaboration by the author with data of the farm.

Table VIII 3. Sales revenues of female calves in 2014, 2015 and 2016. (Real situation & price in Lonja Binefar)

2014 FEMALE CALVES									
REAL SALE FEMALE				SUPPOSED PRICES BINEFAR (R) 180-220 KG			SUPPOSED PRICES BINEFAR (E) 180-220 KG		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)
2	448.35	4.400	2,179.88	(WEEK 9) 2014	4.35	2,155.11	(WEEK 9) 2014	4.73	2,343.37
4	915.32	4.200	4,248.00	(WEEK 23) 2014	4.15	4,197.43	(WEEK 23) 2014	4.49	4,541.31
1	234.71	4.100	1,063.35	(WEEK 23) 2014	4.15	1,076.32	(WEEK 23) 2014	4.49	1,164.50
1	190.61	3.846	810.06	(WEEK 47) 2014	4.02	846.71	(WEEK 47) 2014	4.40	926.75
3	666.40	3.786	2,787.90	(WEEK 35) 2014	4.01	2,952.85	(WEEK 35) 2014	4.37	3,217.95
5	1,038.31	4.400	5,048.26	(WEEK 9) 2014	4.35	4,990.90	(WEEK 9) 2014	4.73	5,426.88
	TRANSPORTE		-400.75		TRANSPORTE	-400.75		TRANSPORTE	-400.75
	DESCUENTO		-263.37		DESCUENTO			DESCUENTO	
	RETENCION		-385.88		RETENCION	-385.88		RETENCION	-385.88
TOTAL	3,493.70		15,087.46			15,432.68			16,834.13
Mean per Female calves				Mean per Female calves			Mean per Female calves		
16	218.36	4.12	942.97		4.17	964.54		4.54	1,052.13
2015 FEMALE CALVES									
REAL SALE FEMALE				SUPPOSED PRICES BINEFAR (R) 180-220 KG			SUPPOSED PRICES BINEFAR (E) 180-220 KG		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)
8.00	2,004.59	3.907	8,654.29	(WEEK 14) 2015	4.00	8,860.29	(WEEK 14) 2015	4.38	9,702.02
8.00	2,051.14	3.606	8,173.03	(WEEK 27) 2015	3.77	8,544.74	(WEEK 27) 2015	4.13	9,360.69
4.00	935.00	3.846	3,973.59	(WEEK 42) 2015	4.16	4,298.01	(WEEK 42) 2015	3.84	3,967.39
			0.00			0.00			0.00
			0.00			0.00			0.00
			0.00						
	TRANSPORTE		-346.49		TRANSPORTE	-346.49		TRANSPORTE	-346.49
	DESCUENTO		-312.04		DESCUENTO			DESCUENTO	0.00
	RETENCION		-411.88		RETENCION	-411.88		RETENCION	-411.88
TOTAL	4,990.73		19,730.50			20944.67			22271.72
Mean per Female calves				Mean per Female calves			Mean per Female calves		
20.00	249.54	3.79	986.52		2.386	1,047.23		2.47	1,113.59

2016 FEMALE CALVES									
REAL SALE FEMALE				SUPPOSED PRICES BINEFAR (R) 180-220 KG			SUPPOSED PRICES BINEFAR (E) 180-220 KG		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)
6	1,691.97	3.726	6,966.23	(WEEK 27) 2016	3.81	7,123.28	(WEEK 27) 2016	4.13	7,721.56
6	1,462.16	3.666	5,923.11	(WEEK 39) 2016	3.85	6,220.39	(WEEK 39) 2016	4.18	6,753.57
6	742.90	3.560	2,909.20	(WEEK 15) 2016	3.83	3,144.06	(WEEK 15) 2016	4.15	3,406.75
2	250.90	3.55	979.76	(WEEK 15) 2016	3.83	1,061.85	(WEEK 15) 2016	4.15	1,150.56
4	477.70	3.59	1,886.44	(WEEK 15) 2016	3.83	2,021.70	(WEEK 15) 2016	4.15	2,190.61
	TRANSPORTE		-159.12		TRANSPORTE	-159.12		TRANSPORTE	-159.12
	DESCUENTO		-128.75		DESCUENTO			DESCUENTO	
	RETENCION		-335.17		RETENCION	-335.17		RETENCION	-335.17
TOTAL	4,625.63		18,041.69			19,076.99			20,728.77
Mean per Female calves				Mean per Female calves			Mean per Female calves		
24	192.73	3.62	751.74		3.83	794.87		4.152	863.70

Source. Elaboration by the author with data of the farm.

Table VIII 4. Sales revenues of cows and bulls in 2014, 2015 and 2016. (Real situation & price in Lonja Binefar)

2014 COWS AND BULLS									
REAL SALE COWS				SUPPOSED PRICES BINEFAR (R) 180-220 KG			SUPPOSED PRICES BINEFAR (E) 180-220 KG		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)
1	316.05	2.200	768.32	(WEEK 9) 2014	3.16	1,103.58	(WEEK 9) 2014	2.41	841.66
1	297.92	2.100	691.32	(WEEK 47) 2014	2.97	977.73	(WEEK 47) 2014	2.23	734.12
1	311.64	2.700	929.78	(WEEK 47) 2014	2.97	1,022.76	(WEEK 47) 2014	2.23	767.93
2	671.30	2.800	2,077.00	(WEEK 25) 2014	2.47	1,832.21	(WEEK 25) 2014	3.22	2,388.55
1	312.13	2.400	827.77	(WEEK 25) 2014	2.447	843.98	(WEEK 25) 2014	3.22	1,110.59
TOTAL			5,294.19			5,780.26			5,842.85
Mean per cows and bulls				Mean per cows and bulls			Mean per cows and bulls		
6	318.17	2.44	86.79		2.23	963.38		2.97	973.81

2015 COWS AND BULLS									
REAL SALE COWS				SUPPOSED PRICES BINEFAR (R) 180-220 KG			SUPPOSED PRICES BINEFAR (E) 180-220 KG		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)
1	322.91	2.404	857.78	(WEEK 28) 2015	2.23	795.70	(WEEK 28) 2015	2.97	1,059.74
1	327.32	2.50	904.22	(WEEK 51) 2015	2.23	806.57	(WEEK 51) 2015	2.97	1,074.22
			-17.16						
TOTAL	650.23		1,744.85			1,602.26			2,133.96
Mean per cows and bulls				Mean per cows and bulls			Mean per cows and bulls		
2	325.12	2.45	872.42		2.23	801.13		2.97	1,066.98
2016 COWS AND BULLS									
REAL SALE COWS				SUPPOSED PRICES BINEFAR (R) 180-220 KG			SUPPOSED PRICES BINEFAR (E) 180-220 KG		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)
2	586.04	2.000	1,295.15	(WEEK 39) 2016	2.23	1444.09	(WEEK 39) 2016	2.97	1923.30
1	366.03	2.50	1,011.16	(WEEK 39) 2016	2.23	901.95	(WEEK 39) 2016	2.97	1201.26
1	343.98	2.40	912.23	(WEEK 39) 2016	2.23	847.62	(WEEK 39) 2016	2.97	1128.89
	-12.00	0.50	-6.63						
TOTAL	1,284.05		3,211.91			3193.66			4253.44
Mean per cows and bulls				Mean per cows and bulls			Mean per cows and bulls		
4	321.01	3.70	802.98		2.23	798.42		2.97	1063.36

Source. Elaboration by the author with data of the farm.

Table VIII 5. Sales revenues of male calves in 2014, 2015 and 2016. (Directly consumer)

2014 MALE CALVES						
REAL SALE MALE				DIRECT SALE TO THE CONSUMER		
PIECES	KG NET	PRRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE
5.00	1,576.33	4.027	7,014.41	(WEEK 9) 2014	7.90	13,760.57
8.00	2,568.09	3.780	10,726.66	(WEEK 23) 2014	7.90	22,418.14
3.00	984.90	3.756	4,087.71	(WEEK 47) 2014	7.90	8,597.68
1.00	292.04	3.516	1,134.63	(WEEK 47) 2014	7.90	2,549.36
1.00	366.52	3.726	1,509.05	(WEEK 35) 2014	7.90	3,199.54
		Transport	-450.75		Transport	-450.75
		Discount	-296.37		IRPF	-4.34
		IRPF	-4.34		Discount	0.00
TOTAL	5,787.88		23,720.99			50,070.21

2015 MALE CALVES						
REAL SALE MALE				DIRECT SALE TO THE CONSUMER		
PIECES	KG NET	PRRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE
1	358.19	3.846	1522.25	(WEEK 14) 2015	7.9	3126.82
1	300.86	3.726	1238.71	(WEEK 14) 2015	7.9	2626.36
7	2545.55	3.666	10311.84	(WEEK 27) 2015	7.9	22221.38
1	267.05	3.5	1032.82	(WEEK 42) 2015	7.9	2331.21
5	1672.37	3.726	6885.53	(WEEK 51) 2015	7.9	14598.95
		Transport	-349.66		Transport	-349.66
		Discount	-314.89		Discount	
		IRPF	-415.65		IRPF	-415.65
TOTAL	5144.02		19910.9479			44139.41

2016 MALE CALVES						
REAL SALE MALE				DIRECT SALE TO THE CONSUMER		
PIECES	KG NET	PRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE
9.00	3,080.63	3.606	12,275.17	(WEEK 27) 2016	7.90	26892.36
2.00	580.65	3.486	2,236.68	(WEEK 27) 2016	7.90	5068.78
2.00	687.96	3.500	2,660.69	(WEEK 39) 2016	7.90	6005.55
5.00			3,741.54			3741.54
		Transport	-119.34		Transport	-119.34
		Discount	-322.16		IRPF	-420.73
		IRPF	-420.73			
TOTAL	4,349.24		20,051.84			41168.16

Source. Elaboration by the author with data of the farm.

Table VIII 6. Sales revenues of female calves in 2014, 2015 and 2016. (Directly consumer)

FEMALE CALVES 2014						
REAL SALE FEMALE				DIRECT SALE TO THE CONSUMER		
PIECES	KG NET	PRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE
2.00	448.35	4.400	2,179.88	(WEEK 9) 2014	7.9	3,913.87
4.00	915.32	4.200	4,248.00	(WEEK 23) 2014	7.9	7,990.29
1.00	234.71	4.100	1,063.35	(WEEK 23) 2014	7.9	2,048.90
1.00	190.61	3.846	810.06	(WEEK 47) 2014	7.9	1,663.93
3.00	666.40	3.786	2,787.90	(WEEK 35) 2014	7.9	5,817.34
5.00	1,038.3	4.400	5,048.26	(WEEK 9) 2014	7.9	9,063.93
		Transport	-400.75		Transport	-400.75
		Discount	-263.37		Discount	
		IPF	-385.88		IPF	-385.88
TOTAL	3,493.7		15,087.46			29,711.62

2015 FEMALE CALVES						
REAL SALE FEMALE				DIRECT SALE TO THE CONSUMER		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE
8.00	2,004.59	3.907	8,654.29	(WEEK 14) 2015	7.90	17499.07
8.00	2,051.14	3.606	8,173.03	(WEEK 27) 2015	7.90	17905.43
4.00	935.00	3.846	3,973.59	(WEEK 42) 2015	7.90	8162.08
			0.00			0.00
			0.00			0.00
			0.00			0.00
		Transport	-346.49		Transport	-346.49
		Discount	-312.04		Discount	
		IRPF	-411.88		IRPF	-411.88
TOTAL	4,990.73		19,730.50			42808.21

2016 FEMALE CALVES						
REAL SALE FEMALE				DIRECT SALE TO THE CONSUMER		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE
6.00	1,691.97	3.726	6,966.23	(WEEK 27) 2016	7.90	14770.05
6.00	1,462.16	3.666	5,923.11	(WEEK 39) 2016	7.90	12763.93
6.00	742.90	3.560	2,909.20	(WEEK 15) 2016	7.9	6485.15
2.00	250.90	3.55	979.76	(WEEK 15) 2016	7.9	2190.23
4.00	477.70	3.59	1,886.44	(WEEK 15) 2016	7.9	4170.08
		Transport	-159.12		Transport	-159.12
		Discount	-128.75		Discount	
		IRPF	-335.17		IRPF	-335.17
TOTAL	4,625.63		18,041.69			39885.15

Source. Elaboration by the author with data of the farm.

Table VIII 7 Sales revenues of cows, heifer and bulls in 2014, 2015 and 2016. (Directly consumer)

2014 COWS						
REAL SALE COWS				DIRECT SALE TO THE CONSUMER		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE
1.00	316.05	2.200	768.32	(WEEK 9) 2014	7.9	2758.96
1.00	297.92	2.100	691.32	(WEEK 47) 2014	7.90	2600.69
1.00	311.64	2.700	929.78	(WEEK 47) 2014	7.90	2720.46
2.00	671.30	2.800	2,077.00	(WEEK 25) 2014	7.9	5860.11
1.00	312.13	2.400	827.77	(WEEK 25) 2014	7.9	2724.74

TOTAL	5,294.19	16664.96
-------	----------	----------

2015 COWS, HEIFERS AND BULLS						
REAL SALE COWS				DIRECT SALE TO THE CONSUMER		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE BINEFAR (INCOME +TAXE)
1.00	322.91	2.404	857.78	(WEEK 28) 2015	7.9	2818.84
1.00	327.32	2.50	904.22	(WEEK 51) 2015	7.9	2857.34
TOTAL	650.23		1,762.01			5676.18

2016 COWS, HEIFERS AND BULLS						
REAL SALE COWS				DIRECT SALE TO THE CONSUMER		
PIECES	KG NET	PRPRICE	REAL SALE (INCOME+TAXE)	WEEKS	PRICE BINEFAR	SALE
2.00	586.04	2.000	1,295.15	(WEEK 39) 2016	7.9	5115.84
1.00	366.03	2.50	1,011.16	(WEEK 39) 2016	7.9	3195.26
1.00	343.98	2.40	912.23	(WEEK 39) 2016	7.9	3002.77
	-12.00	0.50	-6.63			
TOTAL	1,284.05		3,211.91			11313.87

Source. Elaboration by the author with data of the farm.

Figure VIII 1. Number of cows and calves that maximizes the firm's profit. (SOLVER).
Initial situation.

PROFIT FUNCTION (MC, FC, CBH)			
Variable	MC	FC	CBH
	40	40	136
OBJETIVE FUNCTION=INCOME FUNCTION - COST FUNCTION			
	365.92	294.61	2.67
	26,783.90		
RESTRICTIONS			
	FC+MC <= 80		80
	MC <= 50%*(MC+FC)		40
	FC+MC <= CBH		80
	(FC+MC)=>0.59*CBH		80
		Real animals	Max. Animals
	MC	17	40
	FC	20	40
	CBH	63	136
	RESULT	12,281.36	26,784.99

Source. Elaborated by the author.

Figure VIII 2 number of cows and calves that maximizes the firm's profit. (SOLVER)
Scenario 1

PROFIT FUNCTION (MC, FC, CBH)			
Variable	MC	FC	CBH
	40	40	136
OBJETIVE FUNCTION=INCOME FUNCTION - COST FUNCTION			
	483.11	410.86	13.09
37,534.32			
FUNCION DE PRODUCCION			
FC+MC <= 80		80	80
MC <= 50%*(MC+FC)		40	40
FC+MC <= CBH		80	136
(FC+MC) => 0.59*CBH		80	80
		Real animals	Max. Animals
	MC	17	40
	FC	20	40
	CBH	63	136
	RESULT	17,255.02	37,539.64

Source. Elaborated by the author.

Figure VIII 3 Number of cows and calves that maximizes the firm's profit. (SOLVER)
Scenario 2.1

PROFIT FUNCTION (MC, FC, CBH)			
Variable	MC	FC	CBH
	0	0	0
OBJETIVE FUNCTION=INCOME FUNCTION - COST FUNCTION			
	365.92	294.61	-357.60
0.00			
RESTRICTIONS			
FC+MC <= 80		0	80
MC <= 50%*(MC+FC)		0	0
FC+MC <= CBH		0	0
(FC+MC) => 0.59*CBH		0	0
		Real animals	Max. Animals
	MC	17	40
	FC	20	40
	CBH	63	136
	RESULT	-10,416.12	-22,212.75

Source. Elaborated by the author.

Figure VIII 4 Number of cows and calves that maximizes the firm's profit. (SOLVER)
Scenario 2.2

PROFIT FUNCTION (MC, FC, CBH)			
	MC	FC	CBH
Variable	40	40	80
OBJETIVE FUNCTION=INCOME FUNCTION - COST FUNCTION			
	483.11	410.86	-347.18
7,984.19			
FUNCION DE PRODUCCION			
FC+MC <= 80		80	80
MC <= 50%*(MC+FC)		40	40
FC+MC <= CBH		80	80
(FC+MC)=>0.59*CBH		80	47
		Real animals	Max. Animals
	MC	17	40
	FC	20	40
	CBH	63	80
	RESULT	-5,442.43	7,984.19

Source. Elaborated by the author.

Figure VIII 5 Number of cows and calves that maximizes the firm's profit. (SOLVER)
Scenario 3.1

PROFIT FUNCTION (MC, FC, CBH)			
	MC	FC	CBH
Variable	40	40	136
OBJETIVE FUNCTION=INCOME FUNCTION - COST FUNCTION			
	379.23	302.81	2.67
27,643.57			
FUNCION DE PRODUCCION			
FC+MC <= 80		80	80
MC <= 50%*(MC+FC)		40	40
FC+MC <= CBH		80	136
(FC+MC)=>0.59*CBH		80	80
		Real animals	Max. Animals
	MC	17	40
	FC	20	40
	CBH	63	136
	RESULT	12,671.28	27,643.57

Source. Elaborated by the author.

**Figure VIII 6 Number of cows and calves that maximizes the firm's profit. (SOLVER)
Scenario 3.2**

PROFIT FUNCTION (MC, FC, CBH)			
	MC	FC	CBH
Variable	0	0	0
OBJETIVE FUNCTION=INCOME FUNCTION - COST FUNCTION			
	379.23	302.81	-357.60
0.00			
FUNCION DE PRODUCCION			
FC+MC <= 80		0	80
MC<= 50%*(MC+FC)		0	0
FC+MC <= CBH		0	0
(FC+MC)=>0.59*CBH		0	0
		Real animals	Max. Animals
	MC	17	40
	FC	20	40
	CBH	63	0
	RESULT	-10,025.73	0.00

Source. Elaborated by the autor.

Information VIII 2 Mail received from the feed company.

----- Mensaje original -----

De: "Torres Pozo, Miguel A." <matorres@deheus.com>

Fecha: 07/11/2017 13:58 (GMT-08:00)

Para: MARTA SOLSONA GIL <martasolsonagil@gmail.com>

Asunto: RE: AYUDA (PROYECTO MASTER)

Hola Marta, estoy bastante liado estas semanas y no he podido ni mirarlo. Pero si no te contesto ahora, no podré hacerlo hasta el viernes y no te lo aseguro. Así que intentaré darte cifras.

Nosotros los precios que manejamos los calculamos como si fueran para un grupo de ganaderos ya que siempre procuramos completar camiones y visitamos con los mismos precios y productos por comarca. Pero ante la propuesta de un grupo de ganaderos de compra y su compromiso, acuerdo o como lo queramos llamar, la política comercial conllevaría los siguientes descuentos. Ojo, los datos que te doy siempre son por compras mensuales, que es nuestro periodo contable.

Partimos de que el precio actual es para un ganadero o grupo que nos compra < 50 ton/mes.

>50 ton y hasta 100 ton/mes el descuento por volumen es de -1 euro/ton

>100 ton y hasta 150 ton/mes el descuento puede ser de -2 euros/ton

>150 ton y hasta 200 ton/mes el descuento puede ser de -3 euros/ton

Y así sucesivamente hasta un descuento máximo de -6 euros/ton, para compras de >300 ton/mes. En este momento no tenemos ningún cliente que nos compre más de 400 ton/mes de pienso de terneros.

Por otro lado los portes asociados a cada pedido van en función de los kilómetros y las toneladas que salen en cada pedido. Como te he dicho a los ganaderos no les cobramos portes reales, ya que tratamos nosotros de completar los camiones para que les salga más barato, porque si no en algunos casos les saldría un coste de transporte muy alto. Pero para que te hagas una idea, los portes a Puertomingalvo desde nuestra fábrica según la tarifa de los transportistas que tenemos contratados ahora, sería la siguiente.

Tenemos 170 km yendo por Rubielos.

Camión tres ejes, máximo 15 ton:

- Si lleva 15 ton cuesta 14.4 euros/ton
- Si lleva 12 ton cuesta 18.02 euros/ton
- Si lleva 10 ton cuesta 21.6 euros/ton

Camión tráiler, máximo 24 ton:

- Si lleva 24 ton cuesta 13.14 euros/ton
- Si lleva 18 ton cuesta 17.52 euros/ton

Nosotros solemos grabar un porte fijo a cada ganadero para que no se preocupe por el coste de transporte, porque como después están las variables de otros pedidos por la zona o de los tamaños del silo o de la cantidad que entra en cada celda del camión, si aplicáramos la tarifa sin contemplaciones, saldría una cifra diferente en cada pedido.

Bueno, espero que te sirva.

Hablamos. Un saludo.

Miguel Angel Torres Pozo
Director Area

De Heus Nutrición Animal S.A.U.
Avda. de Picassent, 34
Silla
46460 VALENCIA
T +34 609848861

Este mensaje y sus documentos adjuntos estan sujetos a la política de privacidad publicada en la siguiente página web de [De Heus Nutrición Animal](#).

**Figure VIII 7 Number of cows and calves that maximizes the firm's profit. (SOLVER)
Scenario 4.1**

PRODUCCION FUNCTION (MC, FC, CBH)			
Variable	MC	FC	CBH
	40	40	136
OBJETIVE FUNCTION=INCOME FUNCTION - COST FUNCTION			
	1,771.68	1,287.03	126.45
139,494.73			
FUNCION DE PRODUCCION			
FC+MC <= 80		80	80
MC <= 50% *(MC+FC)		40	40
FC+MC <= CBH		80	136
(FC+MC) => 0.59*CBH		80	80
		Real animals	Max. Animals
MC		17	40
FC		20	40
CBH		63	136
RESULT		63,825.78	139,494.73

Source. Elaborated by author.

**Figure VIII 8 Number of cows and calves that maximizes the firm's profit. (SOLVER)
Scenario 4.2**

PRODUCCION FUNCTION (MC, FC, CBH)			
Variable	MC	FC	CBH
	40	40	136
OBJETIVE FUNCTION=INCOME FUNCTION - COST FUNCTION			
	1,771.68	1,287.03	-233.82
90,644.16			
FUNCION DE PRODUCCION			
FC+MC <= 80		80	80
MC <= 50% *(MC+FC)		40	40
FC+MC <= CBH		80	136
(FC+MC) => 0.59*CBH		80	80
		Real animals	Max. Animals
MC		17	40
FC		20	40
CBH		63	136
RESULT		41,128.58	90,644.16

Source. Elaborated by the author.