

## **Milk, from medicine to food in Mediterranean Europe: Catalonia, 19th-20th centuries.<sup>1</sup>**

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### **Introduction.**

The spread of milk consumption was a significant change in the diet of Europeans, however it is one that has not been greatly studied with regard to the populations of Mediterranean Europe. In this article we shall analyse the main circumstances that conditioned that process in Catalonia between the middle of the 19<sup>th</sup> century and 1936. In our study we shall argue that the consumption of milk in this area was only relevant in the 19<sup>th</sup> century in situations of illness or old age, and that it subsequently increased and acquired a new significance as a result of various factors. In particular, we shall emphasise: (a) the scientific advances in microbiology and nutrition, (b) the activities carried out by doctors and various public institutions to promote the consumption of fresh milk, and (c) the technological innovations in the milk producing sector. In Appendix 1 we show two maps representing the main territorial references that we shall mention.

### **1. The consumption of fresh milk in Catalonia in the European context between 1870 and 1936.**

A great deal of evidence remains with regard to the expansion of milk consumption in Europe since the 1870s, yet there were few quantitative estimates until the 20<sup>th</sup> century. In the middle of the 19<sup>th</sup> century, the consumption of fresh milk was high in those regions that specialised in cattle rearing for meat, cheese and butter production, and in some big cities that were close to these regions or which could import fodder from outside to supply urban herds. In consequence, the estimates of fresh milk consumption in the 19<sup>th</sup> century are few, and often limited to the consumption of this product in cities. Nonetheless, the estimates made show that the consumption of fresh milk was already high in many areas of middle and northern Europe by the end of the 19<sup>th</sup> century, and that during the first third of the 20<sup>th</sup> century it continued to rise, coming to exceed 150 litres per inhabitant per annum in many cases

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(Table 1). In contrast, fresh milk consumption in Catalonia was still very low in 1900, and its later expansion was very noticeable in Barcelona, in the more northern parts of the region, and to a lesser extent in the province of Tarragona.

Table 1: Consumption of fresh milk in Western Europe between 1870 and 1930 (litres per inhabitant per annum).

	1870/95 <sup>(1)</sup>	c.1900	c.1910	c.1930		c.1900	c.1910	c.1930
<b>G.B.</b>	<b>40-60</b>	<b>70</b>		<b>95</b>	<b>HOLLAND</b>			
London	52			139	Amsterdam			145 <sup>(2)</sup>
Manchester	109				<b>NORWAY</b>	<b>150-160</b>		<b>190</b>
Other cities	64-122				Oslo			194 <sup>(2)</sup>
<b>SWITZERLAND</b>	<b>115</b>				<b>SWEDEN</b>	<b>180</b>		
Zurich				216-252	Stockholm			252-288
Lucerne				324	<b>DENMARK</b>	<b>180</b>		
Berne				270	Copenhagen			260
<b>FRANCE</b>		<b>72</b>			<b>W. GERMANY</b>			
Paris	60			72-90	Saxony	120		
Strasbourg				158 <sup>(2)</sup>	Munich		158	
Lyon				72 <sup>(2)</sup>	Stuttgart		180	
Toulouse				60-79 <sup>(2)</sup>	Flensburg		180	
<b>AUSTRIA</b>					Hamburg			155
Vienna				180-185	Berlin			90-130

**Sources:** Rew (1892) p.251, 266, 272; (1904a) p. 419, 421-426, Bulharowski (1929) p. 7, Llovet (1934) p.15, Carrasco (1934) p.673, Mas Alemany (1935) p. 27, Atkins (2005) p.26, Orland (2005) p.222, Kajærnes (1995) p. 104 and Schärer (1995) p.21.

**Notes:** (1) different years between 1870 and 1895; (2): end of the 1920s.

The reduced consumption of fresh milk in Catalonia until the early years of the 20<sup>th</sup> century is reflected in Medical-Health Surveys carried out by doctors from the different municipalities. Of the 45 Surveys carried out between 1798 and 1907, their authors failed to mention milk consumption in 15 municipalities, and only attempted to quantify it in seven. The doctors also indicated that milk consumption covered the needs of the population, although in the majority of cases the consumption of goat's milk was predominant, and the quantities consumed did not reach 20 litres per inhabitant per annum. The consumption of fresh milk was not only reduced in the municipalities of the centre and south of Catalonia, where the cultivating of cereals, grape vines, olives and fruit trees predominated (e.g. Tortosa, Reus, Calaf, Pons, Solsona, Tarrassa, Vilassar, Martorelles and Castellar del Vallès). Consumption was also very low in the more northern municipalities, where the presence of cattle was much greater (e.g. Vic, Olot, Camprodón and Figueres), and in the region's capital. In the city

of Barcelona, consumption failed to reach 5 litres in 1850 and was 13 litres in 1902.

Various reports into Spanish livestock in 1891 confirm the above observations. These reports only mentioned the presence of dairy herds in the city of Barcelona and just a few other localities. They also indicated that in cattle rearing areas the calves were weaned at three or four months after birth, and from that moment on the cows were not normally milked. Their authors also indicated that goats produced daily between one and three litres of milk over 10 months, but added that the kids were suckled for a long time because meat production was more profitable.<sup>2</sup>

During the first third of the 20<sup>th</sup> century, the consumption of fresh milk increased at a great rate, however it did not reach the high levels seen in Atlantic Europe, and only ended up being relevant in the city of Barcelona and in the province of Girona (Table 2). In Barcelona, fresh milk consumption increased above all between 1900 and 1918, and in the province of Girona increased mainly in the 1920s and 1930s. In these cases, consumption ended up being between 70 and 80 litres.<sup>3</sup> In the province of Tarragona, the expansion of consumption was also very intense, though by 1933 it had yet to reach an average of 35 litres. In the province of Lleida and in most of the province of Barcelona, levels of consumption were still lower in the 1930s and did not exceed 25 litres.

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<sup>2</sup> Dirección General de Agricultura, Industria y Comercio (1892), Vol. I, pp. 295-296, 304-305, 307, 318-323, 384, 396-397; Vol.II, pp. 408, 412-413, 414.

<sup>3</sup> Before the Second World War the consumption of this product was 73 l. in Madrid and 60 l in Milan, and did not reach 40 l in Rome, Seville and Saragossa (Bulharowski (1929) p. 7, Más Alemany (1935) p. 28, Llovet (1934) p. 15, Carrasco (1935) pp.671-673 and Ministerio de Agricultura (1934), pp. 96-103).

Table 2: Consumption of fresh milk in Catalonia between 1900 and 1930  
(litres/inhabitant/year)

	c.1900	c.1918	c.1923		c.1933	
	(a)	(a)	(a)	(b)	(a)	(b)
<b>Provinces</b>						
<b>BARCELONA</b>			53	87	55 <sup>(1)</sup>	96
<i>Capital</i>	13	60			78	98
<i>Rest of province</i>					23	90
<b>GIRONA</b>			25	80	172 <sup>(2)</sup>	>90
<i>Capital</i>					71	>90
<i>Figueres</i>					75-80	>90
<b>LLEIDA</b>			20	75	24	75
<b>TARRAGONA</b>			13	23	34	21

(a): Litres/inhabitant/annum; (b): % of cow's milk

**Sources:** Population census, Más Alemany (1935) p. 28, Llovet (1938) pp.158-159), General Stockbreeders' Association (c.1923) pp. 82-83, 90-91, 94-95, 106-107, Ministry of Agriculture (1934), pp. 96-103; Figueres Municipal Council. (1937) and Girona City Council (1934-1935)

**Notes:** (1) For this year we have corrected upwards the consumption for the province (60 million litres) on seeing that urban milk production (30 million litres) was not taken into account; (2) this figure is clearly exaggerated and we will not take it into consideration.

The expansion of milk consumption in the city of Barcelona and in the province of Girona has left other evidence.<sup>4</sup> The supply to Barcelona until the middle of the 19<sup>th</sup> century was mainly that from goats and cows entering the city on a daily basis, to be milked in the street and returned to their original farms at night. By around 1900 this trade had disappeared, and the city was supplied above all from milk coming from the 1,404 cows in 180 urban dairy herds, which produced 5.5 million litres of milk annually. Between 1.5 and 2 million litres of milk coming from neighbouring districts was also marketed in another type of establishment without stabled cattle – creameries. In 1918, the number of dairy herds in Barcelona had multiplied to 650, the number of stabled cows had risen to 7,500, and annual milk production within the city had increased to 25 million litres. At the same time, the milk coming from outside the city had also increased, coming eventually to 15 million litres.<sup>5</sup> This milk marketing structure changed radically in the 1920s and 30s. Urban milk production rose very little from 1918 onwards and by 1933 had reached 30 million litres by 1933. In

<sup>4</sup> Pujol (2002), pp. 208-213.

<sup>5</sup> AECB (1902) p.526; Asociación General de Ganaderos (c.1923) p. 82-83); Junta Consultiva Agronómica (1920) p. 185; y Llovet (1938) pp. 158-159).

contrast, the number of creameries increased to 1,751, and the milk marketed by these establishments rose to 50 million litres.<sup>6</sup> At this time there were 911 dairy cattle farms counted, supplying mainly Barcelona - in the districts of Barcelonès, Vallès, Baix Llobregat and Osona – and it is estimated that 78% of their production was marketed by 15 companies.<sup>7</sup> The most important of these were Letona S.A. and Soldevila S.A., with combined annual sales of 14.7 million litres. These companies were followed by four others, with sales of 13.5 million, and at a greater distance, the nine remaining ones, with sales of 9.6 million litres.<sup>8</sup> These companies were created initially in order to: (a) control the purchase and sale price of the milk marketed in line with the increase in demand, (b) use the new technique of pasteurisation to lengthen the life of the product, and (c) to promote new milk product preparations to compensate for the reduction in fresh milk consumption during the summer months. In the 1930s however, the consumption of sterilised and bottled milk, condensed milk and milk drinks was still very low in absolute terms. Bottled milk was known as “machine milk” and was not widely accepted among the population.

In Girona the expansion of consumption was late in coming. In the municipality of Olot, the rearing of dairy cows did not begin to acquire importance until 1917, and it was not until the 1920s that the number of dairy farms increased significantly. As a result of this process, by the end of this decade the local council increased the analyses of the milk marketed in its area, both in sales establishments in the municipality, and in the farms that supplied them<sup>9</sup> In Figueres, the city council was still not keeping account of fresh milk consumption in the municipality before the First World War, and in the 1930s it estimated that the consumption was between 75 and 80 litres per inhabitant per annum.<sup>10</sup> In 1928, the doctor who drew up the Medical-Health Survey for Camprodon affirmed that: “Over the years that I have been working, I have seen the beginning of the use of milk as a common food among the people in this country, both in towns and in villages, with the use of cow’s milk being the most

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<sup>6</sup> Más Alemany (1933) p. 20 y (1935), pp. 25 and 28.

<sup>7</sup> *Estadística administrativa de la contribución industrial, de comercio y profesiones de 1930*, (p.104); Llovet (1938) pp. 158-159, estimated that from El Vallès some 100,000 litres of milk were sent daily to Barcelona. Reparaz (1928) pp.245-246, estimated that the deliveries from Osona were between 8,000 and 9,000 litres daily.

<sup>8</sup> Generalitat de Catalunya (1937) p.79.

<sup>9</sup> Junta Consultiva Agronómica (1920) p. 267; Pujolar (1929) pp. 7-18.

<sup>10</sup> Arxiu Comarcal de l'Alt Empordà (Fons Municipal de Figueres: 840, 1837 and 1583).

widespread kind”.<sup>11</sup> At the same time, the consumption of milk came to be so high in Girona that on July 5th 1934 the city council approved the “Health Policy Regulations for the supply of hygienic milk” and the creation of a Milk Centre for the reception and higienisation of this product.<sup>12</sup> In the case of the province as a whole, various agronomists indicated that the production of fresh cow’s milk did not begin to acquire importance until the 1920s, and that its commercialisation was only important on a provincial scale.<sup>13</sup>

In short, we can conclude that there was an overall and very sharp rise in the consumption of fresh milk from the end of the 19<sup>th</sup> century, and that in Catalonia, and in all probability in Mediterranean Europe as a whole, the expansion of consumption occurred much later and it did not attain the high levels of Atlantic Europe. We can also conclude that the expansion of the consumption of fresh milk in Catalonia was initially very localised in the city of Barcelona, and that at a later date it spread out to Tarragona province and very especially to the province of Girona. What circumstances favoured these processes?

## **2. The traditional uses of fresh milk.**

The increasing consumption of animal proteins from the second half of the 19<sup>th</sup> century has often been associated with the growth in people's income. In this sense, it is considered that foods of animal origin have a high flexibility with regard to income, and that when this variable increased as a result of economic growth, the presence of those foods in the population's diet also increased. Nevertheless, income levels and the way they evolved can hardly explain the appreciable differences seen in the consumption of fresh milk in Atlantic Europe and in Catalonia at the end of the 19th century, and the intense expansion in the consumption of this product that took place in the city of Barcelona and in the provinces of Girona and Tarragona. In the city of Barcelona, meat and fish consumption went from 64 to 67 Kg per inhabitant per year between 1900 and 1933, the consumption of eggs increased from close to 100 to almost 180 units, and the consumption of fresh milk, as we have seen,

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<sup>11</sup> Sau, (1928) pp. 49-50.

<sup>12</sup> Girona City Council (1934-1935)

<sup>13</sup> Llovet (1934) pp.9-11.

from 13 to almost 80 litres.<sup>14</sup> With regard to Girona and Tarragona, we can conclude that the expansion of milk consumption was much more intense than that of other foods. Between 1923 and 1933, the consumption of fresh milk in these provinces increased between 160 and 200 %, and these percentages would without doubt be higher if we took as a reference the reduced levels of consumption at the end of the 19th century.

In order to explain the evolution in the consumption of fresh milk, let us first of all remember that milk contains a great quantity of water, and that its calorie and protein contributions per unit of weight or volume are therefore very reduced. In contrast, milk provides a substantial amount of calcium and vitamins, yet these nutritious advantages of milk did not start to be valued until the end of the 19th century. We should also bear in mind that the numerous micro-organisms that contaminate and alter milk did not begin to be discovered until after Pasteur's studies in the 1860s, and their elimination, by pasteurising and sterilising the product, did not become widespread until well into the 20th century.<sup>15</sup>

Until the end of the 19th century, in short, fresh milk was not considered an important food in the population's diet, and its consumption could even be dangerous.<sup>16</sup> Specialists and the population in general valued above all foods with a high density of glucides, lipids and proteins, and using these criteria milk, compared very badly with cereals, tubers, legumes, vegetable fats and the other foods of an animal origin. At the same time, milk was a product that needed to be consumed very soon after milking, and this circumstance reduced its uses and the number of users greatly.

In spite of these inconveniences, the consumption of fresh milk was recommended in situations of weakness due to disease or old age. In these circumstances doctors recommended light or liquid diets, and at that time not many alternatives to milk existed. This product could also be consumed as a complement to other foods; for instance, mixed with cereals and tubers to increase the energy density of these products and to make them more pleasant to eat, or to accompany the consumption of stimulants such as tea, coffee and

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<sup>14</sup> Nicolau and Pujol (2004).

<sup>15</sup> Mas Alemany (1930), pp.168-171.

<sup>16</sup> Atkins (1992) and Murcott (1999).

cocoa. Nonetheless, in early childhood doctors only recommended consuming cow's milk or goat's milk in very limited cases. For instance, when the baby was suffering from syphilis or other infectious diseases, or when it was not possible to use the mother's milk or that of other women.

In this context however, three circumstances favoured its consumption in Atlantic Europe in the 19th century. In that part of Europe: (a) environmental conditions greatly favoured cattle farming for the production of foods with a high concentration of animal fats and proteins; (b) the climatic conditions delayed the contamination of the product more than in Mediterranean Europe; and (c) transport infrastructures were more developed. In Atlantic Europe, in short, the supply of fresh milk was plentiful, the environmental conditions made it easier to preserve the product, and it could be transferred to the main centres of consumption relatively quickly. In that part of Europe it is therefore understandable that milk prices were relatively lower (Table 5) and that levels of income determined the levels of milk consumption much more than in Mediterranean Europe.<sup>17</sup>

Table 5: Normal prices for various foods (A) and relative prices of milk, between 1900 and 1902 (B)

	A				B		
	Milk	Bread	Meat	Sugar	Bread	Meat	Sugar
	pesetas/l	pesetas/kg	pesetas/kg	pesetas/kg	l/kg	l/kg	l/kg
<b>BARCELONA</b>	0.5	0.42	2.5	1.25	0.84	5,00	2.50
<b>Paris</b>	0.4	0.4	2.2	1.2	1.00	5,50	3.00
<b>Vienna</b>	0.29	0.58	2.1	1.05	2.00	7,24	3.62
<b>Munich</b>	0.25	0.47	2.25	0.96	1.88	9,00	3.84
<b>Berne</b>	0.18	0.4	1.8	0.62	2.22	10,00	3.44
<b>Berlin</b>	0.25	0.5	2.5	1	2.00	10,00	4.00
<b>Brussels</b>	0,24	0,3	3	0,97	1.25	12.50	4.04
<b>Hamburg</b>	0.25	0.4	3.75	1.1	1.60	15.00	4.40

Sources: *AECB* (1902), p. 530.

In Catalonia, in contrast, the environmental conditions favoured a very intense expansion of areas under cultivation for cereals, vineyards, olive groves and fruit trees from the 18<sup>th</sup> century onwards, and this circumstance greatly limited the role of cattle farming for food production. This cattle farming was thus concentrated in the northernmost districts, which were those with the worst

<sup>17</sup> See for example for Great Britain, *Rew* (1904a) p.421 and (1904b) p. 391.



communications with main centres of population, and focused mostly on the production of work animals.<sup>18</sup> For this reason, the consumption of beef, cheese, butter and fresh cow's milk was very restricted in Catalonia until the end of the 19th century, and the population's protein, glucide and fat requirements were met mainly by consuming mutton, cereals, legumes and olive oil.<sup>19</sup> In this context, goat's milk partly compensated for the scarcity in the production of cow's milk, but this animals' milk production capacity was very limited. In addition, unlike Atlantic Europe, the transport infrastructure in Catalonia made the marketing of fresh milk much more difficult, and the milk deteriorated very quickly in the climatic conditions found in the region.

Nevertheless, although the consumption of fresh milk could be dangerous for health, there were few substitutes when very light diets were called for. Consumption was high in hospitals for this reason<sup>20</sup>, and doctors recommended it especially in situations of disease or old age.<sup>21</sup> A leading geographer thus stressed that in Catalonia in the 19th century, nobody drank milk except under doctor's order, and referred to "that ancient idea of feeding with milk which considered milk as belonging solely and exclusively to the realm of doctors and healing". Milk, he concluded, "was, so to speak, a dreadful thing. Nobody drank it, and people's concern was so strong on this point, that it was believed that those taking it were sick".<sup>22</sup>

In Catalonia, in short, the supply of milk was very restricted and its consumption was restricted to groups of people for whom there were very few substitutes. It is hardly surprising therefore that its price was relatively high (Table 5), and that its consumption had very little to do with income levels in the population, except in the case of sick people. In the 1880s, the average wage of a male adult in the city of Barcelona was 2.5 to 4.5 pesetas, and the price of a litre of milk was 0.4 to 0.5 pesetas. Higher income groups could therefore

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<sup>18</sup> Junta General de Estadística (1868) pp.25-29, 67-69, 91-95,147-149.

<sup>19</sup> Cussó and Garrabou (2003-2004) pp. 51-72 and Nicolau and Pujol (2004) pp.103-111.

<sup>20</sup> The consumption of ass and goat's milk was common in Vic hospital (Arxiu Comarcal d'Osona: Fons Hospital de la Santa Creu (726, 862)); and that of cow's milk and goat's milk in those of Olot and Figueras (Arxiu Comarcal de la Garrotxa: Fons Hospital d'Olot (19- 31, 33, 165, 166, 169-173, 224 , 230); Arxiu Comarcal de l'Alt Empordà: Fons Hospital de Pobres de Figueres (154, 158)).

<sup>21</sup> Casellas (1849) p.59, Camps (1889) p.37, Aymerich (1881) p. 38 and *Topografía médica de Martorellas* (anónimo, ARAMCB (Fondo Topografías)) pp.81-99) and Salarich (1877) p. 17.

<sup>22</sup> Vila (1930), pp. 12-13, 62-65, and Vila (1979) pp. 119-128.

acquire milk when they needed it, but the majority of the population could only have access to it when they were admitted to hospital, by means of public or private charity, or because they had one or more goats. Nonetheless milk consumption was very low in normal health conditions, and had very little to do with levels of income.

### **3. Social acceptance of a new food and the transformation of the milk sector in the first third of the 20<sup>th</sup> century.**

The progresses made in microbiology and the discovery of vitamins and minerals changed the perception that the population had of fresh milk, and demand for it increased and took on a new significance. The activities carried out by doctors and various public institutions were strategic in the expansion of consumption. This expansion was also furthered by: the growing consumption of coffee and cocoa, the widespread availability of new types of baby bottles with sterile milk and, later, the use of new milk preservation technologies.<sup>23</sup>

The activities of doctors in Catalonia are reflected in: (a) the recommendations that they included in numerous publications on paediatrics, child care and nutrition<sup>24</sup>, (b) the diets prescribed in hospitals<sup>25</sup>, (c) their active participation in the setting up of *Goutes du Lait*<sup>26</sup> and (d) the activities they organised in various primary schools such as the municipal “El Bosque” school in Barcelona.<sup>27</sup> The doctor that drew up the Calaf Survey observed thus in 1903, that “For some years, and mainly due to the advice given by the worthy doctors of the population, the consumption of milk has been on the increase, with very few inhabitants of Calaf not drinking it from time to time”.<sup>28</sup> In 1923 the Director of the Technical Services for Agriculture in Catalonia also highlighted the influence of medical advice on the increased consumption of eggs and

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<sup>23</sup> Between 1905 and 1920, Barcelona’s imports of cocoa increased from 2.3 to 6.3 million kilos and those of coffee from 3.7 to 12.7 million (AECB (1905) p.569 and (1920) pp.566-567).

<sup>24</sup> In the journal *Revista de Medicina y Cirugía Prácticas* (later *Archivos de Medicina, Cirugía y Especialidades*) alone, over 350 articles were published about milk between 1881 and 1936.

<sup>25</sup> The consumption of milk in the Clinic of Barcelona was 250 l per stay and year in 1909 (AECB (1906-1923) and in that of *Sant Jaume* de Olot it was 11 l. in 1885, 127 l. in 1921 and 248 l. in 1936 (Arxiu Comarcal de la Garrotxa (Fons Hospital d’Olot, “Administración General” (c-19 a 31 and 230) and “Notes on what enters and is consumed as food in the Holy Hospital of Olot” (c-224))

<sup>26</sup> Fernández Horques (1934).

<sup>27</sup> Cussó and Garrabou (2004) pp.502-509.

<sup>28</sup> Llorens (1904) p.81.

milk.<sup>29</sup>

Local authorities also participated actively in the expansion of demand. These institutions not only collaborated with doctors in setting up *Goutes du Lait* and financing the consumption of milk in schools. They also adapted the municipal regulations on hygiene for the product to take into account the new scientific knowledge, and they increased the quality controls on milk being marketed. To this end, Barcelona City Council insisted on stricter hygiene conditions for urban cow herds and enforced their transfer to neighbourhoods with less dense populations, specified the characteristics of containers in which milk was transported to the city, reinforced the administrative services entrusted with pursuing its adulteration and, as early as the 1930s, promoted two new facilities for centralising and analysing the milk entering the city.<sup>30</sup> The municipalities of Olot, Figueres and Girona promoted similar initiatives after the First World War.

Nevertheless, the expansion in the demand for milk could only be partially satisfied. In order to increase the supply of milk in Catalonia, it was essential to change the varieties of cattle existing in the region, to increase the availability of cattle feed and fodder, and improve transport infrastructures. When we consider how these obstacles were overcome, two questions can be better understood: the special importance that the city of Barcelona had in the transformation of the milk sector in the region, and the different courses that fresh milk consumption followed.

The city of Barcelona was not only an important centre for disseminating the new preferences of consumers. In the 1880s, cattle breeders in the city started using Swiss and Dutch cows, and the calves obtained were weaned four or five days after birth, to be sold to rural farms that could feed them. Soon afterwards, in the districts of Vallès and Baix Llobregat, the agricultural and cattle farms were expanded with cows from these sources. Some of these farms were big businesses with over 100 cows, but in the great majority they were small and medium-sized farms, which acquired these animals by means of

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<sup>29</sup> Raventós (1923), pp.30-31.

<sup>30</sup> Mas Alemany (1935), p.30-33, and Institut Municipal de la Salut (1991) pp.31-74, 75-104, 171-192. As indicated by Barcelona City Council, in 1902 73 of the 132 milk samples analysed by the Municipal Chemical Laboratory were adulterated (55%). In 1934 the number of analyses was 13,391, and adulterated samples 1,886 (14%) (*AECB* (1902) p.531, (1903) p.408), Más Alemany (1935) p.31) and Roca i Rosell (1988).

different types of contracts with the major traders in the sector. As a result of these activities, the importing of bulls and cows from Switzerland and Holland increased, and after a great deal of cross-breeding the milk productivity of the region's cattle was improved.<sup>31</sup>

However, the aforementioned activities were only developed intensively in some areas. In particular, in those districts where the environmental conditions suited the farming of the new cattle, and which by different means - imports or new crop rotations – were able to increase their availability of feedstuffs and fodder. In El Segria and La Noguera, in the south of the province of Lleida, the expansion of irrigated areas and the use of mineral and chemical fertilizers also increased the availability of fodder. However, in these districts the new irrigation systems were very inconsistent, and the temperatures in spring and summer were too high for the production and marketing of fresh milk on a large scale.

In addition, although the transport infrastructures improved, by the 1930s they were still very deficient for transporting milk over large distances. The railway system did not reach a great many production areas and was too slow, and the road network outside of Barcelona was of a very low density. Moreover, the transportation of milk by lorry only began to acquire importance after the First World War, and refrigerated trucks were only used in very few cases.<sup>32</sup> Lastly, during the 1920s and 1930s, the new milk preservation techniques spread among the big companies supplying the city of Barcelona, but very little in the rest of the region.<sup>33</sup>

In consequence (Map1): the farms in the irrigated areas of Lleida specialised in the production and exportation of fodder and feed, numerous Girona farms moved over to specialising in the production and exportation of dairy cattle, and the farms closer to Barcelona specialised in the production of fresh milk to supply the capital.

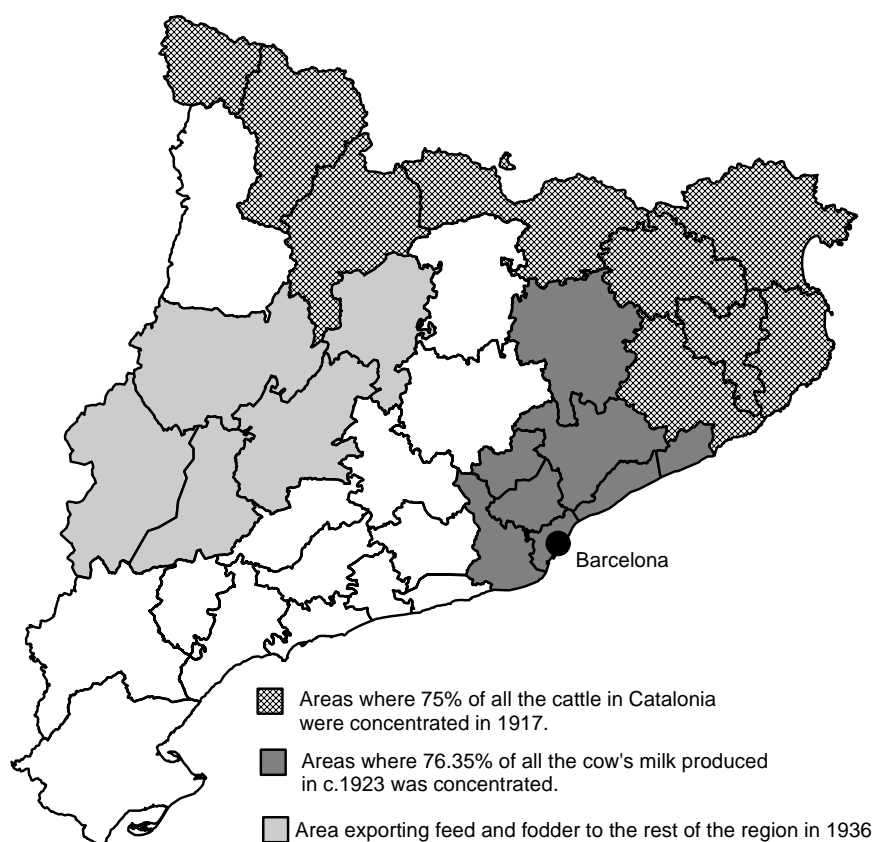
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<sup>31</sup> Pujol (2002) pp. 196-197 and Pujol (2003) pp. 266-268.

<sup>32</sup> Generalitat de Catalunya (1937) p.12), Reparaz (1928) pp.279-280 and Mas Alemany (1935) p.33.

<sup>33</sup> Llovet (1938) p.157.

Map 1: Main areas of specialisation, in terms of dairy cattle farming in Catalonia.



**Sources:** Junta Consultiva Agronómica (1920) pp. 204, 233, 259, 281, Asociación General de Ganaderos (c.1923) pp. 82, 90, 94, 106, and Serveis Tècnics d'Agricultura (1938).

At the same time, while the growth of milk production in the province of Barcelona tended to slow down after the First World War, as its production possibilities became exhausted, in the province of Girona it increased, though without the marketing of that product going beyond the province itself. Various reports on milk prices are in line with the aforementioned trends. In Barcelona (Graph1), milk prices in constant pesetas fell sharply between the end of the 19<sup>th</sup> century and 1920, increased greatly in the immediate post-war years, and stayed very high for the rest of the period. At the same time, while the price of fresh milk in the city of Barcelona was 0.70 pesetas/l around 1933, in the province of Girona it was 0.40 pesetas.<sup>34</sup>

Graph 1: Index of the real prices of milk in Barcelona, according to the Index of

<sup>34</sup> Ministerio de Agricultura (1934) p. and Llovet (1938) p.176.

General Prices to the Consumer in this city (100 base in 1913).



**Sources:** AECB (1902-1923). *Anuario Estadístico de España* (1913-1935), *Memorias Comerciales de la Cámara de Comercio de Barcelona* (1913-1936) and Maluquer de Motes (2005) pp. 1290-1291.

#### 4. Conclusions.

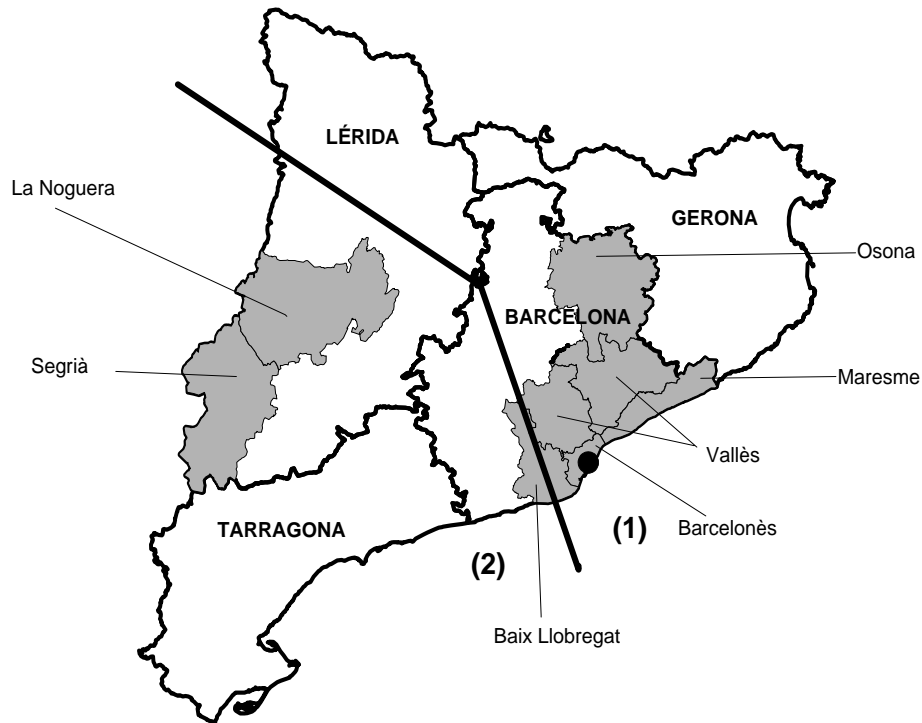
At the end of the 19<sup>th</sup> century the consumption of fresh milk was associated more with its therapeutic properties than its nutritious properties, yet its consumption was already high in Atlantic Europe as a consequence of the agronomic, technical and environmental conditions existing in that part of the continent. For this reason, real prices of milk were low in the centre and north of Europe and much higher in Catalonia, and the levels of income influenced the consumption of that product differently in one area and another. In Catalonia, and in all probability in the whole of Mediterranean Europe, income levels did not have much influence on the consumption of milk in normal conditions of health. After the agrarian crisis at the end of the 19th century, economic growth and the increase in salaries in real terms favoured the dissemination of more complete diets with a greater presence of animal proteins. In the case of the fresh milk, however, the intense expansion that its consumption experienced during the first third of the 20th century cannot be explained merely as a result of the greater purchasing power of families. The consumption of fresh milk increased most of all when its content in terms of calcium and vitamins was discovered, and various public and private initiatives promoted it in different ways; for instance, encouraging its widespread consumption in schools, *Goutes du Lait* and hospitals, and ensuring a better product quality by means of new

municipal regulations. These processes had a great impact in Catalonia. Fresh milk came to be considered as an absolutely essential food, and the supply of the new product increased substantially. In order to meet the new demand however, the majority of farmers, cattle breeders and dairy industry businessmen had to adopt a wide range of technical changes, and this circumstance greatly conditioned the way in which consumption evolved. Thus, whereas the consumption of fresh milk acquired a great importance in the city of Barcelona and the province of Girona, in the rest of the region the average levels of consumption in the 1930s were still very low. At the same time, the changes in the supply and the technical limitations in the treatment and the distribution of milk meant that the expansion of consumption in Barcelona was concentrated above all in the period between the end of the 19th century and the First World War, and in Girona in the 1920s and 1930s. Lastly, in this process we believe that the influence of incomes on the levels of fresh milk consumption should be stressed, although this question should be researched further.

## Statistical Appendix.

### Appendix 1.

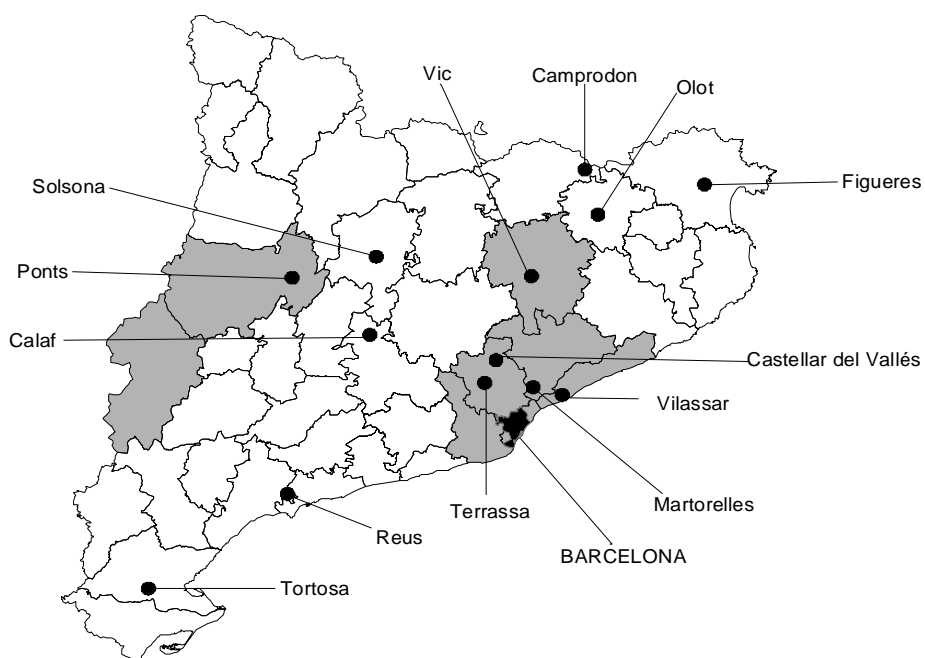
1a: Map of the provinces and regions referred to in the text, and specifying of the main climatic areas of Catalonia.



(1) Area with high rainfall and moderate temperatures in spring and summer.

(2) Area with low rainfall and high temperatures in spring and summer.

1b: Map of the places referred to in the text.





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