

Appendix 1

Consumption of liquid milk in Spain, 1865-1981 (observed consumption l/p/y)

Observations: (a) For 1865 and 1925, we have only total figures for the Canaries, and for this reason the data from Las Palmas and Santa Cruz de Tenerife for 1933, 1955, 1965 and 1981 have also been aggregated. (b) Under the heading of cow's milk, we also include the liquid milk obtained from evaporated and powdered milk.

1.1. 1865, 1925 and 1933.

	1865			1925			1933		
	Total	Cow ⁽¹⁾	Goat ⁽²⁾	Total	Cow ⁽¹⁾	Goat ⁽³⁾	Total	Cow ⁽¹⁾	Goat ⁽³⁾
Álava	50.3	41.6	8.6	27.0	20.8	6.2	55.9	46.8	9.1
Albacete	7.2	0.9	6.2	3.6	0.3	3.3	10.7	2.5	8.2
Alicante	1.5	0.4	1.1	7.7	1.3	6.5	15.3	2.2	13.0
Almería	4.4	0.9	3.4	8.1	0.1	8.0	16.0	0.3	15.6
Ávila	32.5	19.3	13.3	27.0	6.6	20.4	38.1	13.3	24.8
Badajoz	14.8	5.0	9.8	10.3	4.1	6.2	7.4	3.9	3.5
Balearic Islands	2.8	1.4	1.4	19.6	14.0	5.6	28.0	20.8	7.2
Barcelona	1.2	0.6	0.5	45.2	39.0	6.1	47.7	45.2	2.4
Burgos	12.5	6.6	5.8	25.8	22.9	3.0	30.7	24.4	6.4
Cáceres	27.4	8.0	19.5	10.2	2.0	8.2	27.7	9.9	17.9
Cádiz	13.6	7.7	5.9	19.5	11.2	8.2	21.5	14.2	7.3
Canaries	12.3	4.8	7.5	29.7	19.3	10.5	48.0	37.5	10.4
Castellón	5.6	0.2	5.3	8.8	6.4	2.4	25.1	12.6	12.5
Ciudad Real	12.4	3.1	9.3	8.2	1.7	6.5	8.6	3.4	5.2
Córdoba	9.5	4.3	5.2	15.2	3.5	11.7	8.9	3.9	5.0
Coruña (La)	36.6	34.3	2.3	78.5	77.8	0.7	148.1	147.3	0.8
Cuenca	6.2	1.2	4.9	3.4	0.8	2.6	4.7	1.8	2.9
Girona	7.4	5.9	1.4	24.0	18.6	5.4	152.8	140.9	11.9
Granada	5.9	1.2	4.7	28.9	2.4	26.5	38.6	3.4	35.2
Guadalajara	8.7	2.2	6.5	9.0	3.7	5.3	40.2	6.7	33.5
Guipúzcoa	97.5	97.3	0.3	197.4	197.2	0.2	278.0	277.7	0.3
Huelva	23.9	5.1	18.8	11.0	0.8	10.2	11.9	2.4	9.4
Huesca	9.2	3.3	5.9	38.7	33.4	5.3	17.2	13.2	4.0
Jaén	6.2	2.1	4.1	12.6	0.5	12.1	33.5	0.5	33.0
León	27.9	18.7	9.2	39.0	36.6	2.4	15.2	14.4	0.9
Lleida	8.2	5.4	2.7	19.2	15.0	4.2	21.7	17.0	4.7
Logroño	8.1	1.6	6.5	29.8	21.3	8.5	46.4	17.2	29.2
Lugo	38.6	35.1	3.5	186.1	183.6	2.5	209.5	208.9	0.6
Madrid	4.1	2.4	1.7	35.3	32.2	3.1	42.2	39.3	2.9
Málaga	7.3	2.2	5.1	11.5	1.7	9.8	96.8	3.8	92.9
Murcia	4.6	0.9	3.7	22.3	0.4	21.9	18.9	0.8	18.1
Navarre	30.7	25.1	5.6	74.5	62.1	12.3	85.3	74.8	10.5
Orense	37.7	34.0	3.7	64.6	62.3	2.3	62.1	53.3	8.8
Oviedo	123.4	120.6	2.9	224.5	223.7	0.7	210.2	209.5	0.6
Palencia	7.6	5.9	1.6	12.3	10.6	1.7	14.3	12.6	1.7
Pontevedra	27.9	25.6	2.3	42.3	40.0	2.3	35.0	33.5	1.6
Salamanca	21.2	13.8	7.4	16.3	6.6	9.7	54.1	39.7	14.4
Santander	138.1	133.0	5.1	325.3	324.5	0.8	222.8	222.4	0.4
Segovia	13.0	10.7	2.3	24.9	16.5	8.3	26.2	21.8	4.4
Seville	11.7	5.2	6.5	17.8	6.1	11.7	21.3	15.8	5.5
Soria	13.5	7.3	6.2	16.7	5.5	11.2	48.7	23.9	24.9
Tarragona	1.5	0.3	1.2	12.5	3.0	9.5	30.6	6.7	23.9

Teruel	9.1	1.6	7.4	6.0	3.7	2.3	35.9	19.4	16.4
Toledo	5.8	1.7	4.0	16.6	4.8	11.8	16.8	11.3	5.4
Valencia	2.1	0.1	2.1	11.1	7.4	3.7	38.1	35.7	2.3
Valladolid	1.5	0.8	0.7	38.5	32.4	6.1	25.5	21.4	4.1
Biscay	76.6	73.8	2.8	141.8	141.3	0.5	141.7	141.1	0.6
Zamora	20.7	14.2	6.5	11.1	5.2	5.9	20.5	9.8	10.7
Zaragoza	6.3	0.7	5.6	33.4	26.7	6.6	25.2	22.6	2.6
TOTAL	20.2	15.4	4.8	44.8	37.7	7.0	56.3	45.7	10.6

Notes: (1) Hernández Adell and Pujol-Andreu (2016); (2) We estimate a total annual production of 100 l per goat, of which 60 l would have been used to feed the kids and 6.5 l for industrial uses, after the provincial reports issued by the Junta Consultiva Agronómica (1892) on the use of animals and their diet, Junta General de Estadística (1868) on animal population, and Asociación General de Ganaderos del Reino (AGGR) (1925) on the allocation of the net production; (3) Following the indications of the source, we deduct 9%-10% of net production, which was used for feeding the kids (AGGR (1925), Ministerio de Agricultura (1934)).

Sources: Authors' own after Asociación General de Ganaderos del Reino (1925), Hernández Adell and Pujol-Andreu (2016), Junta General de Estadística (1868), Junta Consultiva Agronómica (J.C.A.) (1892), Ministerio de Agricultura (1934).

1.2. 1955 and 1965.

	1955 ⁽¹⁾			1965		
	Total	Cow	Goat	Total	Cow and goat ⁽²⁾	Evaporated and powdered ⁽³⁾
Álava	159.3	155.7	3.6	147.0	142.2	4.8
Albacete	34.5	11.7	22.8	30.6	24.5	6.1
Alicante	22.7	15.7	6.9	61.4	32.2	29.2
Almería	28.0	9.2	18.8	62.9	56.7	6.2
Ávila	65.9	36.2	29.8	105.6	104.8	0.8
Badajoz	29.3	21.4	7.9	65.2	62.8	2.4
Balearic Islands	87.8	75.3	12.5	77.8	71	6.8
Barcelona	17.0	16.2	0.7	81.3	67.5	13.8
Burgos	60.6	57.6	3.0	98.1	96.3	1.8
Cáceres	37.7	24.9	12.9	85.1	78.3	6.8
Cádiz	13.4	8.0	5.4	38.3	30.5	7.8
Canaries	54.7	37.8	17.0	149.4	90.1	59.4
Castellón	29.9	23.6	6.2	46.4	23.2	23.2
Ciudad Real	25.1	15.3	9.8	56.6	53.3	3.3
Córdoba	30.5	19.8	10.7	80.9	77	3.9
Coruña (La)	98.6	96.1	2.5	106.8	105.8	1.0
Cuenca	7.9	1.8	6.1	19.4	14.6	4.8
Girona	65.8	64.9	0.9	109.4	98.2	11.2
Granada	40.6	6.0	34.7	61.9	58	3.9
Guadalajara	26.5	10.9	15.6	70.2	67.9	2.3
Guipúzcoa	119.2	118.9	0.3	147.7	144.7	3.0
Huelva	67.2	9.3	58.0	51.2	46.2	5.0
Huesca	47.1	41.7	5.4	68.4	65	3.4
Jaén	23.7	12.1	11.6	56.7	52	4.7
León	122.1	119.5	2.6	77.4	76.3	1.1
Lleida	43.9	42.4	1.5	66.5	55.1	11.4
Logroño	49.4	39.3	10.1	96.9	93.5	3.4
Lugo	269.3	269.3	0.0	131.5	130.6	0.9
Madrid	26.2	25.1	1.1	114.7	110.7	4.0

Malaga	54.9	15.1	39.8	61.1	50.7	10.4
Murcia	13.8	4.5	9.3	51.0	32.4	18.6
Navarre	63.5	56.1	7.4	125.4	124.2	1.2
Orense	96.1	91.3	4.8	81.5	81	0.5
Oviedo	248.1	248.1	0.0	173.9	173.3	0.6
Palencia	46.9	39.5	7.4	74.1	73.1	1.0
Pontevedra	56.3	56.3	0.0	105.0	103.4	1.6
Salamanca	64.7	39.6	25.1	108.8	107.1	1.7
Santander	182.5	182.5	0.0	206.2	201.4	4.8
Segovia	34.8	32.0	2.8	86.9	85.8	1.1
Seville	29.4	28.8	0.5	59.2	54.5	4.7
Soria	43.9	22.6	21.3	76.1	73.7	2.4
Tarragona	33.9	22.5	11.4	56.2	38.4	17.8
Teruel	24.7	17.8	6.9	32.3	28	4.3
Toledo	32.7	22.8	9.9	92.1	85.9	6.2
Valencia	22.1	21.7	0.4	40.7	23.4	17.3
Valladolid	62.5	58.0	4.5	95.1	91.3	3.8
Biscay	144.8	144.4	0.3	157.1	154.2	2.9
Zamora	19.6	16.1	3.5	53.6	53.3	0.3
Zaragoza	26.9	24.5	2.4	78.2	71.5	6.7
TOTAL	56.3	48.3	8.0	88,0	78.7	9,3

Notes: (1) Average 1954-1955; percentage of milk destined for direct consumption based on 1957 data; (2) The source indicates 'Cow's milk and other liquid milks' (Instituto Nacional de Estadística (I.N.E.) (1969)). (3) Consumption of evaporated and powdered milk has been based on consumption data from historical regions, I.N.E. (1969).

Sources: Authors' own after I.N.E. (1969), Ministerio de Agricultura (1954, 1955, 1957).

1.3. 1981.

	1981				
	Total	Cow	Goat	Evaporated ⁽¹⁾	Powdered ⁽²⁾
Álava	176.3	164.3	0.0	0.8	11.2
Albacete	113.5	81.4	9.9	9.2	13.0
Alicante	107.2	78.8	0.0	18.5	9.9
Almería	116.1	93.8	7.7	10.7	3.9
Ávila	190.8	184.3	1.8	1.9	2.8
Badajoz	136.3	131.8	2.6	0.6	1.5
Balearic Islands	101.5	94.5	0.0	2.8	4.2
Barcelona	119.4	104.4	0.0	3.8	11.2
Burgos	145.6	134.7	2.2	3.5	5.2
Cáceres	163.5	152.2	5.5	3.1	2.8
Cádiz	110.9	93.4	1.1	9.7	6.6
Canaries	277.3	30.1	16.2	3.0	228.1
Castellón	109.1	81.0	1.1	15.2	11.8
Ciudad Real	147.6	132.1	2.2	5.0	8.2
Córdoba	156.9	139.1	7.7	3.1	7.1
Coruña (La)	161.5	157.3	0.0	0.8	3.4
Cuenca	105.4	80.7	2.6	19.1	3.1
Girona	125.1	111.3	0.0	1.8	12.0
Granada	133.5	104.0	19.3	3.7	6.4
Guadalajara	133.6	121.2	2.9	6.8	2.7
Guipúzcoa	150.1	140.2	0.4	0.5	9.1
Huelva	155.1	129.9	13.1	6.1	5.9

Huesca	112.2	100.7	0.4	4.1	7.0
Jaén	141.2	113.9	14.6	7.8	5.0
León	155.8	149.7	0.4	1.4	4.4
Lleida	118.3	101.5	0.0	2.8	13.9
Logroño	150.3	139.1	1.8	2.2	7.2
Lugo	177.9	173.4	0.0	1.6	3.0
Madrid	162.0	144.2	0.0	3.3	14.5
Malaga	140.1	113.2	5.5	14.2	7.3
Murcia	126.1	100.4	3.7	12.4	9.6
Navarre	164.8	161.3	0.4	0.7	2.4
Orense	137.7	135.1	0.4	1.1	1.2
Oviedo	186.8	184.7	0.0	0.9	1.3
Palencia	167.5	161.7	0.4	1.2	4.3
Pontevedra	154.6	148.9	0.0	0.6	5.1
Salamanca	190.0	187.2	1.5	0.4	0.9
Santander	220.2	202.9	0.0	1.2	16.1
Segovia	167.6	161.3	0.0	2.0	4.3
Seville	126.5	114.2	2.2	6.5	3.5
Soria	148.5	131.4	2.2	4.0	10.9
Tarragona	112.9	91.3	0.7	6.5	14.4
Teruel	105.2	84.0	1.8	12.8	6.6
Toledo	153.4	127.0	3.7	5.8	16.9
Valencia	105.3	86.9	0.0	11.1	7.3
Valladolid	180.1	166.1	0.0	1.3	12.7
Biscay	187.4	178.9	0.0	1.2	7.4
Zamora	156.4	152.2	2.2	0.9	1.1
Zaragoza	142.2	123.0	1.8	2.3	15.1
TOTAL	146.8	122.6	2.6	5.1	16.5

Notes: (1) We estimate that 1 kg of evaporated milk yielded 2.5 litres of liquid milk; (2) We estimate that 1 kg of powdered milk yielded 10 litres of liquid milk.

Sources: Authors' own after Instituto Nacional de Estadística (1983).

Appendix 2.

Lineal adjustment scales of observed provincial average consumptions

Scale applied to the 20 th century			Scale applied to the 19 th century		
Observed consumption	Estimated consumption		Observed consumption	Estimated consumption	
l/p/y	l/p/day	l/p/y	l/p/y	l/p/day	l/p/y
			0	0.069	25.1
			2.5	0.074	27.1
5	0.125	45.6	5	0.080	29.1
7.5	0.130	47.3	7.5	0.085	31.2
10	0.134	49.0	10	0.091	33.2
12.5	0.139	50.7	12.5	0.096	35.2
15	0.143	52.4	15	0.102	37.2
17.5	0.148	54.1	17.5	0.108	39.3
20	0.153	55.7	20	0.113	41.3
22.5	0.157	57.4	22.5	0.119	43.3
25	0.162	59.1	25	0.124	45.3
27.5	0.167	60.8	27.5	0.130	47.4
30	0.171	62.5	30	0.135	49.4
32.5	0.176	64.2	32.5	0.141	51.4
35	0.180	65.9	35	0.146	53.4
37.5	0.185	67.6	37.5	0.152	55.5
40	0.190	69.2	40	0.158	57.5
42.5	0.194	70.9	42.5	0.163	59.5
45	0.199	72.6	45	0.169	61.5
47.5	0.204	74.3	47.5	0.174	63.6
50	0.208	76.0	50	0.180	65.6
52.5	0.213	77.7	52.5	0.185	67.6
55	0.217	79.4	55	0.191	69.6
57.5	0.222	81.1	57.5	0.196	71.7
60	0.227	82.7	60	0.202	73.7
62.5	0.231	84.4	62.5	0.207	75.7
65	0.236	86.1	65	0.213	77.7
67.5	0.241	87.8	67.5	0.219	79.8
70	0.245	89.5	70	0.224	81.8
72.5	0.250	91.2	72.5	0.230	83.8
75	0.254	92.9	75	0.235	85.8
77.5	0.259	94.5	77.5	0.241	87.9
80	0.264	96.2	80	0.246	89.9
82.5	0.268	97.9	82.5	0.252	91.9
85	0.273	99.6	85	0.257	94.0
87.5	0.278	101.3	87.5	0.263	96.0
90	0.282	103.0	90	0.268	98.0
92.5	0.287	104.7	92.5	0.274	100.0
95	0.291	106.4	95	0.280	102.1
97.5	0.296	108.0	97.5	0.285	104.1
100	0.301	109.7	100	0.291	106.1
102.5	0.305	111.4	102.5	0.296	108.1
105	0.310	113.1	105	0.302	110.2
107.5	0.315	114.8	107.5	0.307	112.2

110	0.319	116.5	110	0.313	114.2
112.5	0.324	118.2	112.5	0.318	116.2
115	0.328	119.9	115	0.324	118.3
117.5	0.333	121.5	117.5	0.330	120.3
120	0.338	123.2	120	0.335	122.3
122.5	0.342	124.9	122.5	0.341	124.3
125	0.347	126.6	125	0.346	126.4
127.5	0.351	128.3	127.5	0.352	128.38
130	0.356	130.0	130	0.357	130.40

Sources: Authors' own after the indications contained in the text.

Appendix 3.

Methodology for the estimation of consumer populations and their consumption in 1925

In order to better illustrate the method followed for estimating the adjusted consumption and consumer groups, this appendix explains in detail the processing of the data from 1925. The methodology comprises three steps, which are illustrated by Tables A3.1, A3.2 and A3.3, and their associated figures.

Step 1, Table A3.1: The target of this step is to transform observed average consumption (based on statistics – Column 3) into adjusted consumption. In order to do this, we perform a linear interpolation with the scale reproduced in Appendix 2: average observed consumption per capita. Results are presented in Columns 4 (l/p/y) and 5 (l/p/day), which refer to adjusted consumption.

Step 2, Table A3.2: The aim of this step is twofold. Firstly, to estimate the consumer population related to the average adjusted consumption in Column 4 of Table A3.1. Secondly, to evaluate the relationship between the distribution of these groups and that of the average adjusted consumption. Based on the average and variance of the distribution of adjusted and interpolated consumptions (bottom of Column 4 (average 74.03 and variance 53.02), we estimate, with the density function of log-normal distribution (expression (2) in Section 1 of the text) and Column 6 (interpolated consumptions from Column 5, which are organised in increasing order), the accumulated distribution of consumer populations: Column 7 in Table A3.2. Afterwards, we adjust both variables by an exponential function (Figure A3.1). Since the relationship between the structure of consumer populations and average consumption levels is bound to change over time, the parameters of the equations for each year will also change. This is illustrated in Table A3.3. These parameters indicate, firstly, that the minimum levels of adjusted consumption increase over time (from 50.8 to 297.3 ml), because the constant in the equation also increases. Secondly, the decreasing trend of the exponent (for example 0.0168 in 1925, and 0.0065 in 1981) indicates that consumption becomes more evenly distributed. The closer the value is to 0, the more horizontal the function will be, and the more even the consumption levels.¹

¹ The adjusted consumptions are of the type $y(j) = Ae^{bx(j)}$. Where $y(j)$ is the provincial average adjusted consumption and $x(j)$ the proportion of consumer population. In the limit, if $b=0$, then $e=1$, and daily consumption for different proportions of consumer populations would remain constant.

Step 3, Table A3.4: The aim of this step is to estimate the number of consumers and their proportion with regard to the total population in each province. Once this variable is known, we shall be able to estimate the percentage of consumers and the adjusted consumption on a national level, by simply adding up the results for each province. The sequence of all these calculations is at the bottom of Table A3.4. We begin with Column 8, in which we recalculate the level of estimated consumption as calculated in Step 1, based on the parameters of the equation in Figure A3. This adjustment is carried out on the basis of the accumulated population percentage in Column 14. It is noteworthy that this last step is based on the accumulated distribution of total population because this is what the final proportion of consumers for each province and for the country as a whole will be based upon. Once the adjusted consumption is known, the rest of the procedure is automatic. Total consumption (based on statistics), consumption in each province (Column 15) and new average adjusted consumption (Column 9) are used to estimate the total number of consumers in Column 16 (dividing Column 15 by column 9) and the proportion of consumer population in Column 17 (dividing Column 16 by Column 12). If Column 16 is added, and the total is divided by the total Spanish population, the percentage of consumer population in Spain for 1925 is obtained; that is, approximately 43%, with an average adjusted consumption of 105 l/p/y. Both estimations are included in Table 4, in the main text.

Table A3.1.

	Population		Consumption	Cons. per cap	Cons. per cap
Province	1 July 1925	Total Litres	per capita	interpolated	Interpolated
			l/p/y	l/p/y	l/p/day
	(1)	(2)	(3) =(2)/(1)	(4)^(a)	(5)= (4)/365 days
Álava	101,524	2,745,139	27.04	60.50	0.166

Albacete	311,597	1,112,788	3.57	45.00	0.123
Alicante	527,557	4,072,371	7.72	47.46	0.130
Almería	357,045	2,904,121	8.13	47.74	0.131
Ávila	215,949	5,825,989	26.98	60.46	0.166
Badajoz	672,792	6,946,427	10.32	49.22	0.135
Balearic I.	349,413	6,844,985	19.59	55.47	0.152
Barcelona	1,545,304	69,777,299	45.15	72.72	0.199
Burgos	344,203	8,895,529	25.84	59.69	0.164
Cáceres	429,164	4,374,154	10.19	49.13	0.135
Cádiz	539,359	10,504,175	19.48	55.39	0.152
Canaries	490,791	14,600,271	29.75	62.33	0.171
Castellón	306,341	2,692,782	8.79	48.18	0.132
Ciudad Real	455,918	3,724,219	8.17	47.76	0.131
Córdoba	602,439	9,167,544	15.22	52.52	0.144
Coruña	736,700	57,823,982	78.49	95.22	0.261
Cuenca	296,302	994,421	3.36	45.00	0.123
Girona	327,408	7,869,816	24.04	58.47	0.160
Granada	596,211	17,218,267	28.88	61.74	0.169
Guadalajara	203,854	1,842,975	9.04	48.35	0.132
Guipúzcoa	282,101	55,695,218	197.43	197.00	0.540
Huelva	335,549	3,682,605	10.97	49.66	0.136
Huesca	241,247	9,344,507	38.73	68.39	0.187
Jaén	552,447	6,959,857	12.60	50.75	0.139
León	423,955	16,532,254	39.00	68.57	0.188
Lleida	304,741	5,841,777	19.17	55.19	0.151
Logroño	200,423	5,969,373	29.78	62.35	0.171
Lugo	465,998	86,728,577	186.11	186.00	0.510
Madrid	1,157,766	40,824,316	35.26	66.05	0.181
Malaga	577,659	6,665,725	11.54	50.04	0.137
Murcia	647,132	14,400,462	22.25	57.27	0.157
Navarre	341,365	25,420,931	74.47	92.50	0.253
Orense	419,662	27,095,062	64.56	85.82	0.235
Oviedo	741,258	166,392,015	224.47	224.00	0.614
Palencia	220,101	2,717,693	12.35	50.58	0.139
Pontevedra	547,555	23,138,965	42.26	70.77	0.194
Salamanca	334,633	5,440,508	16.26	53.22	0.146
Santander	344,753	112,161,052	325.34	325.00	0.890
Segovia	172,076	4,278,488	24.86	59.03	0.162
Seville	743,174	13,216,760	17.78	54.25	0.149
Soria	152,229	2,547,809	16.74	53.55	0.147
Tarragona	351,413	4,395,550	12.51	50.69	0.139
Teruel	248,802	1,488,750	5.98	46.29	0.127
Toledo	463,431	7,708,413	16.63	53.48	0.147
Valencia	1,001,983	11,112,418	11.09	49.73	0.136
Valladolid	294,608	11,354,310	38.54	68.26	0.187
Biscay	440,474	62,469,437	141.82	142.00	0.389
Zamora	276,119	3,074,913	11.14	49.77	0.136
Zaragoza	509,569	17,013,184	33.39	64.78	0.177
Spain	22,202,094	993,608,181	44.75		
Average				74.03	
Standard deviation				53.02	

Note: (a) Interpolated consumptions after Table in Appendix 2.

Table A3.2.

Interpolated consumption l/p/day (6)	Consumer Population Accumulated (%) (7)	Interpolated consumption l/p/day (6) (continuation)	Consumer Population Accumulated a (%) (7) (continuation)
0.123	32.57	0.157	46.93
0.123	32.57	0.160	48.21
0.127	34.17	0.162	48.80
0.130	35.61	0.164	49.49
0.131	35.95	0.166	50.28
0.131	35.98	0.166	50.32
0.132	36.48	0.169	51.58
0.132	36.69	0.171	52.17
0.135	37.63	0.171	52.19
0.135	37.73	0.177	54.56
0.136	38.26	0.181	55.74
0.136	38.35	0.187	57.76
0.136	38.39	0.187	57.87
0.137	38.71	0.188	58.03
0.139	39.36	0.194	59.94
0.139	39.49	0.199	61.57
0.139	39.56	0.235	70.93
0.144	41.62	0.253	74.79
0.146	42.43	0.261	76.21
0.147	42.72	0.389	90.89
0.147	42.80	0.510	96.02
0.149	43.60	0.540	96.73
0.151	44.65	0.614	97.94
0.152	44.87	0.890	99.56
0.152	44.96		

Figure A3.1.
Milk consumption 1925: Adjusted function between consumer population and daily consumption levels

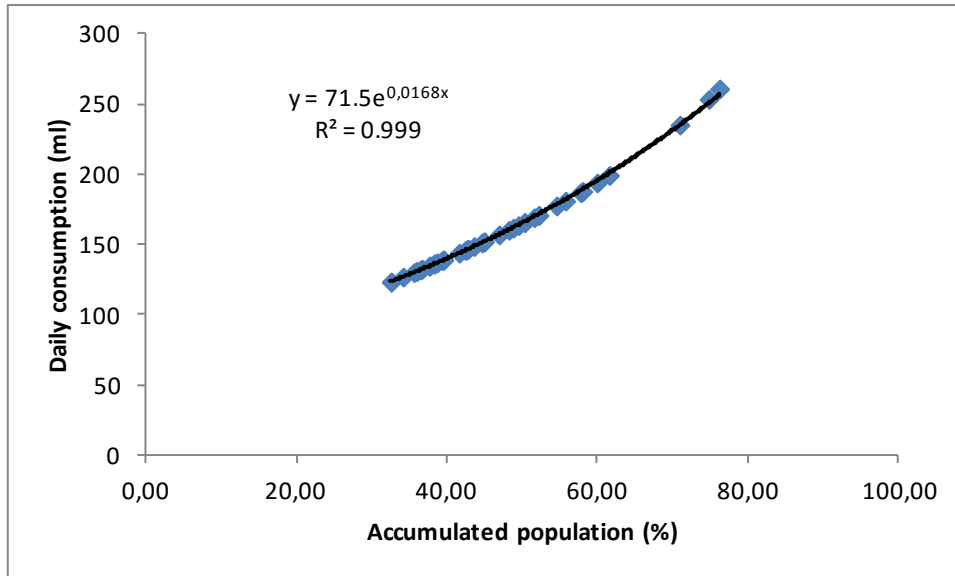


Table A3.3. Daily consumption and proportion of consumer population (Adjusted from log-normal distribution).

Year	Adjusted equation	R-square
1865	$y(j) = 50.8 \exp(0.0139x(j))$	0.999
1925	$y(j) = 71.5 \exp(0.0168x(j))$	0.999
1933	$y(j) = 89.46 \exp(0.0152(j))$	0.999
1955	$y(j) = 107.6 \exp(0.0133x(j))$	0.999
1965	$y(j) = 178.4 \exp(0.0081x(j))$	0.999
1981	$y(j) = 297.3 \exp(0.0065x(j))$	0.996

$y(j)$ = Adjusted averages of provincial consumption
 $x(j)$ = Proportion of consumer population according to log-normal distribution.

Table A3.4

Provinces	Final Adjusted Consumptions		Adjusted Consumptions Initial		Population July 1st 1925			Milk Consumption (litres)	Consumer Population	
	Daily (litres)	Year (litres)	Daily (litres)	Year (litres)	Total Pop.	% Total Pop.	% Total Pop. Accum.		Consumers	Provincial Population (%)
	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Santander	0.932	340.00	0.890	325.00	344,753	1.55	100.00	112,161,052	329,885	95.69
Oviedo	0.644	235.00	0.614	224.00	741,258	3.34	98.45	166,392,015	708,051	95.52
Guipúzcoa	0.564	206.00	0.540	197.00	282,101	1.27	95.11	55,695,218	270,365	95.84
Lugo	0.534	195.00	0.510	186.00	465,998	2.10	93.84	86,728,577	444,762	95.44
Biscay	0.405	148.00	0.389	142.00	440,474	1.98	91.74	62,469,437	422,091	95.83
Coruña	0.323	117.89	0.261	95.22	736,700	3.32	89.76	57,823,982	490,504	66.58
Navarre	0.305	111.50	0.253	92.50	341,365	1.54	86.44	25,420,931	228,001	66.79
Orense	0.298	108.65	0.235	85.82	419,662	1.89	84.90	27,095,062	249,375	59.42
Barcelona	0.288	105.26	0.199	72.72	1,545,304	6.96	83.01	69,777,299	662,930	42.90
Pontevedra	0.257	93.64	0.194	70.77	547,555	2.47	76.05	23,138,965	247,104	45.13
León	0.246	89.84	0.188	68.57	423,955	1.91	73.58	16,532,254	184,019	43.41
Huesca	0.238	87.00	0.187	68.39	241,247	1.09	71.67	9,344,507	107,404	44.52
Valladolid	0.234	85.43	0.187	68.26	294,608	1.33	70.59	11,354,310	132,908	45.11
Madrid	0.229	83.55	0.181	66.05	1,157,766	5.21	69.26	40,824,316	488,642	42.21
Zaragoza	0.210	76.54	0.177	64.78	509,569	2.30	64.05	17,013,184	222,282	43.62
Logroño	0.202	73.64	0.171	62.35	200,423	0.90	61.75	5,969,373	81,057	40.44
Canaries	0.199	72.54	0.171	62.33	490,791	2.21	60.85	14,600,271	201,285	41.01
Granada	0.191	69.89	0.169	61.74	596,211	2.69	58.64	17,218,267	246,359	41.32
Álava	0.183	66.81	0.166	60.50	101,524	0.46	55.95	2,745,139	41,090	40.47
Ávila	0.182	66.30	0.166	60.46	215,949	0.97	55.49	5,825,989	87,878	40.69
Burgos	0.179	65.22	0.164	59.69	344,203	1.55	54.52	8,895,529	136,388	39.62
Segovia	0.174	63.55	0.162	59.03	172,076	0.78	52.97	4,278,488	67,330	39.13
Girona	0.172	62.72	0.160	58.47	327,408	1.47	52.20	7,869,816	125,469	38.32
Murcia	0.168	61.19	0.157	57.27	647,132	2.91	50.72	14,400,462	235,346	36.37
Balearic I.	0.160	58.26	0.152	55.47	349,413	1.57	47.81	6,844,985	117,482	33.62
Cádiz	0.155	56.74	0.152	55.39	539,359	2.43	46.23	10,504,175	185,115	34.32
Lleida	0.149	54.47	0.151	55.19	304,741	1.37	43.80	5,841,777	107,238	35.19
Seville	0.146	53.23	0.149	54.25	743,174	3.35	42.43	13,216,760	248,281	33.41
Soria	0.138	50.32	0.147	53.55	152,229	0.69	39.08	2,547,809	50,630	33.26
Toledo	0.136	49.75	0.147	53.48	463,431	2.09	38.40	7,708,413	154,956	33.44
Salamanca	0.132	48.03	0.146	53.22	334,633	1.51	36.31	5,440,508	113,270	33.85
Córdoba	0.128	46.83	0.144	52.52	602,439	2.71	34.80	9,167,544	195,760	32.49
Jaén	0.123	44.74	0.139	50.75	552,447	2.49	32.09	6,959,857	155,549	28.16
Tarragona	0.118	42.91	0.139	50.69	351,413	1.58	29.60	4,395,550	102,432	29.15
Palencia	0.114	41.79	0.139	50.58	220,101	0.99	28.02	2,717,693	65,039	29.55
Málaga	0.113	41.10	0.137	50.04	577,659	2.60	27.03	6,665,725	162,200	28.08
Zamora	0.108	39.34	0.136	49.77	276,119	1.24	24.43	3,074,913	78,166	28.31
Valencia	0.106	38.52	0.136	49.73	1,001,983	4.51	23.18	11,112,418	288,450	28.79
Huelva	0.098	35.71	0.136	49.66	335,549	1.51	18.67	3,682,605	103,120	30.73
Badajoz	0.095	34.82	0.135	49.22	672,792	3.03	17.16	6,946,427	199,516	29.65
Cáceres	0.091	33.09	0.135	49.13	429,164	1.93	14.13	4,374,154	132,196	30.80
Guadalajara	0.088	32.03	0.132	48.35	203,854	0.92	12.19	1,842,975	57,537	28.22
Castellón	0.086	31.54	0.132	48.18	306,341	1.38	11.28	2,692,782	85,375	27.87
Ciudad Real	0.084	30.82	0.131	47.76	455,918	2.05	9.90	3,724,219	120,845	26.51
Almería	0.082	29.77	0.131	47.74	357,045	1.61	7.84	2,904,121	97,542	27.32
Alicante	0.079	28.98	0.130	47.46	527,557	2.38	6.23	4,072,371	140,527	26.64

Teruel	0.076	27.85	0.127	46.29	248,802	1.12	3.86	1,488,750	53,465	21.49
Albacete	0.075	27.33	0.123	45.00	311,597	1.40	2.74	1,112,788	40,723	13.07
Cuenca	0.073	26.69	0.123	45.00	296,302	1.33	1.33	994,421	37,259	12.57
Total					22,202,094			993,608,181	9,503,199	42.80
Average		75.30							Average adjusted consumption	
Std. Deviation		59.90							104.56	

Column (8): Final estimation of adjusted consumption. Adjustment of scale of daily consumption, calculated using the equation $y = 0.0715 * \text{EXP}(0,0168 * [\text{column}(14)])$, for consumptions under 130 litres per year. For consumptions above this, the maximum proportion of consumers has been set to 95%.

Column (9): Column (8) x 365 days.

Columns (10) and (11): Initial adjusted consumptions by interpolation reproduced in columns (4) and (5).

Column (15): Total consumption of fresh milk based on published statistics.

Column (16): Estimate of the number of consumers, with Column (15)/ Column (9).

Column (17): Estimate of the proportion of consumers per province, with formula (Column (16)/ Column (12)) x 100.

Appendix 4.

Estimates of percentage of milk-consuming population and consumption average among consumers (adjusted consumption), 1865-1981.

4.1. Estimate of percentage of consumer population, 1865-1981 (%)⁽¹⁾.

	1865	1925	1933	1955	1965
Álava	76.4	40.5	51.8	96.0	95.4
Albacete	23.5	13.1	28.1	42.2	46.2
Alicante	7.2	26.6	36.2	42.4	73.8
Almería	17.8	27.3	36.9	41.7	73.4
Ávila	59.1	40.7	48.2	57.1	92.5
Badajoz	32.4	29.7	21.2	42.2	74.6
Balearic Islands	12.0	33.6	45.7	74.5	84.3
Barcelona	5.9	42.9	47.6	35.4	78.1
Burgos	29.8	39.6	47.9	57.8	88.1
Cáceres	55.3	30.8	46.4	44.5	79.8
Cádiz	30.8	34.3	41.0	32.5	56.3
Canaries	30.9	41.0	46.2	56.4	95.8
Castellón	21.4	27.9	46.0	40.1	64.9
Ciudad Real	30.6	26.5	24.0	43.8	74.5
Córdoba	25.3	32.5	23.8	39.5	84.4
Coruña (La)	63.4	66.6	95.5	78.3	91.1
Cuenca	21.4	12.6	14.1	19.9	29.5
Girona	22.7	38.3	95.5	58.6	91.5
Granada	21.4	41.3	48.2	46.2	72.9
Guadalajara	24.9	28.2	49.6	41.4	78.9
Guipúzcoa	93.7	95.8	95.2	92.9	95.3
Huelva	49.4	30.7	30.3	58.8	69.6
Huesca	25.3	44.5	37.9	51.4	77.1
Jaén	21.6	28.2	50.2	42.8	73.4
León	54.6	43.4	37.3	92.7	85.0
Lleida	23.7	35.2	40.6	49.2	75.5
Logroño	24.3	40.4	51.8	53.3	87.9
Lugo	62.6	95.4	95.2	95.2	96.7
Madrid	17.0	42.2	47.7	41.3	88.9
Málaga	23.0	28.1	81.7	56.0	74.9
Murcia	18.3	36.4	40.1	32.3	69.9
Navarre	56.5	66.8	75.0	58.5	96.1
Orense	63.4	59.4	55.8	79.8	77.4
Oviedo	95.7	95.5	95.5	95.0	96.6
Palencia	23.0	29.5	36.1	51.7	82.8
Pontevedra	52.7	45.1	50.4	54.7	92.5
Salamanca	44.3	33.8	50.4	58.6	91.9
Santander	95.2	95.7	94.8	95.0	95.9
Segovia	30.8	39.1	45.0	42.1	81.1
Seville	30.0	33.4	42.0	40.0	74.1
Soria	31.5	33.3	46.5	48.9	84.8
Tarragona	7.1	29.1	48.8	42.2	75.0
Teruel	25.4	21.5	50.8	44.2	48.6
Toledo	21.7	33.4	37.6	41.3	84.8
Valencia	9.5	28.8	50.4	42.6	57.5
Valladolid	7.1	45.1	44.4	58.6	86.7
Biscay	87.9	95.8	95.1	95.9	95.2

Zamora	44.4	28.3	42.5	40.3	72.3
Zaragoza	20.9	43.6	44.6	40.8	83.2

Notes: (1) In 1981, nearly 100% of the population consumed milk.

Sources: Authors' own after Appendix 1 and the methodology applied in the text and Appendix 3.

4.2 Estimated average milk consumption among consumer populations (adjusted consumption), 1865-1981 (l/p/y).

	1865	1925	1933	1955	1965	1981
Álava	65.8	66.8	108.0	166.0	154.0	184.0
Albacete	30.5	27.3	38.3	81.9	66.2	118.8
Alicante	20.3	29.0	42.3	53.5	83.2	114.6
Almería	24.6	29.8	43.3	67.0	85.7	120.6
Ávila	55.1	66.3	80.1	115.6	114.2	199.0
Badajoz	45.7	34.8	34.8	69.6	87.4	143.0
Balearic Islands	23.0	58.3	61.3	117.9	92.3	110.7
Barcelona	19.7	105.3	100.0	48.0	104.1	122.8
Burgos	41.8	65.2	64.1	104.8	111.4	153.0
Cáceres	49.6	33.1	59.9	84.7	106.7	171.0
Cádiz	44.2	56.7	52.4	41.3	68.0	117.1
Canaries	39.8	72.5	103.8	97.1	156.0	290.0
Castellón	25.9	31.5	54.5	74.5	71.4	115.9
Ciudad Real	40.6	30.8	35.9	57.3	76.0	155.0
Córdoba	37.5	46.8	37.4	77.2	95.8	165.0
Coruña (La)	57.7	117.9	155.0	125.9	117.2	170.0
Cuenca	29.0	26.7	33.3	39.9	65.6	113.4
Girona	32.5	62.7	160.0	112.3	119.6	126.7
Granada	27.6	69.9	80.1	87.8	84.8	140.0
Guadalajara	34.9	32.0	81.1	64.0	89.0	140.0
Guipúzcoa	104.1	206.0	292.0	128.3	155.0	158.0
Huelva	48.4	35.7	39.1	114.3	73.7	163.0
Huesca	36.4	87.0	45.3	91.7	88.6	118.0
Jaén	28.5	44.7	66.7	55.2	77.3	148.0
León	51.0	89.8	40.8	131.7	91.2	163.0
Lleida	34.3	54.5	53.4	89.1	88.1	124.0
Logroño	33.5	73.6	89.5	92.7	110.3	158.0
Lugo	61.6	195.0	220.0	283.0	136.0	187.0
Madrid	23.9	83.5	88.3	63.4	129.1	170.0
Málaga	31.6	41.1	118.4	98.0	81.5	147.0
Murcia	25.3	61.2	47.3	42.8	72.9	127.3
Navarre	54.3	111.5	113.8	108.5	130.5	173.0
Orense	59.5	108.7	111.3	120.4	105.4	144.0
Oviedo	129.0	235.0	220.0	261.0	180.0	196.0
Palencia	33.0	41.8	39.7	90.7	89.5	176.0
Pontevedra	52.9	93.6	69.5	103.0	113.5	162.0
Salamanca	47.7	48.0	107.3	110.6	118.4	198.0
Santander	145.0	340.0	235.0	192.0	215.0	230.0
Segovia	42.3	63.5	58.2	82.6	107.2	175.0
Seville	39.0	53.2	50.7	73.4	79.9	132.0
Soria	42.8	50.3	104.9	89.8	89.8	157.0
Tarragona	20.9	42.9	62.6	80.4	75.0	118.4
Teruel	35.6	27.8	70.6	55.8	66.5	113.2

Toledo	26.6	49.7	44.6	79.1	108.6	161.0
Valencia	22.5	38.5	75.6	51.8	70.8	113.3
Valladolid	21.3	85.4	57.5	106.6	109.7	189.0
Biscay	87.2	148.0	149.0	151.0	165.0	196.0
Zamora	46.7	39.3	48.1	48.7	74.2	164.0
Zaragoza	30.0	76.5	56.4	65.9	93.9	149.0

Sources: Authors' own after Appendix 1 and the methodology explained in the text and Appendix 3. Appendix 5.

Estimates of adjusted consumption and percentage of milk-consuming population by Autonomous Regions in Spain, 1865-1981.

Table 8

Adjusted milk consumption by Autonomous Regions in Spain, 1865-1981 (l/p/y)

Autonomous Regions	1865 Ranking		1925 Ranking		1933 Ranking		1955 Ranking		1965 Ranking		1981 Ranking	
Andalusia	36,22	9	50,45	14	72,13	10	78,09	10	81,52	15	139,57	12
Aragon	33,66	10	72,68	9	58,01	14	70,21	12	89,70	13	138,96	13
Asturias	129,00	2	235,00	2	220,00	2	261,00	1	180,00	2	196,00	3
Balearic Islands	22,96	17	58,26	13	61,30	13	117,88	5	92,29	12	110,72	17
Canaries	39,79	8	72,54	10	103,85	7	97,06	8	156,00	4	290,00	1
Cantabria	145,00	1	340,00	1	235,00	1	192,00	2	215,00	1	230,00	2
Castilla-LaMancha	32,70	12	37,40	15	47,62	16	67,79	13	86,79	14	142,67	11
Castile and León	46,50	7	66,26	11	66,83	11	108,03	7	102,16	9	175,48	5
Catalonia	29,27	13	88,05	6	104,64	6	65,37	14	101,99	10	122,83	15
Extremadura	47,89	6	34,13	17	49,50	15	75,82	11	95,39	11	154,11	10
Galicia	58,03	4	136,05	4	151,48	4	158,18	3	117,86	7	165,95	8
Madrid	23,92	15	83,55	7	88,35	9	63,43	15	129,09	6	170,00	7
Region of Murcia	25,34	14	61,19	12	47,26	17	42,76	17	72,92	17	127,33	14
Navarre	54,28	5	111,50	5	113,78	5	108,50	6	130,52	5	173,00	6
Basc Country	89,77	3	164,83	3	197,16	3	144,83	4	160,44	3	182,36	4
La Rioja	33,45	11	73,64	8	89,52	8	92,69	9	110,33	8	158,00	9
Valencian Community	23,41	16	34,76	16	64,69	12	55,29	16	75,11	16	114,01	16
Autonomous RegionsAverage	48,87		91,63		97,79		105,76		111,50		160,83	

Table 9

Consumer populations by Autonomous Regions in Spain, 1865-1981 (%)

Autonomous Regions	1865 Ranking		1925 Ranking		1933 Ranking		1955 Ranking		1965 Ranking		1981 Ranking	
Andalusia	26,01	9	32,39	14	45,36	12	43,66	11	72,44	14	95,38	8
Aragon	23,41	12	38,33	10	44,47	13	43,73	10	75,79	13	95,03	14
Asturias	95,68	1	95,52	2	95,52	1	95,04	1	96,60	1	95,33	9
Balearic Islands	12,04	16	33,62	13	45,68	10	74,46	5	84,30	10	91,64	17
Canaries	30,88	8	41,01	7	46,18	9	56,39	8	95,80	4	95,62	4
Cantabria	95,23	2	95,69	1	94,81	2	95,04	2	95,93	3	95,75	3
Castilla-LaMancha	24,30	10	23,76	17	29,52	17	38,70	16	65,28	16	95,01	15
Castile and León	36,69	7	37,62	11	44,21	14	60,85	6	85,51	9	95,46	5
Catalonia	12,61	15	39,47	9	52,73	6	39,61	15	78,78	11	97,06	2
Extremadura	42,01	6	30,10	15	31,12	16	43,10	12	76,66	12	95,46	6
Galicia	60,60	4	65,98	5	76,24	4	75,65	4	90,09	6	95,27	10
Madrid	17,01	14	42,21	6	47,74	8	41,29	14	88,86	7	95,27	11
Region of Murcia	18,27	13	36,37	12	40,06	15	32,28	17	69,89	15	99,01	1
Navarre	56,53	5	66,79	4	74,97	5	58,52	7	96,06	2	95,27	12
Basc Country	87,46	3	89,01	3	90,00	3	94,82	3	95,26	5	95,45	7
La Rioja	24,28	11	40,44	8	51,81	7	53,28	9	87,87	8	95,11	13
Valencian Community	11,31	17	28,02	16	45,61	11	42,19	13	63,26	17	93,27	16
Autonomous RegionsAverage	36,93		45,31		52,92		57,57		81,94		95,44	