

# Feeding Neptune: Food and nutrition in the Catalan-Aragonese fleet, 1282–1302

The International Journal of

Maritime History

2018, Vol. 30(1) 131–138

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DOI: 10.1177/0843871417745510

[journals.sagepub.com/home/ijh](http://journals.sagepub.com/home/ijh)**Lawrence V. Mott**

University of Wisconsin at Milwaukee, USA

**Abstract**

During the War of the Sicilian Vespers (1282–1302) the Crown of Aragon developed a system to provide food for the crews of the Catalan-Aragonese fleet. This was no small undertaking as even when the fleet mustered only the minimal number of galleys the Office of the Admiral had to provide food for well over 3000 men for up to five months. Not only did tons of food have to be gathered, it had to be prepared and stored for months at sea. All of this effort, of course, was to ensure the crews had an adequate diet. Their work was hard, particularly that of the rowers, and insufficient nutrition and calories could have seriously affected the fleet's performance. Rowing required a great deal of energy and the diet had to provide the necessary calories if the men were to stay in fighting condition. Like other Christian fleets of the period, the meals consisted of cheese, meat mixed in a salsa of vegetables, biscotti and wine. However, the proportions of these elements were distinctly different from that in other fleets, and may reflect a distinct operational philosophy. This research note investigates the food provided to the crews in order to discover the nutrition and calories received by the typical crewman and to determine whether these were in fact sufficient for the grueling work in which they were employed.

**Keywords**

crew dietary requirements, crew nutrition, medieval fleets, ship provisions, War of the Sicilian Vespers

Napoleon Bonaparte once said 'An army travels on its stomach'. Likewise, it could be said that a medieval fleet floated on its stomach. During the War of the Sicilian Vespers (1282–1302), the Catalan-Aragonese fleet managed to repeatedly defeat its Angevin opponent despite having fewer ships, men and resources. Much of this success was due to the

**Corresponding author:**

Lawrence V. Mott, University of Wisconsin at Milwaukee, 10058 Huntsman Path, Pensacola, FL 32514, USA.

Email: [mottx026@gmail.com](mailto:mottx026@gmail.com)

management of the fleet by the Office of the Admiral under the direction of Admiral Roger de Lauria. While most studies have focused on the ships, tactics and strategy employed by a medieval fleet, only passing consideration has been given to the logistics required to maintain the crews. As the trials of the *Olympias* and research by John Pryor have shown, Mediterranean crews required prodigious amounts of water.<sup>1</sup> What is often less discussed is the food and calorie intake required to maintain the performance of the crews. The accounts of the Catalan-Aragonese fleet at the Archivo de la Catedral de Valencia (ACV) yield information concerning how the fleet was fed, as well as some insight into the dietary requirements of an average crew of a galley in a well-managed medieval fleet.

Properly feeding the crews was obviously important for the overall performance of the fleet. In this respect, the crews of Catalan-Aragonese fleet had a diet very similar in composition, though not in proportions, to the other medieval fleets of the period. The average crewman received a ration of salt meat, cheese, chickpeas, horse bean, olive oil, red or white wine, and the ubiquitous biscuit. The salt meat and beans were mixed with spices, brine, onions and garlic to make a *salsa*.<sup>2</sup> This same mixture would continue to be used in Spanish ships into eighteenth century. The actual proportions used in this mixture are unknown. The accounts do not mention the 'spices' used by the fleet, but meals provided to the poor by the Church suggest what was used in a *salsa*. For instance, the records of the Cathedral of Llerida for 1311 indicate that the poor were receiving meals very similar in composition, if not in quantity or quality, to crewmen. Llerida's *salsa* included 'pepper, ginger and saffron'.<sup>3</sup> It is doubtful the fleet used saffron due to the difficulty of preserving it in the conditions on board a galley. However, pepper would have kept well and any portion of the ginger root that spoiled could simply have been trimmed off.

The meal was divided into the *potu* (drink), the *panatica* (biscuit) and the *companagius* (cheese, meat and *salsa*).<sup>4</sup> Unfortunately, except for the issue of biscuit, there are no extant regulations for the thirteenth or fourteenth centuries concerning the allotment of food to the crews. However, a few entries in the accounts listing the amount of provisions placed aboard galleys and the days the galley was expected to be in service provide us with sufficient data to make some estimates of the daily rations for the crews.

The first example is for a galley of 116 oars, carrying a crew of 150 men, which was armed in 1290 for four months of operations.<sup>5</sup> The other three cases for which there is direct information concerning food loaded on board involved galleys armed in March

1. John Pryor and Elizabeth Jeffreys, *The Age of the Dromōn: The Byzantine Navy ca. 500–1204* (Boston, MA, 2006), 354–60.
2. Archivo de la Catedral de Valencia (hereafter ACV), Pergamino 738: '... specierum (spices) pro salsa cicerorum (chickpeas) fabarum (horsebean) alleorum (garlic) ceparum (onion) et salis (salt, saltwater) ...'.
3. 'Item datur salsamentum duplex, scilicet, piper, gingiber et safranum, pro sex denariis inter totum': Prim Bertrán I. Roigé, 'El menjador de l'almoïna de la catedral de Lleida: Notes sobre l'alimentació dels pobres lleidatans al 1338', *Lleida*, 40 (1979), 104–5.
4. ACV, Pergamino 738: '... necnon quantitas biscotti pro panatica, casei et carniū sallatarum pro companagio, vini pro potu ...'.
5. ACV, Pergamino 738: 'et pro precio subscriptarum rerum emptarum ad certam et diversam rationem in eodem quaternio distinctam et assignatarum dictis comitis pro panatica potu companagio et aliis diversis expensis minutis necessariis tam pro ipsis balistariis quam pro aliis

1292 for three months of anti-piracy patrol under Vice-Admiral Manfred Lancia.<sup>6</sup> The amount of stores loaded on board each of the four galleys, the number of days each galley was in service, the estimated daily food ration, and the estimated daily calorie content of the ration are summarized in Table 1. The daily ration estimate is based on the amount of each foodstuff loaded on each galley divided by the number of days in service and the number of crewmen on that galley. While this gives an approximate amount for the size of the portion issued to each man, these represent the minimum value in regards to several food items.

The problem of obtaining an exact figure for the daily ration arises from the absolute dearth of information concerning how often each galley, or the squadron it was attached to, put into port. While in port the crews could supplement the daily food rations and there are no extant documents detailing how much in the way of private stores, if any, members of the crew were allowed to bring on board. Furthermore, there is no way to determine whether the crews were allowed to supplement their diet with fish caught from the galleys or when the fleet was beached. By the sixteenth century, we know the meals for a week were broken into meat days, fish days and cheese days, primarily based on religious grounds. Considering there is no mention of salted fish in the fleet accounts and the paltry amount of salt meat given the fleet, it is very possible that some galleys were supplementing the ship's stores with fish, either caught or bought by the crew where possible.

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personis navigantibus in eadem galea pro mensibus quatuor videlicet: de candelis rotulorum quatuor (3.2 kg), oley cificium duorum (23.4 liters), specierum, pro salsa cicerorum (chickpeas) fabarum (horsebean) alleorum (garlic) cepearum (onion) et salis (salt, saltwater), vini salmis viginti (5504 litres), casei cantariis viginti (1588 kg), carniū sallatarum cantariis duorum (158.8 kg). Et biscotti cantariorum ducentorum quatuor et rotulorum quinquaginta quatuor (16,240 kg) in summa uncias septuaginta tres taros viginti octo et granis quatuordecim. Predictis comitis duobus, naucleriis octo, balistariis Catalanis viginti duobus, rimeriis centum sedecim et proderiis quatuor nonbocantibus deputatis in eadem galea in qua dictus Johannes de grilliaco ad partes predictas ultramarinas ut predicatur navigavit ...'.

6. ACV, Pergamino 737: '... Item predictos Guillilmo Gruacte et Thomasio de Palacio comitis unius ex predictis novem galeis deputatis sub Capitania predicti Manfredi Lancee vini albi salmas quindecim (4128 litres) carniū sallitarum cantarium unium et rotulos quinquaginta (119.1 kg) casei cantarios decem et novem et rotulos octuaginta quinque (1576.09 kg) olei cafiseum unum et medium candelarum rotulos tres et sepi cantarios duo (158.8 kg) (For 88 days). Item predictis Johanni Romello et Guillilmo Ripalte comitis alius predictarum novem galearum vini albi salmas viginti (5504 litres) carniū sallitarum cantarios duo (317.6 kg) casei cantarios viginti quatuor et rotulos sedecim (1918.3 kg) olei cafisea duo candelarum quatuor et sepi cantarios duo (158.8 kg). Item predictis Addorno de Simone et Guillilmo Yscla comitis alius ex predictis novem galeis vocate Tarratina vini albi salma decem et septem et quarterias quatuor (4739 litres), carniū sallitarum cantarias unium et rotulos septuaginta quinque (138.95 kg), casei cantarias viginti unum et rotulos octuaginta octo et medium (1,737.67 kg), olei cafisca duo minus quatuor (20.5 litres) candelarum rotulos tres et medium (2.78 kg) et sepi cantaria unum (79.4 kg)'.

Table 1. Galley provisions, 1290–1292.

	Galley armed April 1290	Galley armed March 1292	Galley armed March 1292	Galley armed March 1292
<b>Number of oars</b>	116	120	116	108
<b>Crew</b>				
Naulerii	8	8	8	8
Balistani	22	26	22	25
Poderii & Bocantes	4	8	4	4
Rimerii	116	120	116	108
<b>Total crew</b>	150	162	150	145
<b>Days in service</b>	120	84	88	90
<b>Provisions [daily ration]</b>				
Biscuit (kg)	16,240 [0.902]	?	?	?
Wine (litres)	5504 [0.305]	4128 [0.303]	5504 [0.416]	4739 [0.365]
Salt pork (kg)	158.8 [0.009]	119.1 [0.009]	317.6 [0.024]	139.0 [0.011]
Cheese (kg)	1588.0 [0.088]	1576.1 [0.116]	1918.3 [0.145]	1737.7 [0.134]
Olive oil (litres)	23.4 [0.0013]	17.6 [0.0013]	23.4 [0.0018]	20.5 [0.0016]
Legumes (kg)	?	?	?	?
<b>Total daily calories</b>				
Candles (kg)	3.2	2.3	3.2	2.8
Tallow (kg)	?	158.8	158.8	79.4
			<b>Average calories</b>	<b>% Calories</b>
			3128	76
			372	9
			94	2
			487	12
			52	1
			?	?
			4133	

Moreover, though the text and table may give the impression that the figures are precise, the reader should remember that there is a great deal concerning the preparation of medieval food for which there is no information. The caloric content of virtually all of the food items could be changed significantly simply by the method used to prepare them. The caloric content of cheese could change substantially simply based on how hard the cheese was pressed. The caloric content of biscuit by weight could vary dramatically solely according to the amount of water driven off during the second baking. Such variables make any estimate of the caloric intake of the crews just that, an estimate. However, while not precise, the values obtained can provide insights as to how well the dietary needs of the crews were being met.

The estimated daily calorie intake from each food item is based on the average of the values for the four galleys listed. In the case of the biscuit, there is only one entry. The *Siete Partidas* (ca. 1260) referred to biscuit as ‘a very light bread for transport because it is baked twice and lasts longer than others and does not spoil’.<sup>7</sup> It may have been ‘light’, but after a few weeks of storage the biscuit undoubtedly took on the attributes sailors over the centuries have become acquainted with, which are those normally associated with a rock. The biscuit would be broken up and put in the *salsa* to form gruel. Unlike the other foodstuffs, the *Ordinacions* of 1354 specify that each crewman was to receive two *lliures* (800 grams) of biscuit per day.<sup>8</sup> The fleet appears to have been issued with more than the minimum prescribed by the *Ordinacions*, so an average of 850 grams of biscuit per day was selected. To put this in perspective, a fleet of 20 galleys, with an average of 150 men per galley, would require approximately 230 metric tons of biscuit for a three-month voyage.<sup>9</sup>

For the calorie content of each food item, several sources were used. For the biscuit, older sources were employed, primarily because they make the distinction between hardtack, or twice-baked biscuits, and biscuits served in the home. The distinction is important, for hardtack contains over 100 calories per gram more than generic baking powder biscuits. For this reason, the work of Plimmer concerning foods used by the military and populace during the First World War in Britain was used, since hardtack is specifically mentioned. The average caloric content per 100 grams for hardtack supplied to the military was 368 calories.<sup>10</sup>

The calorie content for cheese also varied substantially depending on the source, though the values all fell somewhere between 350 and 450 calories per 100 grams.<sup>11</sup> Again, Plimmer lists hard cheese issued to the army, but even here gives two values for

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7. *Las Siete Partidas*, translated by Samuel Parsons Scott; edited by Robert I. Burns (Philadelphia, PA, 2001), Book II, Title XXIV, Law IX.

8. Antonio De Capmany y de Monpalau, *Ordenanzas de las armadas navales de la Corona de Aragon* (Madrid, 1787), 101.

9. For a full discussion of biscuit production for the fleet, see Lawrence Mott, *Sea Power in the Medieval Mediterranean: The Catalan-Aragonese Fleet in the War of the Sicilian Vespers* (Gainesville, FL, 2003), 219–22.

10. R. H. A. Plimmer, *Analysis and Energy Values of Foods* (London, 1921), 219.

11. The calorific values given by different authors varied depending on the type of cheese being tested. Chatfield, whose work was used by Lane for his analysis of the diet of the Venetian fleet, lists cheddar at 368 calories per 100 grams, while Swiss cheese varied from 336 to 404 calories depending on whether the cheese was processed or unprocessed. Waller only listed cheddar

the same cheese, 403 and 460 calories per 100 grams.<sup>12</sup> This is probably the closest to the type of cheese being provided to the fleet. The fleet cheese was probably like a *pecorino sardo*, which is an uncooked hard cheese made from fresh whole sheep's milk curdled using lamb or kid rennet. The mixture is poured into moulds that give the cheese its characteristic disk shape. After a brief period in brine, the moulds are lightly smoked and left to ripen in cool cellars. The disks are lightly baked to produce a protective rind. This system, well developed by the Roman period, is highly effective in preserving the cheese under a variety of conditions and is still used today. Because the values varied substantially, Plimmer's lower value for military cheese was used in the calculations, primarily because it is the approximate average of the different values listed by different sources.

The value of 709 calories per 100 grams for salt pork was taken from Chatfield, mainly because her work is the only one that lists salt pork specifically.<sup>13</sup> For the olive oil, Waller's value of 7822 calories per litre was chosen, which is very close to the values given by other sources.<sup>14</sup> Finally, the value for the calorie content of the wine was taken from the work of Carla Rahn Phillips concerning the Spanish Atlantic fleet in the seventeenth century. Similar to the Catalan-Aragonese fleet, the later Spanish fleet was issued with both red and white wine, and her research found the alcohol content of these wines could vary widely. The first three accounts do not provide any information on the quantities of each type bought, but the final account for 1291–1292 indicates that the fleet was purchasing three times as much white wine as red.<sup>15</sup> Drawing on Phillips's analysis of this issue, an average of 575 calories per litre has been assumed.<sup>16</sup>

Unfortunately, none of the accounts gives the amount of legumes issued to the ships, so there are no data from which to make an estimate of the calorie content for that food ration.

While Table 1 gives the impression that crew members were served each item every day, in fact the week was broken into meat and *companagius* days. Martin Sanuto Torsello (ca. 1320) specified that except for Friday and Saturday the crew was to receive meat in the *salsa*, or stew. On half of the days, half of the crew was given actual pieces of meat cooked in the *salsa*, while the other half received only the meat broth, except on Sunday when the entire crew was issued meat.<sup>17</sup> The *Consolat del Mar* specified a

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cheese, but gave it a caloric value of 458 calories per 100 grams. More recent work by Watt listed a value of 398 calories. C. Chatfield and G. Adams, *Proximate Composition of American Food Materials* (US Department of Agriculture Circular No. 549, Washington, DC, 1940), 33; Dorothy Waller, *Nutritive Value of Foods* (Ann Arbor, MI, 1936), 4; Bernice Watt and Annabel Merrill et al., *Handbook of the Nutritional Contents of Foods* (New York, 1975), 81.

12. Plimmer, *Analysis and Energy Values of Foods*, 85.

13. Chatfield and Adams, *Proximate Composition*, 71.

14. Waller, *Nutritive Value*, 11. Bernice Watt gives a slightly higher value, but the difference is insignificant considering the small amount being issued to the crew. Watt and Merrill et al., *Handbook*, 97.

15. The following was the total amount of wine bought from 1 January 1291 to 28 February 1293: 'Item vini albi salmae trecentum sexaginta duo (99.62 kiloliters). Item vini rubei salmae centum triginta septem (37.70 kiloliters)'. ACV Pergamino 737.

16. Carla Rahn Phillips, *Six Galleons for the King of Spain* (Baltimore, MD, 1986), 170, Table 14.

17. Martin Sanuto Torsello, *Liber Secretorum Fidelium Crucis super Terrae Sanctae Recuperatione et Conservazione* (Toronto, 1972), 63.

similar system in that the men should receive meat on Sunday, Tuesday and Thursday. On the other days, the crew was to be issued the *companatge*, which was defined as 'cheese, or onion, or sardines or other fish' and was issued in the afternoon. The wine was to be issued three times during the morning. On feast days the crew was supposed to receive a double ration of food and drink.<sup>18</sup>

The majority of calories in the rations came from the biscuit, which amounted to over three-quarters of daily calorific intake. This is not unusual and is similar to information for other fleets. What is of interest is that the major source of protein was cheese and not meat. Cheese provided 12 per cent of the daily calories, compared to meat, which provided only 2 per cent. Moreover, there is no mention of fish as a food source in any of the accounts for the fleet. The lack of salt fish is surprising since Sicily had a substantial fishing industry regulated by the Crown.<sup>19</sup> Venice did supply fish to some of its ships, so it would appear that storage was not a problem.<sup>20</sup> Moreover, the *Consolat del Mar* mentions sardines and 'other fish' as part of the *companatge* the captain should provide to the crew.<sup>21</sup> Assuming there was not a problem with storage, then either the availability or cost must have been the controlling factor for the absence of fish in the diet of the crews. The lack of fish in the diet is more surprising considering that compared to the other medieval fleets the men were receiving an extremely small ration of salted meat that amounted to only ten grams per day.

The meals provided were not that much different from those being eaten by commoners, and even the poor, in regards to the portions of wine and meat. The proportions of cheese, meat, legumes, wine and biscuit are strikingly similar to those provided to the poor by various charities in Catalonia during this period. Bertran I. Roigé has shown that the poor received approximately 78 per cent of their calories from bread, which is similar to the 76 per cent the crews received from the biscuit ration.<sup>22</sup> Likewise, the poor seemed to have received approximately 9 per cent of their calories from wine, compared to the crews, which received 12 per cent.<sup>23</sup> The types of vegetables provided to the poor also were similar to those supplied to crews, though again we do not know the quantities. In the thirteenth century, for example, the poor in Avila are recorded as having received leeks, garlic, onions and garbanzos, and later asparagus, spinach, lentils and beans.<sup>24</sup> The main difference was the quantity and quality of the meals provided to the poor, which

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18. Antonio De Capmany y de Monpalau, *Libro del Consulado del Mar* (Barcelona, 1965), 133.

19. Henri Bresc, *Un monde méditerranéen: économie et société en Sicile 1300–1450* (Paris, 1986), I, 261–73.

20. Ugo Tucci, 'L'alimentazione a bordo delle navi veneziane', *Studi Veneziani*, 13 (1987), 121–2, 127 and 130.

21. De Capmany y de Monpalau, *Libro del Consulado del Mar*, 133.

22. Bertran I. Roigé, 'El menjador de l'almoïna', 106.

23. Maria Echániz Sans, 'La alimentación de los pobres asistados por la Pia Almoïna de la catedral de Barcelona según el libro de cuentas de 1283–84', in *Alimentació i societat a la Catalunya medieval* (Barcelona, 1988), 186.

24. James Brodman, 'Charity and Welfare: Hospitals and the Poor in Medieval Catalonia', <http://libro.uca.edu/charity/cw2.htm> [accessed 17 May 2017], 24 and footnote 104.

often included meat from sick animals and amounted to only 2379 calories per day according to Bertrán.<sup>25</sup> The 4000 plus calories the crews were receiving was far above the average. It has been estimated the clergy received between 4700 and 6880 calories per day, whereas the average day labourer was ingesting approximately 3500 calories.<sup>26</sup> Considering that 4100 calories for the crews is a minimum, because of the lack of information about the quantity of legumes provided, the crews were obviously well fed.

Two ration items given to the Aragonese crews were substantially different in their amount compared to other fleets. One of the items that stands out is the quantity of cheese supplied. The amount of cheese provided to the Aragonese crews is highly skewed, with a ratio of 0.10 meat to cheese. The extent of the skew becomes apparent when it is compared to the ratios for the Angevin and Venetian fleets of the time, which were 1.25–1.4 and 1.3 respectively. Why the Aragonese relied so heavily on cheese is unknown. The fleet did have a significant number of Muslim mercenary cavalry, and the reliance on cheese may reflect an attempt to accommodate their dietary restriction against consuming pork. It should also be noted that while the wine ration for the Aragonese fleet was similar to that of the Venetians, the Aragonese were a much more sober crowd than their Angevin opponents who were receiving six times as much.<sup>27</sup>

In summary, the crews received a substantial daily ration, which is not surprising considering their strenuous work of rowing the galleys, and the emphasis placed on maintaining healthy crews. The above data show the Office of the Admiral took the issue seriously. Crew members were supplied with at least 4100 calories per day. While the meals may have become monotonous, it clear from the performance of the fleet during the War of Sicilian Vespers that the meals were more than adequate.

## Note

A summary of this research note was first presented at the 43rd International Congress on Medieval Studies 8–11 May 2008, Session 271.

## Author biography

Lawrence V. Mott received a Master's in nautical archaeology from Texas A&M University and a PhD from the University of Minnesota in medieval history. He has taught in the United States, and in Denmark for several years, during which time he undertook substantial research in the archives of Spain and the United Kingdom. This informed numerous refereed journal articles and two books, including *Sea Power in the Medieval Mediterranean* (Gainesville, FL, 2003), which focuses on medieval maritime and Iberian history.

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25. Bertrán I. Roigé, 'El menjador de l'almoína', 107–9.

26. Brodman, 'Charity and Welfare', 24 and footnote 105.

27. John Pryor, 'The Galleys of Charles I of Anjou King of Sicily: ca. 1269–1284', *Studies in Medieval and Renaissance History*, 14 (1993), 35–103.