WHAT'S FOR DINNER TODAY? REMARKS ON THE PROVISIONS AND DIET OF ROMAN SOLDIERS DURING THE PRINCIPATE*

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ABSTRACT: Many ancient writers have written about feeding the Roman army, including Vegetius, Appian, Cassius Dio, Tacitus and Suetonius. Archaeological sources provide interesting data about army provisioning, food supply, the soldier's diet, but also the consequences of eating certain types of foods. Analyzing the remains of consumption and waste, we can reconstruct the diet of soldiers in various corners of the empire and look at their everyday life "from the kitchen". This contribution is an attempt at an introduction on the nature of literary and archaeological sources concerning the food supply and diet of soldiers stationed in several selected places in the empire.

Słowa kluczowe: armia rzymska, logistyka, zaopatrzenie, rzymska dieta wojskowa

Key words: Roman army, logistics, provisioning, Roman military diet

When someone asks a question about the diet of a Roman soldier, it is very seducing to try to recreate a common ancient military meal. However, when looking closer to the subject, we realize that a number of factors should be taken into account – starting from questions on army supplies and provisioning, local and long-distance trading, local soil and climate conditions, eating habits, and up to the changes that occurred through centuries of Roman domination on three continents. The goal of this paper is to show how complex the answer is to this simple question.

Although the principle elements for the provisioning of the Roman army are well known to us, the supply management system remains unclear in many ways, as relevant written sources are highly dispersed and incomplete.[1] In addition, the ways of provisioning were different during war campaigns and different during peacetime, and they also changed over the centuries. Additionally, the types of archaeological sources for this topic are quite diverse – from animal and fish bones, crustaceans and fish hooks, through amphorae fragments to charred seeds and stones. Moreover, there is pollen and even evidence of food-pest

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[1] Roth 1999, 2–3; Pearce 2002, 933–934; Lemke 2016, 11; Lemke 2017, 187.

infestations up to specific archaeological features such as corn driers or storage facilities.[2] The representativeness of these materials, the regional variation and the uneven degree of research on the different categories of finds makes it necessary to treat them as elements of a whole that can never be fully reproduced. In view of the breadth and complexity of this subject, the evidence presented here is not meant to be exhaustive, but merely a discussion of selected issues concerning the provisioning and feeding of Roman soldiers during the early empire, i.e. between the 1st and 3rd centuries AD.[3]

So, can we answer the question posited in the title or not? What are the limitations of the research and what kind of sources should be taken into account? Is it possible to define "a Roman military diet" or not?

Army supplies during campaigns of war

The fact that the army's provisioning during a given war is crucial to the success of the campaign is obvious and has been raised by many ancient authors.[4] Vegetius noted that "careful consideration should be given to supplies and their issue in order that fodder, grain and the other army provisions customarily requisitioned from provincials may be exacted in good time, and quantities always more than sufficient be assembled at points well-placed for waging war and very well-fortified. But if the taxes in kind be insufficient, everything (needed) should be compulsorily purchased from advance payments in gold. For there is no secure possession of wealth, unless it be maintained by defence of arms."[5]

Providing supplies for the army during campaigns was a logistical challenge. The above passage states clearly that during campaign the army should use both acquisitioned and local, requisitioned food.[6] However, obtaining food and fodder by pillaging, foraging, and requisitions was always somewhat risky and unpredictable, as the enemy could destroy the crops or poison the food,[7] so provisions from their own resources ensured a secure supply. A

[2] Pearce 2002, 932; Thomas, Stallibrass 2008, 2–3.
[3] The number of publications about the logistics and provisioning of the Roman army is abundant, and only some of the important titles can be listed here: von Domaszewski 1927; Wierschowski 1984; Remesal-Rodríguez 1986; van Berchem 1937; Kissel 1995; Mitthoff 2001 or the papers by, among others, P. Hertz, P. Erdkamp, C.C. Monfort in Erdkamp (ed.) 2002.
[4] E.g. Tac. *Ag.* 19; Onos. VI 14; Caes. *Civ*. I 72.
[5] Veg. *Ep.* III 3 (transl. N.P. Milner).
[6] Roth 1999, 5. The same conclusion can be drawn from the memoirs of Ceasar, where food provisioning and supplies played a crucial role during campaigns in Gaul.
[7] Roth 1999, 136 (with reference to Polybius and Sallust) and 155.

soldier during campaign must be provided with processed or well-preserved food, as this was not the time for individual cooking.

A good illustration of the supply problems during war campaigns are the military camps from the period of the conquest of Germania at the turn of the millennia. The Roman army set out from banks of the Rhine, following the Lippe, a small tributary of the Rhine. Along this river, marching camps of different size were discovered that were used during several campaigns between 15 BC and AD 14. Some of them housed two or even three legions, which amounts to about 10.000 or 15.000 soldiers stationed in one place. The campaign of the year AD 9 involved three legions and a few dozen units of *auxilia*, totaling 15–20 thousand soldiers. The supply of food for such an army was certainly a large-scale operation. A major part of the provisioning was transported to ports on the North Sea and then upstream along the Elbe, Rhine and Lippe. For this purpose, special river ports with granaries were built. For example, the camp in Anreppen erected for a campaign by Tiberius in AD 4 had granaries that could hold grain for the entire army for 78 days.[8] Similar ports with granaries were discovered in other camps along the Lippe, for example in Haltern and Beckinghausen. As strategic goods, food supplies were kept in heavily fortified camps and under reinforced guard. Cassius Dio informs us that the person responsible for supplies was, in fact, the commander of the whole army operating in Germania–Publius Quinctilius Varus.

Problems with provisioning during campaigns was frequently seen throughout centuries.[9] The state must have been involved in large-scale military provisioning. Paul Erdkamp drew attention to the fact that as early as the Republic period, large scale supplies of grain for the army by private contractors (*publicani*) was not the only way the Roman administration provided this basic food component. The state was involved in various activities related to the corn supply to the armies.[10] It is a matter of a dispute whether, in the early imperial period, there was a central administration of military provisions analogical to the civil *annona Urbis Romae*, with its *praefectus*, or not. It is also possible that during the early imperial period, the *praefectus annonae* from Rome supervised also military provisions.[11] Pliny mentioned imperial slaves skilled in financial tasks (*dispensatores expeditionis*), who paid out the money

[8] Kehne 2008, 332.
[9] Le Bohec 2015, 28.
[10] Erdkamp 1995.
[11] Van Berchem 1937; Roth 1999, 263; Le Bohec 2015, 27; cf. Remesal-Rodríguez 1986, 86; Remesal-Rodríguez 1990; Kissel 1995, 124–142; Menéndez Argüín 2006 who argued that a *praefectus annonae* was responsible for military logistics.

for supplies during campaigns.[12] *Dispensatores* are also known from epigraphic evidence.[13] Supplies from allied peoples (*frumentum imperatum*) could be added.[14] Capturing of booty and pillaging were also practiced (Fig. 1).[15] These supplies were kept in large storehouses built during war campaigns. For example, the camp at Inchtuthil in Scotland, which was used (and never finished) during Agricola's campaigns, housed six granaries, which may have had a total cubic capacity big enough to store 6000 of a single soldier's daily corn rations for one year.[16]

Organized deliveries brought in on ships were not sufficient enough for the army. Apart from arms and armor, every soldier carried a bag (*sarcina*) on a stick over the shoulder in which he kept food, dishes, personal belongings and tools.[17] Moreover, during the march the baggage train transported luggage on carts and draught animals (*impediments*, *onera*). This way heavy objects were transported, e.g. querns, tools, and tents. The baggage train was concentrated in one part of the marching column and additionally protected against ambushes. It has been calculated that one legion needed 500 draught animals, which naturally needed to be fed and watered. Moving an army undoubtedly required great effort. But were the soldiers able to carry out this task alone?

Despite enormous effort, the massive operation in Germania ended in the year AD 9 with the famous Varian disaster (*clades Variana*) in Teutoburg Forest, which brought the death of soldiers from three legions, nine auxiliary units and thousands of accompanying civilians. The defeat was so great that as a symbolic gesture no Roman legion was ever given the number of the ones that had been annihilated in the Germanic forests ever again. According to Cassius Dio's account, the immediate cause of the catastrophe was the stretched marching formation and hunger among the soldiers, which prompted them to send for supplies amid cries of equally hungry, freezing and frightened women and children.[18] Their presence deep in the wild Germanic forest seems illogical and unnecessary. But in fact, it is a testimony to the large base of suppliers of this army, which had to rely not only on centrally organized

[12] Plin. *Nat.* VII 129.
[13] Roth 1999, 104–105 with fn. 258; 266–267.
[14] Caes. *Gal.* I 48 (on corn and provisions, which might be conveyed from the Sequani and the Aedui); Kehne 2008, 331.
[15] Roth 1999, 148–154.
[16] Kehne 2008, 332.
[17] See Trajan's Column LXI-LXII.
[18] D.C. LVI 20.5.

provisioning, but also on the immediate services provided by these civilians.[19] Soldiers engaged in building fortifications or obtaining additional food had to be relieved of the burden of chores like grinding flour, small repairs, sewing torn clothes, washing or preparing meals. Civilians could carry out such activities.

Army provisioning in peacetime

The main difference between the diet of a Roman soldier during wartime and in peacetime is partly reflected in layouts of military bases, where granaries (*horrea*) take much space.[20] Such buildings on a rectangular plan with a floor on a platform providing ventilation (Fig. 2) are known from various military sites, including Novae in Lower Moesia.[21] Their capacity varied, and while in infantry forts there was enough room for all supplies, the space appears to have been insufficient in the cavalry forts.[22] Some of the forts and camps served as special storage areas.[23] The much smaller fort Arbeia (modern day South Shields) at the mouth of the Tyne, just off Hadrian's Wall, was the site where food supply from the continent arrived for units stationed along the entire great linear fortification. At its peak during the reign of Septimius Severus, it encompassed 22 granaries with a total storage area of more than 2600 sq. m., which could hold an annual grain stock for one legion.[24] A similar fort with granaries existed at Rödgen (Germania inferior), where the fortification of 3.3 ha contained three granaries with a total storage surface of 3300 sq. m.[25]

How such large quantities of supplies were acquired and how the demands were estimated? The archaeological finds from military sites clearly show two sources of supplies: local (regional and provincial) and imported from distant production centres. Literary sources show that requisitions or compulsory purchases for a fixed (lower) price were imposed on the local population,[26] and Roy W. Davies believed that the primary source of supply was the

[19] Roth 1999, 110–112.
[20] Richman 1971; von Petrikovits 1975, 82–98; Kehne 2008, 329.
[21] Sarnowski, Kovalevskaja, Kaniszewski 2005, 149–15. It is very possible that the recently excavated building at Novae is a massive *horreum*, not an arsenal; see Biernacki, Klenina, Zambrzycki 2018, 72 and cf. e.g. Opriș, Rațiu 2017, 20, fig. 8.
[22] Richardson 2004; cf. older analyses in Davies 1971, 123 with fn. 7.
[23] Richborough, Inchtuthil, Usk, South Shields, Haltwhistle, Crobridge, Birrens; see Kehne 2008, 329.
[24] Richardson 2004, 438 (erroneously states 260 sq.m.).
[25] Roth 1999, 177.
[26] Roth 1999, 141–144; Erdkamp 2002, 65–66; Kehne 2008, 327.

population of the given province.[27] Scholars estimate that in many cases the regions where the Roman army was stationed were theoretically able to produce a surplus.[28] Some texts of Vindolanda tablets mention people who might have been low-rank officers (centurions, *optiones* or other military staff) involved in large scale purchases of food.[29] In the East, where the cities were big and rich, urban communities and individuals were involved in organizing supplies, and these activities are described in epigraphic accounts as *prosecutio* and *hospitum*.[30]

Locally or regionally produced goods could be acquired by the military unit without the involvement of the central authority in Rome. However, imperial officials or provincial governors were engaged in large-scale provisions and provisions of goods which could not be obtained locally. A good example is the role of an imperial *procurator*. The provision of goods in kind, such as fodder, grain and all other foodstuffs for the army was the responsibility of the provincial governor or the appointed imperial *procurator* (an official belonging to the *equites/*gentry).[31] *Procurator Augusti* was also responsible for collecting direct and indirect taxes for the imperial *fiscus* and could require the service of soldiers.[32] Moreover, he had to take care of the proper conditions for the food transport. A papyrus found in Hermopolis, dated AD 185, illustrates the process of army supply in Egypt.[33] A designated soldier[34] of a cavalry unit (*ala Heracliana*) stationed in Koptos was sent by his commander to the local community (νομός) to obtain barley. This soldier was given a written order with the authority of the prefect of Egypt himself, and the governor of the nome in question, as well as the council of elders there were obliged to hand over the barley to the officer.

Another example of the imperial administration being involved in organizing supplies acquired locally is when an imperial domain provided goods for the army. Such imperial domain where pottery was manufactured and delivered to the garrisons is known from

[27] Davies 1971, 136. It is beyond the topic of this paper to discuss whether the garrisons had an impact on the local economy or not. As the analyses of the various regions within the empire show, the economic influence was not the rule; see e.g. Duch 2017, 169, with reference to the literature.
[28] Davies 1971, 123; Davies 1974, *passim*; Thomas, Stallibrass 2008, 5–6 and 8.
[29] Tab. Vind. 182, 183, 343, 586, 628; Davies 1974, 318; Bowman, Thomas, Adams 1990; Erdkamp 2002, 67.
[30] Monfort 2002, 73; Erdkamp 2002, 61–63 (the earliest dated to the reign of Trajan).
[31] Davies 1971, 123; Remesal-Rodríguez 1990; Roth 1999, 166.
[32] Monfort 2002, 74–75.
[33] P. Amh II 107; Adams 1999, 120–121.
[34] Perhaps not without significance is the fact that this soldier received a double salary as a reward for outstanding service (*duplicarius*). The provisioning was both an additional reward and an obligation entrusted to proven soldiers.

Walheim in Raetia.[35] The administration of imperial property could be carried out by veterans, tenants or appointed administrators, and *beneficiarii consulares* could be involved in these matters.[36]

On the other hand, archaeological and epigraphic sources clearly indicate that long distance trading of grain and other food took place.[37] Some products typical of the Mediterranean diet, such as olive oil, figs, oysters or spices were not available locally, so they had to be brought in from afar,[38] but some other goods imported from afar such as pottery, clothes or horses are somewhat puzzling. The papyrus known as Hunt's *pridianum,*[39] shows that as many as two thirds of the soldiers of this unit were sent to distant places to arrange supplies of clothing, cattle and horses. A study of animal bone remains from military and civilian sites in Britain and Germany indicates that the Roman military diet differed from the local one, and that it tended to influence the diet of the local population.[40] The archaeological and theoretical analyses show that the garrisons on the Lower Rhine did use local food production and provisioning, but still the extra-regional supply and long-distance trade played a substantial role.[41] Olive oil from Spain was exported in large quantities to the military sites in Britannia and Germania, as it is attested by the finds of Dressel 20 amphorae,[42] and it is possible that the analogical mass provisions from Greece or / and Asia Minor to Lower Danubian garrisons were transported in Zeest 90 amphorae.[43] Grain was also transported to distant provinces.[44] As reported by Cassius Dio, in the middle of the 1st century AD the provincial governor of Hispania Baetica "was summoned and expelled from the senate because he had sent too little grain to the soldiers then serving in Mauritania".[45]

Permanently based military units had to face other problems, mainly related to the capacity of granaries and storehouses, as well as conditions in which food was preserved. These factors

[35] Fisher 1994, 277.
[36] Fisher 1994, 283–284; Tomas 2016, 103.
[37] Thomas, Stallibrass 2008, 5.
[38] For example shell fish or wine imported from distant provinces, see Davies 1971, 128–129, 131.
[39] The document is the roster of a mixed infantry and cavalry regiment (*cohors Hispanorum veterana equitata*), showing the manpower of this unit based in Lower Moesia before the second Dacian campaign of Trajan. See British Museum Papyrus 2851; Fink 1971, 225. For the discussion on dating and the established date of the papyrus (16. September 105 AD), see Syme 1959; Speidel 2009, 299 and a brief presentation of the studies on the document given by Lemke 2016, 24; Lemke 2017, 191.
[40] King 1984, 187–217.
[41] Kooistra, van Dinter, Dütting 2013, 19; Kooistra et al. 2014, 32.
[42] Remesal-Rodríguez 1986; Funari 1996.
[43] Dyczek 2002.
[44] This is attested e.g. in Vindolanda tablets, see Pearce 2002, 933.
[45] D.C. LX 24.1 (translated by E. Cary).

certainly influenced the military diet, and the way certain types of food were distributed. Corn, olive oil, wine or *salsamenta* could be stored for a longer period of time (and rationed), while products like fresh fruit and vegetables, fish or eggs could not. These two groups of goods were acquired from different sources – the first one from afar, as imported food should be preserved anyway, and the second group was obtained locally.[46]

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Since the goods were imported from distant provinces to military garrisons in large quantities, and the supply lines seem to be the same over a long period of time, it would be logical to think about the centrally coordinated system of military provisioning. José Remesal Rodríguez, who analysed mass finds of amphorae on military sites, concluded that it could be as early as under Augustus.[47] José Remesal Rodríguez presented the theory that the lack of sources that directly connect high-ranking officials to a centralized coordination of provisions to the army may result from the possibility that these tasks were handled by *praefectus Urbis Romae*, which is a very convincing hypothesis.[48] In the 1st century, the goods mass-imported from distant places seemed to have been coordinated by the state, perhaps even if they were contracted with private merchants. The army could not rely exclusively on the local markets, as they could be unstable and did not provide all types of food.

The earliest evidence of central posts directly related to army supplies comes from the reign of Trajan and names an official who was given the *cura copiae* (responsibility for general supplies).[49] In the second half of the 2nd and early part of the 3rd century, tasks related to logistical support were fulfilled by appointed officers referred to as *praepositi copiarum* or *praepositi annonae*, *praefectus copiarum* and *adlectus annonae legionis*, as well as *praefecti vehiculorum*, but it seems that they acted during campaigns, not in peacetime, and that they supported provincial governors.[50] All logistical information reached the head office in Rome, where the imperial personnel organized purchases and transport. The epigraphic evidence names low-ranking personnel involved in military provisions (*a copiis militaribus*), who possibly acted under the supervision of *a rationibus*, an official acting in Rome.[51] Personnel involved in supplying the army included imperial and army slaves. A number of inscription

[46] Tomas 2016, 125.
[47] Remesal-Rodríguez 1986; Remesal-Rodríguez 2002, 69–84. Y. Le Bohec also concluded that the logistics under Augustus was "methodically organized"; see Le Bohec 2015, 33.
[48] Remesal-Rodríguez 1986, 86, followed by Erdkamp 2002, 53; Menéndez Argüín 2006.
[49] Erdkamp 2002, 51.
[50] Roth 1999, 267–268; Erdkamp 2002, 51–55.
[51] *CIL* VI 8538; 8539; 8540 (*a copiis militaribus*); Roth 1999, 263–264; Kehne 2008, 330–331.

mentions *dispensatores legionis* – public slaves known from permanent garrisons at Lambaesis and Cologne. Whether or not, they were attached to the *territorium* of the *legio III Augusta* or to the legate or owned by the emperor, they were public slaves who served for the army and were in charge of paying out the money for supplies, both during campaigns and in peacetime.[52]

It follows that it was possible to secure supplies thanks to the prior preparation of an inventory of demand. The list of required products was probably compiled by the centurion holding the rank of camp prefect (*praefectus castrorum*), who was responsible for provisions.[53] The commander of the legion (*legatus legionis*) had to send such an inventory to the provincial governor, who would either issue a relevant document in response or turn to a higher authority – an official in charge of the imperial treasury (*a rationibus*).[54] A copy of such a document was forwarded to the unit commanders and local civil authorities. Soldiers were sent to collect the supplies, while civilians had to ensure these made their way to specific locations, as part of the so-called *cursus vehicularius*, an obligation to perform transport duty, mentioned by one of the Egyptian papyri.[55] We do not know if such an obligation had to be fulfilled by inhabitants of all provinces,[56] but it is highly probable. In all border provinces of the empire large number of soldiers was involved in collection, purchase, conveying or escorting food supplies.[57] To this one has to add *beneficiarii consulares* who certainly supervised the routes used for transports.[58]

[52] Roth 1999, 266–267; Le Bohec 1989, 194–195 (attached to *territorium* or a legate); cf. Silver 2016.
[53] Vegetius writes that the *praefectus castrorum* was responsible for siting the camp, ramparts and ditches, tents, medical service, baggage, firewood etc, while the *praefectus legionis* was responsible for arms, armour, horses, pay and rations (Veg. *Ep*. II 9 and 10). However, Vegetius was writing in the 4th c. about matters of the Principate, and he did not avoid simplifications. In the 2nd century the rank of *praefectus legionis* was held by equestrian commanders of the army in Egypt and Mesopotamia, while other legions were under command of senatorial *legati*. By the end of the 3rd century equestrian *praefecti legionum* became more common, and under Gallienus they replaced the *legati legionum*. At the same time, in the 2nd and 3rd c. *praefectus (castrorum) legionis* replaced *praefectus castrorum*, and ultimately under Gallienus both ranks merged into one, and *praefecti castrorum* are not attested anymore; see Osier 1977, 674–675 and 680. The rank of prefect of the engineers (*parefectus fabrorum*) mentioned by Vegetius (*Ep*. II 11) was in fact only honorary. The duties related to the engineering may have been held by *optiones fabricorum* and *architecti*; see the comments by N.P. Milner in Veg. *Ep*., p. 43, fn. 1.
[54] Jones 1950, 24–25; Often the Emperor himself was involved in the matter of provisioning. Hadrian, for example, tried to have an accurate knowledge of the stock in the individual provinces he visited; see Hist. Aug. *Hadr*. 11.1; Adams 1999, 120.
[55] Mitchell 1976.
[56] Kehne 2008, 328.
[57] Davies 1971, 136.
[58] Monfort 2002, 77.

Transports of grain and other foodstuffs were carried out mainly by sea and rivers[59] and were supervised by designated centurions in the rank of *primus pilus* or *centurio frumentarius*, who may have been accompanied by *frumentarii* – the soldiers engaged in provisions who were circulating between the central offices at Rome and the provinces and performing policing duties.[60] Large-volume containers – amphorae, leather sacks and barrels – were used for transport. Large quantities of amphora fragments are found on all sites associated with the Roman army, and painted inscriptions placed on the top of such vessels sometimes indicate the content – wine, olives, figs, raisins[61] and other dried fruit, honey, as well as salted fish and seafood, and finally the famous *garum* fish sauce and cheaper versions thereof, called *muria* or *liquamen.*[62] In the aforementioned camp at Novae, large refuse pits were discovered, dating back to the time of arrival of the first Italic legion, i.e. around 71/72 A.D.[63] Not only amphorae, but also fragments of other vessels were discovered there, such as ordinary pots delivered to the army from Pannonia and Asia Minor or cheese-press dishes (Fig. 3). Goods also came to Novae packed in barrels, as we know from the carved representation of a barrel on the gravestone of a wine merchant (*negotiator vinarius*).[64] There are also known remnants of barrels, e.g. from Britannia, where they were reused as form-work in wells, and also from Haltern, one of the camps on the aforementioned river Lippe. The barrels, quite numerous in the western part of the empire, show that many products were transported this way.[65] Some products, e.g. grain were probably transported in ordinary sacks. Both barrels and sacks are extremely rarely found preserved, therefore, any estimation of the scale of transports based solely on amphora remains must be regarded as heavily understated.

Stocks were replenished by bulk purchases at a fixed price (*frumentum emptum*).[66] The army was supplied by private entrepreneurs and traders, who sometimes had long-term contracts with the army.[67] We know of their existence, among other things, thanks to

[59] Lemke 2016, 23. The four-wheeled cart was able to transport about half a ton over a distance of 15–30 km in a day, while a boat, 20-34 m long and a displacement of 3–4.5 m could transport from 35 to 110 tons. See Kehne 2008, 328.
[60] Sinnigen 1962; Mann 1988; cf. Rankov 1990, and esp. 176; Kehne 2008, 331–332; Fuhrmann 2011, 218. Later they also served as army intelligence; see Lemke 2017, 188.
[61] Lemke 2013, 152, fig. 2.
[62] Davies 1971, 131. *Garum* was a luxury sauce made from fish blood and viscera, while *muria* and *liquamen* are terms which refer to cheaper and more common types of fish sauce; see Grainger 2014, 38–44.
[63] For general information concerning the foodstuffs imported to Novae see Lemke 2016, 20.
[64] *IGLNovae* 100; Kolendo 2011, 28–32.
[65] Kolendo 2011, 30.
[66] Adams 1999, 123.
[67] Kehne 2008, 329.

inscriptions that mention wealthy intermediaries (*negotiatores*) of the business.[68] Large-scale army provisions brought huge profits to private traders and eventually stimulated the emergence of the provincial business class.[69] The role of veterans in such operations remains unclear. This group was exempted from public customs duties (*portorium*) and indirect tax (*vectigalium*) levied upon trade, the same as the goods imported by the state for the army.[70] Veterans were involved, among others, in the production of building materials and the provisioning of troops.[71]

The demand for retail food purchases could be saturated locally in many cases. Around the legionary camps and forts, civilian settlements existed – larger, in the case of camps (*canabae legionis*), and smaller ones in the case of forts (*vici*),[72] where merchants and service providers were selling food. The estimations made by Michał Duch for Lower Moesia show that the money spent by the soldiers significantly changed the economy of the province.[73] In addition, food could be bought from locals belonging to the native population of a given province.[74] At Novae, the pollen of lettuce (*Lactuca sativa*), unidentified corn (*Cerealia*), as well as plants from the cabbage (*Brassicaceae*) and celery family (*Apiaceae*) were identified in the earliest layers of the fortress.[75] Nevertheless, quite a few soldiers sent letters to their families asking them to send additional food.[76] Inscriptions name a special group of people called *lixae* – camp-followers including actors, seers, holy men and sutlers,[77] public or even private slaves and soldiers' servants (*servitia castris*) called *calones, galearii, agasones and muliones*.[78] Sutlers and military servants could also be involved in obtaining additional food for soldiers.

[68] *AE* 1904, 176; 1909, 81; *CIL* XIII 5221 (Vindonissa); XIII 1788 and 1954 and cf. VI 29722 (Lugdunum); see also Erdkamp 2002, 65; Kehne 2008, 329. G. Fufius Cita (not Cito) was an *eques Romanus* who *rei frumentariae iussu Caesaris praeerat*, not *negotiator* (see Caes. *Gal*. VII 3; cf. Monfort 2002, 70).
[69] Verboven 2007; Kehne 2008, 329.
[70] Tac. *Ann.* XIII 51; Tomas 2017, 152.
[71] Tomas, Sarnowski 2007; Verboven 2007; Tomas 2017, 152.
[72] Tomas 2017, 14–16.
[73] Duch 2017, 228–229.
[74] For the written sources see Campbell 2006, 140–160.
[75] The samples from the layers near the northern defensive walls were identified by H. Winter from the Polish Geological Institute. The publication of the analyses will be included in the forthcoming publication of non-destructive surveys in Novae. For the context, see Sarnowski, Kovalevskaja, Tomas 2010, 162–166.
[76] Davies 1971, 134-136.
[77] McMullen 1984, 445; von Petrikovits 1980.
[78] For example *CIL* XIII 8648 = ILS 2244, Vetera, ca. AD 10, a *centurio* with his two slaves who died with him in Teutoburg Forest; McMullen 1984, 444; Roth 1999, 91–110.

The lands around the military bases, which for the first two centuries AD were under military administration, could be used as meadows and pastures (*prata*).[79] Ancient sources tell us that soldiers were not allowed to hunt and fish during their work shift,[80] but this regulation did not apply to leisure time,[81] and the finds of bones of wild animals and fish hooks and net weights (Fig. 4) from Roman military bases are testimony that meat and fish were also acquired in this way.[82] Epigraphic and literary evidence seems to indicate that the army could recruit hunters (*venatores*) and they were among soldiers exempted from other fatigues (*immunes*). However, it is possible that hunting was performed on the orders of the commanders or on special occasions like festivals that included wild animal fights (*venationes*).[83] Still, hunting – perhaps for large animals – was somewhat of a privilege for officers and commanders.[84] On the other hand, in some cases the remains of wild animal bones show a regional diversity – they are rather rare at military sites in Britannia, but more common in Germania superior.[85]

For at least two centuries, probably from the time of Augustus, who organized *aerarium militare*, the funds for purchases of supplies came from the soldiers' payroll (*stipendium*), from which a certain amount (which increased over time) was deducted (*ad victum*).[86] This system was sensitive to the economic situation and fall of the coin value.[87] Finally, it was replaced by tax in kind for the army, initially introduced during wartime under Marcus Aurelius and Lucius Verus,[88] and with time used more often, perhaps by Septimius Severus.[89]

[79] von Petrikovits 1979; Bérard 1992, 86; also Tomas 2017, 10–11; cf. Hanel 2013, 82–83. The term *prata* is known in epigraphic evidence from a number of inscriptions from the European part of the Empire (Hispania Tarraconensis: *AE* 1946, 17, 18; 1976, 354a, 354b; 2005, 853; Lower Moesia: *CIL* III 13726, Abrittus; Germania inferior: *AE* 1996, 1106, S. Augustin; and Dalmatia: *CIL* III 13250, Biskupija).
[80] *Dig*. XLIX 16.12.1: [...] *ad piscatum venatum opus privatum non militem mittere*.
[81] Vegetius advised to recruit butchers and hunters (Veg. *Ep*. I 7).
[82] Davies 1971, 129–130; King 1999b; Thomas, Stallibrass 2008, 9–10; Kowal 2011.
[83] Veg. *Ep*. I 7. It is possible that under certain conditions soldiers could graze animals and hunt, also as part of their duties, as indicated by an inscription from Rome (CIL VI 130) mentioning a soldier of the Praetorian Guard who oversaw grazing (*custos vivari*) and two others who were relieved of their duties to hunt (*venatores immunes*). However, this inscription is unique and we cannot be entirely sure whether the realities of the garrison of Rome can be applied for the provinces. See also Ti. Claudius Ulpianus, commander of the *vexillatio* based in Montana (Moesia inferior), who hunted for bears and large wild cattle meant for *venationes* in Rome on the order of the provincial legate in AD 147 (*AÉ* 1987, 867, *ursi et visontes*). Contra Davies 1971, 128.
[84] E.g. Tab. Vind. 233 (a letter of Flavius Cerialis, the commander of the *coh. IX Batavorum* at Vindolanda concerning most likely hunting nets), Tab. Vind. 593 (a list of equipment for catching fowl and birds), Tab. Vind. 615 (mentioning the commander's huntsmen). See also Birley 2002, 147–151 on the idea that hunting was a popular activity among officers.
[85] King 1999a, 146; Pearce 2002, 939.
[86] Davies 1971, 125; Herz 2008, 310-312.
[87] Perhaps such economic troubles caused different value of deductions; see Speidel 2000.
[88] *CIL* II 1180 (a famous inscription from Spain of the *praefectus annonae*).

According to Karl Strobel, the term *annona* first appears in the early 3rd-century contexts related to the provincial governors and war campaigns, and, in his opinion, it was Diocletian who organized a regular *annona* as tax in kind for the army.[90] Tax in kind encompassed food, clothing and armaments.[91]

This system was more complicated and employed both central and local authorities, as well as special officials (*dispenser*, *susceptor*, *actarius*). Documents indicate that designated imperial officials were involved in organizing supplies for specific troops, and soldiers were increasingly relieved of these responsibilities.[92]

The military diet

When we are speaking about the Roman military diet, we must remember several important issues. The Roman army was a somewhat privileged community, which had access to imported food.[93] Secondly, this food reflected the Roman culinary habits, therefore, it was an element of identity and Romanization, which may have influenced the neighbouring settlements.[94] Thirdly, a common soldier had a different diet than his high-ranking commander, and the conditions of preparing food and consumption were fundamentally different.[95] This is particularly important when we refer to such sources as the Vindolanda tablets, of which many are documents from the commander's household.[96] Moreover, when interpreted without the context of additional archaeological evidence, they may be misleading: neither beef and mutton nor sheep and cows are mentioned in the records, but sheep and cow bones were found on the site in big quantities, and also generally predominate on military sites.[97]

The basic component of the human diet is water. An adult man needs 3–4 liters of liquids per day, and animals can require 15–30 litres per day.[98] If we count even 10 liters per man (including morning washing) and 20 liters per animal daily and multiply it by 5000 men and 2500 animals, it will make 100 000 liters (100 m^3) daily for a legion in its full force. Such

[89] Van Berchem 1937; Wierschowski 1991. For literature on the subject see Kehne 2008, 330, 338.
[90] Strobel 2008, 280.
[91] Kehne 2008, 330.
[92] Adams 1999, 124.
[93] Pearce 2002, 932.
[94] King 1984, 187–217 and see above.
[95] See the example of evidence from Vindolanda: Pearce 2002, 933.
[96] Pearce 2002, 940.
[97] King 1999a; 1999b; Pearce 2002, 938 and 939. The tablets mention only pig, chicken, goose and deer.
[98] Roth 1999, 119 (gives 2 litres of water daily, but does not include other liquids).

large amount of water was crucial for the army and the army made special efforts to provide good water through aqueducts and to protect them from damage or illegal piping.[99] According to the estimations made by Ivan Tsarov, the average quantity of water delivered to the fortress of Novae through its three aqueducts amounted to 1762 m^3 (1 762 000 litres) per day, which would make over 350 litres per one of 5000 legionaries,[100] which is far more than the minimum requirement. In East and North Africa, where water is less accessible than in the European provinces, rain water must have been collected in cisterns. During campaigns, water carriers (*aquatores*, *hudreumenoi*) were involved in carrying water to the camps.[101]

Another basic product is sugar obtained from honey and salt, which is both important for a human body and for preservation of food, but impossible to trace archaeologically. The salt trade and perhaps military control over salt provisions to the army is attested by inscriptions. A good example here is Dacia, where sources of salt were exploited during the Roman period.[102]

The third staple element of a diet is corn, or rather flour products. The daily allowance per infantry soldier was a little less than a kilo of unground grain,[103] just over half a kilo of other food (e.g. cheese, fruit, nuts or vegetables), 0.15 kg of dried meat (*laridum*) or fish, a mug of sour wine or wine vinegar (*acetum*), which was mixed with water to receive a specific drink (*posca*), some oil and salt.[104] Other types of drinks, such as honey wine (*mulsum*), low-quality red wine (*faex*) or beer are also attested.[105] Cavalry soldiers were given larger amounts, probably due to the need to maintain their stablemen.[106] Grain, however, played a fundamental role in the military diet, although the numbers given in literary sources, such as Ceasar's *Gallic Wars* or *Civil War*, should be read critically.[107] The soldiers had to grind the grain themselves and then process it – to make porridge (*puls*), wholemeal bread (*panis*

[99] Tomas 2011.
[100] Tsarov 2007, 224–225.
[101] Roth 1999, 120–123.
[102] *AE* 1967, 388 and cf. *IDR* III/1, 145 (Tibiscum); Le Bohec 2015, 29; Tomas, Pisz, Hegyi 2020, 35.
[103] Groenman-von Waateringe 1997, 264; Kehne 2008, 324 and fn. 2. The estimations based on written sources differ, but it is agreed that the grain ration did not exceed 1 kg.
[104] Hist. Aug. *Avid*. 5.3; *Hadr*. 10.2; Davies 1971, 124–125; Kehne 2008, 324.
[105] Tab. Vind. 302 (*mulsum*); 185 (*faex*); 186, 190 (*metretes*, which is Celtic beer). See also Pearce 2002, 938–939.
[106] Foxhall, Forbes 1982, 62; Speidel 1989, 240-242.
[107] Davies 1971, 133–134; Pearce 2002, 939; cf. Groenman-van Waateringe 1997, 261–262, Tab. 5.1. For corn production in Lower Moesia, see Duch 2017, 171–72.

militaris), hardtack (*buccelatum*), and pastry.[108] In Britain, spelt used for cooking bread was identified in South Shields granaries.[109] The grain was milled in stone mortars, which were used by the soldiers of the given units. These were usually portable, relatively small tools. The findings of bread stamps, on the other hand, indicate that bread made of flour belonging to soldiers of a given unit was jointly baked in the same ovens.[110] Such stamps usually bear the name of the commander of a given *centuria* or *contubernium,* the latter being the smallest unit in a legion: the inhabitants of a single room in a barrack. The remains of the ovens are often discovered in the so-called *intervallum*, i.e. the strip of land between the camp fortifications and the perimeter street. Ordinary roof tiles were often used as stovetops, on which the dough was placed and covered with a special lid (*clibanus*).

The findings of fragments of vessels used to prepare meals prove that the soldiers cooked themselves. The sherds of pots, bowls, but also grinders or cheese-pressesfound on Roman army sites are nothing special.[111] From the common available ingredients it was possible to make a quite nutritious meal, however, the additional purchases made by the soldiers in the civil settlements as well as game and fish caught in their free time could significantly enrich the diet. Moreover, the soldiers could also sell any surpluses they had cooked in their kitchen.[112]

We also know about the composition of the soldier's diet from the analysis of post-consumption residues, i.e. remains of animal, fish and mollusca, charred seeds and pits/stones of fruit.[113] Thanks to analyses of animal bones we know that beef was the main type of meat (45–65%) in the soldier's diet in most provinces, but there were areas with a greater emphasis on mutton (Britannia, Dacia, Balkans) or pork (Germania).[114] In some cases, the predominance of pork can be considered a sign of Roman presence, as this meat was a popular element of the Italic diet, but in many cases such differences could reflect pre-Roman patterns of meat consumption or simply result from practical reasons such as conditions for breeding, suitability for preservation or fecundity and fast growth.[115] Differences in meat

[108] Pastry (not pasta) was known to the Romans as it is indicated by the finds from Pompeii; see Davies 1971, 125 and fn. 30, but cf. Brion 1960, 126. Pliny the Elder (*Nat.* XVIII 67) states that *panis militaris* was a wholemeal bread.
[109] Van der Veen 1988.
[110] Davies 1974, 319.
[111] Davies 1971, 127–128; Pearce 2002, 939 and cf. Hist. Aug. *Hadr*. 10.2.
[112] Tab. Vind. 2.343.
[113] Davies 1971, 129–134.
[114] Groenman-van Waateringe 1997, 263; King 1999a, 139, figs. 1-2. King 1999b, figs. 12.
[115] Groenman-van Waateringe 1997, 263; King 1999b; cf. Thomas, Stallibrass 2008, 4–5.

consumption – in this case pork – occur among different types of military bases: 20% more pig bones were recorded in the legionary camps than in the forts of the auxiliary units,[116] which seems to be a proof of Roman habits among the legionaries. The find context may be also crucial. Pig, chicken and wild animals appear more often in archaeological deposits related to officers' quarters.[117] Poultry – chicken, geese and ducks, but also wild birds complemented the meat diet. Fish and crustaceans had a significant share in the diet, also in sites located far from larger waters.[118] Estimations based on animal bone remains show that the daily meat consumption ranged from 25g to 160g, with the most probable average ration of 63g.[119]

Meat consumption was supplemented during holidays, when sacrificial animals were killed and their meat was consumed during the feast. A list of food consumed at festivals in Vindolanda lists wine, beer, lard, fish sauce and olives.[120] A papyrus from Egypt, on the other hand, tells us about wheat, lentils, hams, cattle, calves, goats, pigs, wine and radish oil used for cooking.[121] It is worth adding that religious ceremonies in the army had their own calendar, strongly associated with the cult of the emperor and mostly did not coincide with the calendar of civil holidays.[122] And yet purchases for such festive occasions were covered by the soldiers' *stipendium*.[123]

Properly seasoned food, enriched with vegetables and meat resulted in a good and healthy meal, and light wine mixed with water facilitated digestion and prevented food poisoning. The latter was feared most by the commanders of the Roman army. There were no canteens to be found in the camps, as poisoning and gastrointestinal infections were common.[124] Analyses of waste taken from military latrines showed the presence of numerous gastrointestinal parasite eggs: whipworms, roundworms and, to a lesser extent, tapeworms, transmitted through infected water or raw, unwashed products.[125]

[116] Thomas, Stallibrass 2008, 4–5.
[117] Pearce 2002, 940.
[118] Davies 1971, 126.
[119] Groenman-vanWaateringe 1997, 264.
[120] Tab. Vind 190.
[121] PSI 683; Davies 1971, 125.
[122] Helgeland 1978, esp. 1487–1488.
[123] Davies 1971, 125.
[124] Jackson 1988, 133; Allason-Jones 1999, 138; Scheidel 2007, 430.
[125] Alphen aan den Rijn (*Germania inferior*): Kuijper, Turner 1992, 187–204; Künzig (*Raetia*): Nutton 2004, 181; Allason-Jones 1999, 138–139.

It seems that the greatest problem of the soldiers was to provide enough food for a larger group of people and the time needed to prepare a meal. Each unit spent most of the day preparing food, tidying up, collecting firewood, feeding animals and maintaining clothing and armament – rather trivial activities in all.[126] Soldiers, especially cavalry, were helped by the non-combatant support personnel.[127] And it should be remembered that many of them were assigned to non-military tasks – building roads and bridges, working in quarries, building fortifications (also for civilians).[128]

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Even a brief and cursory outline of any army's logistics over the course of several centuries is extremely difficult. This is particularly true of armies in antiquity, which did not have standard solutions valid for the entire territory under their control. Also, their soldiers were of different origins, traditions and preferences. Such an example is the Roman army, which employed proven ways of provisioning and securing supply related facilities, but on the other hand in many cases *ad hoc* solutions were used as well. With the successive reforms of the army and the subsequent transformation of the camps into late antique cities with military personnel, the ways of supply also changed significantly.

According to Peter Kehne, there were several reasons why a centrally regulated, unified and universal system of supplying the army was not developed during the Principate.[129] First of all, due to troops being moved around. The second factor were the differences in the economic conditions of the various provinces: natural conditions, population density, degree of urbanization or the nature of agriculture and crops. The third was the reluctance to transfer power to anyone but the emperor. To this must be added a number of other issues related to transport possibilities or the flow of information, but also a human factor such as corruption. It seems, however, that the lack of a unified system, although it may have caused problems, allowed for *ad hoc* solutions and greater flexibility.

This outline on the nature of the available sources illustrates how difficult it is to evaluate and draw general conclusions about the supply and diet of the Roman army. Archaeological evidence seems to indicate that the soldier's diet was very rich and varied.[130] Moreover, dietary components corresponded to local conditions and the efficient deliveries from distant

[126] Herz 2008, 307.
[127] Speidel 1989, 242–243; Roth 1999, 91–96; 101–116.
[128] Davies 1974; Sarnowski 1987; Herz 2008, 307.
[129] Kehne 2008, 326.
[130] Groenman-van Waateringe 1997, 263.

areas.[131] The regional variation, as well as rank-related differences do not allow to define a common military diet. A range of products which were imported in mass such as corn, olive oil, olives, wine or fish sauce cannot be treated as the only components of a Roman military diet,[132] as regionally obtained products supplemented and influenced this diet. Still, despite many years of research, we are still unable to fully determine how significantly the soldiers' diet differed from that of civilians.

Abbrevations of the sources

CIL	*Corpus Inscriptionum Latinarium*
IGLNovae	J. Kolendo, V. Božilova, *Inscriptions grecques et latines de Novae (Mésie inférieure)*, Bordeaux 1997.
P. Amh.	*The Amherst Papyri. Being an Account of the Greek Papyri in the Collection of the Right Hon. Lord Amherst of Hackney, F.S.A. at Didlington Hall, Norfolk*, eds. B.P. Grenfell and A.S. Hunt. London.
PSI	Papyri in the collection of the Istituto Papirologico "G. Vitelli", Florence
Tab. Vind.	Vindolanda Tablets. Some texts and commentary with notes available at http://vindolanda.csad.ox.ac.uk/ and https://romaninscriptionsofbritain.org/

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[131] Groenman-van Waateringe 1997, 262.
[132] Cf. different opinion e.g. by Monfort 2002, 71.

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Figures:

Fig. 1. Trajan's Column. The Second Dacian War, Scene CX. Soldiers harvest grain in the vicinity of a fort (copy of Trajan's Column) © National Museum in Bucharest (courtesy Ovidiu Ţentea)

Fig. 2. Vercovicium / Housesteads (Britannia). Military granary (*horreum*). Photo © Carole Raddato (https://commons.wikimedia.org/wiki/File:The_Granaries_(horrea),_the_fort_food_supply,_Housesteads_Roman_Fort_(Vercovicium)_(44517284432).jpg; access: 28.12.2020)

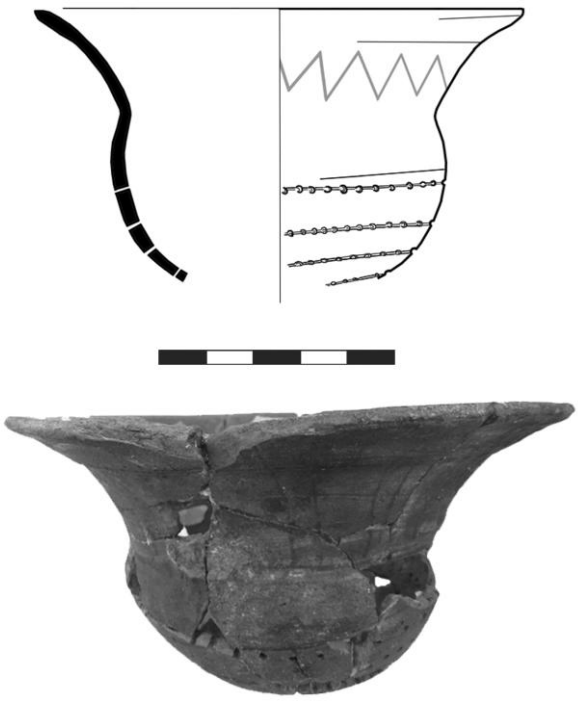

Fig. 3. Roman ceramic cheese-press found in the legionary fortress in Novae (Lower Moesia). The cheese-press was found in a refuse pit dated to the Flavian period © Agnieszka Tomas

Fig. 4. Roman fish-hook found in Novae (Lower Moesia) © Agnieszka Tomas

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