

Sausage and Meat Preservation in Antiquity

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MY WICKED BELLY always gets me into trouble," complained Odysseus,¹ and indeed our general impression is that hunger was a frequent companion of the Greeks, Romans, and other peoples of the ancient Mediterranean world. A number of recent works have attempted to quantify the relationship of the Greeks with their food supply, and the picture they draw is one of small farmers leading a marginal existence and city dwellers forced to import grain from abroad.² It is implied that the ordinary person, unable to afford the dishes described in the cookbooks by Archestratos or Apicius,³ would make do with diet primarily composed of cereal grains—wheat bread or barley cakes—relieved only by legumes, and fruits and vegetables in season.

These studies investigate the cereal crops of antiquity, extrapolating the yield of wheat and barley by comparison with yields in modern developing countries, and factoring in rainfall and climate, generally assumed to be virtually the same as

¹Homer *Od.* 18.53–54; cf. 7.16ff.

²T. Gallant, *Risk and Survival in Ancient Greece* (Stanford 1991); R. Sallares, *The Ecology of the Ancient Greek World* (Ithaca 1991); P. Garnsey, *Food and Society in Classical Antiquity* (Cambridge 1999). See my remarks on Gallant and Sallares in "Staying Alive on the Ancient Greek Farm," *AHB* 6 (1992) 187–195.

³S. D. Olson, A. Sens, edd., *Archestratos of Gela* (Oxford 2000); J. André, ed., *Apicius. De re coquinaria* (Paris 1965). Although Apicius was a famous esthete ca A.D. 30, the work we have under his name is a compendium from the 1st–4th centuries of our era: André 9–10.

today in the eastern Mediterranean. The consensus is gloomy: the annual rainfall in Attica might produce a crop of barley every year but a decent crop of wheat only once in four years. And other sources of nourishment are regularly discounted. It is said that at certain times of year there was a surplus of young sheep and goats. But the lack of pasturage forced farmers to cull their flocks severely and to preserve primarily females who promised to be good milkers and wool producers, plus a very few vigorous males to keep the line going. Therefore, it is said, the average Greek and Roman person could never rely on meat in the diet.⁴

Because most of us in prosperous first-world countries eat too much meat and are being continually counseled to eat less, the role of meat as protein in the diet is sometimes overlooked or even scorned. But animal meat and fat, for both young, growing people and for frail elders, is a superb shortcut to nutrition. Jane Brody, a respected nutritionist who continually counseled moderation in the consumption of meat and fat, nevertheless conceded that if the average youth or adult could eat 150 grams of pork or beef liver once a week, they would satisfy most of their dietary requirements for a whole range of vitamins and minerals.⁵

The picture we get from Homeric descriptions of communal meals is definitely pre-Brodyite. The liver is eaten just as a snack, to start, then whole beeves are skewered and roasted over open flame and smoking gobbets dripping with fat are passed around to the banqueters. But a few short years later Hesiod barely mentions meat. The annual cereal crop is his entire preoccupation. And from that time on, the literature of dining is split between descriptions of haute cuisine and the perennial hunger that afflicted everyone else. Is this a true picture?

⁴The consensus is expressed in Garnsey (*supra* n.2) 16–17.

⁵J. E. Brody, *Jane Brody's Nutrition Book* (New York 1982) 196–198; cf. Lavon J. Dunne, *Nutrition Almanac*³ (New York 1990) 243.

After Homeric times cattle were far too valuable as working farm animals and milk producers to be seen as a source of meat until the day the old ox fell dead in the traces or the old cow could not produce enough milk to justify the labor of feeding her. We may thus exempt beef, on the one hand, as a significant element in the ancient diet.

Sheep and goats, on the other hand, were culled every year, sometimes twice a year, and the occasion called for great festivities as the surplus animals were slaughtered and devoured. At all times of year, as well, sheep and goats were slaughtered on the altar of sacrifice and were often distributed among the members of the sacrificing cult. But normally these flocks were too valuable for their wool and for the cheese that could be made from their milk to be used as food animals during the rest of the year.

The pig produces neither wool nor milk, therefore one might wonder at the prominence of pigs mentioned in the Greek and Roman diet. What the pig does produce is more pigs. Whereas a sheep or goat rarely produces more than one or two offspring a year, the pig will produce at least eight per farrow, and even as many as twelve. The Roman agronomists, in fact, favored a triage of any more than eight in order to keep all the survivors healthy and well fed (Varro *Rust.* 2.4.19). Both sheep and goats have a relatively long gestation of five months. But a sow carries her litter for only 110 days, and when she is young and healthy she can bear two litters a year. The pig is also easier to feed. Pigs are basically omnivores; they will eat any kind of vegetable matter, whether leaf, seed, fruit, root, or the residue from oil or wine-making. They will eat any other living or dead thing and even the remains of other pigs that have been slaughtered. They are easy to raise and their meat and by-products go a long way. "It is a lazy man who buys his side meat from the butcher," said Varro (*Rust.* 2.4.2). The relative values of sheep, goats, and pigs can be calculated in the prices established for sacrificial animals. In the great calendar of the deme Erchia, sheep and

goats are priced at ten drachmas or more while the piglets are always three drachmas.⁶

It is obvious that meat was available in the Greek diet but subject to seasonal surpluses or shortages, particularly in the case of the pig, which at the age of eight months, dressed out, can produce as much as fifty kilos of usable meat, meat by-products, and fat, four to five times as much as a sheep or goat.⁷ It seems obvious that the very first person to slaughter a pig for a meal immediately began to wonder how to save the remainder for another day. Therefore we should consider the various strategies for preserving surplus meat in every analysis of the ancient diet.

Salting as a means of preservation was well understood in antiquity and salted fish—generically called *τάριχος*—may have been the primary commodity. The verb *ταριχεύω* generally means to preserve by pickling.⁸ Theophrastos' shameless man, while at dinner at the house of another, takes part in the sacrifice before dinner and slips some of the meat away to be salted later (*Char.* 9.2). Hams are referred to as *κωλῆνες τεταριχευμένοι*. The verb is also used to describe Egyptian mummification, although in that case saltpeter was used instead of salt.⁹

While Greek authors were generally too fine to discuss the daily business of animal husbandry, the Roman authors who were actual farmers and not afraid to get their hands dirty provide most of our details.

Cato describes step by step the procedure for salting hams. Salt is laid down in the bottom of a large jar. The hams are

⁶ G. Daux, "La grande démarche: un nouveau calendrier sacrificiel d'Attique (Erchia)," *BCH* 87 (1963) 606–610. In Daux's "Le calendrier de Thorikos," *AntCl* 52 (1983) 153–154, lines 29–30, 55–56, sacrificial oxen are priced at 40–50 drachmas. On full grown pigs, see next note.

⁷ This would explain the price of forty drachmas for a full grown sacrificial pig in W. S. Ferguson, "The Salaminioi of Heptaphylai and Sounion," *Hesperia* 7 (1938) 5.

⁸ LSJ⁹ *s.v.* On the biochemical process see A. Davidson, *The Oxford Companion to Food* (Oxford 1999) *s.v.* "salting."

⁹ Hams, Pollux 6.52; mummification, Hdt. 2.86, where we find *litron*, an older form of the word *nitron*.

placed skin side down on the salt and are covered with another layer of salt. Then more hams and layers of salt are added until the jar is full and covered with a final layer of salt. After five days the hams are taken out and put back in reverse order. After twelve days the hams are taken out, brushed off, and dried for two days. They are then cleaned, coated with oil, and cold smoked for another two days before being hung to store in the meat house (*Rust.* 162.1–3).

Columella gives two methods for preserving hams. He partially repeats Cato's instructions for salting in jars, or what might be called the wet process, for the hams remain in their brine. He also describes a dry process in which the pig is boned. Salt is rubbed all over the pieces and into the cavities where the bones were. Then the pieces are pressed between weighted boards for three days to extract as much moisture as possible. The pieces continue to be rubbed with salt and a little saltpeter for 9–12 days and are then rinsed and hung to dry (*Rust.* 12.55.1–4). This is virtually the identical method used today in northern Italy to make *prosciutto crudo* and elsewhere to make country ham. The only variable is the amount of salt used. With enough salt any piece of meat can be made to last forever, although in mariners' journals from the great age of sail we find uncharitable remarks about barrels of salt meat that had been to the Indies and back.

To preserve meat in a way that produces something tasty requires a light hand with the salt. As the salted meat rests at ambient temperature there occurs another process of preservation that ancient writers, so far as we know, did not recognize. Certain bacteria begin to break down the muscle tissue, causing it to ferment and produce lactic acid. Lactic acid not only helps to preserve meat by lowering the pH and killing off harmful bacteria, the resulting fermentation also eventually produces enough lactic acid to stop the fermentation itself. At that point the chemistry of the meat is stable; only drying is needed to make the product resistant to spoilage. The catalogue of

Burger's Smokehouse, a famous producer of pork products in Missouri, gives a short history of the establishment. The original Mr. Burger began ham processing in the days before refrigeration. The pigs were slaughtered in the fall when the temperature had dropped. The hams were rubbed with salt, just as Columella described, and then were hung in an airy place—a corn crib was perfect—all winter long. The warmer days of spring and the hot days of summer completed the cure as the hams sweated out their moisture. The best hams, at least to Missouri tastes, had hung for a whole year.¹⁰ Country hams are made exactly the same way all over Europe, the only difference being that Europeans generally consume this kind of ham raw, while the country hams of the midwest and south are cooked.

Hams will therefore have been a form of storable wealth. The official called the *κωλακρέτης*, found at both Athens and Kyzikos,¹¹ eventually became simply a paymaster, as we see him in Ar. *Vesp.* 695, but in archaic times he was a priest who distributed the hides and hams after sacrifice (*Suda s.v.*). By the same token a *tamias*, or treasurer, was originally a person designated to divide and distribute food (Hom. *Il.* 19.44).

Hams are large, serious reserves of food. Probably the most convenient way of saving smaller pieces of meat or by-products was by converting it to sausage. To salt minced meat and fat and stuff it into casings was a convenient way to give leftovers some shelf life. It also had the advantage of concealing from the squeamish exactly what the contents were. The most frequent generic term for sausage seems to have been *ἀλλᾶς*. The first extant mention of *allâs* leaves no doubt about its form or shape. A line of Hipponax cited by Hephaestion can be translated: "drawing from the tip down, as if stroking a sausage." In 1941 a papyrus bearing a long selection from Hipponax provided the

¹⁰The history of Burger's Smokehouse, in California, Missouri, may be found at www.smokehouse.com.

¹¹Athens: Arist. *Ath. Pol.* 7.3 with comment by P. J. Rhodes, *Commentary on the Aristotelian Athenaiion Politeia* (Oxford 1993) *ad loc.*; IG I³ 86.9, 395.4, 435, etc. Kyzikos: CIG 3660.

context, including the previous line, ἐγὼ δ' ἐβίνε[ον, "I was copulating...," leaving no doubt about what it was the sausage resembled.¹²

From the *Knights* we learn more about the profession of the *allântopôlês*, or sausage-seller, than we do about the nature of his wares. By definition, he was the lowest of the low. When young he had been a boy prostitute (1242). He carries a display table, knives, intestines, tripe, and other offal (150–167, 356, 1179, 1183)¹³ and sells at the gates where salt fish is sold (1257), associating with whores and bath-house attendants. It is implied that he mixes dog and donkey meat into his sausages (1399). We conclude that sausage must have been a cheap and common snack for the crowds coming and going in the city and that, as from time immemorial, sausages were made of the cheapest leftovers and were easy to adulterate.¹⁴ The well-known miserly tendency of the Thebans was derided because they served *allântes* at banquets.¹⁵ And Sokrates made fun of his student Aischines because his father was an *allântopoios* (Diog. Laert. 2.60). Modern attitudes to sausage making used to be summed up by the great Texan politician, Sam Rayburn: "There are two things you should never watch being made, laws and sausages."

There is no precision about the terminology of sausages, as is clear from the typically chaotic cluster of names found in Pollux 6.52: ὑπογάστρια, οὔθατα, ἡτριάϊον δέλφακος, φῦσκαί, ἀλλάντες, χόλιξ καὶ χολίκια ὕεια, κωλῆνες τεταριχευμένοι, σχελίδες ὀλόκνημοι αἰ πέρναι, ἥγυστρον. ἔστι δὲ γάστριον

¹²Hipponax 84 West, in Hephaist. *Ench.* 5.4 Conabruh; *P.Oxy.* XVIII 2174 fr.16 col. ii.16–17.

¹³Schol. Ar. *Eq.* 150, 152, explains that "Agorakritos," the sausage seller, enters carrying tripe, casings, and μαγειρικὴ τράπεζα.

¹⁴The Roman *botularius*, noisily hawking his wares, was the Roman counterpart of the *allântopôlês*, Sen. *Ep.* 56.2.

¹⁵Ath. 148E (Kleitarchos *FGrHist* 137 F 1).

ἡδυσμένον, ὃ καὶ τάκωνας ἔνιοι κεκλήσθαι κτλ. Pollux seems to be listing these items under the generic heading *hypogastria*, or “things below the stomach,” only some of which are sausage. He includes *kolênes* and *pernai*, which both mean ham (*perna* is the Latin word), and *skelides*, generally meaning beef ribs, and omits other common words: *κοιλία*, *χορδή*, and *ισίκιον*. But a writer who dedicated his book to the Emperor Commodus was perhaps not accustomed to dining on such proletarian fare. I offer a short lexicon of sausage terminology.

ἀλλᾶς, as stated, is an inclusive term for sausage, that is, pig intestine stuffed with meat, fat, and a variety of more dubious substances.

botulus is the common Latin word for sausage.

γάστηρ of course is the anatomical word for stomach, seen in a gastronomic sense first in the famous passage from the *Odyssey* (18.44): goat stomachs filled with blood and fat.

ἔντερα are the cleaned intestines, or sausage casings, into which sausages are stuffed, and carried as part of his equipment by the *allântopôlês* (1183). It is still the modern Greek term.

ἦνυστρον is the fourth stomach of the cow (Arist. *PA* 674b16, *HA* 507b9), a kind of tripe, said by Pollux to be seasoned *gastrion* and also known as *τάκων*, a term used by Krates as the sort of food associated with *allântes* and found in the agora (Krates, in Pollux 6.53; Ath. 119C).

ισίκιον is a Latin loan word. From the recipes listed by Apicius it seems to mean ground meat of any kind (Apic. 2 *passim*; Ath. 376D, citing Paxamos). The combination **salsa-isicium*, although not attested, is the ancestor of course of all our Romance language words for sausage. *σειρὰ σαλσικίων*—a string of sausages—is found in later Greek.¹⁶

κοιλία is the generic term for entrails. From the citations in the *Knights* it would seem to mean both tripe proper and the meaty intestines that we call chitterlings, which when stuffed into casings become the tasty sausages called *andouillettes* in France.

lucanica/*λουκάνικα* are mentioned first by Varro, Cicero, and Mar-

¹⁶Leontios of Naples, *Vita S. Simeonis* 8.52 (Migne, *PG* 93.1733); I am indebted to A. Dalby, personal communication, for this reference. See also his *Siren Feasts* (London 1996) 181–182.

tial:¹⁷ a type of sausage from Lucania, smoked, according to the recipe by Apicius.¹⁸ The first attested Greek usage of the word is from fourth century A.D. papyri. The Egyptian official Theophanes traveled to Antioch and kept careful records of his expenses, including six purchases of *loukanika*.¹⁹ It is still the modern Greek word for a cured, dry sausage, and variants of the name are found all over the Mediterranean.

οὔθρατα means udder, called *tripas de leche* in Mexican cooking. Pollux's ἡτριαιῖον δέλφακος means pork belly, that is, side meat rather than the stuff inside.

φύσκη seems to be another word for sausage, something to be stuffed, in *Knights* 364. *Phuskai* can be sliced (Ath. 96B, 139A) and may therefore be large, cured sausages. At Sparta they were nailed to the walls for old men to eat, according to a comedy by Kratinos (Ath. 138E).

χόλιξ and diminutive χολίκιον are cognate to *cholas*, guts, and *chole*, bile or gall bladder, perhaps entrails of some kind. A slice of *cholix* with *ênustron* is a gift to Demos from the sausage seller. Theophrastos' shameless man shoplifts a *cholikion* while leaving the butcher shop.²⁰

χορδή is another generic term meaning gut, so far as I can tell, and means first of all the dried gut that is used as a lyre string (Hom. *Od.* 21.407). But it is also gut stuffed with something, as in a *chordê hematîtis*, or blood sausage (Ath. 125E), and several passages refer to it as being sliced. A comedy cited by Athenaios speaks of a slice of *allâs* and a slice of *chordê*, so they must be different kinds of sausage (95C). He also cites a number of comedies that mention *chordai* (94F–95A) and a play by Epicharmos entitled *Oryai*, which is said to be another word for *chordê* (95F). χορδεύω is a metaphor for making a mess of things (Ar. *Eq.* 214, 315).

As this review demonstrates, there is as little precision in the names of sausages and other offal as there is in gastronomic writing in general, which is notoriously imprecise.

¹⁷Varro *Rust.* 5.111, *lucana* ... *quod milites a Lucanis didicerint*; Cic. *Fam.* 9.16.8; Mart. *Ep.* 13.35.

¹⁸4.61; in Apicius *lucanica* is a feminine singular.

¹⁹*P. Ryl.* IV 627.208; 629.27, 129, 225, 322; 630.230. Cf. Dalby (*supra* n.16) 181; LSJ⁹ Suppl. s.v.

²⁰*Char.* 9.4; *cholikes* are the thick part of the intestine, schol. Ar. *Eq.* 1179.

Let us turn to some culinary aspects of sausage and meat preservation in general. As appropriate for an age before refrigeration, Apicius gives a number of procedures for preserving meats and other foods. Meat can be preserved for a short time without salt, he claims, by immersing it in honey (1.9). Cooked meats can be preserved by soaking them in a combination of mustard, vinegar, salt, and honey (1.10).²¹ Vinegar and salt are obviously the active agents here. He also offers advice on how to restore salted meat to edibility: boil first in milk and then soak in water (1.11). This strategy must have been limited to fancy professional chefs. It is hard to imagine anyone else having a convenient source of milk at hand. In fact, anyone who has cooked salt cod or country ham knows that plain water will do the job just as well.

Most of the sausage recipes in Apicius' book are fancy and are meant to be eaten right away, as instructions are given for immediate cooking in broth or frying. *Lucanicae*, however, are preserved sausages, in which the ground pork is mixed with cumin and other spices, as well as *liquamen*, or *garum*, the universal Roman fish sauce full of concentrated salt. They are then hung up to smoke.²²

I have assumed that most sausage in antiquity was concocted to preserve left-over meat and meat by-products and fat. The fat content is especially important because fat itself is a sort of preservative, covering the bits of meat in a protective coating that keeps ambient bacteria away. A cooked sausage with plenty of fat and salt will resist spoilage for quite a while, depending on the temperature. If a little vinegar is added it will last much longer, although the taste and texture will suffer.

A sausage that is cured raw, however, is almost immortal. As I have inspected the mountains of cured sausages heaped on

²¹ André's note to 1.10 refers to similar recipes by Columella 12.57 and Palladius 8.9.

²²1.61. André claims that they must be cooked before eating.

long tables in the street markets of Provence I have been tempted to put a small marker on a distinctive looking sausage and see how often it shows up on the same vendor's table as he moves from market town to market town, week after week. But such a sausage has a remarkable shelf life because of its natural preservatives. As in the case of cured hams, the salt staves off spoilage in the first stage of curing. Then, when the helpful bacteria already present in the meat begin to make it ferment, the resulting lactic acid performs the same function as the acetic acid in vinegar would, with the difference that lactic acid imparts a spicy taste to sausage instead of just sourness. If saltpeter is added in small amounts, the nitrate starts to break down into nitrite, releasing free oxygen molecules into the mixture. Finally, a long drying-out process concentrates the salt and acid and gets rid of too moist a breeding ground for bad bacteria. These four preservatives, salt, lactic acid, free oxygen, and low moisture, keep cured meat from the most common harmful bacteria: salmonella, staphylococcus, listeria, and clostridium botulinus. The first three will make you sick, but botulism will kill you. Anaerobic bacteria enjoy a moist, room-temperature environment, which a sausage offers, but they cannot live in an acidic medium, particularly with oxygen molecules floating around in it.²³

There is a minor branch of archaeology that might be called replica testing. When ancient testimony fails to clarify the nature of some ancient device, modern researchers have resorted to making replica models to test their interpretations. Examples of successful replicas are the trireme *Olympias*, the merchant vessel *Kyrenia*, and any number of ancient artillery devices.²⁴ Since descriptions of ancient sausage are tantalizing in their inexactness, I have tested a hypothesis that fits all the ancient

²³Modern sausage-making is thoroughly described in Davidson (*supra* n.8) 398–402.

²⁴And see my review of P. Valavanis, *HYSPLIX. The Starting Mechanism in Ancient Stadia* (Berkeley/Los Angeles 1999), in *CR* (forthcoming).

evidence for sausage and created a replica of Greek or Roman cured *loukanika*.

The meat content is 100% pork shoulder and back fat, purchased at the supermarket. The *entera*, or casing is pork casing, ordered from The Sausage Maker, of Buffalo, New York, who sends it scrupulously cleaned and packed in rock salt. I add salt and spices common in Greece and Rome, such as cumin and fennel seed. I take the liberty, and precaution, of adding a tiny pinch of a commercial butcher's preparation of saltpeter on the assumption that sea salt usually contains potassium and sodium nitrates as a minor contaminant. The sausages are hung at room temperature for four days to start the fermentation process and then in a cool place for twenty to thirty days to dry.²⁵

I do not prepare cured ham myself. Because the Burger Smokehouse process is virtually identical to that described by Columella I believe Burger Smokehouse ham—or any modern raw cured country ham, for that matter—is exactly equivalent to its ancient counterpart. These replicas will serve to demonstrate that the Greeks and Romans had appropriate technology to preserve the surplus meat from sacrifices and other opportunities and to distribute it throughout the year, thereby adding significantly to their caloric intake from cereal and other vegetable products.²⁶

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²⁵I have been tempted to add *garum*, as specified by Apicius—actually the modern equivalent of this ancient putrified fish sauce, called *nuoc mam* by Vietnamese; the problem for the researcher is to find a place to hang such sausages in a house where other people live.

²⁶I gave a version of this paper to an audience of classicists and archaeologists at the University of Texas, in February 2001. I offered the audience a tasting of both my sausage and Burger's Smokehouse ham. At last report all were alive and well. I am grateful for helpful remarks at that time from Colin Wells and Andrew Dalby.