THE LAND OF MILK? APPROACHING DIETARY PREFERENCES OF LATE NEOLITHIC COMMUNITIES IN NW ANATOLIA

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Abstract

Recent work by Richard Evershed and colleagues published in Nature in 2008 concerning residue analysis on ancient potsherds has provided clear evidence for milk processing and dairying in Anatolia and SE Europe in the Neolithic. Good results were acquired from ceramic samples taken from late 7th millennium cal BC sites in NW Anatolia. The investigation also suggestively linked the dominance of cattle in the bone assemblages of these sites to dairying. Building on this pioneering work, a new research project takes these primary results to the level of the pottery assemblages themselves. Integrating the residue analysis with ceramic studies, we regard residue analysis sampling specific vessel categories as an important step into assessing pottery function and meaning in prehistoric assemblages. This paper presents background and first results of the research, and will focus on the NW Anatolian key area seen by Evershed as favourable to Neolithic milk processing.

Introduction[1]

Over three decades ago, Andrew Sherratt coined the term "Secondary Products Revolution" to signify the exploitation of domestic ruminants for their secondary products, like milk, wool, etc., and dating this major shift in animal use to about 4,000 cal BC (Sherratt 1981). His claim has always been critically approached and he was perhaps the first to acknowledge its infirm basis, but only during the past decade the suspicions are being buttressed by facts due to the emergence of organic residue analysis in archaeology (cf. Evershed 2008). In 2003, Copley conclusively demonstrated dairying in England as starting during the 5th millennium cal BC as an important form of food production (Copley et al. 2003), and slightly later Craig published milk-processing evidence from pottery coming from two Early Neolithic sites in the Balkans, dating back to the first half of the 6th millennium cal BC (Craig et al. 2005). An extensive organic-residue project carried out by Evershed et al. (2008), targeting the Neolithic revolution and its potential pathways from the Near East to Europe was a major step forward. Evershed and collaborators sampled over 2,200 potsherds, and found good

Leiden Journal of Pottery Studies 26, 2010: 157-172

proof of milk processing across Turkey and SE Europe during the late 7th and 6th millennia cal BC. Particularly good results came from sites in Northwest Anatolia, more specifically from sites along the eastern Marmara Sea board (Figure 1). Two of the sampled Marmara sites, Fikirtepe and Pendik, can be securely dated to the 2nd half of the 7th millennium cal BC. They count among the first Neolithic settlements of NW Anatolia. Corroborating Evershed's pioneering work, a 2007 residue analysis by Özbal and Türkekul Bıyık found traces of milk lipids on some base sherds from the contemporary site of Barcın Höyük, which is located in the same general region (Türkekul Bıyık and Özbal 2008; Türkekul Bıyık 2009). The occurrence of dairying in NW Anatolia will shed new light on the neolithisation of this region, an area that is commonly seen as of key importance for understanding the neolithisation of Europe (e.g., Özdoğan 2008). The analyses done so far are path breaking, because proving that milk was being processed as early as the 7th millennium cal BC, over 2,000 years earlier than Sherratt's suggestion.

What these early studies did not do, however, was to integrate the ceramic data with the chemical ones. Following up on – still rare – work trying to link form with trace use (e.g., Craig et al. 2003, Gregg et al. 2009), our project is explicitly focusing on samples that have the potential to integrating issues of vessel form and vessel function. Within the known ceramic assemblage, it is our aim to select basic-level categories and

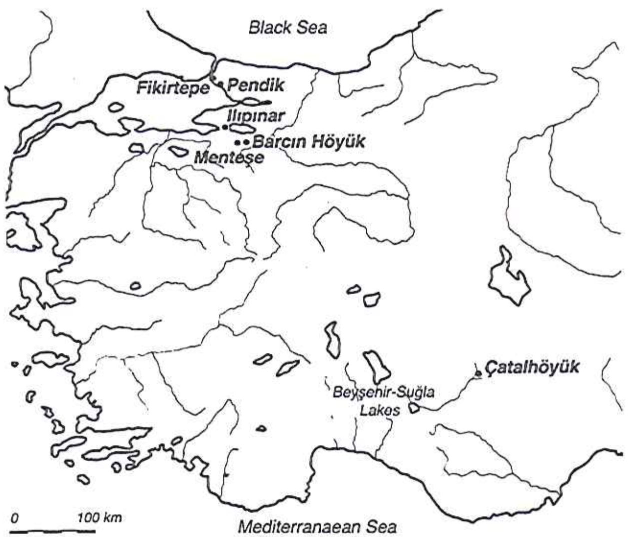

Figure 1. Sketch map of Anatolia with sites mentioned in the text.

subordinate categories in order to resolve hypotheses combining dissimilarity in manipulation with similarity in form, as is, for instance, the case with two-handled pots carried between two hands, and pots with four suspension lugs. The sample will also take into account vessel types not traditionally linked with cooking, including cups, oval bowls and boxes. The immediate goals of the sampling procedure are to acquire circumscribed sets of vessel types related to dairying and other food processes, and, furthermore, to see if technological correlates to such vessel types exist in terms of fabric, surface treatment, firing, and form. Samples are taken from the shoulder areas or from handle zones, provided these parts enable reconstruction of the vessel shapes and category attribution.[2] Ultimately, our aim is to move forward in interpreting vessel function in early Neolithic society, particularly focusing on vessel use in relation to fire.

Pots and fire

We have argued elsewhere for the connections between the Central Anatolian Konya area and NW Anatolia during the Neolithic (Thissen 1999), and we will merely use this association to highlight the development of cooking using ceramic containers, which started earlier in the south.

Çatalhöyük, the key site of Central Anatolia for the Neolithic period, was settled somewhere during the 2nd half of the 8th millennium cal BC. At about the 67th/66th centuries cal BC at Çatalhöyük transformations in material culture (Düring 2002: 220f.) co-occur with changes in attitudes towards food preparation and in pottery technology (Last 2005).[3] These developments had been germinating for a longer time, but around the Levels VI/V transition Çatalhöyük society seems particularly dynamic, open to changes, willing to experiment and also willing and able to adopt the changes (cf. Marciniak and Czerniak 2007: 123f.). Imagine a society in flux. Perhaps the need for openness was also felt in a literal sense, since at about this time the settlement plan became more open: there is an increase in open spaces (Düring 2002: 224).

Simultaneously, new ways of cooking are being created. Until then, people seem to have been cooking perhaps not so much in pots, but were using baskets and "cooking stones" (Atalay and Hastorf 2006: 293). Thousands of baked clay balls have been found in Çatalhöyük often in association with fire installations. Debate has been heated over their suspected function, and interpretations range from room heaters to baked clay objects for cooking. The idea of these clay balls representing cooking gear is not so strange. To us it would appear very cumbersome, laborious and impractical, but there are in fact many ethnographic parallels for clay balls, baked clay objects, or real stones being routinely involved in food cooking procedures (Thissen 2005). Stone cooking, or "indirect moist heating" in American terminology, was, for instance, common practice among North American Indian prehistoric societies, where it was associated with thick walled, fibre tempered vessels. Only with the change to thinner walled, mineral tempered pottery, the demise of the method set in (Sassaman 1995). Closer to home, hundreds of baked clay objects have turned up from the Early Neolithic site of Măgura, in the Lower Danube catchment, Romania, dating to about 6,100 cal BC. Also these may have been used for cooking (Thissen et al. 2007).[4]

One of the conspicuous disadvantages of this method of food preparation is that you would be unable to keep food simmering over the fire for prolonged periods because the control to maintain heat at a constant temperature is low (Arnold 1985: 128).[5] Foodstuffs that would need long simmering times could not be prepared. Other disadvantages are that you will need to pay constant attention and effort to maintain food broiling, you will need to change your stones repeatedly with concomitant drops in temperature, not mentioning the awkward manipulation of the hot cooking objects themselves. Despite these drawbacks, it is now assumed that this method of cooking was in use for over 500 years at Çatalhöyük, and one may actually imagine that this practice is just a continuation of Mesolithic cooking techniques, which may have been the case in the Danube region as well (Thissen 2005).

The pottery in use during this half millennium at Çatalhöyük has simple, bucket-like shapes and thick walls (Figure 2). The clay is tempered with fibres, probably cereal

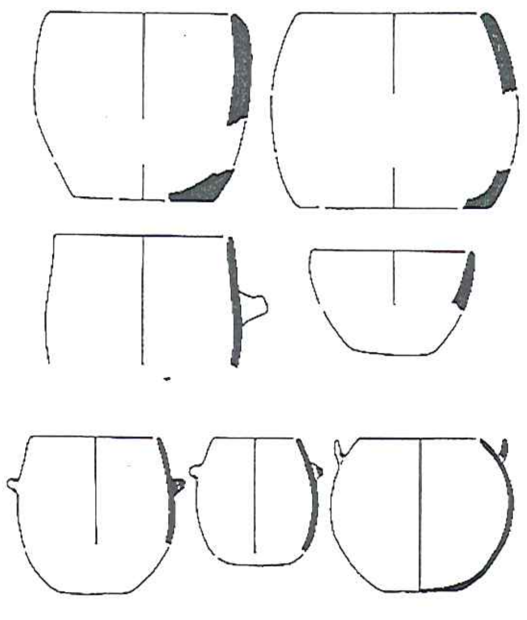

Figure 2. Çatalhöyük, early, thick walled, fibre tempered (top rows) and later, thin walled, mineral tempered pottery (base row).

chaff and/or straw. Handles or lugs are rare, and the larger vessels must have been difficult to hold and manipulate when full. Very few are decorated with "splodges" of brown paint. Mellaart describes the firing as "poor" (1966: 170), the fabric having thick black cores possibly due to a reducing atmosphere followed by rapid cooling in the air (cf. Rye 1981: 116f.). Occurrence was very low. Mellaart found only 300 sherds over seven building levels (Mellaart, *l.c.*). The new, ongoing excavations at Çatalhöyük confirm these low figures for the early levels (Last 2005). Although Mellaart describes this pottery as having fulfilled a purely utilitarian role, it is hard to imagine that it was pottery that was used routinely in cooking, if only because of its rarity. At the same time, the fibre temper used is advantageous for cooking since reducing thermal shock: the cavities created by the burnt-out fibres resisting breakage of the vessel during repeated heating and cooling cycles (Rye 1981: 34). Therefore, even if these pots were used in the kitchen, then probably just in continuation of and in addition to older practices using perishable containers for cooking, involving "cooking stones" as well. Technological innovations, such as pottery containers, thus were embedded in existing procedures.

At about halfway through Çatalhöyük's history, however, the local situation culminated towards the almost exclusive use and production of a different kind of pottery (Figure 2 bottom row). Experiments or attempts to produce thinner walled, mineral tempered vessels resistant to thermal shock and less heavy to manipulate had been going on for perhaps two or three centuries already, before finally being adopted wholeheartedly around 6,500 cal BC (Last 2005). The preferred clays naturally contained sand, mica or quartz, and were mainly obtained from the rich, alluvial soils of the May and Çarsamba Rivers near the site (Doherty 2007, Camizuli 2008). These fine, sedimentary clays apparently had no need for additional tempering. Also quartz tempered pottery is advantageous to cooking since it has, though less so than calcite, thermal expansion coefficients similar to that of the clay matrix (Kilikoglou et al. 1998). According to Philippa Ryan clay balls disappear from level V onwards at Çatalhöyük (cf. also Atalay and Hastorf 2006: 293).[6] Interestingly, the evidence for basket making is also absent from level V onwards. There seems to have been an inversed relationship between basketry, clay balls, fibre tempered pottery on the one hand, and the emergence of mineral tempered ceramics on the other.

Vessels are now carefully burnished both on the inside and outside surfaces, in order to reduce permeability, and to compact the surfaces helping against thermal shock (Schiffer et al. 1994). The combination of thinner vessel walls and mineral tempers is beneficial to a quicker heating up time of the vessel contents, as experimentally confirmed by Skibo et al. (1989: 131). The new pottery is perfectly suitable to be used over direct heat sources to cook food, and Mellaart mentions the presence of thick, sooty deposits on the vessels (Mellaart 1962: 54). The horizontal lug handles and suspension lugs now standardly applied to the new gear help in moving heated vessels from the fire and back again. Parallel developments occur in the neighbouring Beyşehir-Suğla region ceramics, where similar thin walled vessels with lug handles are tempered with dense, crushed shell particles, another ideal thermal shock resistant material (Rye 1981: 33; Arnold 1985: 23ff.).

The changeover from the older, traditional way of cooking with the aid of "cooking stones" to direct heating has several implications. The new technique makes it easier to process food by boiling and steaming, and requires less effort (no manipulating of heated cooking stones, etc.). In addition, food is boiled more rapidly and less fuel is needed. Tasks can be economised and attention space is won. Heat can be maintained for a long time, where sustained cooking breaks down toxins contained in raw food-stuffs naturally (Arnold 1985: 135). This will have expanded the range of food resources. Arnold supplies a six-page list of toxic constituents of plant foodstuffs that can be reduced by prolonged cooking, including beans, peas, barley, rye, lentils, vetches etc., thus making them more tasty as well (Arnold 1985: 129–134). Cooking in pottery also makes it easier to sustain specific temperatures, and enables a cooking technique such as simmering. At Çatalhöyük, however, Atalay and Hastorf argue that with changing cooking procedures (from stone cooking to direct cooking in pots) "the faunal and botanical evidence does not reflect any dramatic change in what was boiled" (2006: 309), and they conceive the transformation as merely a shift in time management. While this may be the case at Çatalhöyük, it is nonetheless tempting to relate Arnold's summary of advantages of direct cooking and the emergence of strong, light and portable cooking gear to the introduction or adoption of new foodstuffs, or to new ways to make them more tasty and nutritional. An argument that can, of course, be reversed: a desire for tastier food was beneficial to the adoption of innovations made in pottery and cooking.

Generally, and within our new "milky paradigm", the control of temperature, and the quickness to heat up a vessel because of its thin walls while being resistant to thermal shock and the ability to maintain heat at constant temperatures, would also have been advantageous for processing milk. Evershed et al. (2008) assume that – for the Turkish/South Balcanic evidence they gathered – milk was being heated, perhaps as part of its processing into lactose-free food products, where it is assumed that adults were still lactose intolerant. The making of yoghurt, for instance, involves heating the milk up to 80°C, after which the temperature is being reduced to about 40°C and maintained for between 4–6 hours. Also the making of cheese involves heating of milk for a prolonged period in order to coagulate the milk solids into a curd. All these practices need a constant temperature, careful monitoring of the fire and of the vessel contents.

Regulating the heating temperatures for a prolonged time span is more effective with direct cooking on the fire than with cooking stones or baked clay objects. Additional control may be achieved with regulation devices for attuning heat transfer, for instance by stand rings on the pot base, by pot stands, or by means of suspension lugs on the vessel itself. Despite these good preconditions, and despite that the evidence for dairying using pottery at Çatal is there, Evershed thinks it was still "less important" at the site. He states that this accords with the available ageing data for sheep and goat at Çatalhöyük, who were almost all killed as subadults and young adults, a pattern he says is suggestive of a concentration on meat production. If animals were being milked at Çatalhöyük this would have been restricted to sheep and goats (Evershed et al. 2008). Louise Martin argues that the Çatalhöyük cattle are morphologically wild – having the same size ranges as those from Aşıklı Höyük. She suggests that although knowledge concerning animal husbandry and breeding techniques was readily available (as seen with sheep and goats) this understanding was not applied to cattle for socio-cultural reasons, where cattle were rather used for hunting, feasting and ritual display (Martin 2002: 215).

NW Anatolia

At about the critical timeframe of the 65th century cal BC with all these changes going on the Konya area, the first Neolithic settlements contemporary with Çatalhöyük are founded in NW Turkey. Also the NW Anatolian pottery groups are thin walled and mineral tempered and have well burnished in- and outside surfaces. More important is that in the Northwest attitudes towards manipulation and use of cooking pots are shared with Çatalhöyük. The triangular lug handles occurring in pairs, and smaller, perforated knob handles occurring in fours connect Çatalhöyük with sites such as Demircihüyük, Barcın Höyük, Menteşe, Fikirtepe, Pendik and Ilıpınar (Figure 3).

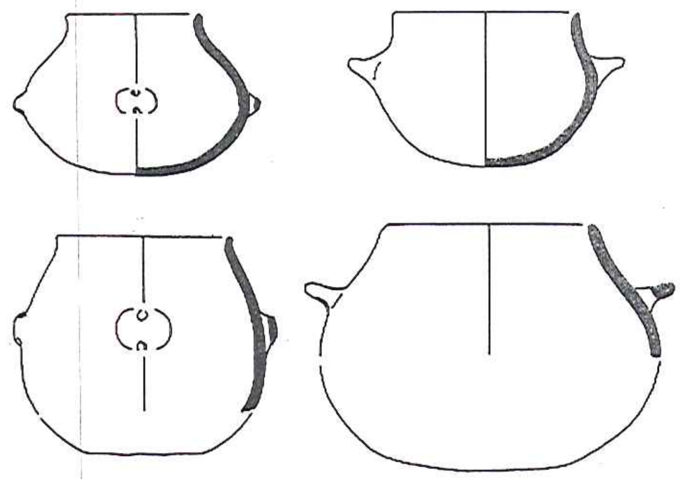

Figure 3. Fikirtepe and Pendik Late Neolithic pottery.

There is no doubt that these morphological and technological concepts were transferred to the Marmara area from an original centre being Çatalhöyük and its hinterlands, where Neolithic life had been going on for a near 1,000 years (Thissen 1999). Within the Marmara region, ceramic knowledge is truly shared, to the extent that the pottery from all these sites is all but interchangeable. Surface treatments and firing of pottery are very similar, and the same operational chains have structured vessel manufacture. Handles, for instance, are attached to vessel walls by means of scoring the contact areas, and the rudimentary handles are modelled and secured to the walls by additional slabs of clay. Manufacturing details suggesting parallel methods or similar *chaînes opératoires* interlink all the known NW Anatolian sites in the later 7th millennium cal BC. In addition, all the Northwestern sites' earlier ceramics were preferably calcite tempered, a feature that is absent from the Çatalhöyük pottery. The calcite was deliberately added: the crushed particles are angular, well sorted and of similar size. We can be sure that potters were aware of the beneficial characteristics of calcium tempers for cooking vessels. Calcium has a similar expansion rate as the clay matrix and so is well suited to be used as a tempering agent in vessels used on the fire (Rye 1976; 1981: 33). Hoard et al. (1995) have argued that the addition of calcium or limestone as a temper allows for thinner walls and more globular shapes, both factors increasing thermal shock resistance as well. All these identical technological variables hint at shared functional purposes and a similar use and manipulation of specific vessel categories over the wider area. The evidence from Ilıpınar, the only site at present where occupation continued into the Early Chalcolithic, shows that this cohesive tradition consists down to Level VI there, dated to about 5,700 cal BC, suggesting unchanged attitudes towards vessel use and vessel manipulation.

Before Evershed's and Türkekul Bıyık and Özbal's discoveries of milk residues in sherds from NW Anatolia, archaeozoologists Lionel Gourichon and Daniel Helmer came to similar outcomes starting out from entirely different research procedures. Analysing the animal bone from the contemporary Menteşe site, which is in walking distance from Barcın Höyük, they point out that in the basal strata cattle herding was predominant, only to shift to sheep herding in the later levels (2008: 439). The same dominance of cattle we find also at Fikirtepe, while the picture for the later Menteşe deposits ("Menteşe middle" and "Menteşe upper") tends towards corresponding more with Ilıpınar phases X–IX, where sheep/goat are prevailing (Buitenhuis 1995; 2008: 208) (Figure 4).

Gourichon and Helmer argue that the observed kill-off patterns in the Menteşe bone suggest milk exploitation, as indicated by the slaughtering of milk lambs (less than 3 months old), and simultaneously the slaughtering of ewes (ages 3–4 years onward), which they see as two complementary strategies in flock management. In cattle they observe a pattern where milk calves were slaughtered exactly at the moment they would be suckled at ages between 6–12 months old. The French scholars interpret all these results as strong arguments in favour of a post-lactation slaughtering, suggesting a husbandry practice geared toward dairy production (Gourichon and Helmer 2008: 439f.).[7]

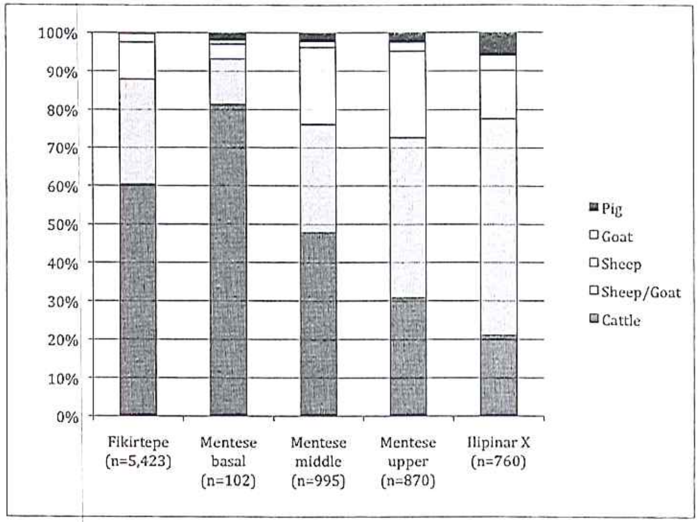

Figure 4. Domestic animal bone distribution in Late Neolithic NW Anatolia (data after Gourichon and Helmer 2008; Buitenhuis 1995: 155f.).

Preliminary results

In order to buttress the recent work done in the field of Neolithic dairying, during the 2009 excavation season at Barcın Höyük we started to sample a good quantity of Late Neolithic pottery to use in an extensive residue programme. In view of the temporal and material culture correspondences with Menteşe, we expect Barcın to yield similar results in animal husbandry and dairy production.

For the current project we have now processed 137 sherds from Barcın, covering the 2nd and 3rd stage of the local Late Neolithic sequence, which can be dated to the 63rd–61st centuries cal BC.[8] The extracted organic residues that were preserved in the porous matrix of potsherds are mainly lipids and their degradation products. The important biomarkers in the extracted organic residues are detected and identified by High Temperature Gas Chromatography (HTGC) and High Temperature Gas Chromatography-Mass Spectrometry (HTGC-MS). The possible origin of the extracted lipids and their degradation product especially from animals can be assigned by determining the stable carbon isotope ratios ($\delta^{13}C$) of palmitic and stearic fatty acids by Gas Chromatography-Combustion-Isotope Ratio Mass Spectrometry (GC-C-IRMA). The probability of finding organic residue in ancient pottery is only about 20–25%. A considerable number of potsherds have to be analyzed in order to obtain statistically meaningful results. Barcın Höyük sherds were no exception and out of 137 samples 33 (24%) yielded enough organic residue from which stable carbon isotope ratios could be determined (Figure 5). All of the extracted organic residues were of animal origin and similar to previous data reported by Türkekul Bıyık and Özbal (2008) as well as by Evershed et al. (2008). 18 of them (55%) were milk lipids. 11 (33%) samples yielded lipid residues that originate from the adipose fat tissues of ruminant animals. Only 4 (12%) samples were porcine adipose fat. The result complements the faunal analysis where the majority of the bones were cattle and sheep. There is no evidence for domesticated pig in Barcın, although excavations did recover some wild boars.

These results clearly indicate that dairying was an important component of the Barcın diet. The results, however, do not provide insight as to whether the Barcın farmers could consume raw milk. The DNA analysis of Neolithic human bone samples to determine if they contained the necessary mutation for lactose tolerance is still not conclusive. However, we can safely claim that Barcın people were consuming milk as a secondary product in the form of, possibly, yoghurt, cheese and maybe even butter. It is well established that no milk lipid residues survive in pottery used only for storage. A thermal process of heating the milk to about boiling temperature as known from yoghurt or cheese production is necessary for lipids to impregnate into the fine pores of pottery. Such lipid samples were protected from the degradation by microbial activity or environmental factors.

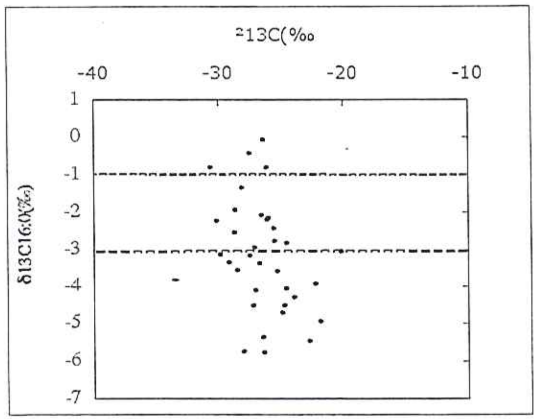

Figure 5. Barcın Höyük 2009 season sherd samples yielding organic residues (n=33). Circled are the samples with milk lipids.

The organic residue samples link up with four out of ten basic-level pottery categories distinguished at Barcın Höyük so far (Table 1; Figure 6).

Basic-level categories	Milk fat residues	Ruminant adipose fats	Porcine adipose fats
Cups	2	1	0
Deep Bowls	3	1	1
Oval Bowls	2	1	0
Pots	11	8	3
Total	18	11	4

Table 1. Barcın Höyük 2009 season organic residue *vs.* Late Neolithic pottery categories.

As expected, given its dominance in the Barcın Höyük ceramic assemblage, the basic-level category of Pots is central among all three groups as well. Within Pots, the various subordinate-level categories (e.g., S-shaped pots and holemouth pots) are equally represented. Both pots with two horizontal lugs and pots with four suspension knobs are present in the milk and ruminant fat groups. Remarkable is the presence of the basic-level category of Cups (diameters between 10–12 cm), occurring both in the milk fat

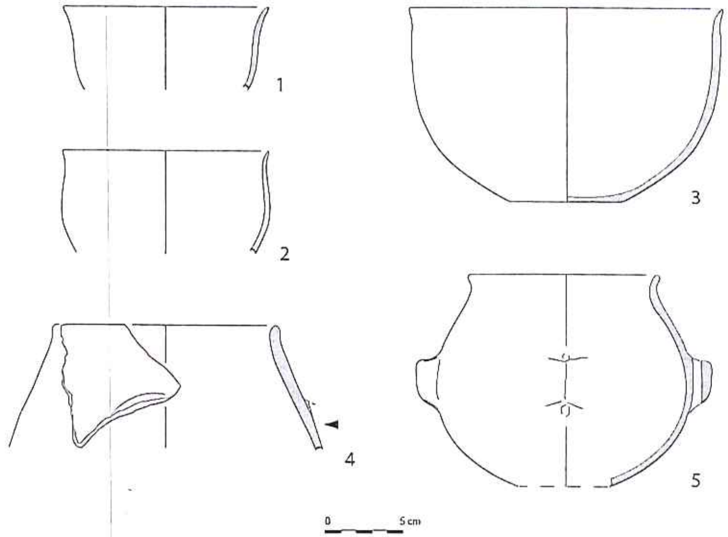

Figure 6. Barcın Höyük selected Late Neolithic pottery categories. 1, 2 Cups; 3 Oval/Deep bowl; 4 Two-lugged pot; 5 Four-lugged pot.

and in the ruminant fat groups. While by their shapes and proportions these "cups" suggest to have been used for drinking, we might want to reconsider their function, now that they are clearly linked up with both milk and ruminant fat residues. Deep bowls occur in all three fat groups, and Oval bowls in two, and they might well have been used for cooking as well, as seems confirmed by bowl bases with sooty deposits on the insides occurring in the Barcın Höyük pottery studied so far. Absent are larger pots with sturdy tubular lugs, but with similar profiles as the normal pots. Also the well-known decorated "Boxes"did not yield any residues.

Outlook

Milk is a reality in the Neolithic of Turkey, and especially in the first farming sites in the Marmara and South Marmara region. It is, however, difficult to rationalize the earliest domestication of cattle and extensive dairying in the settlements of Northwestern Anatolia at this time. Since the regional distribution of residue analysis data is so limited, at present one cannot confidently say whether the extensive dairying of Northwestern Anatolia was part of a broader development or whether this was something initially restricted to this geography. The data do indicate that the Marmara region must have played an instrumental role in dairying, and it might have played such a role in the migration of domesticated cattle to the Balkans exactly because of dairying. Dairying must have had a considerable impact upon society and should probably make us rethink how we conceptualize the Neolithic in the Near East. Since it is also related to the neolithisation of NW Turkey, and since dairying evidence is found in the early levels of early pottery-bearing sites in the Balkans, dairying and human–animal relationships may have been a major force in transmitting ideas and concepts from the Near East to Europe.

The discussion above also aimed to demonstrate that milk processing and dairying are almost by necessity linked with high-level, technologically sophisticated pottery. It is only once new tools had been developed that serious headway could be made in exploiting animals for their milk, and in processing it in palatable foodstuffs that were simultaneously preservable and digestible. The picture gained from these preliminary results is perhaps that at Late Neolithic Barcın Höyük pottery with milk fat residue covers a whole range of vessel types, suggesting that either users were not very particular about specific vessels for milk processing, or rather that milk processing involved a sophisticated technology linked to specific vessel categories and dependent on the dairy produce required. Put otherwise: vessel diversification was partly due to a high-level dairy practice in the late 7th millennium cal BC Marmara region.

Notes

1. The chemical part of the project is carried out by the Archaeometry section of Boğaziçi University, and is being supervised by HÖ and ATB; LT is responsible for the archaeological part, including the sample selection. This project is being sponsored by TüBITAK, the Turkish Science Foundation and supported by the Boğaziçi University Research Fund (Projects 05B505D and 5077). FG and RÖ are directing the Barcın Höyük excavations, which are supported by the Dutch Science Foundation, NWO.

2. Handle zones are good markers of specific vessel categories in the NW Anatolian Neolithic, and are equal in diagnostic potential to rim profiles (cf. for the idea of diagnostic handle zones, Thissen 2001: 3f.).

3. Boundaries are blurred, but a marking point could be set at about Çatalhöyük Levels VII/VI, *c.* 6,600 cal BC. Timing the VI–V shift is only recently resolved quite well (Bayliss and Farid *apud* Bronk Ramsey et al. 2009: 337–340). Commenting upon a series of ^{14}C dates they reach an approximate date for Çatal building 1 being occupied between the latter part of the 66th and the 65th centuries cal BC. The associated ceramics, including those from Building 5 are characteristic for Levels VI–V. Since we assume a knowledge transference concerning pottery making towards the NW, the new Çatal data also provide a good *terminus post quem* for the adoption of the Neolithic life style in NW Anatolia (Thissen 1999). Such a scenario conforms well to the available ^{14}C evidence from the Northwest, where the oldest data from Menteşe suggest settlement during the turn of the 65th/64th C cal BC.

4. Compare the experiment carried out by the Leiden Pottery Department in Romania (van As et al. 2005).

5. Simmering being the technique of cooking food in hot liquids at or just below 100°C.

6. Phillipa Ryan, unpublished paper read at *The 8.2 ka climate event and archaeology in the Ancient Near East* workshop, Leiden, March 19, 2010.

7. Similar patterns have possibly been at work in the contemporary animal bone assemblage of Barcın Höyük (p.c. Alfred Galik, Aug. 2010).

8. Barcın Höyük ^{14}C dates confirm contemporaneity with Menteşe, but largely predate the beginning of settlement at Ilıpınar (Özbal and Gerritsen, *in press*).

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