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# Wool Economy in the Ancient Near East and the Aegean

*Catherine Breniquet and Cécile Michel*

Old Babylonian texts from the first half of the 2nd millennium BC dealing with trade often suggest that Mesopotamia is the land of wool. For scholars who travelled in this area from the middle of the 19th century, it is easy to understand why. The environment allows people to observe numerous herds of sheep grazing in the steppe or desert areas surrounding the Mesopotamian plain. Civilizations of the ancient Near East are supposed not to change over millennia. But this assumption is too short sighted to explain the whole evolution of the wool economy. However, with the introduction of interdisciplinary studies in archaeology and history, we know that herding practices or uses of wool in Antiquity are synonymous with cultural behaviors which need to be understood on scientific grounds in a dynamic perspective. The same situation can be observed in the Aegean, although the historical frame is shorter.

Till now, despite the fact that textile research in Europe is an interdisciplinary and international discipline, it is paradoxically carried out mainly by scholars in isolation, in universities, museums, and laboratories. During the past decade, new analytic methods have been developed in the area of textile research and the archaeology of sheep husbandry, as exemplified by the 2010 European Science Foundation (ESF) Exploratory Workshop organized by M. Gleba and C. Solazzo, 'Archaeology of Sheep Domestication: New Approaches', which dealt with European historical periods.[1] Therefore, it now appears essential to explore the origins and beginnings of the wool economy in the Mediterranean and the ancient Near East, where, remarkably enough, we lack any knowledge of the stages leading up to large-scale textile manufacture. The data provided by archaeology, archaeozoology, and philology needed to be brought together into a united historical perspective. There was in fact no prior systematic study of the multiple aspects of wool in the economies of the various Near Eastern and Aegean states from the beginnings of writing until the end of the 1st millennium BC. Scholars never before had the opportunity to compare their approaches and their conclusions. One of the main goals of the conference, whose proceedings are published in the present book, was thus to make colleagues aware of the enormous potential of such an interdisciplinary approach, which can revitalize historical research on technology, economy, and the environment in ancient Near Eastern studies.

[1] The proceedings of this conference remain unpublished.

As the result of the ESF Exploratory Workshop held in November 2012, this publication intends to contribute towards a better understanding of the role of wool and woollen textiles in ancient economies.

## 1. Chronological, historical and geographical frame

The history of the Ancient Near East covers a huge chronological frame, from the first pictographic texts of the late 4th millennium to the conquest of Alexander the Great in 333 BC. During these millennia, different societies – from the first urban ones to the universal empires of the late first millennium – develop in a changing landscape where sheep (and their wool) always played an important economic role. We choose to explore the place of wool in the economy, paying attention to the construction of the so-called 'Wool Revolution'.[2]

Wool was originally used for weaving and probably controlled by the first urban institutions, but, as a novel material, it also became a form of payment, given to workers as such, and exchanged within the framework of a primitive market economy. Wool became a kind of currency in a pre-monetary economy. This 'wool revolution' had less impact in the Bronze Age Aegean, where linen kept its importance along with wool, but there too, wool was produced in large quantities, as evidenced by Linear A and B tablets.

If Mesopotamia in the 3rd millennium BC has been called the birthplace of wool, this is because of local socio-economic developments that led to its increased production, as well as improvements in techniques for the manufacture of woolen threads and fabrics. In this region, workshops first began to produce fabrics and clothing in unprecedented quantities. By the late 3rd millennium BC, wool had become the main woven material and was distributed to male and female workers as a subsistence ration. The ESF Exploratory Workshop analyzed the impact of this transformation, which radically altered the natural environment, the political landscape, and international trade networks, across the Near East to the Aegean. Its main focus was economic aspects of wool production.

The first textiles were made from vegetal fibres,[3] the most important of them flax, cultivated from the beginnings of agriculture (around 9,000 BC).[4] Flax textiles remained in use till the end of the 1st millennium BC.[5] The exploitation of wool began as a consequence of the domestication and selective breeding of livestock. In southern Mesopotamia, with the onset of urbanism in the late 5th and 4th millennia BC, archaeozoological remains suggest that husbandry of pigs and cattle began to lose ground to nomadic goat and sheep-herding. This development should be understood within the context of the economy of Ubaidian chiefdoms, in which sheep became the animal of prestige.[6] Wool fibres implied new techniques: spinning with the spindle, whorl, and distaff; weaving using the vertical weighted loom; felting. Use of animal fibres brought with it new forms of management, such as quotas of yield and production: our challenge was to describe and document this process.

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[2] McCorriston 1997. Huot 2000.
[3] Rast-Eicher 2005.
[4] Helbaek 1959. Van Zeist and Bakkers-Heeres 1974.
[5] Waetzoldt 1980.
[6] Breniquet 2006. Sudo 2010.

According to cuneiform documentation, large-scale textile production began during the second half of the 3rd millennium.[7] Domestic production went on, but only women wove at home; spindles and spindle whorls became a female gender marker among grave goods.[8] In Mesopotamian institutions and in Aegean palaces, scribes recorded standardized production goals for both palatial wool production and for textile production in workshops. Thousands of textile workers, primarily women and children, were supervised and sustained by the central authorities.[9]

Early in the 2nd millennium BC, international trade in textiles expanded, its profitability depended on the quality of the fleece from which the textiles were produced.[10] Isotopic analyses allow the possibility of following the growth of some herds;[11] diversification of wool-bearing sheep breeds can also be detected. In southern Mesopotamia, palaces employed merchants to market the wool produced by their herds; private entrepreneurs also engaged in such commerce.[12]

During the 1st millennium, wool and dye products were important elements in exchange networks and wool could be used to finance international trade.[13]

The opportunity to work in a diachronic and comparative perspective with the ancient Aegean world (both Minoan and Mycenaean worlds) where sheep and wool were also predominant gives a perfect framework for the discussions.

## 2. Sources and methodologies

The main challenge of this joint work was to link different sources and methodologies. This is possible for recent excavations: among these for example, Arslantepe in Turkey and Ebla in Syria whose results are developed here. However, such examples are scarce. We could expect textiles or raw materials to be the main source of our knowledge. But unfortunately, as everybody knows, wool like all the organic materials is rarely preserved in archaeological soils. Thus, woolen archaeological samples are too scarce to be the sole foundation of this research. Other sources such as the written documents, mainly economic texts related to exchanges or ration system, can be used in this perspective, even if these documents are often elusive. But this is not enough with regards to the evolution of field and theoretical archaeology. Knowledge from animal bones collected on the sites, from experiments with ancient material or ethnographic evidence, or from iconographic data can illustrate one aspect of wool economy or another. For example, in the ancient Near East, textile remains are rare and fragmentary, with a few exceptional cases of preservation, such as at Chagar Bazar and Tell Shioukh Fawqani, both in Syria.[14] Microscopic examination of these fragments, as well as of textile imprints on pottery, sealings, and tablets (such as at Khirbat al-Mudayna[15] in Jordan), or of mineralized textiles on metals, together with a sound knowledge of spinning and weaving techniques, allows identification of fibres and how they were manipulated. These remains provide new sets of data on such matters as the textile

[7] Waetzoldt 1972 for a famous study.
[8] Michel 2006 and Michel 2013 for a domestic textile production during the first centuries of the 2nd millennium BC.
[9] Lambert 1961; Maekawa 1980.
[10] Veenhof 1972; Michel and Veenhof 2010.
[11] Kijas *et al.* 2012.
[12] Charpin 1982.
[13] Graslin-Thomé 2009.
[14] For Chagar Bazar, see Breniquet *et al.* forthcoming.
[15] Communication by E. Andersson Strand.

economy, techniques, quality, decoration, and dyes. The results can then be compared to the data provided by texts that show sources, materials, and prices.

Thus, the 'wool revolution' and its impact on societies can be observed from the Near East to the Aegean in a multitude of sources and involving many different specialists: historians of texts and images, philologists, archaeologists, craftspeople testing techniques and textile tools, archaeozoologists. We chose to invite these many different specialists. The main goal was not to illustrate one source by another, but to link them within the framework of a multidisciplinary approach. Participants were asked to present systematic studies of the multiple aspects of wool in the economies of the various Near Eastern and Aegean states from the beginnings of writing until the end of the 1st millennium BC.

The workshop and its publication are driven by two complementary concepts that we tried to combine: the chronological and the multidisciplinary approach. Thus, the present book starts with an overview of the first evidences and the first uses of wool, together with a presentation of the various methodological approaches. Then, several chapters deal with the system of wool rations and the trade in wool. And the last chapters deal with wool in institutionalized economies.

## 3. First evidence, first uses of wool and methodological approaches

The first chapters may be considered as methodological, highlighting the vast knowledge which is necessary for textiles studies (generally speaking), and the difficulties encountered by the confrontation of philological and archaeological data in early Mesopotamia.

Because of the poor state of the rare textile remains from Mesopotamia, the very well preserved Hallstatt sample of woolen textiles and fleeces represent a good case study. Despite the chronological and geographical differences, A. Rast-Eicher's analyses are highly useful in terms of comparison. They show a new methodological approach of ancient textiles which is now more accurate than the previous model held by M. Ryder on ancient fleeces. The latter model is still in use in Mesopotamian archaeology.[16]

An overview of the archaeology of wool in this area shows how human choices and environmental constraints act together (C. Breniquet). Such an interdisciplinary approach remains difficult because it is mainly based on ancient excavations. It is thus forced to rely on old reports which used traditional interpretations of archaeological objects, texts and iconography. Some wrong readings of archaeological records, especially in iconography, may complicate such a study. The *chaîne opératoire* helps to reconstruct ancient techniques, as shown by craftspeople and experimental archaeologists.

The role of the archaeozoology for understanding the development of the wool production needs to be emphasized. It shows the existence of two sheep varieties in the Chalcolithic Near East – large sheep with spiral horns and a hairy coat, and small sheep with coiled horns and a woolly coat – which are both found on images. A fat-tailed sheep is also attested by iconography since the Late Uruk period. As it is not possible to correlate directly bones and fleeces, iconography is integrated into the scientific approach as a mean of confirmation (E. Vila and D. Helmer).[17] The second variety of sheep was preferred in the 3rd millennium and onwards in Northern Mesopotamia.

[16] Ryder 1993, 2007.
[17] Vila 1998, 2002.



*Practice of spinning. Scholars at work (from left to right): W. Sallaberger, M. G. Biga with A. Rast-Eicher P. Charvat, B. Palme (in the back), Ph. Abrahami, E. Andersson Strand, B. R. Foster, M.-L. Nosch*

Experimentation and ethnoarchaeology also has an invaluable role to play, but these disciplines remain less used than in European archaeology. E. Andersson Strand, from the CTR, has developed many methods to make invisible and perishable artefacts (wool and textiles), in archaeological contexts, visible to the scientific community.[18] This approach was developed with the material from Arslantepe, a newly excavated site in Turkey which provided tools and textiles from the Chalcolithic period. A cross-examination of the material by archaeologists and skilled craftswomen has shown a change of size of spinning tools from at the beginning of Period VIB2 (Early Bronze Age, c. 2900–2800 BC), and thus in spinning practice. Furthermore, the assemblages of loom weights witnessed a change in weaving technology allowing the production of finer fabrics (Romina Laurito, Cristina Lemorini, and Assunta Perilli).

To emphasize the importance of such experimentation, during the conference, an unsual experimental session was presented by two colleagues (E. Andersson Strand and A. Rast-Eicher). They brought different sheep fleeces and various spindles and showed how to use them, so that most of the participants could experiment with them. This experimental session demonstrated, better than any explanation, the technical skill involved in spinning and how time consuming the activity was within a traditional context of production. It made visible the difference between wool and goat hair qualities. It also made clear the different stages of cleaning and preparing wool for spinning, excluding the existence of carding for the period covered by the conference, because carding involves very specific tools which appear much later.

Documentation is renewed with the first written sources, the proto-cuneiform texts from the end of the 4th millennium BC. Archaeology plays a less important role because most of the excavations are old and badly documented (with the exception of Arslantepe and Ebla as already noted). The 3rd millennium sources were analyzed according to different complementary topics: translation of technical terms involved in wool craft, in names of clothes or fabrics), relationship to the power (wool for the king, wool distributed to the court), economic perspectives (frequency of wool deliveries in the ration system, monthly or annually, wool as a currency or measure, wool

[18] Andersson Strand 2012.

converted into silver, wool for exchanges, wool as a source of wealth, etc.), and organization of the labour (craft specialization, gender, etc.).

These uses of wool, as well as the control of new technologies for fabrics and clothes, and the existence of specific weights for wool, [19] are parts of the economic and social mechanisms of the first urban states. Such conclusions can be drawn from the case study of the archaeological material and the textual evidence of the well-known Syrian site of Ebla dated to the second half of the 3rd millennium BC (L. Peyronel; M. G. Biga).

Such uses can also be found in the Aegean world, but it remains difficult to be sure whether wool and related techniques (like dyeing) were initially closely connected with institutions. Generally speaking, writing a new synthesis of the role of wool and dyeing in the Aegean world is beyond the possibilities offered by this workshop.[20] A few comments can be made for future researches. Wool is attested in Crete at the end of the 4th millennium. It starts to be used for clothes during the second half of the 3rd millennium (P. Militello).

## 4. Trade, exchange and the ration system

Since the first urban cities of the late Uruk period, the status of wool changed, or at least became clearer (P. Charvat).[21] Wool was one of the commodities appearing most frequently as a means of payment, given to the workmen. The well-known Mesopotamian ration system is attested for the first time.[22] The link between wool and power (chiefdom, royalty whatever its name) is also documented by the first written sources: wool and woollen textiles are collected as taxes, stored, redistributed to the people of the court, and of course are involved in long-distance exchanges.[23]

With the Akkadian period (24–23th centuries), another step was reached. Wool became a raw material for increasing industrialization of commodity production (B. Foster). This interesting economic aspect has to be understood within the framework of a changing society where kinship relations become less important than previously, allowing the emergence of new social groups. The growing production and use of wool also increased the part played by women and herdsmen in Mesopotamian society.[24] Inspection documents from Tell Beydar (ancient Nabada, 24th century) witness an urban communal management of herds; shepherds were fully integrated into the urban community. At Lagaš and Ur, herds in the charge of nomads are controlled by the temple (W. Sallaberger). The 3rd millennium evidence demonstrates that wool was a *product*, and not just a raw material, whose quality is synonymous of a careful control of the animal herds and breeding, and of a skilled and organized workforce.

At Ebla, in the kingdom of Akkad or during the Ur III period,[25] wool was distributed as part of the ration for various categories of workers, mainly weavers working in large workshops. Such a distribution of salaries in kind (barley, wool and oil) is also well attested in the 2nd millennium sources. For example, the very new Mari textual evidence from the *šakkanakku* period (19th

[19] Ascalone and Peyronel 2006; Zaccagnini 1984.
[20] For a general study see Barber 1991.
[21] Charvat 1997, 2011, after Englund 1997.
[22] Gelb 1965.
[23] Crawford 1973; Edens 1992.
[24] Huot 1997, 536.
[25] Zeder 1994.

century) concerns flocks of sheep, as well as parts of the '*chaîne opératoire*' (production, cleaning and distribution of textiles (L. Colonna d'Istria). Wool rations, which might have been annual, varied according to the social status, the gender and the age of the recipients.

Wool also played a central role in trade in Mesopotamia, Anatolia and the Aegean. Several corpuses of texts and archaeological artefacts have thus been analyzed for the 3rd and 2nd millennia;[26] when dealing with recent excavations, valuable help was also provided by archaeozoology.[27] Wool, as the main commodity in several 3rd millennium corpuses, is used as a means of payment to buy various products; it is even sold in long distance trade. Mari documents from the next period (18th century),[28] as well as other corpuses from upper Mesopotamia and Central Anatolia, provide important data about the wool trade and circulation, both in the institutional and private spheres. Palaces had important needs of wool for the production of textiles to cloth the royal family, the palace population, to distribute as allocations to its workers or to offer to foreign kings. Their textile production was almost exclusively for internal consumption and for diplomatic gifts.[29] However, the surplus of the private contemporaneous Assyrian production of textiles was sold abroad, in Anatolia (C. Michel). Assyrian merchants were also largely involved in the Anatolian local wool trade where most of the wool ended up in the Anatolian palaces or other major households where it was used for textile production (A. W. Lassen).

Old Babylonian texts from Southern Mesopotamian Sippar document the commercialization of the wool produced by the palace sheep.[30] The wool surplus of the palace flocks was given to entrepreneurs who entrusted it to merchants by credit sale contract, which they had to pay back in silver. These transactions concerned very small quantities implying that, as in the 18th century Mari, the palace's surplus was quantitatively unimportant (K. de Graef).

The Mycenaean period (15th–13th centuries, as shown by the Linear B palatial archives), is also well characterized by the importance of wool production and its use in the palatial economies.[31] However, the documentation is biased because Linear B documentation is overwhelmingly found in palatial contexts. So, such an important use of wool has to be also explained regarding to the different parts of the Mycenaean territory (F. Rougemont).

The organization of the production seems to vary according to the site considered and the nature of the discoveries of the concerned areas. The Mycenaean texts present, as the Mesopotamian sources, philological and archaeological difficulties. However, the combination of different sources, allow the reconstruction, on scientific basis, the organization of sheep breeding (F. Rougemont) and the labour and consumption associated with wool (M.-L. Nosch). It is clear that wool is an important part of the Bronze Age Mycenaean palace economies. Palaces mobilize hundreds of men for managing the sheep flocks and the plucking of wool, and set annual production targets for groups of women workers in villages, characteristic of ration system, or *corvée* work.[32] Sheep and wool are parts of the wealth of sanctuaries. Some smaller quantities of wool are allocated as 'donations' to divinities.

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[26] Peyronel 2004 for the historical periods. Matoian and Vita 2009 and Sauvage 2012 for Ugarit.
[27] Helmer, Gourichon and Vila 2007.
[28] Most of the texts from Mari dealing with wool have been gathered by Durand 2009.
[29] Rouault 1977a and 1977b.
[30] Charpin 1982.
[31] Killen 1964. Rougemont 2009.
[32] Nosch 2009.

A peculiar link, attested by archaeology and epigraphy, between the Levantine coast and the Aegean has to be stressed. It concerns international exchanges in the Middle and Late Bronze Age in Mediterranean: textiles, dyes (purple) and probably non-local metals found in the Near East are concerned (V. Matoïan and J.-P. Vita). The introduction of purple to dye woollen fabrics may be already attested around 2000 in Crete, on the basis of the discovery of numerous crushed murex shells (P. Militello) among other possible archaeological evidence.[33] Thus, even if connections between the first purple-dye experiments and palatial institutions remain unclear, this technique for dyeing could have originated in Crete. As in the Mycenaean palaces, crossed analyses of archaeological and textual evidence from Ugarit on the Levant coast show that textiles and the clothing industry played a significant role in the economy of the kingdom (V. Matoïan and J. P. Vita). The organization of the collection of wool and of the textile workers in the 14th century palace of Nuzi, a site located east of the Tigris, echoes the Mycenaean ones.[34] There, texts detail the dyeing processing of wool as well as the many colors of this natural raw material. Wool served as a mean of payment both for purchases and for wages; it could be loaned, and is occasionally found in inherited goods (P. Abrahami).

## 5. Wool in institutionalized economies

From the second half of the 2nd millennium and on, Assyrian and Babylonian states show all the characteristics of mature institutionalized economies. Middle Assyrian sites, such as Armannu or Dūr-katlimmu (13th century), produced archives showing state-run sheep farms which production in wool was made into textiles in workshops run by state dependents. These workers received wool both for work-assignments (*iškāru*), and for clothing (N. Postgate). The textiles produced by these workshops were destined for the king's family, palace staff and the army. In parallel, the surplus of private textile production was still commercialized. Thus, the household of Babu-aḫa-iddina at Aššur, organized textile production using dependent female workers as work-assignments. This household was also involved in long distance trade, sending textiles to the Levant. The Middle Assyrian sources allow us to review the technical terminology of wool and goat hair, the production processes and workers, and the range of attested woolen products, including felt and carpets. Curiously enough, the Assyrian documentation of the Ist millennium, less numerous, documents about the same aspects.

Sources from the Neo-Babylonian period belong mainly to temple archives and document the economic and administrative organization of these huge institutions. Wool played a crucial role in the economy of the Ebabbar at Sippar:[35] The surplus of its production represented a great source of income for the temple.[36] However, there are also a number of private archives belonging to families linked to the temple; some of these archives found at Sippar, show that sheep husbandry had a very high income: a herd of 36 sheep was enough for a whole large family (S. Zawadzki).

The last paper by F. Joannès deals with fabrics and clothes in wool and other raw materials during the Achaemenid and Seleucid periods. At that time, clothing was still a sign of cultural

[33] The most up-to-date studies on purple have been written by Alberti 2007 and 2008.
[34] Rougemont forthcoming.
[35] Zawadski 2002.
[36] Zawadzki 2006.

identity: clothes in religious context occurring in the documentation of the temples differed from the garments attested by the dowry inventories related to marriages contracts.

## 6. Perspectives

Our main goal has been to reconstruct the processes that led to the first form of industry in Antiquity, in both Near East and the Aegean, in the light of archaeological and historical data. These syntheses by millennia and areas show however that we were not able to cover the whole field of the initial topic. For example, the Hittite documentation has not been analyzed. In addition, the archaeological data for the 2nd and 1st millennium have not really been covered. We did not explore the sacred role of the fabrics nor the role of wool in temple economy (gifts for deities, possessions of temples, etc.). This can be explained in several ways. Firstly, textile studies imply a vast knowledge in different domains, needing a multi-disciplinary approach and comparisons with different cultural areas. This means that scholars should have a specific formation which is quite uncommon in our academic field. We must point also to the fact that documentation is very scattered in the literature: numerous papers or books need to be synthesized. A systematic approach to the ancient craft of textiles, via archaeology, texts and iconography, by involving all relevant specialists in highly specialized, collective projects, will yield a new comprehensive picture of the economic and cultural impact of textiles and textile manufacturing on society. Another long-term perspective would be to draw comparisons with Egypt. The hieroglyphic texts and images were produced by the elite who wore and used mainly linen textiles, but common people certainly spun and wove wool for their personal use. The western bank of the Nile was a large boggy area in which flocks of sheep might have been numerous.

This exploratory workshop and its publication have great potential for application to other crafts and material culture studies of the ancient Near Eastern world. International cooperation promoting increased exchange between research centres and creating a European network of researchers on textiles based on a wider perspective are highly desirable. Furthermore, the research will become embedded into the teaching activities of the institutions involved. The numerous archaeological and written sources from the ancient Near East and the Aegean give an enormous amount of data on wool, textile crafts, and clothing and allow the development of original research projects for various periods and areas. The project must be carried forward on a broader basis, so we hope to consolidate the approaches of archaeology and philology to develop new areas for collaboration, especially in field research. A systematic approach to the ancient craft of textiles, via archaeology, texts and iconography, by involving all relevant specialists in highly specialized, collective projects, will yield a comprehensive picture of the economic and cultural impact of textiles and textile manufacturing on society.

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