

## CHAPTER 8

# PASTORAL SYSTEMS AND ECONOMIES OF MOBILITY

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### INTRODUCTION

Domesticated sheep and goats appear in the Mesopotamian archaeological record as early as the eighth millennium BC (Hesse 1997: 141). Over the ensuing millennia, increasingly specialized and institutionalized forms of animal husbandry can be identified, especially with the emergence of large-scale, centrally administered economies during the Uruk period (see Green 1980; McCorriston 1997; Kouchoukos 1999). By the third millennium BC (the Early Bronze Age), animal husbandry was firmly established as a major component of the economy in both northern and southern Mesopotamia. The systems of pastoral production operating in Bronze Age Mesopotamia were organized at a variety of different scales and according to a range of economic strategies. Small-scale, village-based herders grazed their animals in the immediate vicinity of their settlements, either within the agricultural zone or immediately beyond, while larger, institutionally managed herds often had to be taken further afield in search of pasture. At the same time, groups of highly mobile, nomadic pastoralists traversed the landscape, maintaining varying forms of social, economic, and political interaction with their settled neighbors. At all levels, however, sheep/goat herding and cereal cultivation were practiced in close proximity to one another, making use of intermingling and overlapping territories. These two basic forms of production complemented one another economically and were often closely integrated in terms of daily practice and short- and long-term planning.

One major distinguishing factor was the need for mobility. Across the Mesopotamian region, fluctuations in the availability of water and pasture have tended to encourage some degree of daily or seasonal movement among sheep and goat herders. Crop cultivation, on the other hand, ties its practitioners more closely to specific plots of land, and this usually means that at least some proportion of the population remains sedentary for significant portions of the year. From a cross-cultural perspective, there is no justification for assuming the existence of a universally applicable dichotomy between sedentary agriculturalists and nomadic pastoralists. Ethnographic and historical sources provide ample testimony to the many different forms of mobility that are possible and to the range of agro-pastoral combinations that have been practiced in the Near East and in other parts of the world throughout history (e.g. Irons & Dyson-Hudson 1972; Équipe Écologie 1979; Barnard and Wendrich 2008). The evidence from ancient Mesopotamia indicates a complex and shifting economic and socio-political landscape within which both settlement-based and nomadic herders played a key role.

The goal of the present chapter is to provide a broad overview of the different forms of pastoral production that were practiced in Bronze Age Mesopotamia, to delineate the role of mobility within these different pastoral systems, and to show how computer modeling can deepen our understanding of the intersection between pastoral and agricultural economies in Mesopotamia. Specifically, this chapter provides an introduction and context for Chapter 12, which presents simulations of sedentary-pastoral interactions. The chapter begins with a discussion of the sources available, emphasizing the difficulty of using archaeological evidence alone to investigate herding practices and mobility patterns. The next section uses these sources to reconstruct, as far as possible, the outlines of the pastoral systems visible in Bronze Age Mesopotamia. Building on this foundation, I then move on to a discussion of mobility, both as a general herding strategy and as a long-lived feature of the socio-political landscape in Mesopotamia. The chapter then closes with a look at several features of the broader agro-pastoral economy that are particularly amenable to investigation through computer modeling.

# PASTORAL SYSTEMS & ECONOMIES OF MOBILITY

## SOURCES

Compared to other components of the Mesopotamian economy - such as agricultural production or trade - the evidence for pastoral systems and mobility patterns is relatively sparse. It does, however, reveal the outlines of a pastoral sector that was extremely heterogeneous, encompassing both large- and small-scale herders and animated by a complex mixture of household and institutional interests. I begin by identifying some of the strengths and weaknesses of each type of evidence - archaeological, written, and ethnographic - highlighting some especially useful or interesting examples.

The most direct evidence for pastoral production strategies is provided by the assemblages of animal bones recovered from archaeological sites. These faunal remains are typically most abundant in trash deposits and in other areas where the remnants of butchery, cooking, and eating activities are preserved. The bones that are preserved do not represent an accurate snap-shot of the entire collection of animals that were being raised and/or consumed at a site during any particular period of time. When analyzed in the aggregate using statistical methods, however, faunal assemblages can provide valuable information about the goals of pastoral production, about management strategies, and about long-term trends in the role of pastoralism within the broader economy. For example, Zeder has used animal bones found at sites along the Middle Khabur river in Syria to track the emergence of a region-wide, specialized pastoral economy over the course of the third millennium BC. She argues that changes in the relative proportions of animal species at these sites indicate a move 'from a broad-based exploitation of both domestic and wild species, to an almost exclusive emphasis on sheep and goat' (Zeder 1998: 62). Stein, focusing on a more local scale of analysis, has used sheep and goat bones from the small site of Gritille in southeastern Turkey to reconstruct herd composition at the site and, thereby, to examine village-level herding practices and production strategies. He argues that the age-sex distribution of the animals at Gritille indicates a conservative, subsistence-oriented herding strategy that can be contrasted with the maximizing, surplus-oriented strategies adopted within contemporary urban centers (Stein 2001: 226-31).

Miller, using archaeobotanical analysis, has focused on the use of animal dung as fuel. She argues that the seeds recovered from burnt deposits on archaeological sites can indicate whether sheep/goats were being taken out to pasture or were being fed by hand. On this basis, she suggests that the ratio of wild seeds to cereal seeds can serve as a proxy indicator for the relative emphasis placed on pastoralism during a particular period (Miller 1997).

Direct archaeological evidence for mobility patterns and, in particular, for pastoral nomads is rare. A number of debates in the archaeological literature have drawn attention both to the difficulty of identifying and interpreting nomadic camps and to the pitfalls of relying on negative evidence (e.g. Finkelstein and Perevolotsky 1990; Cribb 1991; Rosen 1992). Although Danti (2000) has identified several camp sites for mobile groups near the Syrian Euphrates, the presence of mobile pastoralists within the Mesopotamian landscape must generally be inferred from negative evidence. For example, in a series of articles devoted to northern Mesopotamia, Wilkinson argues that the uncultivated zone beyond the limits of hollow ways would have been the preferred grazing ground for local flocks of sheep and goats. On a broader geographic scale, he has also suggested that areas without evidence for settlement and cultivation may have served as 'pastoral corridors' through which groups of transhumant pastoralists led their flocks seasonally to distant grazing grounds (Wilkinson 2003: 121). In both northern and southern Mesopotamia, examinations of settlement pattern data have revealed even larger unsettled pastoral zones that may have been linked to the adjacent agricultural zones through a series of large 'gateway' settlements lying along the border between zones (Wilkinson 2000: 13; Adams 2006: 151).

Some of the most intriguing archaeological evidence for mobile groups in Mesopotamia, however, comes from possible gathering places where nomadic or semi-nomadic groups may have periodically assembled for various social, political, religious, and economic purposes. For example, the so-called *Kranzhügel* or 'round cities' of the western Khabur have long inspired speculation and debate, but a growing number of studies are now identifying these sites as multi-purpose meeting places for mobile populations, rather than densely built-up

## PASTORAL SYSTEMS & ECONOMIES OF MOBILITY

cities.<sup>1</sup> A number of enigmatic ritual constructions along the Upper Euphrates in Syria have also recently been interpreted as gathering places for nomadic groups. Porter, for example, argues that the impressive mounds at Tell Banat played a role in the perpetuation of ancestor traditions that helped create and maintain social bonds among a dispersed population of mobile pastoralists (Porter 2002).

The archaeological evidence sketched above provides some tantalizing hints regarding the role of pastoralism in Bronze Age Mesopotamia, but it is the written material that really demonstrates the centrality of pastoral production within the Mesopotamian economy. Babylonia, in particular, was renowned for the high quality of its woolen textiles, and these were a primary export from southern Mesopotamia (Schneider 1977; Veenhof 1995). Detailed information about the textile production process and about the herds of sheep that supplied the necessary wool can be gleaned from the cuneiform record. Documents dating to the Ur III period are particularly revealing. For example, we know that weaving workshops employed large numbers of workers including women and children (Waetzoldt 1972: 94; Wright 1996; Wright 2013). Contemporary documents from the city of Umma, on the other hand, provide valuable data about herding practices, such as fattening and wool collection, and about the size and composition of the herds (e.g. Adams 2006: 149-55). We also have a group of texts that records the day-to-day operation of the animal collection center at Puzrish-Dagan (modern Tell Drehem), where the central government amassed animals acquired as taxes and booty, prior to redistribution (Sigrist 1992; Zeder 1994; Hilgert 1998, 2003).

These rich written sources, which were produced by and for the central institutions, provide very little information about small-scale, household-level pastoral practices. They also seldom demonstrate a direct interest in recording or controlling the movements of groups of mobile herders. This means that, in most cases, we can only piece together scattered, indirect references to such groups and to their mobility patterns. One major exception is the corpus of texts excavated at the city of Mari on the Middle Euphrates. The letters from the site, in particular, provide a fascinating glimpse into the socio-political role of large groups of tribally organized, nomadic herders during the early second millennium BC. These documents also preserve valuable information about the organization of these groups and about their movements across the landscape, whether dictated by economic concerns or political maneuvering. Analogous groups of nomadic pastoralists also played a similar role during other periods of Mesopotamian history, and it is likely that the patterns of mobility and tribal organization visible in the Mari texts can be traced back at least into the third millennium BC (e.g. Edzard 1981; Fleming 2004: 36-9).

Despite the impressive detail that can be gleaned from the archaeological data and from ancient documents, we still lack direct evidence for many aspects of the pastoral systems and the mobility patterns of Bronze Age Mesopotamia. In many cases, therefore, we have turned to more recent historical sources and ethnographic studies for insight. Ethnographic sources are particularly valuable for the light they can shed on household- or village-level pastoral practices and on the fine-scale details of day-to-day decision-making. In the same vein, they often provide valuable descriptions of alternative economic strategies and patterns of local organization that might co-exist with the regimented, maximizing approaches often favored by powerful institutions. We have drawn from a number of valuable ethnographic studies conducted within the Mesopotamian region and in adjacent areas (e.g. Sweet 1960; Barth 1961; Fernea 1970; Ochsenschlager 1992; 2004). We have tried to use ethnographic analogy as sparingly and as carefully as possible, paying particular attention to aspects of the modern socio-political and technological environment that may render comparisons problematic. For example, patterns in the availability of pasture have changed dramatically since the introduction of commercialized agriculture to the region, and the demands of the global economy have, in many cases, transformed the practices of both large- and small-scale herders (Kouchoukos 1999; Alizadeh 2003; Abdi 2003; Potts 2008). At the same time, the mobility patterns of modern nomadic communities have often been interrupted and constrained by the actions of modern nation-states, whether through policies of sedentarization or through restrictions on the permeability of international borders. As far as possible, therefore, we have also drawn from historical studies devoted to earlier time periods, as a means of establishing a broader and more solid comparative base.

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<sup>1</sup> For various aspects of the debate relating to these sometimes densely occupied settlements see Kouchoukos 1999: 387-95; Lyonnet 2008; Akkermans & Schwartz 2003: 259; Wossink 2009; Meyer 2010.

# PASTORAL SYSTEMS & ECONOMIES OF MOBILITY

## BRONZE AGE PASTORAL PRODUCTION

Viewed in isolation, none of the sources discussed above provides a comprehensive overview of the pastoral economy, but in combination they can help us build a more complete picture. The present section will lay out some of the basic facts of pastoral production in Bronze Age Mesopotamia. It begins with an overview of the animals that were raised and the products that were derived from these animals, before moving on to examine the scale of Mesopotamian pastoral production and the range of herding options available.

There are two primary ways of gaining information about the livestock that were raised in Mesopotamia. First, written sources provide access to native terminology and, therefore, to native systems of description and classification. For example, in the Ur III texts from Puzrish-Dagan, the native terms for four species of caprine have been identified and tentatively translated into their modern equivalents: the domestic sheep (udu), the domestic goat (maš<sub>2</sub>), the wild sheep or mouflon (udu-hur-sag), and the wild goat or bezoar (dara<sub>4</sub>). Among the domestic sheep, a number of distinctive breeds have also been identified, including the 'long-fleeced sheep' and three types of 'fat-tailed sheep,' as well as several breeds linked to specific geographic locales, including Shimashki, Lullubum, and Sharumijum (Steinkeller 1995: 50-54). In these texts, animals are also distinguished according to age, sex, and color, and they can be qualified with terms describing their physical state (e.g. 'without fleece' or 'crippled') or their role within the herd (e.g. 'breeder' or 'lead animal') (Steinkeller 1995: 54-6). Similar classification systems also appear in documents from other periods and other cities, though sometimes employing a more restricted range of terms, as dictated by the purposes for which the texts were written. For example, a group of Old Babylonian documents from the city of Ur employs only a narrow set of terms that distinguishes sheep and goats according to the amounts of wool and hair that they are able to produce (Van De Mieroop 1993: 162-5).

The second source of data used to identify livestock varieties in Mesopotamia is animal bones. Although identifications below the level of genus are seldom possible, archaeologically recovered animal bones can be confidently placed within modern systems of animal classification, thereby avoiding some of the uncertainty associated with the interpretation of ancient terminology. Studies of animal bones from Bronze Age sites in southern Mesopotamia are, unfortunately, relatively rare (e.g. Mudar 1982), but comprehensive faunal analyses are available for most recently excavated sites in northern Mesopotamia. When viewed in the aggregate, either at the site or the regional level, these archaeologically recovered bones are especially valuable as indicators of the relative importance of specific animals within the Mesopotamian economy. For example, the faunal records from sites in the Khabur basin show a trend towards greater specialization in sheep and goat husbandry by the third millennium BC (Zeder 2003: 162-4). This trend appears to have been associated with the presence of large areas of steppe pasture accessible from the major tells of the Jazira, as well as with the opening up of large pastoral reserves in areas that had formerly been settled (Wilkinson and Tucker 1995; see Chapter 3).

Across Mesopotamia, sheep and goats were valued as sources of both primary and secondary products. Of the primary products, meat and hides were particularly important. The animals that arrived at the Ur III collection center at Puzrish-Dagan, for example, were redirected to a variety of different recipients, but most of them were ultimately destined for direct consumption as meat (Zeder 1994: 187). Documents from Old Babylonian Ur also include evidence for meat consumption, specifically in the context of offerings and festivals, but the herd compositions recorded in other texts from the site suggest that relatively few animals were being killed for meat (Van De Mieroop 1993: 165, 171).

The most important secondary products were sheep wool and goat hair, both crucial for the Mesopotamian textile industry. It has been argued that a major shift in the textile industry - from linen (i.e. flax-based) to woolen textiles - occurred during the late fourth millennium BC, resulting in a new emphasis on wool-bearing sheep (McCorriston 1997: 520-1). Whatever the precise timing of the onset of large-scale wool production, it is clear that the woolen textile industry had taken on a major role in the Mesopotamian economy by the later part of the third millennium BC. Another important secondary product was milk in its various forms. Information

## PASTORAL SYSTEMS & ECONOMIES OF MOBILITY

about the types of dairy products common in Mesopotamia has been gleaned from a range of written sources, including Old Babylonian lexical lists, Ur III administrative documents, and Sumerian literary texts. Fresh milk and cream were difficult to preserve and appear primarily as offerings to the gods, rather than as parts of the everyday diet.<sup>2</sup> The milk of goats and cows, however, was processed into a number of byproducts, including yogurt, buttermilk, ghee, and a number of different types of cheese (Stol 1993; Reynolds 2007: 179). It is also worth mentioning the importance of manure, a secondary product that demonstrates the close interaction between the agricultural and pastoral economies in Mesopotamia. Archaeological evidence suggests that manure and other settlement refuse were applied as fertilizer to the fields surrounding the nucleated settlements of northern Mesopotamia during the third millennium BC (Wilkinson 1982, 1994).<sup>3</sup> If animals, such as sheep and goats, were also allowed to graze on fallow fields, further quantities of manure would also have been deposited on these fields during the course of the day.

There is currently no way to obtain an accurate measurement of the full magnitude of pastoral activities in Bronze Age Mesopotamia. The figures preserved in a number of texts can, however, give us some sense for the scale of production, as reflected in the quantities of animals managed by state and temple institutions. During the Old Babylonian period, for example, in a single year twelve shepherds employed by the Nanna-Ningal temple complex at Ur 'brought in a total of 7715 sheep and 103 goats for plucking and shearing' (Van De Mieroop 1993: 165). For the city of Umma during the Ur III period, Adams has estimated that the state employed an average of 25 shepherds to manage herds totaling perhaps 10,000 sheep and goats (Adams 2006: 151). Both of these figures pale in comparison to the 66,095 fat-tailed sheep identified by Waetzoldt in the records from Ur III Lagash, leading him to estimate a total of 500,000 sheep and goats for the Lagash region (Waetzoldt 1972: 14, 17, cited by Adams 2006: 151 and Adams 1981: 148).

Clearly, by the later part of the third millennium BC, if not earlier (McCorriston 1997), the institutional powers in Mesopotamia were managing a large-scale pastoral sector. Some aspects of this economic sector were documented in great detail, but evidence for the systematic administration of herding practices is notably absent from the documentation.

'The pattern presented for sheep husbandry reflects, in short, a prevailing concern on the part of the bureaucracy only for delivering the requisite outputs of wool and meat to further industrial processing or to elite consumers and shrines, and a reciprocal detachment and indifference with regard to even the most basic hazards, needs and personal requirements of herd management... The very large quantities of cuneiform records create an initial impression of broad and painstaking supervision. In fact, however, they focus only on a handful of control points chosen to meet a given set of state goals for resource expropriation.' (Adams 2006: 165)

The lack of explicit documentation means that evidence for institutional herding practices must be pieced together from scattered references.

We know that herds of sheep and goats were placed under the control of 'shepherds' (sipa), probably men with previous experience managing herds in the region and, therefore, with knowledge of local pasturelands (Adams 2006: 149). In some cases, several different levels of shepherd, each fulfilling distinct functions and organized hierarchically, can be identified (Van De Mieroop 1993: 169). The shepherds were given herds of sheep and goats on 'consignment' from the palace or the temple, and often they simply added these animals to their own, privately held herds (Adams 2006: 149; Van De Mieroop 1993: 167). The herds were subject to periodic inspection by institutional administrators, and contracts were drawn up to specify the expected returns, whether in the form of wool, meat, hides, or live animals. Any additional productivity would revert to the shepherd.

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<sup>2</sup> It is generally assumed that the fresh milk was part of the animal herder's compensation, and therefore typically not documented in the state archives.

<sup>3</sup> Note that archaeological evidence for manuring in southern Mesopotamia is mainly for the later empires, namely Parthian onward.

## PASTORAL SYSTEMS & ECONOMIES OF MOBILITY

'...in Larsa the palace demanded 80 lambs per 100 ewes...If the shepherd was able to increase the herd by more animals than was required of him, he was allowed to keep them in his own herd. When he was unable to reach that quota he could repay the temple with animals from his own flock, or with payments in silver, or sometimes even with a slave...There was also an allowance for a certain loss of animals, due to diseases, cold, and attacks by wild animals.'

(Van De Mieroop 1993: 168)

The chance to increase his own holdings provided a powerful incentive for the shepherd to take good care of the animals given him on consignment. The number of animals assigned to each shepherd varied greatly: from 38 to 1287 animals at Ur III Umma and from 106 to 1002 animals at Old Babylonian Ur (Adams 2006: 151; Van De Mieroop 1993: 165). Sometimes fodder was provided,<sup>4</sup> but herds were also taken out to graze in nearby pastureland. Whereas in the case of Umma, in particular, evidence for relatively frequent deliveries into the cities by the shepherds argues against the use of distant pasturelands (Adams 2006: 153-4), the animals collected at Puzrish-Dagan and distributed among the Ur III cities came from outside the core of the Ur III state.

As mentioned above the archaeologically preserved animal bones can provide information about herd composition and about pastoral strategies. This type of analysis is based on the creation of a 'survivorship curve' which describes the age at which animals within a given population or herd were killed. Because culling strategies tend to vary predictably according to production goals, the shape of the survivorship curve can indicate whether a herd was being raised primarily for meat, milk, wool, or any combination of these (Payne 1973). For example, sheep and goat bones from the site of Tell al-Hiba (ancient Lagash) in southern Mesopotamia fall along a curve that is typical among herds raised for meat (Mudar 1982: 24-6). Interestingly, because these animals may actually have been brought in from outlying areas to provide meat for city residents, it is possible that they represent only a small proportion of their original herds. The apparent evidence for a herd raised for meat production may ultimately derive from a larger herd that was being raised for other purposes, such as wool production (Mudar 1982: 24-6). In the administrative records from Puzrish-Dagan, we may be seeing a similar situation but from a different perspective. Most of the animals that were brought to the collection center at Puzrish-Dagan were destined for consumption, but many may have been selected from herds that were ultimately structured to serve different production goals. In fact, we know that most of these animals were derived, not from local herds managed directly by the palace or temple, but instead from herds kept far away on the periphery of the Ur III state (Steinkeller 1987: 23-4). In contrast to the Puzrish-Dagan texts, a set of plucking and shearing accounts from Old Babylonian Ur can be used to create a model of total herd composition. In these documents, which list the age and sex of animals brought in for plucking and shearing, rams often outnumber ewes, a composition pattern that fits well with the emphasis on wool production (Van De Mieroop 1993: 165).

Herd composition also provides information about economic strategies in a more general sense. The pastoral production strategies mentioned above (i.e. meat, milk, wool, and meat with milk) are all specialized strategies, but more generalized approaches to herding are also possible. Centralized state institutions, such as those that flourished in Mesopotamia during the third millennium BC, tend to favor specialized economic strategies that are geared toward the maximization of production. Small-scale, village- or household-level production strategies are often more generalized, with a focus on resilience and long-term survival (Stein 2001: 226-31). So far, we have been focusing on the institutionally managed pastoral sector in Mesopotamia, but we must also search for other forms of pastoral production that may have existed beyond the institutional sphere. Stein has argued that studies of herd composition can provide an important means of distinguishing between opportunistic, maximizing strategies and more conservative, resilient strategies in Mesopotamia during the Early Bronze Age. He uses a study of animal bones at the small site of Gritille in southeastern Turkey to argue that villages in the Mesopotamian region often followed economic strategies at odds with the goals of urban institutional powers. More specifically, he argues that the residents of the village at Gritille were not attempting to maximize production in order to produce an exportable surplus; instead, they had adopted 'conservative, subsistence-oriented herding strategies' that were geared toward local meat consumption and herd security.

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<sup>4</sup> Animals were also fattened up for consumption. See Widell (2009) on the office of the animal fattener in Umma.

## PASTORAL SYSTEMS & ECONOMIES OF MOBILITY

Through practices such as controlled breeding and selective culling, they appear to have maintained their flocks at a constant size and composition, rather than maximizing output over the short-term by allowing herd size to expand to take advantage of currently available forage (Stein 2001: 229-31).

In attempting to model village-level pastoral practices in Mesopotamia, we have been forced to rely heavily on modern ethnographic sources. For example, in modern villages groups of households often form herding cooperatives based on kinship linkages or other forms of association. In the village of Tell Toqaan in northwestern Syria, sheep and goats are owned by individual families, but each day, families related by kinship join their herds together into a single large flock. An older boy or a young man from one of the families leads the animals out to pasture for the day (Sweet 1960: 98-9). Tell Toqaan is also visited by groups of nomadic herders who graze their flocks on stubble in the fields.

### MOBILITY

In Mesopotamia the territories exploited for cereal cultivation and pastoral production overlap and intermingle. This feature of the agro-pastoral landscape was most famously explored by Michael Rowton, who undertook a sustained analysis of the complex relationships between nomad and sedentary and between tribe and state in Mesopotamia. In a series of pioneering articles, Rowton developed a set of concepts that continue to exert a strong influence on debates today, if often as a focus for critique. According to his argument, the climate and geography of the region have persistently encouraged reliance on an 'enclosed' form of nomadism in which nomadic pastoralists must make use of pastoral 'enclaves' within the settled, agricultural zone.

'In Western Asia the usual distinction between the realm of the nomad and that of the sedentary does not apply. In many areas the pastoral land was encircled by urban settlement, either partly or completely; the grazing lands visited by the nomads constituted enclaves partly or completely within the sedentary zone.' (Rowton 1974: 1)

For these nomadic groups, two main patterns of seasonal movement are common. Nomads who keep their animals in the steppe during the winter must move toward the rivers in the summer in search of water and pasture. Groups that spend the summer in the mountains, on the other hand, must move to the fringes of the agricultural plains during the winter in search of pasture and stabling. In both cases, the necessity of seasonal migration forces nomadic groups to enter the settled zone on a regular basis, and it forces them, therefore, to engage in some form of interaction with settled groups (Rowton 1973: 252). In fact, Rowton argues that this enclosed form of nomadic pastoralism often leads to a high degree of socio-political integration between nomadic and sedentary groups, resulting in a characteristic 'dimorphic' form of political organization.

More recent studies have cast doubt on several aspects of Rowton's model (e.g. Porter 2000: 422-3; Fleming 2004: 70-2), but the underlying themes of his work still deserve a central role in any discussion of pastoralism in Mesopotamia. We must pay careful attention to the spatial component of the pastoral sector and to the role played by climate and geography in defining distinct and/or overlapping zones of pastoral and agricultural production. We must also allow for the possibility that nomadic pastoralists and sedentary agriculturalists were often joined together within a single social or political unit. In fact, in this respect we need to move beyond Rowton's model by discarding the assumption that nomadism and sedentism necessarily represent distinct and opposing lifestyles and, therefore, distinct groups of people. In many cases, this dichotomy may be misleading. The scant evidence available often suggests the existence of more fluid forms of socio-political interaction, set against the backdrop of a multi-sector economy that assumed different forms and degrees of integration at different scales of operation (e.g. Stein 2001; Wilkinson 2000).

As mentioned above, the evidence for nomadic pastoralists in Bronze Age Mesopotamia is, on the whole, relatively weak. The ritual constructions along the Upper Euphrates (e.g. Tell Banat, Tell Ahmar, Jerablus Tahtani) and the *Kranzhügel* sites of the western Khabur (e.g. Tell Chuera, Tell Beydar) may, at least in part, have served as meeting places, where dispersed groups of nomadic or semi-nomadic pastoralists gathered

## PASTORAL SYSTEMS & ECONOMIES OF MOBILITY

periodically (e.g. Porter 2002; Lyonnet 2008; see also footnote 1). Archaeological surveys in northern Mesopotamia have produced evidence for possible pastoral corridors that would have channeled the movements of mobile herders into and out of the settled zone, either toward the mountains in the north or the arid steppe to the south (Wilkinson 2003: 121). The low agricultural potential of the steppe zone, in particular, has ensured that this broad band of land separating northern from southern Mesopotamia has typically remained relatively free of permanent settlement. Throughout history, this otherwise inhospitable region has, however, been occupied and exploited by large numbers of mobile herders.

Direct, detailed evidence for transhumance patterns during the Bronze Age is rare. The texts from Mari demonstrate very clearly that groups of 'hana' or 'tent-dwellers' were considered an important component of the population ruled by the king of Mari. Although the term 'hana' was somewhat polyvalent, encompassing a range of socio-political overtones, it is clear that many of these 'tent-dwellers' were, in fact, mobile pastoralists (Heimpel 2003: 29-36; Fleming 2004: 148-59). The texts provide little unambiguous information about the movements of these groups (Heimpel 2003: 30-4), but ethnographic sources can sometimes serve as valuable heuristic guides. For example, drawing on an early ethnographic survey of nomadic tribes by von Oppenheim (1939), as well as some more recent ethnographic studies (e.g. D'Hont 1994), Streck has attempted to identify the territories traversed by specific transhumant groups that appear in the Mari texts (Streck 2002: 163-68).

Numerically, these mobile pastoralists appear to have represented a significant component of the population within the Mari kingdom, but they almost certainly would not have travelled together *en masse* during their seasonal migrations. Unfortunately, the texts provide little information about the typical size of the migratory group. A range of ethnographic studies have demonstrated that the size and composition of nomadic groups can vary significantly from year to year and season to season. For example, in a compilation of data from nomadic-pastoral societies in the Middle East, Tapper identifies several organizational levels that often play a role in nomadic group formation (Tapper 1979). The primary 'herding unit' might comprise only a few households or tents, but these herding units will typically join together into a larger 'migratory unit' (e.g. 20-50 tents) during the seasonal migration. In some cases, there may be an agreed upon optimal herd size that structures decisions regarding the composition of the basic herding unit (e.g. Swidler 1972), but the makeup of the herding unit is often extremely fluid, with individual households moving in and out of herding units according to circumstances. This ability to adjust group size and composition to suit current circumstances allows many nomadic groups to respond in a flexible way to environmental conditions and/or to changes in the economic or political climate.

Because nomadic groups are highly mobile and because they often maintain far-flung social and political relationships, they can play an important role in short- and long-distance trade (Khazanov 1984: 202-212). Of course, nomads are infamous for their ability to disrupt lines of trade and communication (Rowton 1981: 33-4), but they are also well placed to facilitate the exchange of both staples and luxury goods. The pastoral nomads of Bronze Age Mesopotamia specialized in the raising and exchange of sheep and goats, and they almost certainly traded with settled groups for a range of other goods. Although there is only rare evidence in the Mari texts that nomadic groups participated directly in caravan trading (Rowton 1981: 33; Streck 2002: 172-4), it is highly likely that they still played a major role as middlemen in wide-ranging trade networks.

The most suggestive evidence comes from archaeologically recovered settlement pattern data. During the third millennium BC, the distribution of archaeological sites in northern Mesopotamia suggests that trade between city-based agriculturalists and pastoral nomads may have played a central role in defining the overall settlement pattern. Surprisingly, many of the largest sites in the region are located in a marginal zone, well to the south of the prime rain-fed agricultural land (Chapter 3). As mentioned above, these settlements may have risen to prominence as 'gateway cities,' facilitating trade with nomads operating out of the dry steppe to the south. Even more, these cities appear to have defined an important east-west trade route, effectively linking settlements across the entire Jazira with one another and with the pastoral zone to the south (Wilkinson 2000: 12-14). This macro-scale pattern suggests a complex network of trade connections that would have supported the flow of commodities between agricultural and pastoral producers over broad distances.



## PASTORAL SYSTEMS & ECONOMIES OF MOBILITY

Unfortunately, the micro-scale is more difficult to access. Archaeology offers little clear evidence, and neither the Mari texts nor ethnographic sources provide adequate information concerning the day-to-day mechanics of nomad-sedentary trade at the level of individuals or households. Barth's brief discussion of the negotiation of exchanges by Basseri nomads can, however, serve as a rough guide. Although Barth describes formalized 'bazaar' events in which nomadic and sedentary groups meet at the edge of the settlement, he points out that most exchanges are arranged at a more informal level between 'friends' (Barth 1961: 98-9).

'Each nomad has stable relations with a number of such trading partners in villages scattered along the migration route of his section; the most important one, however, is the one in the winter area.

The trading relationship is first established on the villager's initiative – he comes out in the daytime among the nomad tents with donkeys loaded with a variety of goods... The nomad who wishes to make an exchange invites the villager into his tent for tea, during which prices and forms of payment are discussed, and the social identity of the nomad is established. Occasionally, and then only when there is a pre-established relationship, the nomad may solicit an exchange by bringing or sending pastoral products to the villager, specifying the goods he requires.' (Barth 1961: 98-9)

We must also envision a meso-scale in which local and regional forms of social and political organization defined and constrained the niches that nomads could occupy, both as herders and as traders. For example, we know that the Upper Khabur region was densely packed with settlements during the mid third millennium BC, and we know that these settlements were organized into larger scale polities. In this dense political landscape, negotiations over rights to pasture, unimpeded passage, and trade must have been a common and necessary occurrence. At the same time, as the Mari texts demonstrate, we must also assume that this political system was cross-cut by and, in some cases, overlapped with wide-ranging networks based on kinship or tribal affiliation.

### MODELING THE AGRO-PASTORAL ECONOMY

For the purposes of modeling, pastoral production systems offer a series of unique possibilities. Especially interesting is the degree of contrast and also complementarity between sheep/goat herding and cereal agriculture. Sheep and goats mature according to very different life cycles and obey different seasonal rhythms than do cereal crops. They also respond very differently to environmental pressures and can be moved to avoid spatially localized crises. The existence of a prominent pastoral sector operating in parallel with cereal cultivation provides a degree of economic flexibility that is vital, especially in environmentally marginal zones (Wilkinson 2000: 14-16). For example, during drought years, failing crops might be partially salvaged by feeding them to sheep and goats (Fig. 2.13). This common practice can transform otherwise doomed crops into an alternative form of economic capital for local villagers, or, if visiting nomadic pastoralists are allowed to graze the crops, local people might accumulate social capital in the form of debts to be repaid at a later date (Nordblom 1983; Wilkinson 2000: 17-18).

A wealth of ethnographic and historical studies have shown that systems of pastoral and cereal production can complement one another, providing important buffering mechanisms in times of crisis (Widell 2007). It can be difficult, however, to trace the details of their mutual interdependence in real-world situations, let alone in the distant past. By providing a controlled, laboratory-like setting, the MASS simulations allow us to track the interactions between the pastoral and agricultural sectors at many analytical scales, from the daily activities occurring within a particular field to spatially extensive trends and processes operating over long periods of time. They also allow us to identify points of conflict, where the specific requirements and rhythms of these two production systems or the strategies adopted by farmers and herders might operate at cross purposes, producing negative consequences for one another.

The inclusion of mobile, seasonally transhumant pastoralists within the simulation (alongside locally based herders) introduces another series of analytical possibilities. As discussed above, nomadic groups can serve as

## PASTORAL SYSTEMS & ECONOMIES OF MOBILITY

an important conduit for trade and communication between settlements. In some of our simulation runs, we have chosen to model only a single settlement and its immediate sustaining area. Nomadic visitors provide one means of introducing outside influence into the settlement, thereby opening up what would otherwise be a relatively closed system. By simulating seasonal visits by nomadic herders, we can monitor the impact of periodic influxes of goods and opportunities for trade. We can also track the degree to which the timing of the nomadic visits – e.g. before or after the harvest – can affect the short- and long-term viability of individual households and/or the settlement as a whole (Chapter 12). In multi-settlement simulation runs, on the other hand, the spatial scale of the simulation is greatly increased. We can monitor commodity flows across broad distances, carefully tracking the movement of pastoral resources and other goods along nomadic migration routes. The ability to move goods into and out of micro-regions, whether to avoid harsh environmental conditions or in response to factors of supply and demand, can serve as an important buffering mechanism. It may also help drive localized population booms or economic take-offs, and perhaps also settlement collapse.

## PASTORAL SYSTEMS & ECONOMIES OF MOBILITY

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