THE ANIMAL ECONOMY OF PEOPLE LIVING IN THE SETTLEMENT OF TELL RAD SHAQRAH (SYRIA)

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Abstract: Animal management in the Early Dynastic and Akkadian periods at the site of Tell Rad Shaqrah in the Khabur River valley in Syria was reconstructed on the grounds of an analysis of osteological remains discovered at the site during excavations in 1991–1995. Of the total number of 4025 bone fragments, 59.2% were identified. In both chronological periods the most important role belonged to domestic animals, dominated by sheep and goat and followed by cattle. Remains of wild animals, mostly gazelle and equids, were also discovered; these were all post-consumption remains. Two young Barbary macaques (magots) were also identified; their bones were found in the storeroom and were identified as not post-consumption.

Keywords: Khabur River valley, Early Bronze Age, animal husbandry, hunting, Catarrhini

The site of Tell Rad Shaqrah was excavated in 1991–1995 by an archaeological mission from the Polish Centre of Mediterranean Archaeology of the University of Warsaw (PCMA). The excavation run by Piotr Bieliński was part of a salvage project stemming from the construction of a reservoir on the Khabur River, to the south of the town of Al-Hasakah. About 60 archaeological sites were identified along a 30-km stretch of the river valley examined within the frame of the project (Monchambert 1984). Rad Shaqrah was one of a few sites chosen for archaeological research (Anastasio, Lebeau, and Sauvage 2004: Map 33).

Tell Rad Shaqrah was inhabited mainly in the 3rd millennium BC, in two periods of the Early Bronze Age: Early Dynastic III (2500–2300 BC, Early Jezirah III – EJ III) and Akkadian (2300–2150 BC, Early Jezirah IV – EJ IV; Bieliński 1992: 82; 1994: 159; 1996: 162, 168, 170; Koliński 1996). Apart from a large number of artifacts, animal remains were also discovered. The following is a presentation of the results of an archaeozoological analysis of the remains.

MATERIAL AND METHODS

The osteological material was recovered from seven settlement levels (Levels I–VII) and three stratigraphic units of intermediate character (Levels I–II, II–III, III–IV; ***Table 1***). Part of the material could not be associated with any level (L.?), and some remains belonged to a subsurface layer (SUBS) or a layer of mixed character (MIX) caused mostly by modern disturbance. These were excluded from archaeozoological analysis. The rest was associated with two subperiods of the Early Bronze Age: Early Dynastic (EJ III: L.V, L.VI and L.VII) and Akkadian (EJ IV: L.I–II, L.II, L.II–III and L.III). In the case of settlement levels L.III–IV and L.IV, the chronology was described as Early Dynastic–Akkadian (EJ III–EJ IV). Very few bone fragments came from a layer dated to the Ninevite V period (EJ I–II, 2800–2500 BC) and were excluded from a detailed analysis due to the very low number.

The material was collected by hand, without sieving the soil. This is the reason for the low number of small bones recorded.

The assemblage represented mainly post-consumption remains, the only exception being the bones of two young Catarrhini or macaques discovered in a store room (No. 27). The assemblage consisted of 4025 fragments of bones and shells of molluscs. Of these, 2384 pieces (59.2%) were identified zoologically and anatomically. Despite the high percentage of identified remains, the material was very fragmented. The condition of the bones was due to activities related to preparation of the meat for consumption, but also to unfavorable deposition conditions, in which the bones were deposited as organic waste.

The osteological material was identified zoologically and anatomically by Joanna Piątkowska-Małecka with the exception of the Early Dynastic remains from room 27 (L.V), which were identified by Alicja Lasota-Moskalewska. Two groups, vertebrates and invertebrates, were distinguished among the identified fragments, and the former was further separated by class into mammals, fish and birds. The remains were grouped as wild and domestic species, equids being separated out as it was not always possible to state for certain that the form was wild, domestic or tamed. Percentages of remains were calculated for three chronological periods: EJ III, EJ III–IV and EJ IV, and the domestic and wild mammal shares of particular species were also determined. The results were then compared with respect to chronological periods and on that basis it was evaluated how the percentages differed.

Anatomical distribution was analyzed for sheep and goat remains from the three chronological periods and for cattle and equids from Early Dynastic layers. Bone fragments of animals of particular species or families were assigned to body part as defined by consumption value, either low quality (head, distal parts of limbs and phalanges) or high quality (thorax and proximal parts of limbs) parts of the carcass. In each group, percentages were calculated and the results were compared with model anatomical distributions based on counting bones in animal skeletons of particular species,

Table 1. Animal remains by settlement levels
**osteological material identified by A. Lasota-Moskalewska; abbreviations: L – level, SUBS – subsurface layer, MIX – mixed layer, EJ III – Early Dynastic period, EJ IV – Akkadian period*

Level	L.?	SUBS	MIX	L.?	L.?	L.V	L.V*	L.VI	L.VII	L.III–IV	L.IV	L.?	L.II–III	L.II	L.II–III	L.III
Chronology	?	?	?	EJ I	EJ III	EJ III	EJ III	EJ III	EJ III	EJ III–IV	EJ III–IV	EJ IV	EJ IV	EJ IV	EJ IV	EJ IV
Cattle	37		8		15	64	50	82			8	27		4		36
Pig	2				1	3	3	2								
Sheep	7				1	10	20	1		1	10					4
Goat	1			2	5	5	5	4		1				2		6
Sheep/goat	76	21	2	4	58	355	37	371		5	105	45	21	25		187
Sheep/goat/ gazelle	15															
Dog	0				1	22										1
Deer						1		6								3
Roe deer						6		1								
Gazelle	14		3		20	25	10		5		17	6		6		41
Hare					1		1					1				
Hyena							6									
Carnivorae					8	5										2
Equidae	43				5	38		97		18	4	6		4		26
Onager							32									
Barbary macaque (magot)							60									
Micromam-mal (rodent)	13					17										2
Bird						13		2					1			2
Fish						4	2	1								
Mollusk	16				4	1									1	2
Snail			1								1					2
Indentified	224	21	14	6	119	569	226	567	5	25	145	85	22	41	1	314
Unidentified	133	12	10	7	139	414		364		10	113	112	30	22		275

ruminants and horse in this case (Lasota-Moskalewska 2008: 236).

Age was estimated on the basis of epiphyseal fusion (Kolda 1936) and the state of the dentition. Remains of juvenile animals killed before they reached morphological maturity were distinguished and the share of juvenile individuals was calculated for sheep and goat from two chronological periods and for cattle and equids from the Early Dynastic period.

Sex was estimated on the basis of sexual dimorphism marked in the skeleton. It was possible only in the case of goat remains from the Early Dynastic assemblage, which was sufficiently well preserved. The shape of the horncore was used as a diagnostic feature (Lasota-Moskalewska 2008: 166).

Measurements were taken of bones preserved complete and of their fragments suitable for measuring, using the unified von den Driesch method (1976). Estimates were made of the morphology of equids and domestic animals (cattle, sheep, goat and dog). Breadth measurements for cattle used a 100-point scale (Lasota-Moskalewska 1984). The point scale was also used for fragments of goat horncores (Lasota-Moskalewska, Kobryń, and Świeżyński 1991). In addition, withers height was calculated for sheep and goat, using Manfred Teichert's coefficients (after von den Driesch and Boessneck 1974) for the former species and Zdzisława Schramm's (1967) for the latter. Ludwig Kiesewalter's coefficients (after von den Driesch and Boessneck 1974) were used to calculate withers height of equids. In the case of dog remains, Florián Koudelka's coefficients were used (after von den Driesch and Boessneck 1974).

Marks on bone surfaces were described, both the ones reflecting meat preparation for consumption and the ones which formed after the bones were discarded as post-consumption waste, when they were left on the surface of the ground or were covered with soil.

RESULTS

The site of Rad Shaqrah yielded 5541 bone remains and 28 fragments of bivalve and snail shells. Some of them (414 pieces) were discovered on the surface, in the mixed or of unidentified chronology layers. These were excluded from further analysis, and so were the 13 fragments from the layer dated to the Ninevite V period, identified as belonging to sheep or goat. The other fragments from the Early Dynastic and Akkadian periods were subjected to a detailed archaeozoological analysis [***Table 2***].

BONE REMAINS FROM THE EARLY DYNASTIC PERIOD (EJ III)

Layers dated to the Early Dynastic period yielded 2403 fragments of animal remains, 1486 were identified, which accounts for 61.8%. There were only five fragments of bivalve shell; the other remains belonged to vertebrates, mainly mammals, with very few unidentified birds (15 fragments) and fish (7 fragments). Remains of rodents, which could be an accidental addition, and of macaques, the bones of which were most likely unconnected with activities involved

in husbandry and hunting, were not taken into account when percentages of particular domestic animals were calculated. The macaque remains, represented by bones of the skull, mandible, ribs and proximal parts of both limbs, were found in room 27 considered to be a storeroom. They belonged to very young individuals.

Mammals were mainly represented by remains of domestic animals (80.7%) followed by bones of equids (12.4%), very likely including some onager remains. Wild mammals were the least numerous (6.9%) with most fragments belonging to gazelle (63.2% of wild animal bones, ***Table 2***). Other species of ruminants (deer and roe deer), leporids (hare) and carnivores (hyena) were represented by fewer fragments. In domestic animals group, bones of small ruminants dominated (78.2%), most of them being sheep remains. They were followed by cattle bones (18.9%). Dog and pig bones were the lowest in number (2.1% and 0.8% respectively).

Analysis of anatomical distribution of cattle remains showed that most of the

Table 2. Zoological distribution of animal remains from given chronological periods: EJ I – Ninevite V, EJ III – Early Dynastic, EJ III–IV – Early Dynastic and Akkadian taken together, EJ IV – Akkadian

Chronology	EJ I	EJ III		EJ III–IV		EJ IV	
	n	n	%	n	%	n	%
Cattle	–	211	18.9	8	6.2	67	18.7
Pig	–	9	0.8	0	0.0	0	0.0
Sheep	–	32	2.9	11	8.5	4	1.1
Goat	2	19	1.7	1	0.8	8	2.2
Sheep/goat	4	821	73.6	110	84.6	278	77.7
Dog	–	23	2.1	0	0.0	1	0.3
Domestic mammals altogether	–	1115	100.0	130	100.0	358	100.0
Deer	–	7	7.4	17	–	3	5.1
Roe deer	–	7	7.4	0	–	0	0.0
Gazelle	–	60	63.2	0	–	53	89.8
Hare	–	2	2.1	0	–	1	1.7
Hyena	–	6	6.3	0	–	0	0.0
Carnivorae	–	13	13.7	0	–	2	3.4
Wild mammals altogether	–	95	100.0	17	–	59	100.0
Equidae	–	140	–	22	–	36	–
Onager	–	32	–	0	–	–	–
Barbary macaque (magot)	–	60	–	0	–	0	–
Micromammal (rodent)	–	17	–	0	–	2	–
Bird	–	15	–	–	–	3	–
Fish	–	7	–	–	–		–
Mollusk	–	5	–	–	–	3	–
Snail	–	–	–	1	–	2	–
Identified altogether	–	1486	–	170	–	463	–
Unidentified	7	917	–	123	–	439	–
Total	**13**	**2403**	–	**293**	–	**902**	–

bones came from the thorax (38.4%) and head (22.7%, ***Table 3***). There were fewer bones of the proximal parts of both limbs (9.0% forelimb and 10.9% hind limb), which are high quality elements of the carcass, and the fewest remains came from the distal parts of limbs (below 8%). The results are similar to the model distribution; there were no surpluses or shortages of any parts of the carcass.

Somewhat different results were observed in the case of sheep and goat remains. Most bones came from the head (26.9%), and slightly fewer from the thorax (24.0%). They were followed by bones of proximal parts of both limbs represented by similar shares (forelimb 14.7% and hind limb 15.6%). Distal parts of limbs represented the lowest percentage (below 10.0%). In comparison with the model distribution, there was a shortage of thorax bones, which were represented by a value almost two times too low, and a modest surplus of remains of proximal parts of both limbs.

Most remains of equids came from the head (26.2%) and thorax (29.1%). There were fewer skeletal elements of proximal parts of both limbs (forelimb 15.1% and 10.5% hind limb) and the distal part of the hind limb (12.2%). The fewest remains represented the distal part of the forelimb (5.8%) and phalanges (1.2%). Comparison with the model distribution showed that there was a surplus of the proximal part of both limbs among the equid remains from the Rad Shaqrah settlement.

Age analysis showed that 16.0% of the remains of cattle belonged to individuals killed at a young age. In the case of sheep and goat, the percentage was lower and amounted to 7.5%. For equids the percentage was 3.5%. Additionally, the age of one individual at the time of death was estimated at approximately 20 years. Two fragments of goat horncores belonged to females.

Eight fragments of cattle bones were measured and then the 100-point scale was calculated [***Table 4***]. The remains ranged

Table 3. Anatomical distribution of cattle, sheep, goat and equid remains in the Early Dynastic period (EJ III)

Part of body	Cattle		Sheep/goat		Model	Equids		Model
	n	%	n	%		n	%	
Head	48	22.7	235	26.9	**20**	45	26.2	**23**
Thorax	81	38.4	209	24.0	**43**	50	29.1	**43**
Proximal part of forelimb	19	9.0	128	14.7	**5**	26	15.1	**4**
Distal part of forelimb	16	7.6	53	6.1	**8**	10	5.8	**11**
Proximal part of hind limb	23	10.9	136	15.6	**3**	18	10.5	**3**
Distal part of hind limb	14	6.6	74	8.5	**7**	21	12.2	**10**
Phalanges	10	4.7	37	4.2	**14**	2	1.2	**6**
Total	**211**	**100.0**	**872**	**100.0**		**172**	**100.0**	

from 15 to 65 points with most being at 30 or more points. The withers height of cattle was calculated on this ground at between 98 cm and 130 cm. Low height (below 110 cm) was observed in the case of two individuals, the rest were of average size.

Based on the length of a sheep metatarsus and seven talus bones, the withers height of the species was calculated.

Table 4. Measurements of animal bones from the Early Dynastic period (EJ III)

Species	Anatomical part	Measurement	mm	Point score/WH (cm)/Sex
Cattle	Fragment of metacarpal	Bd; Bd-SD	54; 55–28/22	40; 45
	Fragment of metatarsal	Bp-SD	50–26/28	65
	Talus	GLI-GLm-Bd	58–53–43, 62–57–43	30. 40
	Calcaneus	GL	114	35
	I Phalanx I	GL	46, 56	15. 40
Sheep	Fragment of radius	Bp-SD	30–16	–
	Fragment of metacarpal	Bd	27	–
	Fragment of tibia	Bd	27	–
	Metatarsal	GL	144	WH=65.4
	Talus	GLI-GLm-Bd; GLI-Bd	31–30–21, 31–30–19, 30–28–18, 28–27–19; 29–17, 28–19, 28–19	WH=70.3 (x2); 68.0; 63.5; 65;8; 63.5 (x2)
Goat	Horncore	Length	80, 138	0. 25/female (x2)
	Fragment of humerus	Bd	30	–
	Fragment of metacarpal	Bp-SD; Bd	30–18; 28	–
	Metatarsal	GL-Bp-Bd-SD	128–22–21–17	40/WH=68.3
	Talus	GLI-GLm-Bd; GLI-Bd	28–26–18; 28–18, 27–17	–
	Phalanx II	GL-Bp-Bd	23–11–9	–
Equid	Radius	GL-GLI-Bp-Bd	290–233–68–60	WH=101.1
	Talus	GH-GB	40–44	–
Gazelle	Fragment of humerus	Bd	31	–
	Fragment of radius	Bp; Bd	20; 30, 29	–
	Fragment of metacarpal	Bd	26	–
	Fragment of metatarsal	Bd	20, 22	–
	Talus	GLI-GLm-Bd	25–24–16	–
	I Phalanx I	GL-Bp-Bd; GL	39–9–8; 42, 42, 40	–

Abbreviations: Bd – greatest breadth of the distal end; SD – smallest breadth of diaphysis; Bp – greatest breadth of the proximal end; GLI – greatest length of lateral part; GLm – greatest length of the medial part; GL – greatest length; GH – greatest half of talus for horses; GB – greatest breadth of talus for horses

It ranged from 63.5 to 70.3 cm with most below 70 cm. Consequently, it can be concluded that the sheep were of the large morphological type. Goats represented the small form, not taller than 69 cm as indicated by the withers height estimated from the length of the metatarsus to be 68.3 cm and from the length of two horncores which corresponded to 0 and 25 points on the scale.

On the basis of a radius from an equid, its withers height was calculated at 101.1 cm. The low height implies that the bone belonged to the African wild ass.

BONE REMAINS FROM TRANSITIONAL EARLY DYNASTIC TO AKKADIAN PERIOD (EJ III–IV)

Two layers from the Early Dynastic and Akkadian periods yielded 293 fragments, 170 out of which were identified zoologically and anatomically (58.0%). Invertebrates were represented only by a fragment of snail shell, the other remains belonged solely to mammals, mainly domestic (76.9%). There were fewer bone fragments of equids (13.0%) and wild mammals (10.1%) were represented exclusively by bones of gazelle. A large majority of domestic mammals belonged to sheep and goat (93.9%; mostly sheep), the rest to cattle (6.2%).

An analysis of the anatomical distribution of sheep and goat remains demonstrated that bones of the proximal part of the forelimb had the largest share (25.4%; *Table 5*). They were followed by bones of the head, thorax and proximal part of hind limb represented by similar shares (between 17.9% and 19.7%). The distal parts of both legs were the fewest (below 7%). Comparison with a model distribution showed a shortage of thorax bones and a surplus of bones belonging to the proximal parts of both legs, most of these representing the fore limb.

The percentage of small ruminants killed at a young age reached 5.4%.

BONE REMAINS FROM THE AKKADIAN PERIOD (EJ IV)

The layers from the Akkadian period yielded 897 bone fragments and five shells of invertebrates. 463 pieces (51.3%) were

Table 5. Anatomical distribution of sheep and goat remains from given chronological periods: EJ III–IV – Early Dynastic and Akkadian taken together, EJ IV – Akkadian

Part of body	EJ III–IV		EJ IV		Model
	n	%	n	%	
Head	21	17.2	59	20.3	**20**
Thorax	24	19.7	59	20.3	**43**
Proximal part of forelimb	31	25.4	41	14.1	**5**
Distal part of forelimb	7	5.7	24	8.3	**8**
Proximal part of hind limb	23	18.9	75	25.9	**3**
Distal part of hind limb	8	6.6	22	7.6	**7**
Phalanges	8	6.6	10	3.4	**14**
Total	**122**	**100.0**	**290**	**100.0**	

identified zoologically and anatomically. Vertebrates were represented by a low number of unidentified birds and by mammals. In the last group, excluding bones of micromammals, remains of domestic animals accounted for a large majority (79.0%), followed by wild animals (13.0%) and equids (7.9%). Wild animals were represented mostly by gazelle and a fairly low number of remains of deer, hare and one carnivore. Bones of livestock animals belonged mostly to small ruminants (81.0%; mainly goat). There were fewer remains of cattle (18.7%) and the fewest of dog (0.3%).

Anatomical distribution of sheep and goat remains showed that the most bones came from the proximal part of the hind limb (25.9%; ***Table 5***). Bones of the head and thorax had equal shares (20.3% each). They were followed by remains of the proximal part of the forelimb (14.1%). The remaining distal parts of limbs amounted to 19.3%. Compared to the model distribution, there was a surplus of bones of both limbs, dominated by the hind limb, and an underrepresentation of thorax remains.

Sheep and goats killed at a young age accounted for almost 5% of the species.

The length of the cattle phalanx I was measured and placed on the 100-point scale [***Table 6***]. The length translated into 48 points, which means that the individual was middle-sized, about 118 cm tall. Sheep represented the large morphological type. This is confirmed by two values for the withers height, which reached 65.8 and 68.0 cm, calculated on the basis of the talus. The length of the dog tibia was measured and the result was used to calculate withers height, which was 57.2 cm. It means the dog was middle-sized.

The bone remains bore marks associated with preparation for consumption and cooking. The first category includes rather few skinning marks and, more

Table 6. Measurements of animal bones from the Akkadian period (EJ IV)

Species	Anatomical part	Measurement	mm	Point score/WH (cm)/Sex
Cattle	Phalanx I	GL	59	48
Sheep	Talus	GLI-GLm-Bd	30–29–20, 29–28–19	WH=68.0, 65.8
Goat	Fragment of humerus	Bd-SD	33–19	–
	Fragment of radius	Bd-SD	39–20	–
	Talus	GLI-GLm-Bd	31–28–19	–
Dog	Tibia	GL-Bp-Bd-SD	196–34–24–15	WH=57.2
Gazelle	Fragment of humerus	Bd	29	–
	Fragment of radius	Bp-SD	38–21	–
	Fragment of tibia	Bd	26, 28	–

Abbreviations: Bd – greatest length of the distal end; SD – smallest breadth of diaphysis; Bp – greatest breadth of the proximal end; GLI – greatest length of lateral part; GLm – greatest length of the medial part; GL – greatest length

frequently observed, chopping marks. The state of preservation in the form of flaky pieces also indicated chopping despite the lack of visible traces of a blade hitting the bone surface. Cooking involved roasting or boiling meat together with the bones. Roasting is confirmed by burning marks and charred surfaces, boiling by the presence of remains displaying porous structure and grey color. Consumption of meat is indicated by relatively rare filleting marks. All the types of marks were found on a variety of osteological elements, mainly long bones and vertebra, and in the case of filleting on ribs, both in livestock (sheep, goat and cattle) and wild game (onager and gazelle). Apart from marks related to food processing in preparation for consumption, bones from Rad Shaqrah also displayed marks related to their disposal as waste, such as cracks and holes after gnawing by rodents and carnivores, most likely dogs.

ZOOLOGICAL DISTRIBUTION OF REMAINS FROM EARLY DYNASTIC AND AKKADIAN PERIODS

Comparison of species profiles of remains discovered in layers dated to the Early Dynastic and Akkadian periods indicates that they were similar. In both chronological groups, vertebrate bones dominated and invertebrates were represented by very few fragments of snail or bivalve shells. Vertebrates were represented mainly by mammals and very few remains belonged to unidentified birds and fish, the latter found only in Early Dynastic layers. Osteological material from the first period was in a slightly better state of preservation, which was reflected in the percentage of fragments identified zoologically and anatomically reaching 61.8%, while for the Akkadian period the corresponding percentage was 51.3%.

In both chronological groups mammal bones belonged mainly to livestock, reaching about 80.0%. Minor differences, not exceeding 7.0%, were observed in percentages of wild animals and equids. The former dominated in the Akkadian period (13.0%), when fewer remains of equids were present (7.9%). A reverse situation was observed in the Early Dynastic period (wild mammals 6.9% and equids 12.4%).

Among the remains of wild mammals, gazelle dominated in both periods. There were fewer fragments of deer, roe deer, hare and carnivores, including hyena. Remains of Barbary macaque (magot) discovered in room 27 came from the Early Dynastic period. Domestic mammals in both periods were mainly represented by sheep and goat, with the former being in the majority. They were followed by remains of cattle. A few fragments of pig were observed only in the Early Dynastic period. Remains of dog were discovered in layers from all periods.

DISCUSSION OF RESULTS

Breeding of livestock supplemented with wild game hunting was a major part of the animal economy practiced by the people who lived in the settlement at Tell Rad Shaqrah in the Early Bronze Age (Early Dynastic and Akkadian periods). Certain significance can be attributed to equids which could have been represented by wild, tamed and domestic species. Birds played a minor role, with slightly more

remains discovered in layers dated to the Early Dynastic period compared to the Akkadian period. However, since no fragments were identified zoologically, it is impossible to say whether they belonged to domestic or wild species. Gathering of invertebrates, mollusks and snails, and fishing were of very low importance. The small number of fish remains, discovered only in layers dated to the Early Dynastic period, and of shell fragments may result from the techniques used to explore the site and the fact that sifting was not applied during the excavation. It significantly lowered the number of recovered bone and shell fragments of small size. An experimental study at the Dorstad site showed that both the sifting itself and the use of sieves of smaller and smaller mesh diameter leads to an increase in percentage of remains of small animals, especially fish. The experiment confirmed that without sifting no remains of fish were recovered but after sifting through a sieve with a 4-mm mesh the percentage of bone material increased by nearly 20%, and with a 1-mm mesh by more than 30% (Clason and Prummel 1977).

Equids played a certain role in the animal economy of the Rad Shaqrah settlement and their remains were discovered in layers associated with both the Early Dynastic and Akkadian periods. The percentage of animal remains decreased over time, from slightly over 12% to a little below 8%. The difference is not very significant and does not prove any essential change in the economy. All the forms might have been represented. On the grounds of equid skeleton, it is not possible to state with certainty, if a particular fragment belonged to a wild, tamed or domestic individual. Osteometric analysis and the size of some skeletal remains confirmed that the assemblage from the Rad Shaqrah site contained bones of Asiatic wild ass, i.e., onager. It was a wild species, popular with hunters in the Near East. It is not known, if it was ever tamed and domesticated, but the idea seems rather unlikely (Clutton-Brock 1999; Lasota-Moskalewska 2005: 195). Some remains could also come from the African ass, which is not very tall (withers height of about 110 cm). Withers height calculated from a radius recovered from a layer from the Early Dynastic period stood at 101.2 cm, implying that it could have belonged to an ass. Textual sources provide information, that the Khabur Triangle area specialized in the production of equids used to pull wagons (von Koppen 2002). The animals in question were most likely crossbred of asses, either domestic or wild, with onager and/or wild horse (Uerpmann 2003; Vila 2006).

All skeletal elements, including phalanges, were represented in the case of equids. The anatomical distribution was in line with the natural structure of the skeleton. There was only a surplus of bones belonging to the proximal parts of both limbs. It indicates that fragments were divided into smaller pieces, which might have been due to preparation for consumption. Additional confirmation of the possibility of consumption of meat from equids was provided by the marks observed on the surfaces of some bones. A fragment of radius could exemplify this. It was split transversally across the proximal epiphysis, perhaps in order to extract marrow. Chopping marks were observed on a phalanx, and filleting marks on a fragment of rib. Moreover, many

osteological remains of equids found in layers dated to the Early Dynastic period bore black burning marks, suggesting that the meat had been roasted with bone. The marks were observed on both high quality (fragments of vertebra, ribs, radius and tibia) and low quality (metapodia) parts of the carcass.

The percentage of individuals killed at a young age was 3.5% in the case of equids discovered in layers dated to the Early Dynastic period. The result poses a difficulty for conclusive interpretation. It is slightly higher compared to other sites which were characterized by breeding of domestic equids. Normally, breeding is aimed at exploitation of living animals, which is reflected in a low percentage of young individuals amounting to about 1% (Lasota-Moskalewska 2008: 250). Nevertheless, a detailed estimation of the age of equid remains from ancient Mesopotamian sites has yet to be undertaken.

Hunting wild mammals was a supplementary activity in relation to animal husbandry, and it amounted to approximately 10%. With time its significance apparently increased, as indicated by a slight growth of the number of wild mammal bones from 6.9% in the Early Dynastic period to 13.0% in the Akkadian period; this coincided with a decrease in the number of equid remains. Hunted the most often was gazelle, less frequently other species like deer, roe deer, hare and carnivores. There were several hyenas among the latter, but due to the species' scavenging practices, they could well be an accidental addition to the assemblage. Remains of gazelle belonged to several species. Some skeletal fragments from Rad Shaqrah were identified as coming from dorcas gazelle; these were fragments of horncores with round cross-section and slightly arched shape, rather shallow grooves on the surface and only slightly pneumatized.

The fairly low number of wild animal remains limits the ability to interpret them with regard to age and sex of the animals and hunting rationale. It seems they were an additional source of meat for consumption. This is confirmed by chopping marks and charred surfaces observed on different anatomical elements of gazelle. Remains of wild species also constitute an indication of the natural surroundings of the site. They represent fauna typical of dry steppe and river valleys. A similar species profile was established by Melinda Zeder in her study of sites from the 3rd millennium BC in the middle stretch of the Khabur valley in northern Mesopotamia (e.g., Tell Abqa, Tell Taya, Tell Raqa'i 2–3, Tell Atij I–VI, Tell Mashanaqah and Tell Gudeida, Zeder 1998). Independent studies of animal bones in the Khabur valley are still limited; the material from Tell Raqa'i and Atij was studied by Scott Rufolo (2011), that from Tell Knedig by Emmanuelle Vila (2005) and a small part of the collection from Tell Bderi by Cornelia Becker (1988). More data are available from sites located further north, in the plain of the Khabur Triangle: e.g., Tell Arbid (Piątkowska-Małecka and Koliński 2006), Tell Brak (Weber 1999; 2001; Dobney, Jaques, and Van Neer 2003), Tell Beydar (Van Neer and De Cupere 2001; Siracusano 2014) Tell Khazne (Antipina 2004) and Tell Mozan (Doll 2010).

Rad Shaqrah also produced remains of two very young Barbary macaques (magots), a Catarrhine from Cercopithecidae family, found in an Early Dy-

nastic storeroom. These animals were clearly not hunting trophies and were not intended for consumption. The Catarrhini family consists of approximately 60 species living in Africa, the Arabian Peninsula and southeastern Asia (Kowalski 1971; Gilbert 2002: 50). No species ever inhabited Mesopotamia or its immediate vicinity. Despite that, images of the monkeys are known from different representations, such as relief scenes and coins (Hamoto 1995). The manner of depicting the animals is similar. They are shown from the side, sitting on the ground, less frequently being carried by people, and sometimes in scenes with musicians. A frequent element of images representing monkeys are collars and leashes, which implies that the animals were kept in captivity and that indicates that they could be tamed.

Sumerian and Akkadian texts from the 2nd and 1st millennium BC list monkeys among the exotic animals. On the grounds of inscriptions commissioned by Middle and Neo Assyrian monarchs, it can be concluded that some of them received monkeys as tribute (Dunham 1985: 236–241). The stele of Ashur-nasir-apli II from Nimrud contains information about a herd of monkeys living and reproducing in captivity, and a relief on the wall of the palace of the same king shows a tribute-bearer from Phoenicia with two monkeys. In this light, it could be suggested that the remains of two Barbary macaques from the settlement at Rad Shaqrah belonged to tamed individuals kept for amusement or as a sign of prestige. The fact that the assemblage was found in one room and that both monkeys were young individuals supports this idea. It is not possible, however, to say whether the monkeys were kept in the settlement or reached the place by accident, for instance, as a prestigious item transported up and down the Khabur River.

The basic activity related to animal economy in the Early Bronze Age settlement on Rad Shaqrah was the breeding of small ruminants, sheep and goat (dominated by the former), supplemented by raising cattle. Percentages of sheep, goat and cattle were roughly similar in both chronological periods under analysis. The first two species accounted for about 80% of the livestock, the other 20% belonged to cattle. Pig played virtually no role in the animal economy; its sparse remains of below 1% share were discovered only in layers from the Early Dynastic period. Nothing more referring to the age, sex or morphology can be concluded on the basis of their remains.

Dogs were among the remains of domestic animals which did not belong to livestock. The paltry data referring to the species suggest that these were middle-sized individuals. They were possibly shepherd or guardian dogs.

In view of their supplementary role in husbandry cattle were probably kept to obtain meat for consumption. It is indicated by a significant share of animals killed at a young age, amounting to approximately 16%. This was true of the Early Dynastic period. It cannot be said whether the tendency changed over time for lack of data. Slaughtering, butchery and consumption took place in the inhabited area, and no part of the carcass was taken out of the settlement or brought from outside. The cattle belonged to the *Bos taurus brachyceros* type and demonstrated a withers height of 98 cm to 130 cm. The population was well crossbred, homogeneous and

the animals were of medium size with only a few small individuals.

Two species of small ruminants were of fundamental importance for animal husbandry. Sheep and goat domination is typical of the economy in the Near East, including the Khabur River basin. It suggests a pastoral lifestyle with the animals raised being very well adapted to a difficult environment and limited forage. Sheep and goat endure walking well, have fairly low requirements concerning feed and can survive a longer time without water (up to two days). It seems that the climate of the area in the 3rd millennium BC was similar to the one today (Bryson and Bryson 1997). Precipitation is scarce, about 200–250 mm, and there is a high rate of about 50% interannual variability (Sanlaville 1990: Figs 1, 4).

Slaughtering, butchery and meat consumption took place in the inhabited area. It is confirmed by the presence of all skeletal elements, together with phalanges remaining on the spot where the animals were slaughtered and skinned. In the Early Dynastic and Akkadian periods there was a shortage of thorax bones and a surplus of remains coming from proximal parts of both limbs in relation to the model distribution. Fragments of vertebra and ribs were less numerous by about half, which suggests that this part of the carcass was taken out of the inhabited area. Reasons for this are unknown and therefore difficult to interpret. An analysis of anatomical distribution of species from other sites in the Khabur River valley could help to throw light on the issue. It is possible that the shortage of thorax bones is related to some kind of food exchange with inhabitants of other settlements. It is hypothesized, based on installations used for storage of grain, mainly barley, with capacities exceeding local population consumption needs, that some of them filled the role of specialized production centers (Schwartz 1994: 25–28; Hole 1999: 279–280; Rufolo 2011).[1] The surplus of remains coming from the proximal parts of limbs most likely resulted from dividing the fragments into smaller pieces during processing for consumption. This theory is supported by chopping marks on some fragments of humerus, radius, femur and tibia bones of sheep and goat.

Small ruminants were raised both for meat and for their secondary products, mainly for wool and, to a lesser degree, for milk. The percentage of animals killed at a young age, reaching approximately 8% in the Early Dynastic period and slightly less, about 5%, in the Akkadian period, indicates keeping a balance between the number of individuals slaughtered and those selected for further breeding. Due to insufficient data on animal sex, nothing more can be concluded about breeding routines related to sheep and goat. Sheep represented a big form reaching about 70 cm at the withers. The form emerged probably as a consequence of the cross-breeding between domestic sheep and urial that took place in Asia Minor during the Pre-Pottery Neolithic era (Lasota-Moskalewska, Kobryń, and Świeżyński 1998). Goat represented the small form, of a withers height below 69 cm. This form was common in Asia and Europe from the Neolithic period onward.

[1] For a discussion of this and other interpretations, see Koliński 2012.

Animal economy in the settlement of Rad Shaqrah was similar to the one practiced in other settlements of the mid-3rd millennium BC located in the Khabur River valley. The area, despite unfavorable conditions for human occupancy, was densely populated at the time. A clear hierarchical distinction of settlements was observed (relatively small towns, mid-sized and small villages) and occasionally specialization of certain settlements. Not all of them were analyzed in terms of archaeozoological studies. Nevertheless, data collected by Melinda Zeder (1995; 1998) in a preliminary study of several sites, e.g., Tell Mashanaqa, Tell Raqa'i, Tell Ziyadeh, Tell Gudeida and Tell Atij, as well as Tell Bderi (Becker 1988), indicated that the animal economy in the middle of the 3rd millennium BC was based on raising small ruminants supplemented by breeding cattle. Thus, the animal economy as evidenced at the site of Rad Shaqrah was characteristic of the Khabur River valley in the mid-3rd millennium BC.

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