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FOOD PATTERNS IN THE BRONZE-IRON AGE ARCHAEOLOGICAL SITE LERNAKERT IN ARMENIA: RESULTS OF ARCHEOZOLOGICAL RESEARCH

Abstract. In 2019–2021, excavations at the Late Bronze Age – Early Iron Age archaeological site of Lernakert on the northwestern slopes of Mount Aragats yielded a significant quantity of faunal remains. The archaeological complex comprises two cyclopean fortresses (Veri Berd and Vari Berd), tombs, and settlements. Archaeozoological analyses were conducted to identify dietary and food technology components in this region. The diversity of animal remains reveals diverse meat sources from both hunting and herding practices, highlighting the dynamic nature of food patterns over time. Reflecting a long history of animal exploitation influenced by social, cultural, and environmental factors, this study aims to characterize the unique features of animal-derived food resources at this settlement, outlining the economy and inhabitants' activities during the late Bronze Age to Early Iron Age. Therefore, our paper states, that the main difference between the Bronze Age and the Iron Age was the agricultural and economic progress to a better standard of living, and the differentiated food patterns of Lernakert have been the tools for adapting to the local geography and unfavorable environment. While acknowledging the potential role of social interaction in shaping food patterns, further investigation is needed. The methodology employs osteological analysis of animal remains excavated from Lernakert's Veri Berd, Vari Berd, and settlement areas. The results reveal the diverse husbandry practices and food types of this period, highlighting the evolution of livestock management between the Bronze and Iron Ages.

Keywords: faunal remains; food patterns; Lernakert; meat consumption; North-west Armenia communities.

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ПИТАНИЕ НАСЕЛЕНИЯ АРХЕОЛОГИЧЕСКОГО ПАМЯТНИКА ЛЕРНАКЕРТ ЭПОХИ БРОНЗЫ И ЖЕЛЕЗА В АРМЕНИИ: РЕЗУЛЬТАТЫ АРХЕОЗООЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ

Аннотация. Раскопки на археологическом комплексе Лернакерт эпохи поздней бронзы – раннего железа на северо-западных склонах горы Арагац в 2019-2021 годах выявили большое количество фаунистических останков. Комплекс состоит из двух циклопических крепостей (Верн Берд и Вари Берд), гробниц и поселений. В связи с этим, были проведены археозоологические исследования для определения компонентов молочной и пищевой технологий в этом регионе. Разнообразие останков животного происхождения свидетельствует о различных источниках мяса, полученных в результате животноводства и охоты, подчеркивая динамичный характер системы питания с течением времени. Эти факты отражают историю эксплуатации животных, которая целиком связана с социальными, культурными и экологическими факторами. Данное исследование направлено на выявление отличительных особенностей компонентов пищи животного происхождения на этом поселении, а также описание хозяйства и образа жизни его населения. Таким образом, основным различием между бронзовым и железным веками являлся сельскохозяйственный и экономический прогресс, направленный на повышение уровня жизни, а характерные пищевые привычки Лернакерта являлись инструментами адаптации к местным географическим условиям и неблагоприятной среде. При этом по-прежнему не учитывается социальное взаимодействие, которое также могло играть главную роль в формировании образа жизни населения этого поселения. Методология данного исследования основана на анализе остеологических останков животных, обнаруженных при раскопках Лернакертского Верн Берда, Вари Берда и поселенческих стоянок. Результаты исследования проливают свет на различные методы ведения животноводческого хозяйства и типы продуктов питания в рассматриваемых эпохах.

Ключевые слова: останки животных; система питания; Лернакерт; потребление мяса; общества северо-западной Армении.

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Introduction

The turning point of cultural traditions in the Caucasus occurred during the period between the Middle Bronze and Late Bronze Ages when significant changes were recorded [1: 378–422].

The Late Bronze and Early Iron Ages (1500-1200 BC and 1200-900 BC, respectively) witnessed a distinct cultural development and tradition that persisted until roughly 800 BC. Notably, the Caucasus during this period exhibited a greater degree of cultural and social change compared to preceding eras [2: 134]. In contrast, Avetisyan and Bobokhyan's studies suggest that Late Bronze (1500-1200 BC) and Early Iron Age (1200-900 BC) societies in this region, represented by the Lchashen and Metsamor cultures, already displayed clear characteristics of complex societies and early state formations [3: 432].

Subsistence strategies in Armenia have received less attention compared to studies of pottery styles and metallurgy. However, it is an undeniable fact that Late Bronze and Early Iron Age societies relied on the exploitation of both plants and animals for their livelihood [4: 319].

Ancient dietary information comes from diverse sources, including animal depictions in caves, on tombstones, or on monuments, while direct consumption evidence emerges from waste pits and fossilized dung. Additionally, chemical analyses of food remains aid in determining archaeo-food sources [5: 204–223; 6: 1011–1020]. Based on these methods, Manoukian et al. presented compelling evidence of a diverse diet across Kura-Araxes settlements in Armenia. Their findings suggest an economy based on both meat and plant processing, fats, and dairying [7].

In this study, we employed animal skeletal remain analysis, a valuable tool for understanding food patterns and human animal resource management strategies in Late Bronze to Early Iron Age Lernakert, including Veri Berd, Vari Berd, and the settlement area.

In recent years, international and local expeditions have unearthed and investigated a group of Bronze and Iron Age monuments in Armenia, sometimes referred to as “agglomerative houses” or “spiral structures.” Unlike other megalithic monuments, these structures remain insufficiently studied, hindering our understanding of their chronology, function, and architectural details. “Ring-shaped structures” were widespread in Jordan, Syria, and Saudi Arabia, with the latter region boasting numerous and diverse examples. There are several conflicting views in historiography about the functions of “wheeled structures”. These structures have been proposed to be dwellings for single families, shelters for livestock, or even ritual sites due to the presence of nearby documented tomb complexes. These structures, the focus of our research, were found in the aforementioned regions mainly as “kites” [8: 56–58; 9: 3189; 10: 1–34].

Material and Methods ***Lernakert archaeological site***

Lernakert village is located in Shirak province, on the northwestern slope of Mount Aragats, at an elevation of 1980 meters above sea level (Fig. 1). This archaeological complex

comprises two Bronze-Iron Age fortresses, extensive necropolises, an ancient water distribution system, and other megalithic structures. The Vari Berd fortress stands roughly 0.4 kilometers south of the village at an altitude of 2020 meters. Veri Berd, situated 2.5 kilometers southeast of the village, sits at a higher elevation of 2120 meters, while Vari Berd lies 1.2 kilometers to the east. Both fortresses were constructed atop prominent, naturally occurring rocky hills with flattened peaks (Fig. 2).

Excavations conducted between 2019 and 2021 revealed evidence of human habitation at Vari Berd spanning several phases, with the earliest settlements dating back to the 3rd millennium BC. Remnants of an Early Bronze Age settlement were discovered on the western and northern slopes and foothills of the hill.

The Early Bronze Age settlement of Vari Berd extends northward, reaching the village's southern and southwestern outskirts. Evidence from pottery and Late Bronze Age burials found within the settlement on the western slope indicates subsequent inhabitation of the fortress area during the Late Bronze Age.

The eastern slope of Vari Berd also shows signs of habitation, with various structures visible in the area. The most notable feature is the circular structure located east of the third platform. The Veri Berd settlement occupies the eastern and northern slopes of the fortress, encompassing its least accessible area. It is no coincidence that the entrance to the fortress passes through the settlement located on the northern slope (Fig. 3). In this settlement, the remains of different shapes and sizes structures were recorded [11: 189–200].

Excavations on the eastern slope of Veri Berd uncovered a portion of the central area and an adjoining cell. Preliminary data suggests this structure was built during the Early Iron Age, parallel to the construction of the fortress, within the confines of the earlier Early Bronze Age settlement.

The northern slope of Veri Berd features another isolated structure comprised of three platforms and walls ranging from 1.5 to 2.5 meters thick. The uppermost platform is circular, the second is quadrangular, and the third has an irregular circular shape. While preliminary, exploratory excavations hint at the use of this complex in the post-Urartian period, the structure itself could be contemporaneous with the one discovered in Veri Berd's excavation site No. 1. Sites No. 1, No. 7, and exploratory trenches No. 2-4 provide further insight into the various stages of settlement within the fortress. The uppermost layer can be attributed to the Classical period (1st century BC – 1st century AD). Radiometric dating of organic materials from a pit in the center of excavation site No. 1 placed the second layer between 365 and 203 BC (Fig. 4). Scattered remains of antique pottery on the ground near the fortress and visible surface structures suggest a dense population in these areas during the Classical period.

The construction technique of the investigated structure, located south of Veri Berd of Lernakert, is related to the architecture of other antique sites of Shirak (for example, Hoghmik [12: 49–56], and Shirakavan [13: 32–46]).

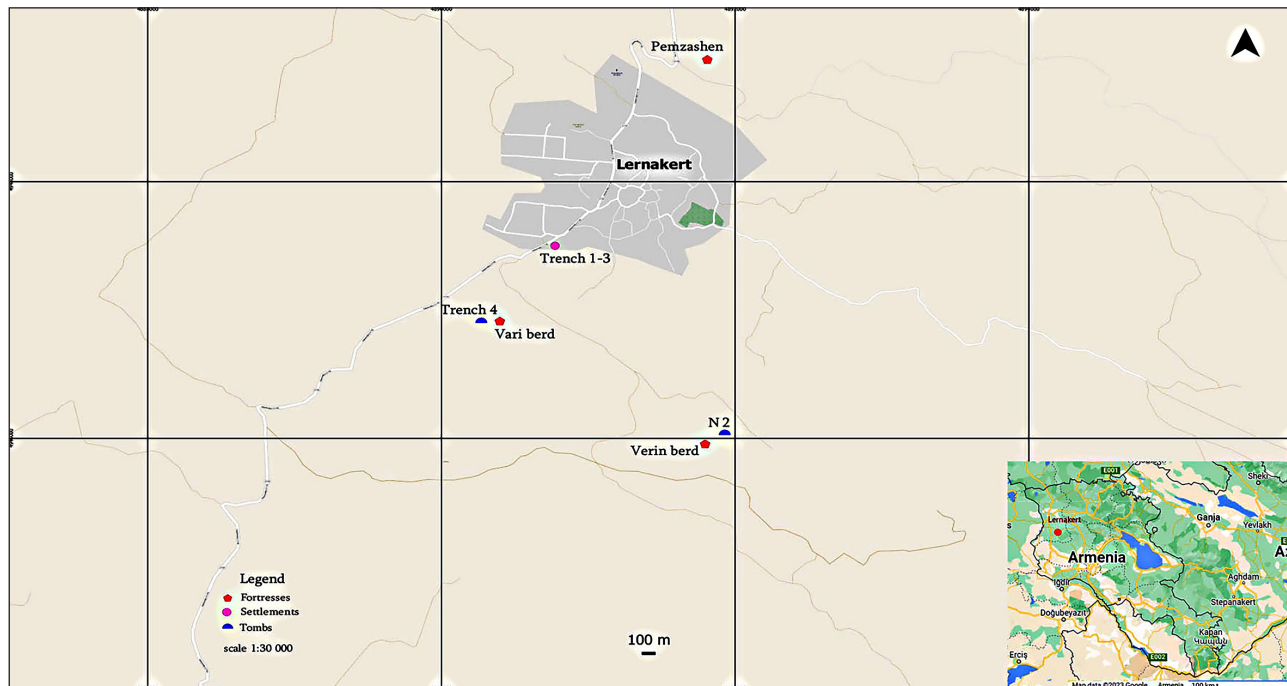


Fig. 1. Lernakert complex location

Рис. 1. Местоположение Лернакертского комплекса

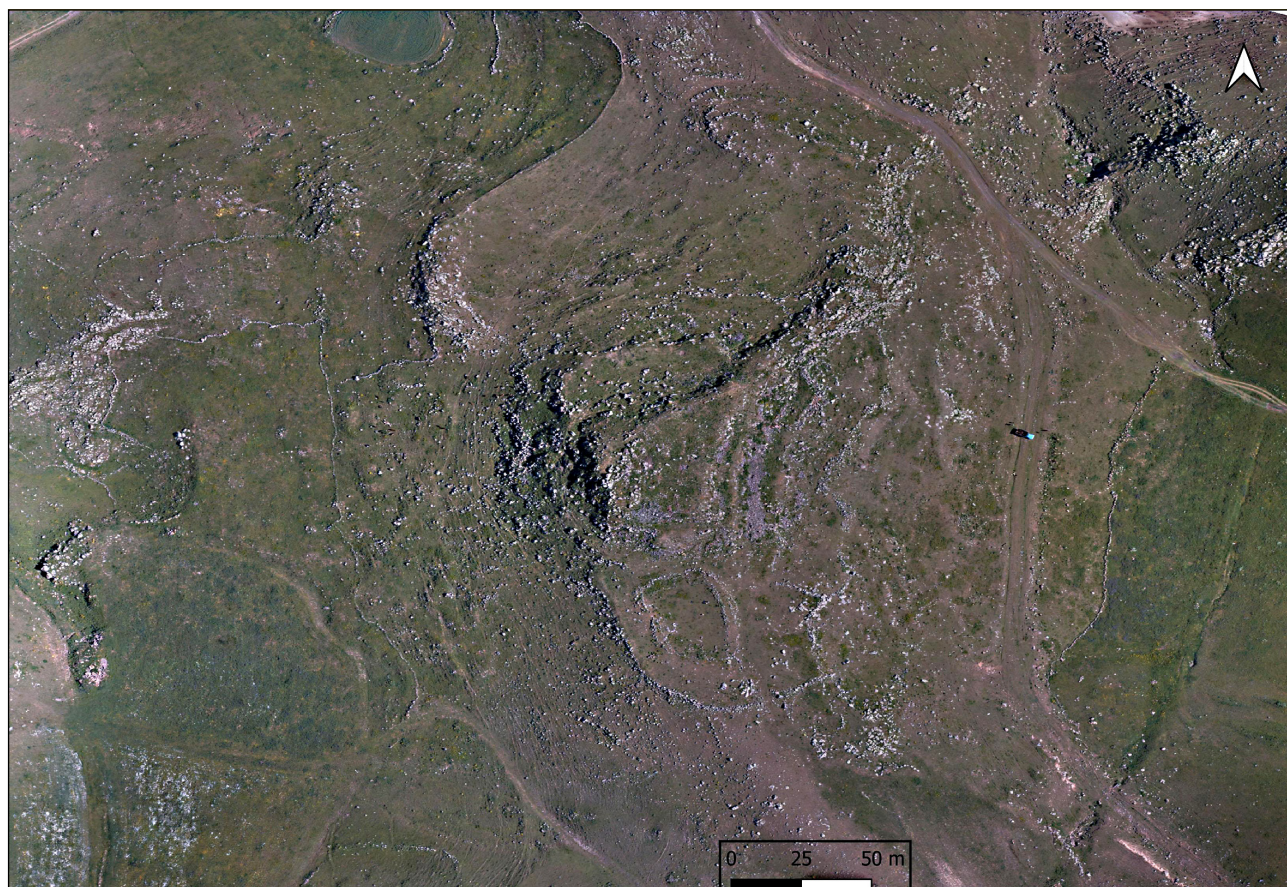


Fig. 2. General view of Lernakert complex in Shirak 1

Рис. 2. Общий вид на Лернакертский комплекс в Ширак 1



Fig. 3. General view of Lernakert complex in Shirak 2

Рис. 3. Общий вид на Лернакертский комплекс в Ширак 2



Fig. 4. Veri Berd, trenches 1 and 7

Рис. 4. Вери Берд, раскоп 1 и 7

Diagnostic ceramics from the Vari Berd fortress within Lernakert's Trench 3 indicate two distinct settlement phases. The first phase dates to the Early Bronze Age (2800-2600 BC), while the second falls within the Late Bronze Age (1500-1400 BC). Similarly, excavations in Trenches 1, 2, and 4 of the Veri Berd fortress, along with the latter section of Trench 3, revealed evidence of Early Iron Age (1200-1000 BC) habitation. Veri Berd's Trench 5 yielded finds indicative of the Late Bronze Age (1400-1300 BC), while the remaining trenches point to habitation during the early Classical period (365-203 BC) based on the recovered artifacts (Table 1). Ceramic dating employed typological analysis and comparisons with contemporaneous regional sites.

The area of Lernakert, rich in alpine meadows and water resources, was favorable for the development of animal husbandry and agriculture. Excavations unearthed evidence of a well-developed agricultural sector, evidenced by the presence of grinding stones and grain remains. Tools associated with processing secondary cattle breeding products, such as sinkers and spindles, further support the practice of developed cattle breeding in the area.

Table 1. The chronology of the Lernakert complex in Shirak.

Таблица 1. Хронология Лернакерского комплекса в Шираке.

Lernakert	Early Bronze Age ca.	Late Bronze Age, ca.	Early Iron Age, ca.	Early Classical, ca.
Vari Berd fortress	2800-2600 BC Lernakert, trench 3	1500-1400 BC Fort, trench 3	1200-1000 BC Fort, trench 1, 2, 3, 4	-
Veri Berd fortress	-	1400-1300 BC Trench 5	-	365-203 BC Trench 1 and 2, 6, 7

Methods

The digitization and modeling of the Lernakert archeological site commenced in 2019 and continues periodically. This effort has captured a substantial portion of the monument complex, including both fortresses (Veri Berd and Vari Berd), cemeteries, stone pathways, and other features. Digitization work proceeded concurrently with ongoing archaeological fieldwork. Additionally, aerial photography of the area was undertaken using a drone. Orthophotoplans and elevation maps (Digital Surface Models – DSMs and Digital Elevation Models – DEMs) were generated from the acquired baseline photographs. These two datasets were combined to create digital 3D models of the investigated sites. For each monument or site, high-resolution elevation and contour maps were produced with a horizontal scale of 1 meter, and detailed cross-sections were created with corresponding lengths, coordinates, and heights. A variety of GIS software programs were employed to generate two-dimensional and three-dimensional maps of the study region and the specific archaeological sites. During the six excavation seasons of the 2019-2021 expedition, three-dimensional surveys, documentation, and analysis were conducted on two Bronze Age fortresses (Veri Berd and Vari Berd), their associated settlements, extensive burial grounds, megalithic structures, and other monuments. The research data was incorporated into a dedicated database [14: 446–453] (Figs. 5 and 6).

The first author analyzed the faunal remains at the Bioarchaeology Laboratory of the National Academy of Sciences of the Republic of Armenia’s Archaeology and Ethnography Institute. The osteological materials were primarily hand-collected and identified using established literature [15: 816; 16: 1147; 17: 64; 18: 146–248].

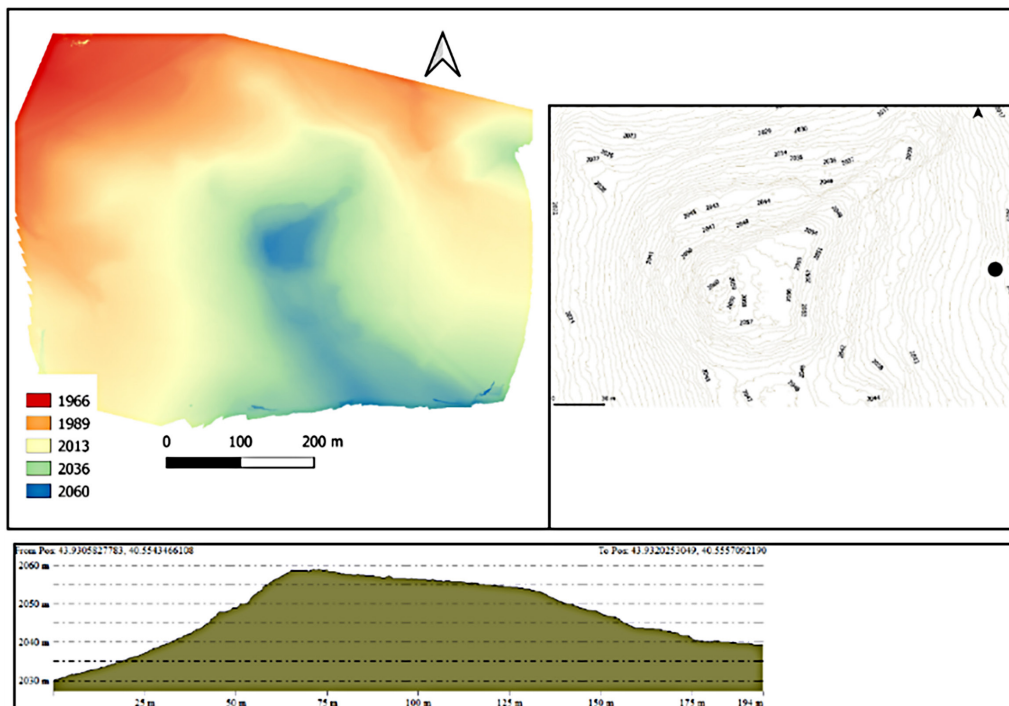


Fig. 5. Vari Berd elevation map, outline, and section

Рис. 5. Топографическая карта Вари Берд, контур и разрез

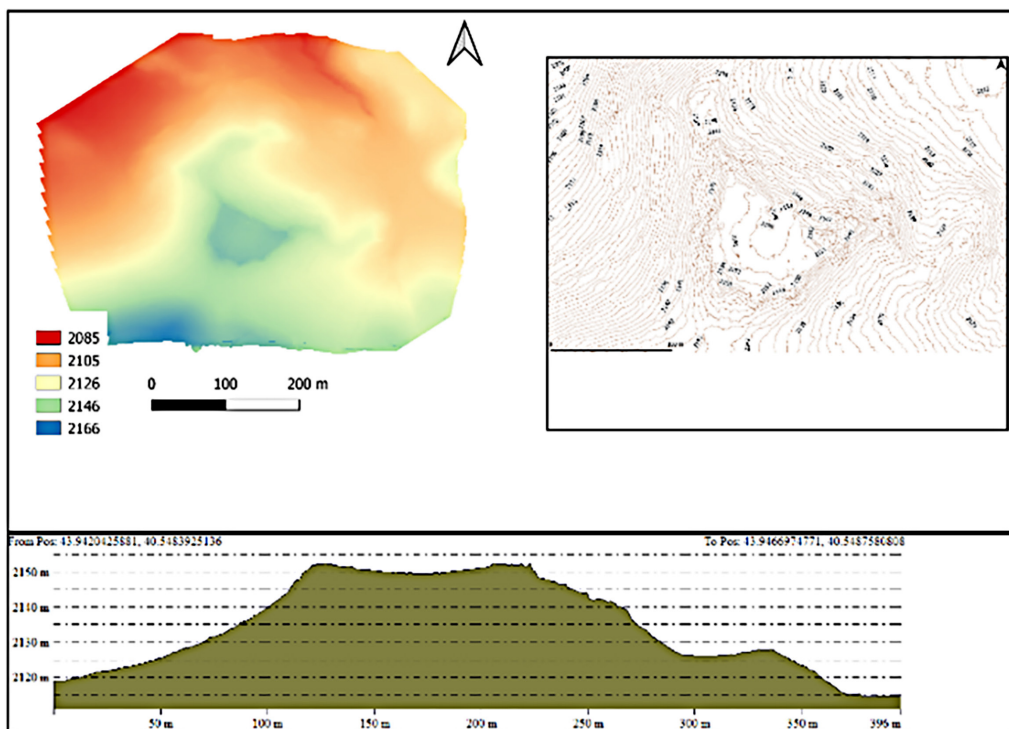


Fig. 6. Veri Berd elevation map, outline, and section

Рис. 6. Топографическая карта Вери Берд, контур и разрез

Results

Faunal remains

More than 3028 osteological remains were recovered during the 2019-2021 excavations of Lernakert, of which 1581 bones were successfully identified (Table 2).

Table 2. NISP and MNI* of osteological remains from Lernakert (2019-2021)

Таблица 2. NISP и MNI остеологических останков из Лернакерта (NISP – Число выявленных видов, MNI – Минимальное число представителей)

Taxa	Veri Berd tr. 1/7 (Excavated 2019-2020)		Veri Berd tr. 2 (2019-2020)		Vari Berd tr. 3 (2019)		Vari Berd tr. 4 (2019)	
	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
Ovis aries / Capra hircus (sheep/goat)	126	12	26	3	42	4	22	1
Bos taurus (cattle)	229	7	22	2	138	5	25	1
Equus caballus (horse)	21	2	6	1	20	1	5	1
Sus scrofa domestica (pig)	58	5	8	1	7	1	-	-
Cervus elaphus (red deer)	9	1	-	-	-	-	-	-
Capreolus capreolus (roe deer)	37	2	-	-	-	-	-	-
Felidae (cats)	95	2	-	-	-	-	-	-
Rodentia	43	3	-	-	9	4	-	-
Total	618	34	62	7	216	15	72	3

Taxa	Veri Berd tr. 5 (2019)		Veri Berd tr. 6 (2019)		Veri Berd tr. 7 (2020)		Vari Berd tr. 1 (2019)	
	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
Ovis aries / Capra hircus	47	6	5	1	61	3	5	1
Bos taurus	52	3	36	1	51	2	40	1
Equus caballus	12	2	2	1	-	-	-	-
Sus scrofa domestica	-	-	5	1	14	2	2	1
Cervus elaphus	-	-	-	-	-	-	-	-
Capreolus capreolus	17	2	12	1	-	-	3	1
Felidae	-	-	-	-	-	-	-	-
Rodentia	-	-	-	-	-	-	-	-
Total	128	13	60	5	126	7	50	4

Taxa	Vari Berd tr2 (2020)		Vari Berd tr. 3 (2021)		Lernakert tr. 3 (2019)	
	NISP	MNI	NISP	MNI	NISP	MNI
Ovis aries / Capra hircus	23	2	33	3	-	-

Bos taurus	18	1	130	4	1	1
Equus caballus	6	1	20	1	-	-
Sus scrofa domestica	8	1	-	-	-	-
Cervus elaphus	-	-	-	-	-	-
Capreolus capreolus	-	-	-	-	-	-
Felidae	-	-	-	-	-	-
Rodentia	-	-	9	4	-	-
Total	55	5	192	12	1	1

* NISP – Number of identified species
MNI – Minimum number of individuals

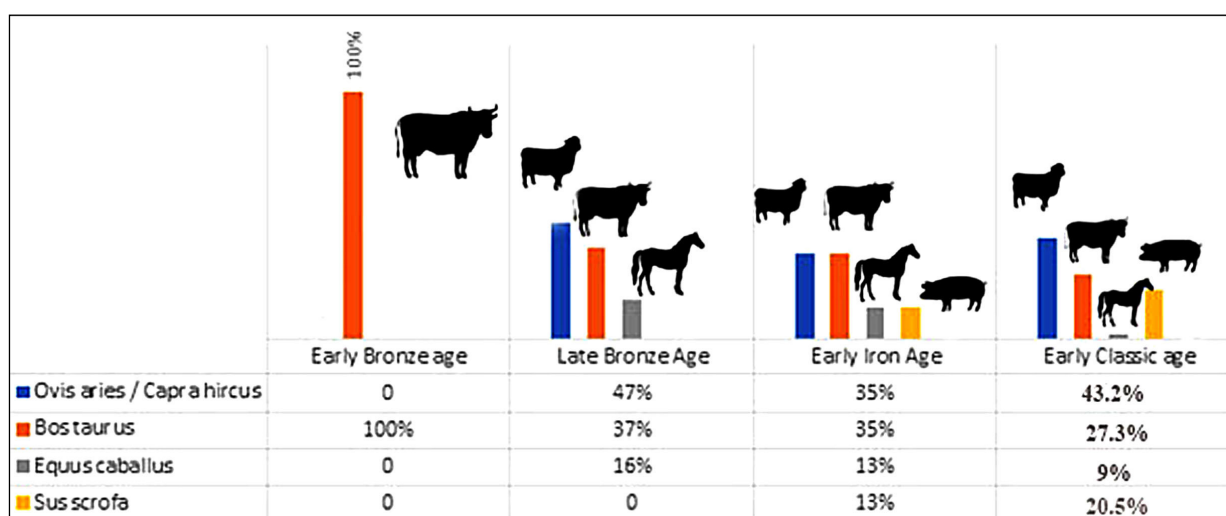


Chart 1. The general structure of identified livestock of Lernakert

Схема 1. Общий состав выявленного скота из Лернакерта

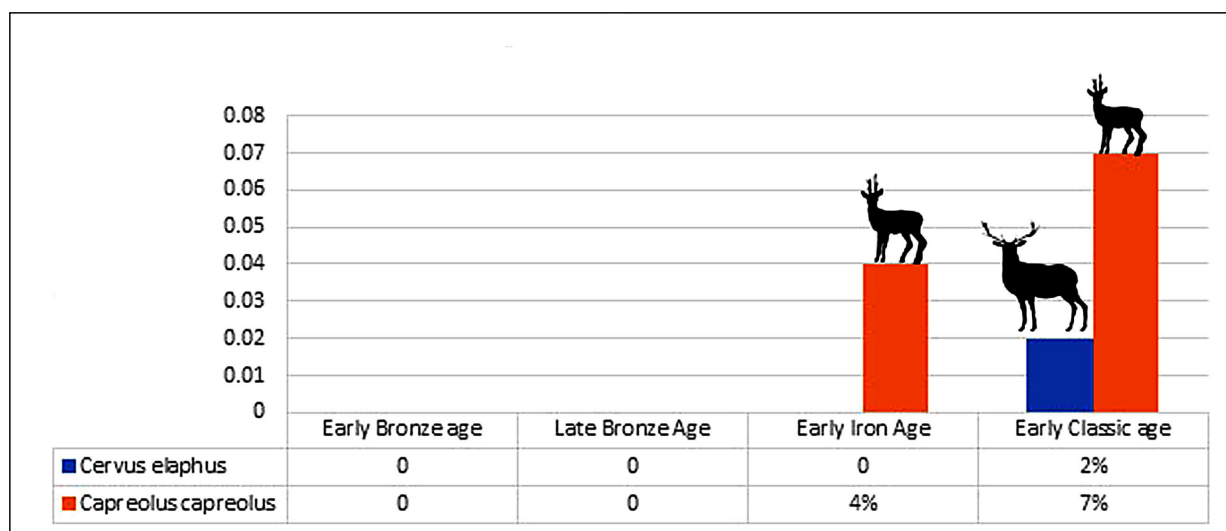


Chart 2. Wild animal remains of Lernakert

Схема 2. Останки диких животных из Лернакерта

Analysis of the faunal remains revealed three main domestic species forming the foundation of the meat diet across the studied periods. Cattle dominated the Early Bronze Age assemblage (100%), while a shift towards small livestock was observed in the Late Bronze Age (47%) and Early Classical period (41%). Cattle and equids remained secondary meat sources throughout these later periods, representing 37% and 26% respectively. Notably, pig consumption, evidenced by pig trotters, appears in the Early Iron Age (13%) and increases further in the Early Classical period (20%). The Early Iron Age witnessed competition for meat resources between cattle (35%) and sheep/goat (35%). Additionally, wild game consumption, likely the result of occasional hunting activities, appears to have been minimal during the Iron Age and Early Classical period (Charts 1 and 2).

Bone modifications

Cut marks. A systematic examination of the animal bones revealed a significant number (43%) exhibiting cut marks, indicating meat removal. These marks suggest that butchering practices involved splitting most of the bones into sections.

Burnt bones. While less commonly encountered, heavily burnt bones were also identified. These instances likely point towards human activity, specifically the use of fire for cooking purposes. However, it is important to note that burning marks can occasionally arise from unintentional exposure of the settlement to fire.

Chewing and Gnawing by Animals. Little evidence was recorded of bones with carnivore gnaw marks.

Weathering. The majority of the bones exhibited good preservation, indicating exposure to dry weather conditions with minimal moisture or weathering marks.

Tool and Ornament Marks. No bones displayed evidence of human modification or wear patterns suggestive of their use as tools or ornaments.

Pathology. While some pathological traces were observed on animal teeth and a few bones, a detailed investigation of these is still pending.

Discussion and Conclusion

This paper presents an analysis of animal bone remains from the Lernakert settlement, spanning the Early and Late Bronze Ages, Iron Age, and Early Classical period. The investigation sheds light on the dietary practices of the inhabitants during these various periods. Our findings contribute to the broader understanding of the evolution of food patterns in prehistoric societies, particularly regarding the diversification of meat consumption and food preparation techniques across the Bronze and Iron Ages, extending into the Early Classical period.

This analysis of faunal remains from Lernakert reveals a fascinating shift in human dietary strategies across the Bronze and Iron Ages, transitioning into the Early Classical period. Notably, the observed decrease in hunting activities and increased reliance on domestic animals for food products suggests a society with a growing focus on other, potentially more specialized, occupations. Furthermore, the differences in the exploitation of domesticated animals between the Early and Late Bronze Ages and the Iron Age point towards distinct

animal husbandry practices employed during these periods. These findings, alongside the documented changes in food patterns, highlight the dynamic interplay between evolving husbandry techniques, dietary practices, and the economic landscape of Lernakert throughout its history.

The bronze and iron tools manufacturing progress during the mentioned Ages was substantiated by various choices of food types for human communities in Lernakert (cattle, sheep/goat, pig, horse, etc.).

The main difference between the Bronze Age and the Iron Age involved novel livestock management strategies, a shift towards diversified agriculture, and potential economic growth leading to an improved standard of living.

The diversified food patterns at Lernakert might be a strategy for adapting to the local semi-arid environment. However, further evidence is needed to explore the potential role of social interaction in shaping the inhabitants' lifestyles.

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