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Animals in the life of the monks of the Dominican monastery in Łęczyca in light of the results of archaeozoological analysis

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Original article

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Abstract. This article presents the results of an archaeozoological analysis of a collection of 1002 post-consumption bone remains, which were recovered from the site of a former Dominican Monastery in Łęczyca (Łódzkie Voivodeship, Poland). The material comes from excavations carried out in 2020-2021. The objective of the research was to reconstruct the meat consumption patterns, animal husbandry practices and economic importance of animals in the community residing in the monastery between the 2nd half of the 13th century and the end of the 18th century. The analysed mammal and bird remains were retrieved from layers that were dated to the 13th-16th century (Phase I) and the 16th-18th century (Phase II). The analysis of the Order of Preachers' culinary offerings revealed a diet consisting mainly of beef, followed by mutton, goat and pork. In addition to the benefits of keeping domesticated livestock, the friars also consumed poultry (mainly geese as well as, to a lesser extent, chickens, turkeys and ducks). They also made use of live poultry. Valuable parts of the carcass, obtained from animals of differing ages, were consumed. Hunting played a negligible role in their diet, as is evidenced by the presence of a very low proportion of bones from wild animals, such as roe deer, red deer and fox.

Key words: Middle Ages, early modern period, monks, animal bones, consumption, farming.

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I. INTRODUCTION

The study of animal remains forms a part of interdisciplinary research, the objective of which is to supplement the current knowledge of the role of animals in daily human life (Albarella 2017; Wilczyński 2021). Archaeozoological sources are particularly valuable when it comes to supplementing or verifying information from medieval and early modern written sources, which are often incomplete, especially in the context of reconstructing food supply processes.

The Łęczyca region lies within the lowland area of central Poland, at the intersection of the Bzura Valley and the Warsaw-Warmia Urstromtal (glacial valley). The earliest known settlement in the region is fortified and dates back to the 6th century (Nadolski 1964: 67-68). At the beginning of the 16th century, the region was traversed by two important communication routes: one connecting Małopolska with Kujawy and Pomerania; and the other connecting southern Wielkopolska with southern Mazovia. Despite the presence of marshes around this junction, intensive settlement developed (Zajączkowski 1987: 17).

The formal establishment of the monastery in Łęczyca is believed to have originated in the first half of the 13th century, as is evidenced by a papal bull issued by Pope Honorius III (Kłoczkowski 1956: 11). This is corroborated by a document dated 14 December 1297 issued by Duke Władysław Łokietek, which authorised the monks to obtain a specific amount of tallow (38.88 kg) each year from the butcher's shop belonging to Herman of Warta. Herman himself, who was motivated by concern for the salvation of his soul, donated 25.92 kg of tallow from the same butchery to the monastery (Jurek 2014: 128-129).

The Dominicans were bound by the principles of the Gospel, engaged in pastoral ministry and embraced a state of poverty. They had no fixed income or assets, and stockpiling goods for more than a year was prohibited. Their subsistence was based on alms (Kłoczkowski 1956: 11; Salij 1986: 15, 25; Hinnebusch 1986: 97), which were only available in large, prosperous urban centres (Kłoczkowski 1956: 114). After adopting the clerical rule of St Augustine, the next step for the friars was to draw up their own Religious Constitutions, modelled on those of the Norbertines (Kłoczkowski 1956: 12; Hinnebusch 1986: 100).

The long process of the friars' settlement, coupled with the formalities that were involved, renders the reconstruction of the precise sequence of events leading to the arrival of the Dominicans in Łęczyca a difficult undertaking (Kłoczkowski 1956: 47-48; Ginter 2020: 17). During the 14th century, the Order faced a period of profound crisis, characterised by a decline in moral standards and a breach of the monastic regulations. Over time, the transgressions of the friars escalated to include violent crimes (Ginter 2021: 20). Noteworthy events include the ordination of Władysław of Oporów as Bishop of Włocławek, along with the hosting of a provincial synod and four provincial chapters of the Order of Preachers in 1459. Following the second partition of Poland (in 1791), Łęczyca came under Prussian rule. The monastery building was subsequently converted into a fortress and the eight monks residing there were relocated to Sochaczew. Following a period of reconstruction, the monastery was converted into a prison in 1799, which operated until 2007. During the First World War, the building was used as a penitentiary and a hospital. During the Second World War, the monastery was under German administration and death sentences were carried out within its walls. Following the closure of the prison in 2007, scientific research began at the site (Fig. 1).

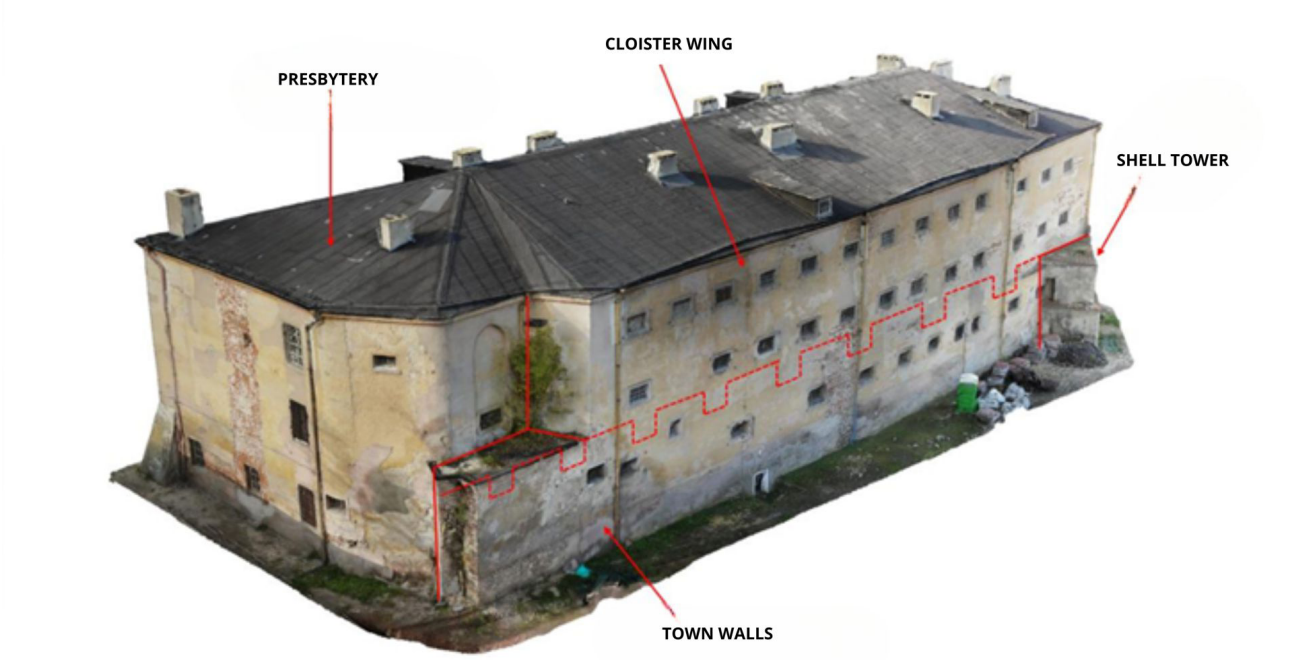

Fig. 1. 3D model of a prison complex with the location of the existing elements of medieval architecture marked (processed by A. Ginter 2020).

The first research phase was initiated in 2010 with the Archaeological and Architectural Workshop 2010. This workshop was held under the direction of Dr hab. J. Pietrzak, Professor at the University of Łódź, Paweł Filipowicz MSc and Dr Zbigniew Lechowicz.

This event marked the first encounter of researchers specialising in various disciplines (including architecture, conservation and archaeology) with the Dominican Monastery in Łęczyca. Between 2019 and 2021, archaeological studies were conducted with the objective of examining relics from the monastery (Fig. 2). In 2019, the archaeological research was supervised by Paweł Filipowicz, MSc. During the next two research seasons (2020 and 2021), the researchers worked under the direction of Dr Artur Ginter (Institute of Archaeology, University of Łódź).

To date, there have been few archaeozoological analyses of bone collections from monasteries. Such collections represent a particularly valuable source

Fig. 2. The excavations from 2012 are marked in green, while those from 2020 are in yellow and the research areas from 2021 are indicated in red (processed by A. Ginter)

of information about the diet of the monks. The primary focus of the archaeozoological research associated with Łęczyca was on the analysis of bone materials from the excavations of the gord and the nearby settlement in Tum, dated to the 9th to the mid-14th century (KRYSIAK 1955; MAKOWIECKI 2014). In addition, several studies were performed on other orders, such as the Cistercians of Łekno (Wielkopolskie Voivodeship) and Bierzwnik (Zachodniopomorskie Voivodeship), the Benedictines of Lubiń (Wielkopolskie Voivodeship), the Teutonic Knights of Mała Nieszawka (Kujawsko-Pomorskie Voivodeship; MAKOWIECKI 2002) and the Augustinian Eremites of Stargard (Zachodniopomorskie Voivodeship; MAKOWIECKI & WIEJACKA 2016).

II. MATERIAL AND METHODS

The collection that was analysed originated from eight test pits and was comprised of 1002 animal remains. These remains were excavated during archaeological studies carried out in 2020-2021 under the direction of Dr A. GINTER. The material was then assigned to two chronological phases: I (13th-16th century) and II (16th-18th century), based on historical data about the Łęczyca Monastery (Table I). Phase I, dating from the late 13th to the mid-16th century, is associated with the origins of the monastery and the period of crisis. In this Phase, 526 bone fragments out of 605 were identified, representing 87.0% of the whole collection. Phase II, which spanned from the 16th to the early 18th century, encompassed the period of growth in the monastery's assets and its subsequent demolition by the Austrian authorities. Within this phase, 332 bones out of 397 were identified, representing 83.6% of the entire collection (Table II). The osteological assemblages were well-preserved, allowing for the reliable taxonomic identification of the material.

The zoological and anatomical identification of mammals was based on macroscopic analyses of the bones from individual animal specimens, supported by archaeozoological textbooks and atlases of animal anatomy (SCHMIDT 1972; AKAJEWSKI 1994; KRYSIAK et al. 2007; LASOTA-MOSKALEWSKA 2008;

Table I

Compilation of animal remains excavated during the archaeological research in 2020-2021 from the area of the Dominican Monastery in Łęczyca

Species / Dating	Phase I							Phase II					
	XIII	XIII-XV	XV	XIV-XVI	XV-XVI	XVI	**Total**	XVI-XVII	XVI-XVIII	XVII	XVII-XVIII	XVIII	**Total**
Cattle (*Bos primigenius* f. *taurus*)	27	12	13	77	80	41	250	35	49	40	17	11	152
Pig (*Sus scrofa* f. *domestica*)	15	7	4	58	20	6	110	12	7	49	2	–	70
Sheep/Goat (*Ovis ammon* f. *aries*/*Capra aegagus* f. *hircus*)	25	8	12	45	16	20	126	21	9	39	9	–	78
Sheep (*Ovis ammon* f. *aries*)	1	–	–	9	1	–	11	–	–	5	–	–	5
Goat (*Capra aegagus* f. *hircus*)	2	–	–	3	–	–	5	–	–	4	–	–	4
Horse (*Equus ferus* f. *caballus*)	–	–	1	1	–	–	2	2	–	5	2	–	9
Dog (*Canis lupus* f. *familiaris*)	–	1	–	–	–	1	2	1	–	1	–	–	2
Roe deer (*Capreolus capreolus*)	–	–	–	–	–	1	1	2	–	–	–	–	2
Red deer (*Cervus elaphus*)	1	–	–	–	–	–	1	–	1	–	–	–	1
Fox (*Vulpes vulpes*)	–	–	–	–	–	–	–	–	–	1	–	–	1
Domestic chicken (*Gallus gallus*)	1	–	1	1	1	–	4	2	–	–	–	–	2
Mallard duck (*Anas platyrhynchos* f. *domestica*)	–	–	–	–	1	–	1	1	–	1	–	–	2
Goose (*Anser sp.*)	2	–	–	1	5	3	11	–	–	1	–	–	1
Turkey (*Meleagris gallopavo*)	–	–	–	–	1	–	1	–	–	1	–	–	1
Small bird (*Aves*)	–	–	–	–	–	–	–	–	–	2	–	–	2
Large bird (*Aves*)	–	–	–	–	1	–	1	–	–	–	–	–	–
Unidentified	12	6	3	27	22	9	79	17	5	41	1	1	65
Total	**86**	**34**	**34**	**222**	**148**	**81**	**605**	**93**	**71**	**190**	**31**	**12**	**397**

Table II

Species distribution of the animal remains

Species/Chronological Phase	Phase I		Phase II	
	Total	%	Total	%
Cattle (*Bos primigenius* f. *taurus*)	250	49.4%	152	47.5%
Pig (*Sus scrofa* f. *domestica*)	110	21.7%	70	22.0%
Sheep/Goat (*Ovis ammon* f. *aries/Capra aegagus* f. *hircus*)	126	25.0%	78	24.2%
Sheep (*Ovis ammon* f. *aries*)	11	2.1%	5	1.5%
Goat (*Capra aegagus* f. *hircus*)	5	1.0%	4	1.5%
Horse (*Equus ferus* f. *caballus*)	2	0.4%	9	2.8%
Dog (*Canis lupus* f. *familiaris*)	2	0.4%	2	0.5%
Total domesticated mammals	**506**	**100%**	**320**	**100%**
Roe deer (*Capreolus capreolus*)	1	–	2	–
Red deer (*Cervus elaphus*)	1	–	1	–
Fox (*Vulpes vulpes*)	–	–	1	–
Total wild mammals	**2**	**0.3%***	**4**	**1.2%**
Domestic chicken (*Gallus gallus*)	4	–	2	–
Mallard duck (*Anas platyrhynchos* f. *domestica*)	1	–	2	–
Goose (*Anser* sp.)	11	–	1	–
Turkey (*Meleagris gallopavo*)	1	–	1	–
Total domesticated birds	**17**	**3.2%***	**6**	**1.8%**
Small bird (Aves)	–	–	2	–
Large bird (Aves)	1	–	–	–
Unidentified	79	–	65	–
Total	**605**	–	**397**	–

Reitz & Wing 2008; France 2009; Gifford-Gonzales 2018). The identification of the mammals was further facilitated by a reference collection housed in the Department of Bioarchaeology, Faculty of Archaeology, University of Warsaw. To distinguish between the sheep and goat bones, the criteria described in scholarly publications by Zdzisława Schramm (Schramm 1967) as well as Melinda Zeder and Heather Lapham (Zeder & Lapham 2010) were applied. The distinction between these two species is challenging due to the morphological similarities in their skeletons. In instances where an unambiguous identification was not possible, the remains were categorised in a common sheep/goat group.

The age of the mammals was determined on the basis of the fusion of the epiphyses with the long bone shafts (Kolda 1936) and the formation of teeth (Lutnicki 1972). In the case of cattle, the age was additionally identified by the size of the holes on the surface of the horn core (Armitage 1980). Sexual dimorphism traits were used to determine the sex. In cattle, these were the length and width of the bones of the metapodial segments (Howard 1963). In the case of sheep and goats, the sex was identified on the basis of the shape of the horn core (Lasota-Moskalewska 2008: 166). In the case of pigs, the distinctive feature was the shape and proportions of the tusks and their alveoli (Mayer & Brisbin 1988). In wild animals, the eruption of the teeth in roe deer, facilitated the age determination (Morow 2003: 33-40).

The measurements of the mammalian bones were performed according to the methods established by Angela von den Driesch (1976). Based on these, the morphology of the domestic animals was reconstructed. The 100-pointscale method developed for cattle (Lasota-Moskalewska 1980) and goats (Lasota-Moskalewska et al. 1991) was also used for this purpose. The cattle bone measurements were transposed onto a 100-point scale and the points obtained were then categorised into three groups: small

(0-30 points); medium (31-70 points); and large (71-100 points) individuals. Based on the greatest lengths (GL) of the bones, the height at the withers (WH) of cattle was calculated using the Fock coefficients (Fock 1966) and of sheep using the coefficients developed by Manfred Teichert (1969).

The characteristics of the traces observed on the bone surfaces were analysed in order to distinguish between the categories of traces resulting from butchery and the cooking of different animal species, such as the cattle, pig, sheep, goat, horse, red deer, roe deer and fox. The main categories of consumption processing traces were distinguished and the length of the ribs of each species was measured, referring to the so-called 'pot portion' (Makowiecki 2014). Taphonomic traces, as distinguished by Robert Lee Lyman (1994), which arise from natural and post-depositional processes, were also noted. Due to the lack of significant differences, the traces were described collectively for both chronological phases and were grouped into three categories: butchery marks; evidence of bone working; and traces related to depositional processes.

The determination of the species, anatomy, age and sex of the birds was conducted by Dr Krzysztof Wertz of the Institute of Systematics and Evolution of Animals of the Polish Academy of Sciences in Kraków. In the *juvenile/infantile* phase (bones are porous and unfused, although more than half are already ossified), the bird has not yet reached full physical maturity and its anatomical features and behaviours are still developing. The *subadult* stage (bones have reached adult length but still show porosity and visible fusion lines between the diaphyses and epiphyses) is a period during which the bird is approaching full maturity, but does not yet exhibit all the morphological traits characteristic of adult individuals. The techniques for determining the age of bird bones are based primarily on the degree of epiphyseal fusion, and to a lesser extent on the analysis of growth layers. The most visible difference between the sexes in birds is the plumage; however, there are also skeletal features that allow for sex determination – for example, the presence of a spur on the tarsometatarsus in roosters (including domestic chickens) and the presence of a medullary bone in hens during the laying period (Serjeantson 2009: 38-55).

III. RESULTS

Phase I (13th –16th century)

The osteological material was comprised of 605 fragments, 526 (86.9%) of which were identified. The majority of these were the remains of domestic mammals (96.2%), with wild mammals representing a minority (0.3%). The latter were represented by a tibia fragment of a red deer and a M2/M3 tooth of a roe deer, both in the eruption stage, based on which the age of the individual at death was determined to be approximately 4-5 years.

Bird remains constituted 3.2% of all the identified bones. The majority of these bird skeletal remains belonged to geese, followed by fragments of chickens, with single fragments belonging to mallards, turkeys and a large-bodied bird. Two individual geese were subjected to age determination, which revealed them to be no more than two years old. One fragment of the femur of a chicken was found to belong to a female.

The largest number of bones of domesticated mammals belonged to domestic cattle (49.4%), followed by the remains of sheep and goats (28.1%) (mostly sheep), with pigs (21.7%) in third place. A small proportion of the bones were found to be the remains of horses (0.4%), where the rib and fibula were distinguished, and of dogs (0.4%), which included the pelvic bone (0.4%; Table II, III).

Cattle were mainly represented by valuable parts of the carcass, including the proximal sections of the forelimb (20.4%) and hind limb (20.0%). The remains of parts of the carcass such as the head (15.6%), distal sections of the forelimb (3.6%) and the hind limb (4.8%), and the phalanges (3.6%) were less numerous. In relation to the standard distribution, a surplus of fragments from the proximal part of the forelimb and hind limb were identified, while a deficit of phalanges was noted (Table V).

In the case of cattle, the percentage of bones from animals killed at a young age was 10.0%. The age of another bovine individual, which was killed at around 15-18 months of age, was determined based on the degree of molar wear (M2) (Table VI). The sexes of four individuals were determined, including one neuter and three females (Tables VII, VIII).

Seven measurements were collected and transposed onto a 100-point scale, based on which two distinct size categories of *Bos taurus brachyceros*

Table III

Compilation of anatomical elements of mammals and birds from Chronological Phase I

Anatomical Element/Species	Cattle	Pig	Sheep/Goat	Horse	Dog	Roe deer	Red deer	Chicken	Mallard duck	Goose	Turkey	Large bird
Skull	18	18	8	–	–	–	–	–	–	–	–	–
Cerebellum	4	–	1	–	–	–	–	–	–	–	–	–
Mandible	12	24	12	–	–	1	–	–	–	–	–	–
Teeth	5	8	6	–	–	–	–	–	–	–	–	–
Vertebrae	25	11	4	–	–	–	–	–	–	–	–	–
Ribs	55	10	21	1	–	–	–	–	–	–	–	–
Sternum	–	–	–	–	–	–	–	–	–	3	–	1
Scapula	11	5	11	–	–	–	–	–	–	1	–	–
Coracoid process	–	–	–	–	–	–	–	–	–	1	–	–
Humerus	16	4	5	–	–	–	–	2	–	2	1	–
Radius	20	3	9	–	–	–	–	–	1	1	–	–
Ulna	4	4	3	–	–	–	–	–	–	–	–	–
Metacarpal	8	3	20	–	–	–	–	–	–	–	–	–
Carpal bones	1	3	–	–	–	–	–	–	–	–	–	–
Pelvis	10	2	5	–	1	–	–	–	–	1	–	–
Femur	24	1	9	–	–	–	–	2	–	–	–	–
Tibia	16	9	18	–	–	–	1	–	–	1	–	–
Astragalus	3	1	–	–	–	–	–	–	–	–	–	–
Calcaneus	2	–	–	–	–	–	–	–	–	–	–	–
Metatarsal	7	–	10	1	–	–	–	–	–	–	–	–
Fibula	–	–	–	–	1	–	–	–	–	–	–	–
Phalanges	9	4	–	–	–	–	–	–	–	1	–	–
Total	**250**	**110**	**142**	**2**	**2**	**1**	**1**	**4**	**1**	**11**	**1**	**1**

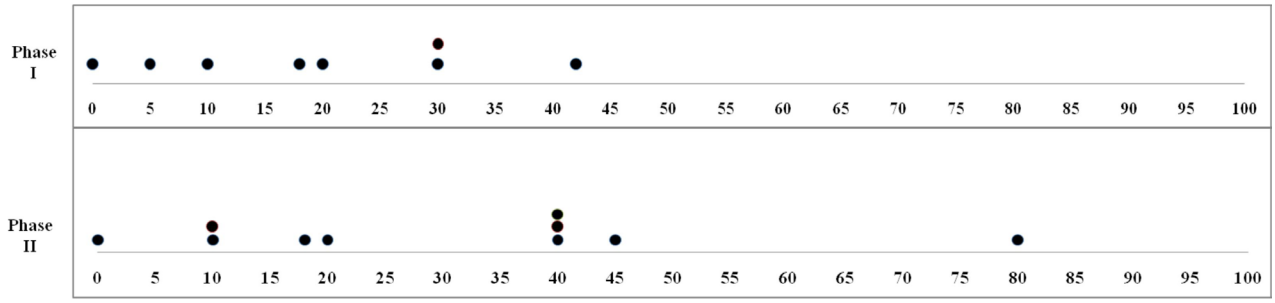

Fig. 3. Graph of the 100-point scale of cattle remains from Chronological Phases I and II.

cattle were distinguished. The first category (6 instances) ranged from 0 to 31 points. One instance (42 points) corresponded to cattle with an average body size (Fig. 3; Table VIII).

Small ruminants represented the second most abundant species among the domestic mammals, accounting for 28.1%, with a preponderance of sheep bones. The most prevalent bones were represented by valuable parts of the carcass such as the proximal forelimb (19.9%) and hind limb (22.5%) sections and the trunk (17.6%). The bones of the head and the distal parts of the limbs were less numerous, with

no phalanges identified (0%). A comparison with the standard distribution revealed a surplus of the proximal sections of both the forelimb and the hind limb (Table V).

In the case of small ruminants, the percentage of animals killed at a young age was 8.7%. Among the goat bones, the presence of bones belonging to one male and one female were identified (Table VII).

The circumference measurement taken from the base of a goat's horn core was transposed onto a 100-point scale. This measurement yielded a score of 26 points, suggesting that the goat was of a short stature (Table VIII).

Another domesticated species that was identified was that of the pig, the remains of which accounted for 21.7% of the collection. An analysis of the anatomical distribution of the pig remains showed that head remains represented almost half of the collection (45.4%). The next most prevalent categories were the bones of the trunk (19.0%), the proximal section of the forelimb (14.5%) and the hind limb (11.0%). Phalanges were the least numerous (3.7%). A comparison with the standard distribution revealed a surplus of cranial bones and, to a lesser extent, the proximal section of the forelimb (Table V).

The percentage of bones from pigs killed at a young age was 21.8%. Two individuals were killed at a very young age: between 3.5 and 6.5 months; and between 7 and 17 months. Five individuals were approximately 17 to 22 months of age at the time of death (Table VI). Sex was determined in the case of five pigs: three were classified as male and two as female (Table VII).

Phase II (late 16th – early 18th century)

A total of 397 animal remains were identified during the second phase of the study, 332 of which (83.6%) were identified. The majority of these belonged to domestic mammals (96.4%), whereas wild mammals constituted a minority (1.2%). Among the latter animals, a fragment of a red deer antler, a fox metacarpus and a roe deer skull with M2/M3 molars in the eruption stage were identified. The age of death of the roe deer was determined to be around 4-5 years, based on the teeth (Table III, VI).

The percentage of birds in Phase II was 1.8%. The following species were identified: a juvenile chicken, mallard, as well as single bones of a goose, turkey and an unidentified small-bodied bird, and the eggshell of a small bird, probably a chicken. The sex of one mallard (a male) was determined, while one chicken bone belonged to a female.

The most prevalent species among the domestic animal remains was cattle (47.5%), followed by sheep or goats (27.2%), with sheep outnumbering goats, and then pigs (22.0%). A few skeletal fragments belonged to horses (2.8%) and dogs (0.5%; Table II). The horse was represented by fragments of the skull, ribs, metacarpal and metatarsal bones and by unidentified long bones. The dog bones were comprised of a molar and a fragment of the pelvis (Table IV).

The anatomical distribution of cattle bones showed that valuable skeletal elements were the most abundant, such as the proximal parts of the forelimb (22.5%) and hind limb (29.6%). Bones of the head (9.2%), trunk (26.3%) and phalanges (2.6%) were less numerous. A comparison with the standard showed a surplus of proximal segments of both limbs (Table V).

The percentage of the bones of domestic cattle killed at a young age was 8.5%. The age at death was determined to be around 15-18 months of age, based on the eruption of a permanent tooth (M2) (Table VI). The sex was determined in the case of one individual (a male) (Table VII).

The osteometric analysis yielded 10 cattle bone measurements, which were transposed onto a 100-point scale, thereby resulting in three size categories. The first category (5 instances) ranged from 0 to 31 points and corresponded to small-bodied cattle (*Bos taurus brachyceros*). The second category ranged from 40 to 45 points (4 instances), corresponding to average-sized cattle of the same morphological form. One instance (80 points) represented a different morphological type *(Bos taurus primigenius)*, which was characterised by large body size (Table VIII; Fig. 3).

The second largest group of bones identified in Phase II were the remains of sheep/goats (27.2%). An analysis of the anatomical distribution of the remains revealed that the bones of the head (24.4%), the proximal forelimb (17.2%) and the hind limb (15.0%) were the most numerous, followed by trunk bones (16.0%). The number of distal limb bones, including phalanges (3.4%), was significantly smaller. A comparison with the standard showed a surplus of the proximal segments of both limbs and a deficit of trunk bones and phalanges (Table V).

Table IV

Compilation of anatomical elements of mammals and birds from Chronological Phase II

Anatomical Element/Species	Cattle	Pig	Sheep/Goat	Horse	Dog	Roe deer	Red deer	Fox	Chicken	Mallard duck	Goose	Turkey	Small bird
Skull	6	8	9	1	–	–	–	–	–	–	–	–	–
Antlers	–	–	–	–	–	–	1	–	–	–	–	–	–
Cerebellum	4	–	–	–	–	–	–	–	–	–	–	–	–
Mandible	2	8	7	1	–	2	–	–	–	–	–	–	–
Teeth	2	4	5	–	1	–	–	–	–	–	–	–	–
Vertebrae	20	5	2	–	–	–	–	–	–	–	–	–	–
Ribs	20	10	12	2	–	–	–	–	–	–	–	–	–
Scapula	6	5	3	–	–	–	–	–	–	–	–	–	–
Coracoid process	–	–	–	–	–	–	–	–	–	1	–	–	–
Humerus	7	5	6	–	–	–	–	–	–	–	–	–	–
Radius	16	2	6	–	–	–	–	–	–	–	–	–	–
Ulna	5	6	–	–	–	–	–	–	–	1	1	–	–
Metacarpal	4	–	11	2		–	–	1	–	–	–	–	–
Pelvis	9	6	–	–	1	–	–	–	–	–	–	1	–
Femur	26	3	4	–	–	–	–	–	–	–	–	–	–
Patella	1	–	–	–	–	–	–	–	–	–	–	–	–
Tibia	9	6	9	–	–	–	–	–	2	–	–	–	–
Astragalus	2	–	1	–	–	–	–	–	–	–	–	–	–
Calcaneus	3	1	–	–	–	–	–	–	–	–	–	–	–
Metatarsal	6	–	9	1	–	–	–	–	–	–	–	–	–
Long bone	–	–	–	2	–	–	–	–	–	–	–	–	1
Phalanges	4	1	3	–	–	–	–	–	–	–	–	–	–
Egg shell	–	–	–	–	–	–	–	–	–	–	–	–	1
Total	**152**	**70**	**87**	**9**	**2**	**2**	**1**	**1**	**2**	**2**	**1**	**1**	**2**

Table V

Anatomical distribution of cattle, sheep/goat and pig remains from different chronological phases (forelimb, proximal part – scapula, humeral bone, radial bone and ulna; forelimb, distal part – carpal bones and metacarpal bone; hind limb, proximal part – pelvis, femoral bone, tibial bone and fibula; hind limb, distal part – tarsal bones and metatarsal bone)

Carcass Parts/Chronological Phase	Cattle		Sheep/Goat			Pig		
	Phase I	Phase II	Phase I	Phase II	Pattern	Phase I	Phase II	Pattern
Head	15.6%	9.2%	19.0%	24.4%	20.0%	45.4%	28.5%	20.0%
Trunk	32.0%	26.3%	17.6%	16.0%	43.0%	19.0%	21.4%	34.0%
Forelimb, proximal part	20.4%	22.5%	19.9%	17.2%	5.0%	14.5%	25.7%	4.0%
Forelimb, distal part	3.6%	2.6%	14.0%	12.6%	8.0%	5.4%	0.0%	10.0%
Hindlimb, proximal part	20.0%	29.6%	22.5%	15.0%	3.0%	11.0%	21.4%	3.0%
Hindlimb, distal part	4.8%	7.2%	7.0%	11.4%	7.0%	1.0%	1.5%	9.0%
Phalanges	3.6%	2.6%	0.0%	3.4%	14.0%	3.7%	1.5%	20.0%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Table VI

Age of the cattle, pig and roe deer individuals based on dental wear from different chronological phases

Dentition	Slaughter age	Number of observations
Phase I		
Cattle		
Erupting M2	15-18 months	1
Pig		
Erupting P1	Less than 3.5-6.5 months	2
Erupting M2	7-17 months	1
Erupting M3	17-22 months	5
Roe deer		
Erupting M2/M3	Approximately 4-5 years	1
Phase II		
Cattle		
Erupting M2	15-18 months	1
Pig		
Erupting M3	17-22 months	1
Roe deer		
Erupting M2/M3	4-5 years	1

Table VII

Sex of the animals described in this paper

Species/ Chronological Phase	Phase I			Phase II	
	Male	Female	Castrate	Male	Female
Cattle	–	3	1	1	–
Pig	3	2	–	2	–
Goat	1	1	–	2	–
Chicken	–	1	–	–	1
Mallard duck	–	–	–	1	–
Total	**4**	**7**	**1**	**6**	**1**

The percentage of bones of sheep/goats killed at a young age was 12.8%. Age was determined based exclusively on an evaluation of the skeletal development. The gender of two individual goats (male) was determined (Table VII).

In the case of sheep, the height at the withers was calculated based on length measurements of the metacarpal bones of two individuals, which were found to be 55.2 cm and 57.2 cm. This indicates that these individuals were of a medium size (Table VIII).

Pig remains (22.0%) were the third largest group of domesticated animal remains. The anatomical distribution of the remains showed that the bones of the proximal sections of the forelimb (25.7%) and hind limb (21.3%) and of the trunk (21.4%) were the most numerous. Distal limb bones, including phalanges, constituted a minimal proportion of the remains (1.5%). No remains of the distal hind limb section were found (0%). A deficit of trunk bones and phalanges was observed when compared to the standard (Table V).

Furthermore, 25.7% of the pig bones belonged to animals that were killed at a young age. In addition, the age of one individual that died at the age of around 17-22 months was determined on the basis of dentition (Table VI).

The sex of two individual pigs was determined as males. The radial bone width measurements yielded 19 points, suggesting that the animal was of a small stature (Table VIII).

A comparison of the results of the analysis of the species and the anatomical distribution of the skeletal remains excavated from both chronological phases showed a considerable degree of similarity. In both phases, cattle bones represented the most prevalent category (almost 50.0%), followed by sheep and goat remains (around 26.0%), and then pigs (just over 20.0%). In Phase I there was a marginally lower proportion of wild mammal bones and a higher proportion of bird bones than in Phase II. The bones of different livestock species were comprised mainly of the remains of the proximal forelimb and hind limb sections.

The analysed bone collection consisted of post-consumption waste in the form of small, chipped bone fragments. Traces of butchering were identified on the bones of all animal species, both domestic and wild. The bone remains of cattle, followed by sheep or goats and then pigs, bore the greatest number of such traces. In the case of horses, chopping marks were identified on the midsections of the shaft of some long bones and small cuts on the ribs. Among the wild animals, chopping marks were found on the midsection of the ulna shaft of a fox (Table IX).

Chopping marks indicative of the carcass being divided into smaller fragments were the most common (Fig. 4A). Such traces were present mainly on the vertebrae, ribs, radius, metacarpus, femur and tibia. The long bones were chopped lengthwise, trans-

Table VIII

Dimensions of the animal bones from different chronological phases (abbreviations used: HBC – height of the basilary canal; GL – greatest length; Bp – greatest breadth of the proximal part; Bd – greatest breadth of the distal part; SD – smallest breadth of the shaft; DD – smallest shaft depth; LI – side length; GLI – greatest lateral length; GLm – greatest length of the medial part; SLC – smallest length of the callum; HGL – humerus glenoid length; LA – length of acetabulum of the pelvis; WH – withers height)

Species	Carcass parts	Type of measurement	Measurement (cm)	Number of points	Coefficient (cm)	WH (cm)	Sex
Phase I							
Cattle	Cerebellum	HBC	10.5	5	–	–	–
	Metacarpal bone	GL-Bp-Bd-DD-SD	16.5-4.9-4.6-2.3-2.8	16	6.0	99.0	Female
	Metacarpal bone	GL-Bp-Bd-DD-SD	14.4-4.4-4.5-1.8-2.1	18	–	–	Castrate
	Metacarpal bone	GL-Bp-Bd-DD-SD	19.8-3.7-4.2-2.2-2.1	0	–	–	?
	Metatarsal bone	GL-Bp-DD-SD	18.1-3.8-2.2-2.3	30	–	–	–
	Talus (Ankle bone)	Bd-GLm-GLI	3.8-5.7-6.3	42	–	–	–
	Phalanx I	GL	4.8	20	–	–	–
Sheep/Goat	Humerus	GL	28.0	–	–	–	–
	Metacarpal bone	GL	11.7	–	–	–	–
	Metacarpal bone	GL	11.3	–	–	–	–
	Metacarpal bone	Bp-SD	2.1-1.2	–	–	–	–
	Femur	Bp	4.2	–	–	–	–
	Scapula	SLC	1.8	–	–	–	–
Sheep	Humerus	Bd	2.8	–	–	–	–
	Metatarsal bone	Bp-SD	2.1-1.1	–	–	–	–
Goat	Cerebellum	HBC-HGL	10.7-12.6	26	–	–	–
Phase II							
Cattle	Cerebellum	HBC	22.0	40	–	–	–
	Cerebellum	HBC	13.2	20	–	–	–
	Pelvis	LA	5.9	–	–	–	–
	Metacarpal bone	Bp-DD-SD	4.2-2.9-2.6	45	–	–	–
	Metacarpal bone	Bp-Bd-DD-SD	4.4-5.1-2.8-2.4	18	–	–	–
	Metacarpal bone	GL-Bp-Bd-DD-SD	23.0-4.2-5.0-2.6-2.4	0	–	–	?
	Tibia	GLm	2.0	–	–	–	–
	Tibia	Bd	6.0	–	–	–	–
	Metatarsal bone	Bp-DD-SD	4.2-2.9-2.6	40	–	–	–
	Metatarsal bone	GL-Bp-Bd-DD-SD	23.0-4.2-4.9-2.4-2.5	40	–	–	?
	Metatarsal bone	GL-Bp-Bd-DD-SD	17.5-5.4-5.4-2.1-2.5	80	5.55	97.1	Male
	Calcaneus (Heel bone)	GL	10.4	10	–	–	–
	Phalanx I	GL-Bp-Bd-SD	4.5-2.6-2.2-2.1	10	–	–	–
	Phalanx II	GL-Bp-Bd-SD	2.6-2.5-1.9-1.8	–	–	–	–
Sheep	Metacarpal bone	GL-Bp-Bd-SD	11.7-2.1-2.4-1.3	–	4.89	57.2	–
	Metacarpal bone	GL-Bp-Bd-SD	11.3-2.0-2.3-1.1	–	4.89	55.2	–
	Metacarpal bone	Bp-SD	2.2-1.4	–	–	–	–
Goat	Cerebellum	HBC-HGL	13.8-20.7	65	–	–	–
Pig	Humerus	SD	1.6	–	–	–	–
	Radius	Bd-Bp	2.9-2.6	19	–	–	–
	Pelvis	LA	2.8	–	–	–	–
	Tibia	Bp	2.7	–	–	–	–

Table IX

Description of the butchery marks, bone manufacturing and post-depositional traces

Track type	Anatomy	Cattle	Pig	Sheep	Goat	Sheep/Goat	Horse	Dog	Red deer	Roe deer	Fox	Chicken	Goose	Large bird	**Total**
Meat processing															
Chopping	Skull	4	6	–	–	–	–	–	–	–	–	–	–	–	10
	Cerebellum	4	–	–	1	–	–	–	–	–	–	–	–	–	5
	Mandible	5	13	1	1	3	–	–	–	1	–	–	–	–	24
	Vertebrae	20	2	–	–	4	–	–	–	–	–	–	–	–	26
	Ribs	20	1	–	–	9	–	–	–	–	–	–	–	–	30
	Sternum	–	–	–	–	–	–	–	–	–	–	–	1	1	2
	Scapula	10	4	–	–	3	–	–	–	–	–	–	1	–	18
	Humerus	20	6	4	1	7	–	–	–	–	–	–	–	–	38
	Radius	21	4	–	–	12	1	–	–	–	–	–	–	–	38
	Ulna	3	6	–	–	–	–	–	–	–	1	–	–	–	10
	Metacarpal bone	5	3	1	–	11	1	–	–	–	–	–	–	–	21
	Pelvis	8	9	–	–	3	–	1	–	–	–	–	1	–	22
	Femur	31	2	–	–	9	–	–	–	–	–	–	–	–	42
	Tibia	19	7	–	2	16	–	–	1	–	–	–	1	–	46
	Talus	3	–	–	–	–	–	–	–	–	–	–	–	-	3
	Calcaneus	1	1	–	–	–	–	–	–	–	–	–	–	–	2
	Metatarsal bone	6	–	–	–	13	1	–	–	–	–	–	–	–	20
	Long bone	–	–	–	–	–	1	–	–	–	–	–	–	–	1
Chopping from both sides	Ribs	30	12	–	–	10	3	–	–	–	–	–	–	–	55
Disarticulation	Coracoid process	–	–	–	–	–	–	–	–	–	–	–	1	–	1
	Femur	–	–	–	–	–	–	–	–	–	–	1	–	–	1
Skinning	Metacarpal bone	–	–	1	–	–	1	–	–	–	–	–	–	–	2
Filleting	Ribs	4	–	–	–	–	–	–	–	–	–	–	–	–	4
	Phalanges	–	1	–	–	–	–	–	–	–	–	–	–	–	1
Sawing	Pelvis	1	–	–	–	–	–	–	–	–	–	–	–	–	1
	Tibia	1	–	–	-	–	–	–	–	–	–	–	–	–	1
Bone manufacturing															
Sawing	Antlers	–	–	–	–	–	–	–	1	–	–	–	–	–	1
Subpositional marks															
Gnawing	Skull	1	1	–	–	-	–	–	–	–	–	–	–	–	2
	Vertebrae	1	1	–	–	–	–	–	–	–	–	–	–	–	2
	Ribs	1	2	–	–	–	–	–	–	–	–	–	–	–	3
	Scapula	–	2	–	–	–	–	–	–	–	–	–	–	–	2
	Humerus	4	1	1	–	2	–	–	–	–	–	–	–	–	8
	Radius	1	–	–	–	2	–	–	–	–	–	–	–	–	3
	Metacarpal bone	–	–	2	–	9	–	–	–	–	–	–	–	–	11
	Pelvis	–	2	–	–	–	–	–	–	–	–	–	–	–	2
	Femur	1	1	–	–	–	–	–	–	–	–	–	–	–	2
	Tibia	–	2	–	–	5	–	–	–	–	–	–	–	–	7
	Metatarsal bone	2	–	–	–	6	–	–	–	–	–	–	–	–	8
	Phalanges	–	–	–	1	–	–	–	–	–	–	–	–	–	1
Weathering	Skull	–	1	–	–	–	–	–	–	–	–	–	–	–	1
	Mandible	–	1	–	–	–	–	–	–	–	–	–	–	–	1
	Humerus	–	–	–	–	–	–	–	–	–	–	–	1	–	1
	Radius	1	–	–	–	–	–	–	–	–	–	–	–	–	1
	Ulna	1	1	–	–	–	–	–	–	–	–	–	–	–	2
	Coracoid process	–	–	–	–	–	–	–	–	–	–	–	1	–	1
	Metacarpal bone	4	–	–	–	–	–	–	–	–	–	–	–	–	4
	Femur	–	–	–	–	3	–	–	–	–	–	–	–	–	3
	Tibia	1	–	–	–	1	–	–	–	–	–	–	–	–	2
	Metatarsal bone	1	–	–	–	–	–	–	–	–	–	–	–	–	1

Fig. 4. Two exemplary bones marked with cuts. A – traces of cuts on a fragment of a pig's pelvic bone; B – trace of diagonal chopping in the middle of the shaft of a horse's metacarpal bone.

versely, in the middle of the shaft, underneath the epiphyses and at the epiphyses. In addition, traces of cuts were visible on the ilium and on the callum scapula (Fig. 4B). The joints exhibited the fewest traces of carcass division. Saw or knife marks were visible on the pelvis and tibia of the cattle. This is indicative of the use of a different tool than that used for dividing the carcass, such as an axe. Cuts made during filleting, i.e. the separation of the meat from the bone and the preparing of it for cooking, were observed on the ribs of the cattle. To ascertain the size range of the portioned meat, the ribs that had been chopped obliquely on both sides were measured. The results for cattle ranged from 4.7 cm to 13.9 cm, while for sheep/goats they ranged from 3.4 cm to 18.8 cm, and for pigs from 3.3 cm to 9.5 cm. This suggests that such portions may have been consumed by the inhabitants of the monastery. Unfortunately, due to the unavailability of pottery analyses, a direct comparison between the results and the archaeozoological findings was not possible. The material contained minimal bones with indications of skinning, suggesting that the animals may have been slaughtered outside the monastery.

Evidence of sawing was observed on the upper part of a red deer antler fragment, which may have been related to the making of bone objects.

A small number of bones contained traces of small circular dents, which were the remains of dog bites (10.3%). They were mainly present on the metacarpal bones of small ruminants. Several dozen domestic animal bones showed signs of weathering (25.0%), two of which were identified as goose bones.

IV. DISCUSSION OF THE RESEARCH RESULTS

The animal remains that were recovered during the 2020-2021 excavations at the former Dominican Monastery in Łęczyca, which functioned from the second half of the 13th century to the end of the 18th century, are a valuable source of knowledge about the monks' meat diet and the role of animals in their daily lives.

In the 13th century, mendicant orders were established, including the Dominicans, who were disciples of the Castilian Dominic Guzman (1170-1221) (Moulin 1986: 12). Information regarding their daily lives can be found in the Rule of St Augustine *(Regula sancti Augustini)* and the *Monastic Constitutions* (Verheijen 1967: 417-437). The *Monastic Constitutions,* which appeared in the years 1216-1228, were modelled on the Norbertine rule and defined the organisational framework of the order and its daily life (Stolarczyk 2016: 18). The Order of Preachers was originally an order of Canons Regular. The Canons Regular followed the model of the lives of the apostles, as well as following some monastic habits, such as fasting and getting up at night to pray. It is known that St Dominic accepted donations as a means of acquiring goods (Wołek 1929: 14-21). The Łęczyca Monastery owned real estate as a capital investment; specifically, the Order invested in monastic property when it was reasonable and convenient. In the 1480s, the scholaster of Łęczyca and the canon of Gniezno, Bogusław of Oporów and Chodów donated a butcher's shop to the monastery (Stolarczyk 2016: 48, 112).

The Dominican friars would gather for a communal meal in the refectory at a designated hour, and would read relevant passages from the Bible before the meal was concluded (Stolarczyk 2016: 36). Among other stipulations, it was mentioned that the '*generale'* were additional portions, consisting of eggs (up to 6), cheese, fish, etc. On Sundays, Thursdays and occasionally Tuesdays, fish was served, such as herring, eel or pike. '*Pitania*' (from the term *pietas*– piety) was provided by pious foundations. It consisted of extra portion shared between two

monks, containing e.g. cheese or eggs. The system of nutrition varied from one monastery to another, depending on the area, rhythm of religious festivals and the season. For instance, during the Norman Conquest of England (1066), one of the priors of Westminster Abbey persuaded the monks to abstain from eating meat and to eat fish instead (Moulin 1986: 44-49). The consumption of meat was forbidden by Saint Benedict of Nursia, with the exception of very ill friars; however, this prohibition did not extend to poultry. Young and ailing monks were given a double portion of eggs (up to 12) (Moulin 1986: 51).

An analysis of the bone material excavated from the grounds of the Dominican Monastery in Łęczyca revealed that the monks consumed primarily beef, followed by mutton and goat meat, and less frequently consumed pork, poultry and game. It is worth noting that beef and pork constituted the basic ingredients of the diets of the inhabitants of Polish territories belonging to varying social status in the Middle Ages and the early modern period (Grężak & Kurach 1996).

During both phases of the monastery's development, ruminants occupied a dominant position among the domesticated animals. This can probably be attributed to the fact that these animals were useful both after they were slaughtered and during their lifetimes. Cattle were a source of calorific meat, tallow, milk, skins and manure, but they were also used as draft animals. Sheep were used to obtain meat, fat and skins, with their horn sheaths being used to make glue. During their lifetimes, wool and milk were also obtained, from which cheeses were made. Goats, which began to be valued in the Middle Ages as towns and cities developed, were kept mainly for their meat and milk, but also for the production of highly prized leather goods (Lasota-Moskalewska 2005: 117). The diet of the monks was supplemented with pork. The pig was the only species that was not useful when it was alive (apart from providing fertiliser); however, pigs were killed for fat, lard and a large quantity of meat. Given the high prices of oil in the Middle Ages, animal fat, which was primarily derived from pigs, was commonly used as a substitute (Moulin 1986: 52).

An analysis of the anatomical distribution indicated that the slaughter and cutting of the carcasses took place outside the monastery, most likely in the slaughterhouses in nearby town (Stolarczyk 2016: 48). This is corroborated by the small number of phalanges and head remains that were found (with the exception of pigs). A small number of traces of skinning were observed on some of these anatomical elements. This is not unusual, however, as the range of economic and consumption activities carried out in the monastery grounds was limited. The inhabitants of the monastery consumed good-quality beef from valuable parts of the carcass, such as the trunk, forelimbs and hind limbs (shoulders, legs and hams), which are distinguished by their high calorific value (Lasota-Moskalewska 2008: 238). A similar observation was made in the case of the remains of small ruminants, except for the scarcity of valuable parts of the trunk. In the case of pig carcasses, valuable elements, such as the proximal sections of the forelimb and the hind limb, as well as the less valuable head, were consumed. The remains of the head were found to be more numerous in Phase I. The surplus of pig head bones is a common phenomenon that is observed at most medieval sites (Iwaszczuk 2014).

The age and sex of the slaughtered animals are also indicative of the quality of the meat that was consumed. The slaughtered animals were mature, but not old, which suggests they were bred for meat. The cattle were less than 2 years of age. The same was true of the sheep and goats. In the case of ruminants, the proportion of bones of animals killed at a young age was similar to that found at most archaeological sites from the prehistoric and medieval periods, ranging from 5.0% to 8.0% (Lasota-Moskalewska 2008: 250). The percentage of the bones of young animals among the pig remains was approximately 25.0%. This data suggests that these animals were kept for their meat and fat. The animals were kept for a longer period, presumably to obtain a carcass with a higher fat content (Lasota-Moskalewska 2005: 144; 2008: 250). The advantages of raising pigs include their omnivorousness and rapid weight gain in a short period of time. Furthermore, they have the capacity to bear more than one litter a year (Lasota-Moskalewska 2005: 139).

Although the sex ratios of the cattle in two chronological phases indicated a predominance of female specimens, the sample size was too small to draw definitive conclusions. Females ensured the continuity of the herd and were a source of milk; additionally, like males, they were a source of fertiliser and hides. The presence of a single neutered individual was identified, suggesting that it was used as a draught

animal for ploughing. The sex proportions among goats showed a balanced split (1:1). Among pigs, the number of bones from males was twice that of females, which may be attributed to changing breeding conditions or a crisis, as the meat from males is of a poorer quality.

The cattle represented a small and short-horned form of the *Bos taurus brachyceros* type, which is typical of medieval Poland (Iwaszczuk 2014; Makowiecki 2016). In Łęczyca, animals of a small to medium body size were bred, with a height at the withers ranging from 90 to 100 cm; however, one individual was notably large. The sheep were comparatively small, with a height at the withers of 55 to 58 cm, and they represented a common type, while the goats were of a small to medium size. Sheep could sometimes be used for agricultural work and, like other domestic species, their manure was an important component of the economy. Mutton and lamb were not held in high esteem in the medieval Western European culinary tradition, as is evidenced by the saying '*mutton and lamb tripe, as well as head, are good for the poor*'. From the second half of the twelfth to the fourteenth century, the Cistercians were actively involved in the wool trade (Moulin 1986: 52, 171).

Evidence suggests that horse meat may have been occasionally consumed at Łęczyca, as was indicated by chopping marks observed on the fragments of certain bones. However, horses were mainly used in a living state. It is known that the Łęczyca Convent had a pair of horses in the 17th century (Stolarczyk 2016: 123). It is also possible that horse meat was consumed in small quantities in Lubiń and Mała Nieszawka (Makowiecki 2002: 120).

The percentage of bones from wild animals found in Łęczyca was also quite low – less than 2.0% (single fragments of fox, roe deer and red deer bones). Hunting laws began to evolve in the early Middle Ages. Small game, known as *animalia minuta* (e.g. foxes and hares), was originally permitted to be hunted by all, while the permission to hunt big game, such as red deer or wild boar (*animalia superiora*), was later granted as a privilege to laymen and the clergy (Gach 2020: 111).

In addition to mammals, the monks of the monastery also consumed poultry – primarily domestic geese, followed by chickens, mallards and turkeys. It has been hypothesised that wherever the practice of chicken farming was more advanced, geese were procured through the collection of eggs from wild geese (greylag goose), which were subsequently reared by hens. As a result, the weight of the bird increased and it lost the ability to fly, which facilitated its control. The analysis of archaeozoological data obtained from studies of the castle of the Teutonic Knights in Mała Nieszawka indicated that goose meat constituted approximately 20.0% of the diet of the monks, making it the most prevalent poultry to be consumed (Wiejacka & Makowiecki 2018: 79-82). The chicken is the only domestic bird to have been introduced to Europe from Indochina around 2,000 years ago (Benecke 1994). In the last quarter of the 13th century, this species was documented in official church and ducal records concerning landed estates (Kozłowski 2004). Eggs were one of the most important products obtained from chickens. This is confirmed by the presence of the bones of female birds at Tum and at other sites (Makowiecki 2014: 377). It is widely accepted that all domestic ducks are descended from the wild mallard (*Anas platyrhynchos*) and underwent domestication on two separate occasions: firstly in the Far East at least 3,000 years ago; and subsequently in Europe during the Middle Ages (Cywa-Benko 2005). However, the presence of turkey bones is perplexing, given that this bird was domesticated in North America. It cannot be ruled out that turkeys were known in Europe before the 16th century, as is evidenced by the images adorning 10th-13th century rings from Hungary (Lasota-Moskalewska 2005: 247).

No evidence of fish consumption was found in the material, which may be due to the fact that soil was not sieved during the excavation work. The scarcity of animal protein associated with the introduction of fasting by the Church was supplemented by the consumption of fish, which were farmed as early as in the 13th century (Bockenheim 1999: 7-15). The existence of fishponds in proximity to monasteries in Poland has been documented through written sources. In the region of Wielkopolska, carp ponds were established in the Sieradz and Wieluń areas (Makowiecki 2003: 46). Purchases of fish were most prevalent during the periods of Advent and Lent.

A comparison of the results of archaeozoological studies conducted in other monasteries demonstrates some differences in the diet of the monks, which may be the result of local economic conditions, religious rules or the specific characteristics of farming.

An archaeozoological analysis of the material comprising approximately 2,000 animal remains from the Cistercian Monastery at Bierzwnik revealed that, between the end of the 13th century and the beginning of the 14th century, the proportion of remains of domestic mammals was 51.0%, fish 41.0% and birds 6.0%, with wild mammals and reptiles representing 1.0% each. In the context of domestic mammals, pig remains were predominant (51.0%), followed by sheep (32.0%) and cattle (17.0%). The meat of the domestic mammals consumed was of a good quality, with a higher presence of head bones noted in the case of pigs (Makowiecki 2002). A high proportion of bird meat was observed in the diet of the Benedictine monks in Lubiń (Makowiecki 2002: 120). This observation is corroborated by bone remains (more than 2,000 fragments) collected from the grounds of the former Augustinian-Eremite church in Stargard, dated to the period from the 13th to the end of the 18th century. Pork was the predominant meat source in the diet of the monks, followed by beef, then mutton and goat. Among birds, chicken remains prevailed. All body parts of the animals were consumed. The animals were most frequently killed for meat at a young age (Makowiecki & Wiejacka 2016).

The dietary preferences of the monks at the monastery in Łęczyca differed from those of the monks in similar centres. The main differences were the predominant presence of ruminants and the lesser importance of pigs. In addition, no evidence of the large-scale consumption of fish or fowl was found.

With the exception of a small number of references to animals in Dominican monastery books, no further information regarding their role has been found in any other written sources. However, data from the monastery books of the Dominicans from Kraków (18th century) concerns livestock that were kept on the monastery's farms. For example, in 1761 the following domestic mammals and poultry were kept on the farm in Sadowie: 5 horses, 12 cows, 8 oxen, 1 bull, 8 pigs, 18 piglets, 20 sheep, 21 chickens and 16 geese. In comparison, the animals kept on the parish priest's farm included 3 oxen, 2 horses, 3 pigs and an undisclosed number of calves and poultry (Kantor 1976: 75: Table 7; 76: Table 8). In the books of Łęczyca there is one mention of illegal cattle grazing in the town's fields (Stolarczyk 2016: 143).

The results of the archaeozoological research provide a significant contribution to our understanding of the diet and animal husbandry practices of the Dominican Monastery in Łęczyca and, more broadly, the functioning of medieval monastic communities in Poland. The differences in meat consumption in different monasteries may be indicative of different husbandry practices, economics strategies and religious rules that impacted the daily lives of the monks.

V. CONCLUSIONS

In conclusion, the animal remains from the Dominican Monastery site in Łęczyca were primarily derived from meat consumption waste. The results of an archaeozoological analysis of the bone remains reflect, to some extent, the culinary and economic behaviours of the Friars Preachers of Łęczyca in the period from the 13th century to the end of the 18th century. The research indicates that the meat supplied to the convent was mainly sourced from domesticated mammals and birds, and less frequently from game. Beef was the most prevalent meat to be consumed, followed by mutton and goat meat, and then pork. The meat consumed in the Dominican Monastery in Łęczyca was of a good quality. Preference was given to valuable parts of the forelimb and the hind limb (fillet, shoulder and leg) from animals killed at a young age. The results presented herein provide a preliminary overview of the consumption and utilisation trends of animals by monks in the Dominican Monastery in Łęczyca. A further analysis of additional bone collections from the same site and the town would facilitate the establishment of socio-topographic relationships and the identification of links between the monastery and the town.

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VII. CONFLICT OF INTEREST

The author declares no conflict of interest.

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