

ON THE UTILIZATION OF THE DOMESTIC FOWL IN CENTRAL EUROPE FROM THE IRON AGE UP TO THE MIDDLE AGES

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ABSTRACT: On the basis of fowl bone finds from 43 sites in Central Europe, using data on the age structure, the sex ratio and the intensity of sexual dimorphism as evidenced in the skeleton of prehistoric fowl populations, the author investigates the development of the use of domestic chicken.

KEYWORDS: ARCHAEOZOOLOGY, DOMESTIC FOWL, CENTRAL EUROPE, IRON AGE - MIDDLE AGES, UTILIZATION

RESUMEN: El trabajo investiga el tipo de explotación que podemos inferir se llevaba a cabo con las gallinas de Europa Central a partir de datos de 43 yacimientos arqueológicos en donde se estudia la estructura de edad de las poblaciones, la relación de sexos y el grado de dimorfismo sexual evidenciado en las osamentas.

PALABRAS CLAVE: ARQUEOZOOLOGIA, GALLINA, CENTROEUROPA, EDAD DEL HIERRO - EDAD MEDIA, APROVECHAMIENTO

INTRODUCTION

The fowl is the oldest domestic animal from the group of birds. It is descended from the red junglefowl (*Gallus gallus* Linné, 1758) which is widely spread in East and Southeast Asia (Herre & Röhrs, 1983, 1990). The oldest traces of its keeping were found in early Neolithic layers in Northeast China, e.g. in Cishan (Province of Hebei) and Peiligang (Province of Henan) which date both from the 6th millennium B.C. (Chow, 1981, 1984). In the following millennia domestic fowl spread from East Asia to Central Asia and then to the Near East and, from the late Bronze Age, to Europe (cf. West & Zhou, 1988). The earliest archaeozoological evidence of fowl keeping in Central Europe comes from settlements and from graves of the late Hallstatt Age (Phase C and D). Among them there are bone finds of the domestic fowl from Nersingen, Wallerfangen, Schirndorf and from the Heuneburg (Germany), from Kotlin and Supca (Poland) as well as from Tešetice (Bohemia) and Nové Košariska (Slovakia; cf. Benecke, 1992, Table 27). Data indicating the existence of domestic fowl in the early Hallstatt Age (Phase A, "Urnenfelderkultur") in Central Europe (Jockenhövel & Ostojka-Zagorski, 1987) have to be assessed carefully until new finds confirm the early dating of the fowl remains from Loviky (Moravia).

During the pre-Roman Iron Age fowl keeping in Central Europe did not develop very much. Among bone finds of the domestic animals, chickens are normally represented in that period with only about 0,3% (Figure 1). In some regions like the coastal areas of the North and the Baltic Seas they were distributed only sparsely during that time, since in many sites of the coastal zone - which were particularly rich in bone materials - fowls have not been found at all. In contrast, the wild bird fauna had plenty of different species in that region so that one can get the impression that in

these areas there might not have been a special need for adopting the habit of fowl keeping. A main reason for that could have been the climatic conditions of the coastal region which might have been detrimental to fowl keeping. It became popular there only in Roman Times. As Figure 1 shows, keeping of fowls increased its importance progressively in Central Europe during the following centuries.

Some indications on the practice of fowl keeping from the Iron Age period up to the Middle Ages can be taken from fowl bones found in settlements of that time. Relevant clues can be drawn, in particular from data concerning the age structure, the ratio between the sexes and the phenotype of the fowl population. Based on such data this paper provides a short survey on the development of the use of domestic chicken in Central Europe from the beginnings of fowl keeping in the early Iron Age up to the Middle Ages.

MATERIAL AND METHODS

This study is based on published archaeozoological data of fowl bones from 43 different sites or occupation phases. As regards their dating the sites include 3 Iron Age, 14 Roman Times and 26 Middle Ages samples. For reasons of space it is not possible to present the sites in detail (cf. Benecke, in press, catalogue). The age-determination criteria, i.e. the classification into juvenile or adult animals according to the bone structure (ossification) or the degree of joint formation, follow the appropriate data of the authors who published the bone finds. The results of determining the sex by using the tarsometatarsi have been also adopted. For those samples providing individual

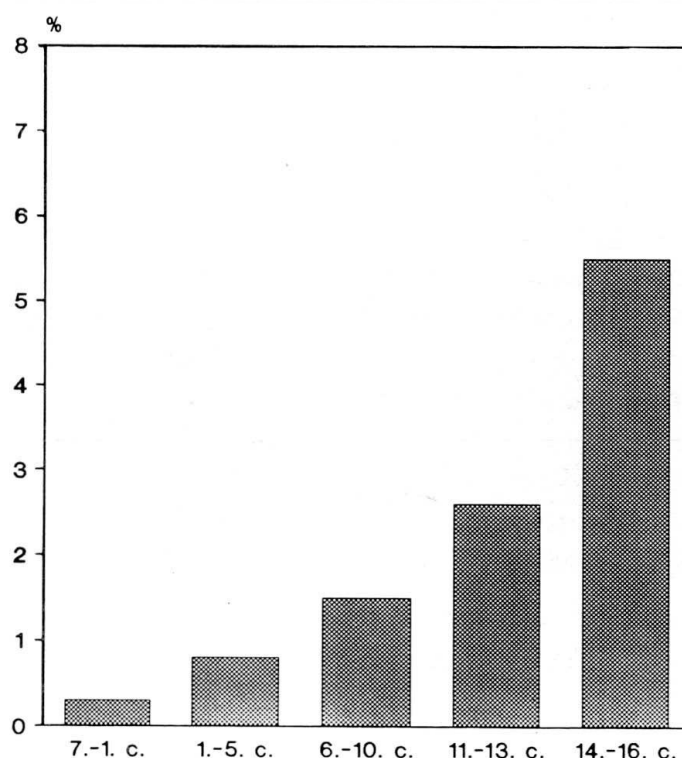


FIGURE 1 - The frequency of chicken in the bone finds of domestic animals from the Iron Age up to the Late Middle Ages. Calculated on the basis of archaeozoological data from 364 sites in Central Europe.

measurements, sex determinations were also estimated with other bones of the postcranial skeleton using multivariate analyses, thus increasing the number of sex-determined bones (on the methods cf. Benecke, 1989). Both types of results were then combined with each other.

In this study we have also examined to what extent data on the intensity of sexual dimorphism in the fowl skeletons indicated a preferential use of a population. For this purpose, skeletons of recent fowl breeds of known use were examined for a possible covariance of parameters. The material analyzed comprised 198 skeletons from recent breeds. The intensity of sexual dimorphism was estimated for different elements as the metrical distance (Mahalanobis D^2) between cocks and hens using the basic length and width measurements (for calculation cf. Weber, 1980). As can be seen in Figure 2, the heavy breeds, used mainly for meat production, show the greatest amount of sexual dimorphism in the postcranial skeleton, being even greater than in the wild form (Bankiva). The dwarf breeds, mainly kept as pets, exhibit the lowest D^2 -values. Sexual dimorphism in the light fowl breeds, mainly those with a double use (eggs, meat), falls between the dwarf breeds and the wild Bankiva fowls. Altogether these data indicate that in recent fowl breeds the intensity of sexual dimorphism as reflected on the skeleton does seem to have a certain degree of correlation with the main use of the breed.

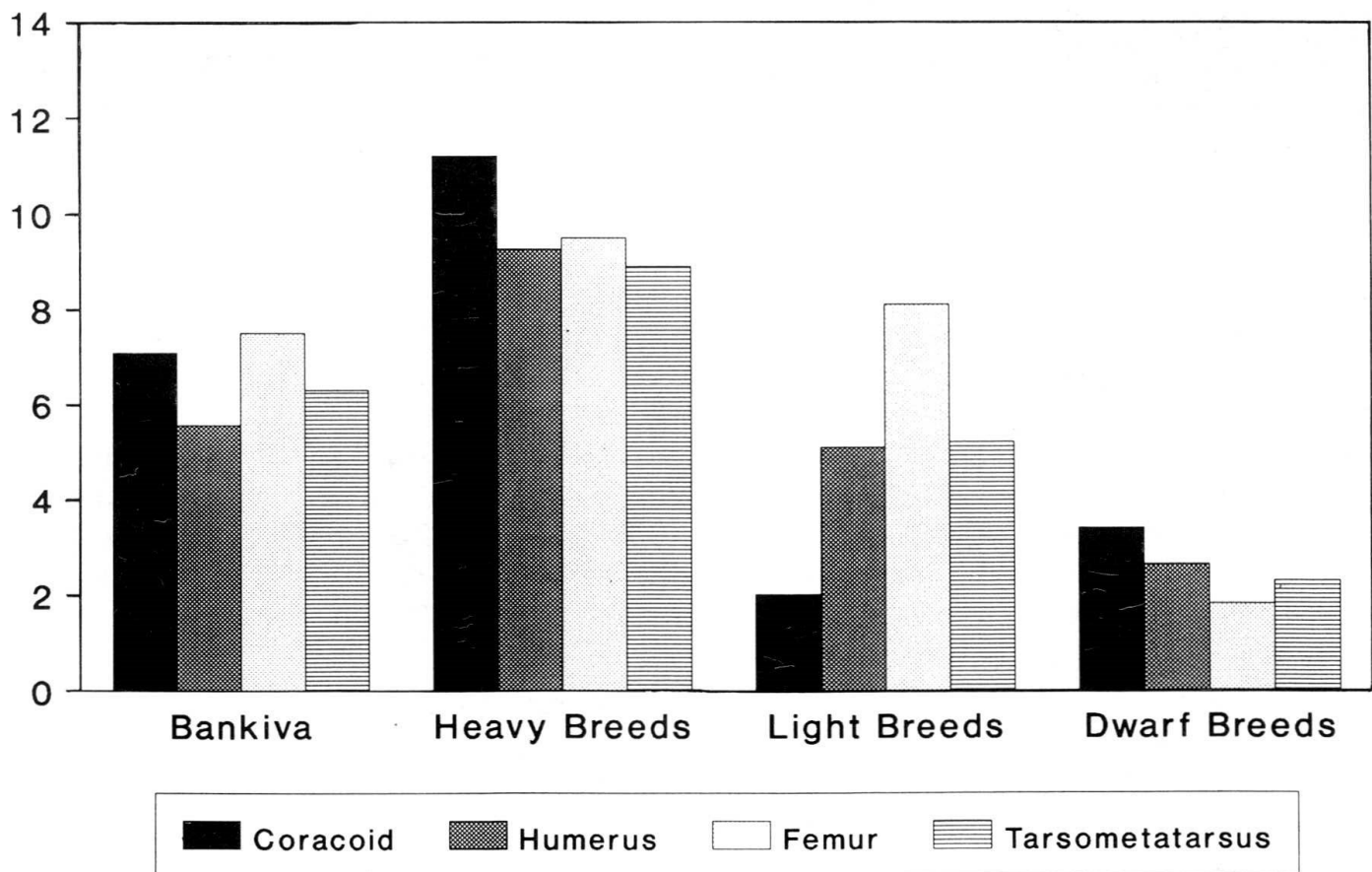


FIGURE 2 - Sexual dimorphism in the postcranial skeleton of recent chicken breeds calculated as Mahalanobis distances (D^2) between the sexes for four elements (basic measurements).

RESULTS AND DISCUSSION

Iron Age

As bone finds indicate, fowl keeping in Central Europe had only a limited importance within the food production scheme in the centuries of pre Roman Iron Age. In relation to other domestic animals (cattle, pigs, sheep/goat and horse) the proportion of domestic fowl is, on the average, 0,3% of the NISP. Regional differences could not be detected as the following data on the mean percentage of domestic chickens show¹: Southern Germany 0,1 % (n = 9), Oder region 0,1 % (n = 4), Central Germany 0,6 % (n = 8), Lower Vistula region 0,4 % (n = 4), Kujavia 0,2 % (n = 9), Bohemia/Moravia 0,4 % (n = 4) and Switzerland 0,1 % (n = 8).

From the period between the 7th and the 1st century B.C. there are only statistically meaningful data for three sites on the age composition and the sex ratio of the domestic fowl. In the oldest of these three settlements, on the Heuneburg near Hundersingen (dated to the early Latène Period), the ratio between hens and cocks is about 1:3, whereas adult animals are the dominating cohort. These data indicate a predominant use of the chickens for meat production. The egg yield of hens probably was so low that - except for some breeding stock - they were slaughtered as young animals. The two other sites dating back to the late Latène Period evidence some changes towards an increased egg yield. Whereas in Altenburg-Rheinau the ratio of sexes was still balanced, the proportion of hens in Manching is already 62,5%. In both settlements the percentage of young animals is relatively high, amounting to 42,9 and 43,8% respectively. Altogether, these results point towards a dominant use of meat and a more intense egg production compared with the early Latène Period.

Roman Period

Fowl keeping in Central Europe gained an even more significant role in the first centuries after Christ compared with the Iron Age (Figure 1). This development had more influence on the region of the Roman provinces on the Rhine and the Danube (Germania romana) than on the Germanic region (Germania libera). Whereas in the Roman provinces - except the province of Germania inferior - poultry keeping was mainly restricted to domestic fowl, in Germania libera geese keeping was the typical form of poultry farming (cf. Table 1). As the archaeozoological data show, the contribution of domestic poultry (fowls, geese) to the overall production of food in the Roman provinces was three times higher than in the Germania libera region. The percentage of poultry in the Roman province of Pannonia is remarkably high.

From 14 sites inferences can be made on the ratio between meat production and egg yield in Roman fowl keeping by using the data on the age structure and the proportions of both sexes².

(1) - In brackets - number of sites taken into consideration.

(2) - Basically it should be kept in mind that bone finds come mainly from military facilities (castellum, garrison, camp village) as well as from Roman towns. Until now there are no comparable representative results from country estates (Villa rustica) or other rural settlements, which are the main places of Roman animal production and, thus, of poultry keeping. For the first types of settlements, it is difficult to assess to what extent were domestic chickens kept within the settlements, or to what extent fowls were exclusively brought there as a commercial product. At least for the military settlements it is assumed that the soldiers based there practised fowl keeping (cf. Prummel, 1989).

Region (number of sites)	Sum	chicken	goose	percentage of poultry
North Sea, coastal region (5)	116	51,7	48,3	1,5
Baltic Sea, Gotland (2)	502	64,3	35,7	0,6
Lower Rhine Valley, Germania inf. (8)	497	79,5	20,5	2,0
Lower Saxonia, southern part (4)	41	78,0	22,0	0,2
Brandenburg (5)	36	83,3	16,7	0,3
Kujavia (3)	98	62,2	37,8	0,9
Upper Rhine Valley, Germania sup. (9)	1319	94,6	5,4	0,7
Danube region, Raetia/Noricum (15)	1240	95,5	4,5	2,1
Pannonia sup. et inf. (8)	2433	86,8	13,2	4,4

TABLE 1 - The ratio of domestic chickens and geese and the percentage of domestic poultry in different regions of Central Europe during the Roman Period.

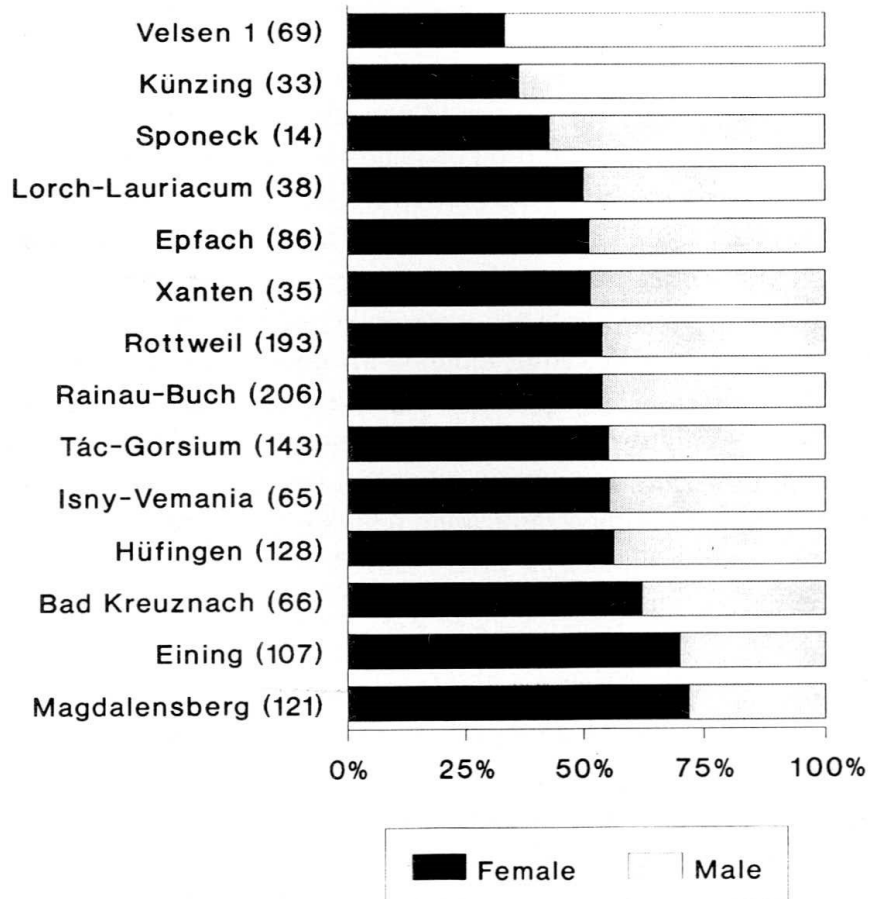
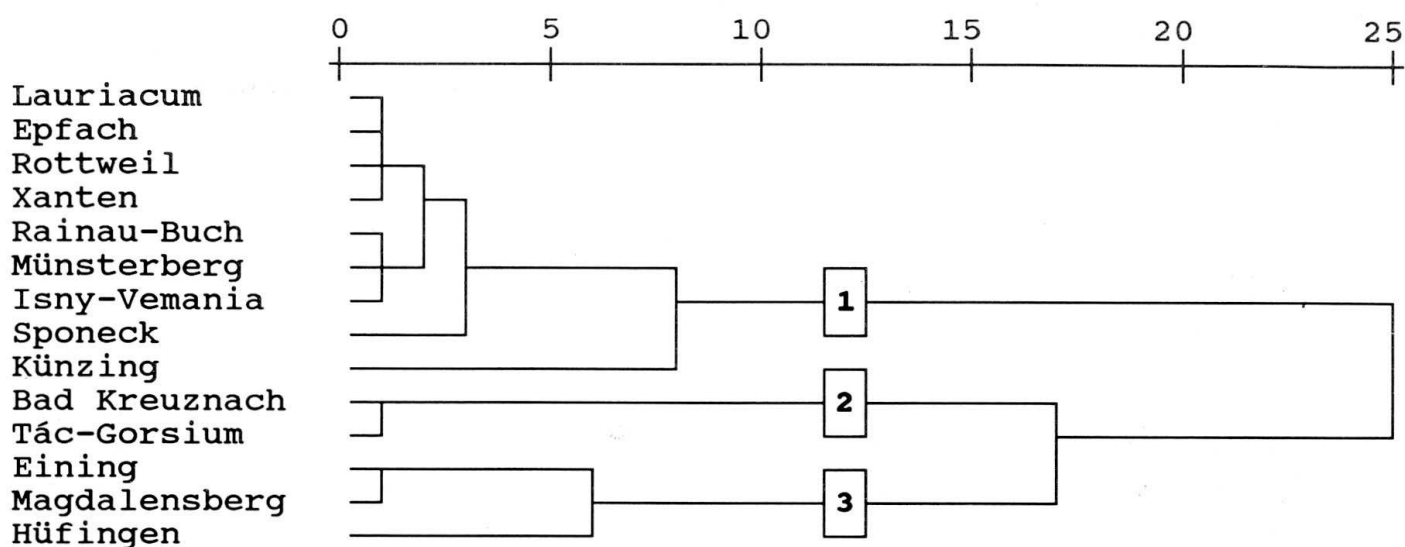


FIGURE 3 - The ratio of hens to cocks in Roman sites from Central Europe. The numbers of the sex-determined bones are given in brackets.



Cluster Number		juvenil	adult	Number	male	female
1	773	17.3	82.7	663	48.0	52.0
2	203	37.4	62.6	209	42.6	57.4
3	1337	14.3	85.7	356	34.3	65.7

FIGURE 4 - Cluster analysis of data on the age structure and on the sex ratio for domestic chickens from Roman sites in Central Europe.

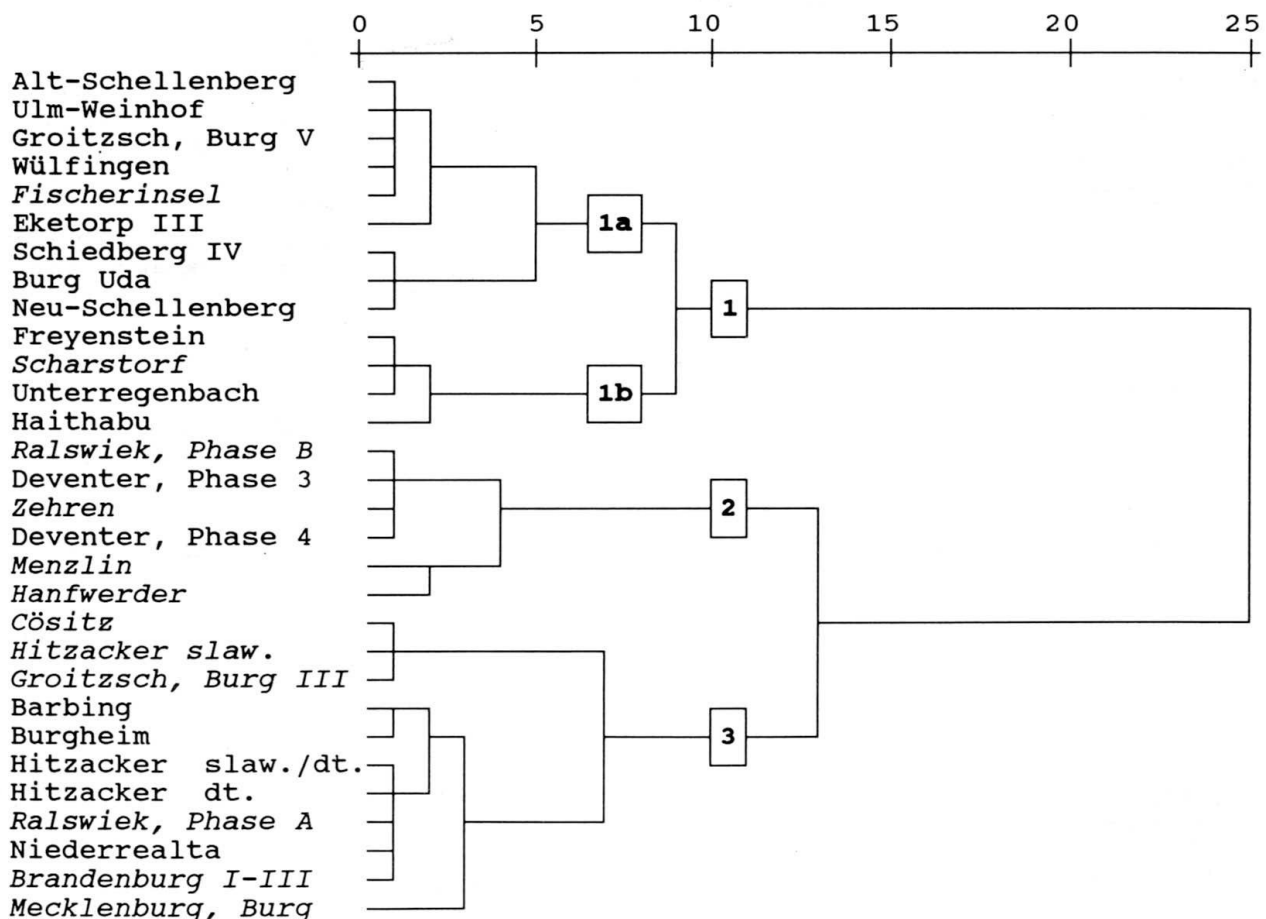
As shown in Figure 3, most of the sites indicate a balanced ratio of sexes between hens and cocks of about 1:1. Just in Velsen 1, Künzing and Sponeck do the finds show a dominance of cocks. These settlements were castellums. On the other hand, in the palace villa of Bad Kreuznach, the camp village of Eining and the Roman town on the Magdalensberg, hens dominate. But even in these settlements the 5:1 ratio of hens to cocks, recommended by COLUMELLA (VIII, 2) for the Roman fowl breeding, is not met. If we take the results of the age structure into consideration, we come up with the following picture on the ratio between meat and egg production in the Roman provinces (cf. Figure 4): A high percentage of male, adult animals in most of the sites (clusters 1 and 2) points towards a main use of fowls for meat production, since it is rather evident that adult cocks have much more meat than hens. Also in Eining, Hüfingen and in the town on the Magdalensberg (subcluster 3), fowls might have been kept mainly for meat production, though egg yield possibly played a much greater role as the results on the sex ratio, indicating a higher proportion of hens, show. According to Roman written sources (e.g. COLUMELLA VIII, 4 and 5), Romans tried to increase the egg yield by extending the laying period by means of feeding special fodder (among others, semi-boiled barley mixed with clover).

The present study indicates that in the sites analyzed domestic chickens were mainly used for meat production. Obviously, capons were kept for this purpose (PLINIUS X, 25; COLUMELLA VIII, 2 and VARRO III, 9) and chickens were crammed for this same reason (COLUMELLA VIII, 7; VARRO III, 9). Among the bone finds, large-sized tarsometatarsi, where a spur epiphysis in the form of a porous bone layer or the spur consisting of a loose osseous substance, are assigned to capons (e.g. Dräger, 1964; Lipper, 1986; Johansson, 1987). Such types of bones have been retrieved, among others, from the Magdalensberg, Lorch-Lauriacum, Breisach-Münsterberg, Eining, Bad Kreuznach and from

Tác-Gorsium. Except for Tác-Gorsium, where the frequency of capons among the sex-determined tarsometatarsi is relatively high (amounting to 17,5%, Bökönyi 1984), they are rare occurrences.

Apart from their food production use, domestic chickens fulfilled some other functions. They produced feathers and downs which were used in a versatile form as stuffing material. It is known that cocks were used for cock-fights (e.g. PLINIUS X, 24) and fowls in general were used as oracular birds and as meals for the deceased (cf. Lauwerier, 1988; Kokabi, 1988). The keeping of small breeds is known just as a kind of hobby (COLUMELLA VIII, 2).

From the Germanic region, representative archaeozoological data on the utilization of domestic fowls are only known from Eketorp II (Öland). The fact that 90,7% of the bones belonged to adult animals and a 3:2 sex ratio favoured hens, indicates -by analogy to most of the Roman province sites- a dominant use of meat as compared with the egg production in the keeping of chickens.



Cluster	Number	juvenil	adult	Number	male	female
1	6961	9.6	90.4	1805	44.6	55.4
1a	4004	9.5	90.5	755	29.1	70.9
1b	2957	9.8	90.2	1050	55.7	44.3
2	448	41.5	58.5	217	52.5	47.5
3	664	47.6	52.4	374	25.4	74.6

FIGURE 5 - Cluster analysis of data on the age structure and on the sex ratio for domestic chickens from medieval sites in Central Europe. Names of Slavonic sites are written in italics.

Middle Ages

Poultry keeping comprising fowls, geese, pigeons and, during the Middle Ages, also ducks, served mainly like in previous centuries to produce food such as meat and eggs. Fowls and geese contributed to that more than any other group. According to our results, there was a continuously growing importance of the domestic fowl for the supply of meat during the Middle Ages. Thus, its mean percentage in the bone samples of the domestic animals increased from 1,5% in the period from the 6th to the 10th c. up to 2,6% in the period from the 11th to the 13th c. and to a still higher frequency of 5,5% in the late Middle Ages and, Early Modern Times (14th - 16th c.) respectively.

The data on the age structure and the sex ratio of domestic chickens from these 26 sites indicate differences in the importance and aims of the medieval times fowl keeping strategy. A cluster analysis essentially revealed three basic patterns (Figure 5). A larger group of sites, which includes mainly Slavonic settlements, is characterized by a high percentage of young animals (47,6%) as well as a hen to cock ratio of about 3:1 (Cluster 3 in Figure 5). There was no evidence for such a flock structure in previous periods. It first occurs in fowl keeping during the Early Middle Ages. Those results taken together speak in favour of a fowl farming strategy with a major emphasis on egg yield. The regulation of the stock which was necessary for that was obviously done through a continuous slaughtering of mainly young surplus cocks and, to a minor extent, of young hens incapable of breeding. This would explain the relatively high proportion of juvenile chickens. Another group of sites which includes many settlements of the Frankish-German region, is

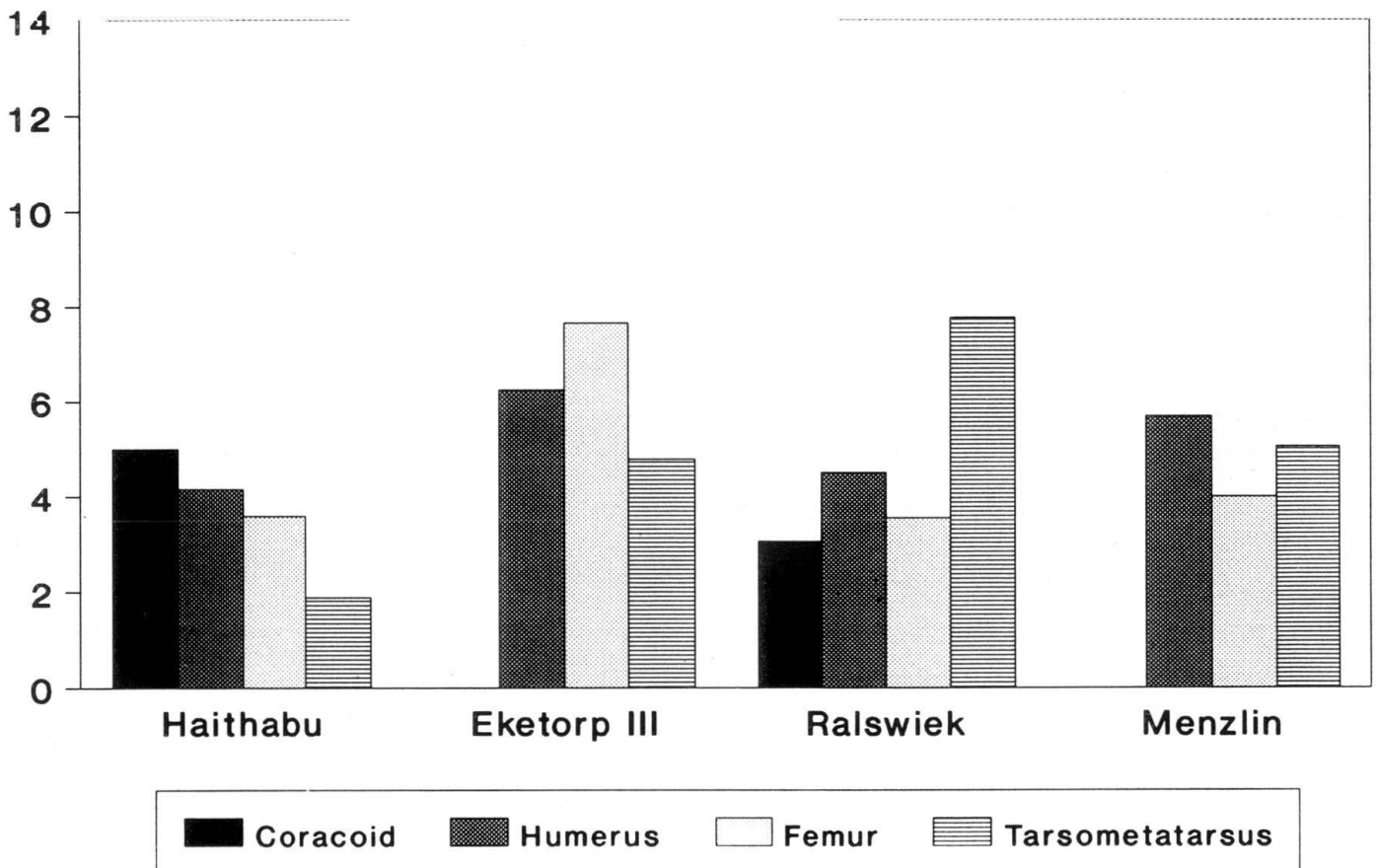


FIGURE 6 Sexual dimorphism in the postcranial skeleton of medieval fowl populations (Haithabu, Eketorp III, Ralswiek, Menzlin) calculated as Mahalanobis distances (D^2) between the sexes for four elements (basic measurements).

characterized by a majority of adult animals (90,4%) and a relatively balanced sex ratio (Cluster 1 in Figure 5), whereas two other groups can be divided in relation to the last feature (Subcluster 1a and 1b). For these settlements it can be assumed that fowl keeping aimed at a predominance of meat production with a varying importance given to egg yield. The age composition of the sites clumped into cluster 2 is similar to that of the sites from cluster 3 whereas the cock: hen ratio is similar to the one characterizing sites in cluster 1. For this reason these sites, where meat production again seems to be by the prioritarian objective of fowl keeping, take an intermediate position among the whole sample.

Studies on the intensity of sexual dimorphism among four series (Haithabu, Eketorp II, Ralswiek, Menzlin) do not reveal significant differences (Figure 6). The D^2 -values calculated for four elements are within the same order as those calculated for recent light breeds (cf. Figure 2). Thus, Middle Age domestic chickens can be best compared with multi-use fowls (combining meat and egg production). The specialization into meat and egg laying breeds probably began not before the turn from Late Middle Ages to Early Modern Times. It would be obviously useful to continue studies on the sexual dimorphism from bone remains of domestic fowls from sites of the 14th up to the 17th century.

SUMMARY

As conclusions of our analysis we can now summarize the following:

1. Domestic fowl are a part of the Central European fauna of domestic animals since the Late Hallstatt Age (Ha C/D). In the coastal regions of the North Sea and the Baltic Sea fowl keeping prevailed only at the time of transition from the Late Latène to the Roman Period.
2. From the Iron Age up to the Late Middle Ages the importance of domestic fowl within the food production strategy continuously increased. Its frequency in the bone samples of domestic animals of this time rose from 0,3% to 5,5%.
3. During the Iron Age results indicate that domestic fowl was mainly used in meat production.
4. Most of the settlements from the Roman Period are characterized by a balanced sex ratio and a majority of adult animals. Obviously, domestic chickens in Roman towns and military stations were kept mainly for their meat. Data from villae rusticae sites are lacking for the moment.
5. In the area of the Roman provinces archeozoological data and written sources indicate the use of domestic fowl, for other types of activities e.g. the keeping of fighting cocks, use of oracular birds and as meals for the deceased.
6. The medieval sites show a great diversity in the relation between meat and egg production. In many settlements, specially in the Slavonic region, the egg yield had a great importance in the keeping of fowl.
7. According to the intensity of sexual dimorphism, as evidenced by the postcranial skeleton, domestic chickens from the medieval sites of Haithabu, Ralswiek, Menzlin and Eketorp III can be best compared with multi-use fowls (i.e., those combining meat and egg production).

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