

Ancient Monuments Laboratory
Report 80/87

ANIMAL BONES FROM JARROW.
3RD REPORT.

B A Noddle

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Summary

Nearly 6000 bone fragments were identified from this very disturbed and many contexted site, being only 60% of the total weight. They were divided into saxon, early medieval, general medieval and late medieval periods, the vast majority being general medieval. The usual species were present, cattle being the most numerous, but there were many more fowl bones than on most sites of the period. The age range of the species, cattle in particular, suggests the development of an influential meat market in Jarrow. Average size of the meat animals is greater than other medieval sites in Southern Britain and Northern Europe.

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Animal Bones from Jarrow. 3rd report

The evaluation of this bone collection posed a number of problems. They were exceedingly fragmented, although otherwise well preserved, and only 60% by weight could be identified. They came from several hundred contexts, many of which included only a single identified fragment. These bones must represent a vast number which were originally deposited on the site, since nearly 6000 were in fact identified.

As many of the contexts were much disturbed and their contents came from a wide range of dates, grouping of the material also presented problems. The bones were assessed in 4 groups, Saxon (self explanatory), early medieval (up to 14th century), general medieval (context containing 14th century material or those covering a wide range of dates) and late medieval (contexts so described by the excavator and those dating from the 16th century and later). In many of the disturbed contexts it was likely that the only bone not fragmented beyond recognition came from the later parts of the date range. In these circumstances it seemed likely that the bones recovered were the result of taphonomic process rather than input, and no anatomical analysis was attempted.

It was assumed that every context contained bones from different individuals. Wherever possible, these individuals were assigned an age category. These were new born, no epiphyseal fusion or permanent teeth in wear; juvenile-intermediate group of epiphyses unfused, 2nd molar in wear but not 3rd; immature-latest group of epiphyses unfused 3rd molar not fully in wear, and mature 3rd molar fully in wear and all epiphyses fused. The earliest maturing bones are coracoid process of scapula, 2nd phalanx, proximal epiphysis radius, distal epiphysis humerus and elements of pelvic girdle; the intermediate group comprises 1st phalanx, distal metapodials and tibia; the late group comprises proximal humerus, ulna, femur and tibia, and distal radius, ulna and femur, the central epiphyses of the vertebrae and the peripheral epiphyses of the ilium and ischium.

Measurements were taken according to the recommendations of von den Driesch (1976) with the exception of the metapodials ^{where} the epiphyseal junction width was measured. In the case of bird bones only lengths were measured. The measurements were all taken to the nearest mm.

There have been many arguments in the literature about the validity of the concept of minimum numbers of individuals. The author's opinion is that this is a most useful concept in many though not all sites. It is employed in this instance, and the age groups are based upon these individuals.

Proportions of species

These are set out in table 1. This shows actual numbers of identified fragments and MNI, and also the % proportions with the exception of frog and

rabbit bones, which are merely recorded as present. Though the rabbit might have formed part of the diet of medieval Jarrow the bones could equally well have come from wild animals of a later date which had burrowed in the site. The category "other bird" includes single specimens of swan and stork, but comprises mainly small passerines. A ^(written) complete list of identifications kindly supplied by Dr. T. O'Connor is included as an appendix. The rodents mainly present in large groups, probably originate from the pellets of owls inhabiting ruined parts of the site.

As is usually the case in all archaeological assemblages from the medieval period cattle bones predominate, with sheep second and pig 3rd. What is highly unusual are the large numbers of bones from domestic poultry, principally fowl. Where there are substantial differences in the proportions derived from fragment counts and minimum numbers of individuals, the latter is probably more correct on this site. Goat is as ever underestimated, as some goat fragments may have been identified as sheep; the goats here listed are positive goat identifications. Likewise red deer bones might have been identified as cattle, but even if this is the case, hunted species form a very small part of the assemblage. Horse dog and cat are present at all periods except for dog in the early medieval group, but they are not thought to have contributed to the food supply. Fish is undoubtedly greatly underestimated. Fish bone is fragile and frequently does not survive digestion by either man or pig, as well as dog and cat. All the dog bones and nearly all the cat bones were found as isolated specimens, suggesting that they had been scavenged rather than buried, with the exception of one larger group of cat bones.

Age Range of Individuals

Not all of the minimum numbers of individuals could be aged. Table 2 sets out those where this was possible, expressed as a %. The total number on which this % was based is also given, which in a number of instances was probably too small to be reliable. Lyman (1987) using deposits of wild animal bones resulting from the Mount Helen volcanic eruption, estimates that a minimum of 30 individuals is statistically valid, but these circumstances may not be relevant to the conditions of this site. However, assuming that the data in table 2 are valid, certain economic deductions can be made. Prior to the agricultural revolution and the development of early maturing stock, the best meat would have been obtained from animal of the immature age range, between about 2 and 4 years of age in the case of cattle in modern terms, slightly younger in sheep or pig. Such stock is expensive, in that it contributes nothing but its carcass and hide, whereas older stock might well have produced offspring as well as wool in the case of sheep and labour in the case of cattle (pigs are an exception to this). Though suckling pig has long been considered a delicacy (and the numbers of new born pig from Jarrow bear this out) the skins of very young cattle and sheep are likely to be

of greater value than their flesh.

In the case of cattle, the proportion of immature to mature animals is 1 to 2 in the Saxon period, whereas this is reversed in all the medieval periods: this may indicate the development of an urban market for which farmers deliberately reared animals rather than disposing of adults at the end of their useful career together with young stock which was thought to be unhealthy or for which there was inadequate winter fodder. The proportions of immature and mature sheep remain constant, but the numbers of Saxon sheep of known age are very small. There are apparently more mature pigs in the Saxon period than later. If this is indeed the case one explanation might be that pigs were bred on the site during the Saxon period but not later, but totals are very low. In the case of fowl, just over half the individuals were immature, indicating that many birds were reared for production of meat as opposed to eggs.

Size and Other Characteristics of Stock

The measurements of bones of the various species are set out in tables 3 onwards. All the medieval periods have been amalgamated. It is likely that fragments of bone large enough to measure date from the later periods and those from earlier disturbed layers have been too abraded. The large number of fowl bones measured (presented in table 7) are likely to be particularly late, since these bones are particularly fragile.

Cattle As has been the case with the other Jarrow sites investigated, the bones tend to be larger than animals of the same period from both Southern Britain and also various German sites (Noddle 1975). An unexpected finding was the increase in size between Saxon and Medieval periods, as the converse is usually the case; this might be further evidence of the late date of the Medieval bones.

The solitary horn core was moderate in size and oval in shape, but few inferences can be drawn from a single specimen. The position of the nutrient foramen of the femur was ascertained in 5 specimens; three were in the position most commonly found in modern cattle, and 2 in the more typical ancient position. Again, numbers are too small for firm conclusions.

Sheep Measurements of the sheep bones are set out in table 4, and these include goat bones, which are designated (g). It was unfortunate that there were so few Saxon bones that could be measured, allowing little comparison on this site. However, the limited evidence suggests that there was little change in size between the two periods. The shapes of the scapulae and horn cores give some indication of the type of animal. Primitive sheep have long thin scapula necks, and those of modern meat producing sheep short thick ones. Most of the Jarrow sheep were intermediate in type, the ratio of the measurements made being around unity; the present day Welsh mountain sheep gives a similar result (Noddle 1983). The oval shaped horn cores indicate a similar type of sheep.

Pig The pig bones that could be measured are presented in table 5, and again there are few Saxon specimens. Amongst the medieval animals there is a fairly wide range of sizes, and some of the long bones are large, but the teeth are of the same average size as other medieval sites (Noddle 1975). There is a tradition of large pigs in this area (Martin 1858) but this does not extend back to the Saxon era, so the large Saxon astragalus designated (w) is likely to have come from a wild animal.

There is little to say about the scanty measurements from the other mammalian species. The dogs were all small (below collie size) and most of the cat bones were a single specimen. The horses were also small.

Poultry There is a greater proportion of poultry bones from this Jarrow site than any other known to the author. The number of immature specimens indicates that birds were reared for the table as well as for laying. The age at which fowl bones mature was probably rather over 20 weeks, the figure given for the White Leghorn breed before intensive selection for rapid maturity took place (Latimer 1927). A considerable number of measurements was possible, and these are set out in table 7, but the majority are of medieval bones.

A comparison has been carried out with other published sites, Hamwih (Coy and Bourdillon 1980) and North Elmham (Bramwell 1980) for the Saxon period and Exeter (Maltby 1979) for the medieval period, covering the same wide range of dates as Jarrow. Probably because there are so few Saxon measured specimens, no very definite statements can be made, except that the femora are larger than the average at the other 2 sites but this is not the case for the humerus or tarsometatarsal. It must be borne in mind that there is a considerable size difference between male and female fowl, and capons are larger than intact cockerels according to both Coy and Bramwell. Bramwell thinks that there are two breeds of fowl during the medieval period, one almost a bantam. There is no evidence of this at Jarrow. Unfortunately none of the authors cited give figures for the tibio-tarsus, so there is no comparison for the long thin examples which were found. It is thought that these came from game fowl, an exceptionally long legged breed; they agree with modern specimens and also with a large group of game fowl dating from the 18th century at Usk (Noddle unpublished). Another late medieval site is Coventry Town Walls; here Bramwell (1986) reports normal medieval fowl of ^{less than} ~~about~~ 2 kg weight ~~only~~. *with few exceptions*

Abnormalities and Pathology

The majority of abnormalities were found amongst the cattle bones. The most interesting specimen was an example of syndactyly in a young calf (2144) and comprised a double 3rd phalanx, which probably carried a single hoof in life. Most of the other abnormalities were found amongst the phalanges, mostly defects in the compact surface bone of the joints. These took the form of small deep holes, shallow pits or clefts on the distal surface, and there were a total of 6 bones affected, 4 1st, 1 2nd and 1 3rd. These defects are very common amongst modern bones.

Really pathological specimens included 2 cases of ringbone, one high and one low, and a 2nd phalanx affected by arthritis. A 3rd phalanx had the characteristic stubby shape caused by chronic laminitis. Another 3rd phalanx had a posterior extension of the joint surface which Higham (1981) believes to result from heavy traction work.

Abnormal bones other than phalanges included several bones affected by abscesses, 2 small examples in pelvic girdle bones and a rather larger one which distorted the neural spine of a thoracic vertebra. A chondrochondral junction was enlarged probably as a result of rickets. A hole similar to those described in the phalanges occurred in the glenoid cavity of a scapula. The edge of the acetabulum is normally notched at the ischiopubic junction; this notch takes several forms, but both the specimens found here exhibited a modern form. Apart from the scapula, which was Saxon, all the above specimens were medieval.

Absence of the posterior cusp of the lower 3rd molar is a common anomaly in cattle of all periods. In this instance 2 out of 24 (8%) were affected amongst the Saxon specimens, and 4 out of 32 (12%) amongst the medieval.

No abnormal sheep bones were noted, apart from a distal humerus with exostoses; this is thought to be the result of multiple minor traumas.

Most of the abnormal pig bones were suffering from osteomyelitis, 2 5th metapodials one 3rd phalanx and a badly affected mandible. A newborn radius was enlarged by rickets. The premolar teeth in a mandible overlapped each other; this is likely to have been the result of slow growth caused by malnutrition. A maxillary premolar appeared to be pitted by caries. A distal humerus exhibited a long split in the condylar joint surface; this is characteristic of modern pigs.

There were 3 instances of healed fracture, 2 in cat bones and one fowl. Some of these pathological conditions are described by Baker and Brothwell (1982).

Butchery and Boneworking

The bones were far too fragmented for any butchery marks to be recognised. There were however a number of instances of bone working, either the characteristic splinters of needle manufacture or the proximal metapodial stump which remains after these activities. Context numbers included 393 1667 and 1769 (medieval) and 2007 (Saxon).

Wild birds and small mammals

Identifications by Dr. T.P. O'Conner.

The following arrived too late to be included in the main body of the report. The number in brackets refers to the number of individuals.

Wild birds

Saxon *Tringa* sp (1) Redshank or greenshank
Turdus pilaris (1) fieldfare

Early medieval.

Columba livia (1) Rock dove
Sturnus vulgaris (1) Starling
Larus marinus (1) Black gull.
Vanellus vanellus (1) Lapwing.

General medieval.

Anthus sp. (1) Pipit
Columba livia (1) Rockdove
Corvus corax (1) Raven
Corvus monedula (8)* Jackdaw
Corvus sp. (1) Jackdaw or chough
Fringilla coelebs (1) chaffinch
Lyrurus tetrrix (1) black grouse
Scolopax rusticola (2) Wood cock
Strix aluco (1) tawny owl.
Sturnus vulgaris (3) starling
Tringa sp. (2) Redshank or greenshank
Small wader sp. (1) Dunlin or ringed plover?
? tern or shearwater (1)

* Also a nest of at least 3 nestlings.

Rodents and Small Mammals

Saxon An owl pellet containing at least
2 *Microtus agrestis* short tailed vole
2 *Sorex arineus* common shrew

Medieval

Rattus norvegicus (4) Brown rat
Arvicola terrestris (1) water vole
Apodemus sp. (5) wood mouse
Mus musculus (1) house mouse
Microtus agrestis (1) short tailed vole
Vole sp. (8)

There were also 3 medieval fish bones, comprising one each of

Gadus mortus (cod)
" *vorens* (saithe)
Merlangus merlangus (whiting)
a number of frog bones

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Table I Proportions of Species

a identified fragment count

b minimum no. individuals

the figure following in brackets is the % in each case.

		Saxon	Early Medieval	General Medieval	Late Medieval
Cattle	a	319 (47)	218 (33)	1216 (34)	444 (40)
	b	74 (33)	51 (24)	264 (25)	36 (25)
Sheep	a	106 (16)	167 (16)	941 (26)	214 (20)
	b	44 (19)	43 (20)	243 (23)	40 (28)
Pig	a	63 (9)	159 (24)	626 (18)	201 (19)
	b	35 (15)	48 (23)	188 (19)	26 (18)
Horse	a	10 (1)	3 (21)	39 (24)	1 (21)
	b	6 (3)	3 (1)	26 (2)	1 (1)
Goat	a	4 (21)	-	5 (21)	-
	b	2 (1)	-	2 (21)	-
Dog	a	11 (2)	-	22 (1)	6 (1)
	b	2 (1)	-	16 (2)	1 (1)
Cat	a	3 (21)	1 (21)	85 (2)	9 (1)
	b	3 (1)	1 (21)	24 (2)	4 (3)
Deer Red	a	1	2 (21)	14	7)a (1)
	b	1)a (21)	2 (1)	11)a (1)	3)b (3)
Roe	a	2)b (1)	-	5)b (1)	2
	b	2	-	3	1
Fallow	a	-	-	1	-
	b	-	-	1	-
Badger	a	-	-	4 (1)	-
	b	-	-	1 (21)	-
Hare	a	-	-	1 (21)	-
	b	-	-	1 (21)	-
Fowl	a	94 (14)	129 (20)	470 (13)	155 (15)
	b	34 (15)	41 (20)	210 (20)	24 (17)
Goose	a	56 (8)	27 (4)	88 (2)	19 (2)
	b	22 (10)	16 (8)	39 (4)	2 (1)
Duck	a	1 (21)	1 (21)	8 (21)	4 (21)
	b	1 (21)	1 (21)	8 (21)	4 (3)
Pidgeon	a	-	3 (41)	16 (1)	-
	b	-	3 (1)	10 (1)	-
Other bird	a	2 (21)	1 (21)	18 (1)	3 (21)
	b	2 (1)	1 (21)	10 (1)	3 (2)
Totals	a	672	653	3564	1065
	b	226	210	1055	144

Table 1 cont.

Other bones not included in these totals (+ indicates present).

Rabbit	b	3	4	28	1
Rodent	+		-	+	+
Frog	-		-	+	+
Fish	b	3	3	5	-

Table 2. Age Range of Principle Species
Expressed as %

		Saxon	Early Medieval	General Medieval	Late Medieval
Cattle	N	-	5	8	13
	J	6	9	11	-
	I	33	55	48	52
	M	61	32	33	35
	T	36	22	145	23
Sheep	N	7	12	9	8
	J	7	4	17	16
	I	40	32	38	36
	M	47	44	36	40
	T	15	25	131	25
Pig	N	-	25	21	26
	J	18	18	21	21
	I	59	43	51	47
	M	24	14	7	5
	T	17	28	105	19
Fowl	J	-	17	20	15
	I	57	56	52	54
	M	43	28	27	31
	T	7	18	88	13

N Newborn

T Total

J Juvenile

I Immature

M Mature

For definitions of these terms see text.

Table 3

Cattle Bone Measurements

The figure in brackets indicates the number of times the preceeding measurement occurred. * Indicates that the bone from which the measurement was obtained may not have been fully grown.

A Whole Bones

Bone	Period	Length	PXW	DW	MSW
Metacarpal	Medieval	180	59	-	32
Metatarsal	Saxon	210	42	48	24
		233	48	52	27
	Medieval	187	39	42	22

B Parts of Bones

Bone	Part Measured	Period	Measurement							
Lower 3rd Molar	Length	Saxon	32 (3)	33 (5)	34 (3)	35 (5)				
			36 (3)	37 (2)	38 (2)	39				
		Medieval	32 (4)	33 (4)	34 (7)	35 (3)				
			36 (2)	37 (7)	38 (5)					
Scapula	*Width neck	Saxon	47	54						
Humerus	Width distal	Saxon	63							
		Medieval	63	73						
Radius	*Proximal width	Medieval	67	71	72	79	89			
	Distal width	"	67	77	77					
Metacarpal	Proximal width	Saxon	60							
		Medieval	43	47	50	52 (3)	53 (2)	56	60	
		Medieval	47	49(2)	50 (2)	51	52 (2)			
			57	58 (3)	60	62	80			
Tibia	Distal width	Medieval	54	55 (2)	60	65 (2)	66			
Metatarsal	*Proximal width	Medieval	38	41	42	43	45	47 (3)	48 (2)	51 (2)
	Distal width	Saxon	49							
		Medieval	44	45 (2)	47 (2)	49	57	61		
1st Phalanx	Length	Medieval	52	54 (6)	55 (6)	56 (4)	57 (4)	58 (7)	59 (8)	
		Medieval	60	(4)	61 (5)	62	63 (3)	64 (5)	65 (2)	
			66 (3)	67	68 (2)					
	Saxon	50	52 (3)	53	54	55	59			

Table 3 continued:

The figure in brackets indicates the number of times the preceeding measurement occurred. *Indicates that the bone from which the measurement was obtained may not have been fully grown.

Horn Core	Medieval	Greatest basal diameter		Least basal diameter		
		54		43		
						Ratio 1.26
Astragalus	Body weight (estimated by method of Noddle 1973)					Kg.*
	Saxon	176	236			
	Medieval	177	190	193	196	206
Femur	Position of nutrient foramen		Above			

Table 4 Measurements of sheep bone

A complete bones

Bone	Period	Length	Proximal width	Distal width	Mid shaft width
Humerus	Medieval	127	35	27	=
Radius	Medieval	126	30	26	7
		131	28	26	16
		135	30	27	17
		138	30	28	17
		148	34	-	-
Metacarpal	"	121	23	25	13
Tibia	"	121	23	25	14
		190	-	-	-
Metatarsal	"	120	19	-	-
		122	19	23	11

B Parts of bones

Bone	Part Measured	Period	Measurement				
Lower 3rd molar	Length	Saxon	19	20	21 (3)	23	
		Medieval	19 (2)	20 (6)	21 (4)	22 (8)	23 (5)
Humerus	width distal	Saxon	29				
	condyles	Medieval	25	26 (9)	27 (6)	28 (11)	30 (4) 31

Table 4

The figure in brackets indicates the number of times the preceding measurement occurred. *Indicates that the bone from which the measurement was obtained may not have been fully grown.

Bone	Part Measured	Period	Measurement		
Radius	Proximal Width*	Medieval	25 29 (3) 30 (3) 31 (3) 32 (3)		
	Distal Width	Saxon	31 (2)		
	*	Medieval	28 29 30		
Metacarpal	proximal width	Medieval	19 21 (2) 23 24 (9)		
	distal width	"	23		
Tibia	Distal width	Saxon	27		
		Medieval	20 21 23 (2) 24 (4) 25 (9) 26 (8) 27 (11) 28 (3)		
Astragalus	Maximum Length*	Saxon	29		
		Medieval	25 (2) 27 (2) 28 (2) 29 (3) 30		
Metatarsal	Width	"	19 (2) 20 21		
1st phalanx	Length	Saxon	40 (9)		
		Medieval	32 33 34 (2) 39 36 (3) 37 (3) 38		
Scapula	Length of shaft \ minimum neck width	Saxon	1.0		
		Medieval	0.97 0.98 1.0 (4) 1.08 1.1		
		Period			
		24	17	1.24	
		31	19	1.63	
		31	19	1.63	
		Period	Proximal	Distal	
		Saxon	2	1	
		Medieval	4	5.	

Table 5

The figure in brackets indicates the number of times the preceding measurement occurred. *Indicates that the bone from which the measurement was obtained may not have been fully grown.

Measurement of Pig bones.

Parts of bones

Bone	Part Measured	Period	Measurement
Lower 3rd molar	length	Medieval	29 (2) 30 (3) 32 (4) 33(2) 34 (2)
Scapula Neck	width	Saxon	22
		Medieval	21 22 23 (2)
Humerus	Width distal	Medieval	31 33 34 35 (2)
Radius	Proximal [*] width		24 25 26 (2) 27 (2) 31 33
Metacarpal	Length	60 65 67 79	81 83.
Tibia	Distal Width	Medieval	28 (3) 29 30 31 32 (2) 33 35
Astragalus Max.	Length [*]	Saxon	39 44 (W)
		Medieval	34 35 37 39

Table 6 Other Mammals

Animal	Bone	Measurement	Period	
Horse	Scapula Neck	Width	Medieval	66
	1st phalanx	Length	Saxon	76 79
Dog	Lower	Length	Saxon	21
	Radius	Length	Saxon	89
			Medieval	90
	Metacarpal	"	Medieval	58 58 90
	Femur	"	Saxon	107
Cat	Radius	"	Medieval	92
	Tibia	"	"	110
	Metatarsal	"	"	50 50
Red deer	Lower 3rd Molar	Length	"	30
or fallow deer	Astragalus	Length	"	34 38

Table 7

The figure in brackets indicates the number of times the preceding measurement occurred. *Indicates that the bone from which the measurement was obtained may not have been fully grown.

Measurements for bone.

Bone	Period	Length
	Medieval	42 48 (2) 49 (2) 52 53 (2) 54 (2) 55.
		56 57 (3) 58 61.
	Saxon	58 60 66.
Scapula	-	60 .
Humerus	Medieval	61 63 (2) 64 65 66 67 (2) 72 73 (2)
Radius	Saxon	57
	Medieval	55 59 60 76 104
Ultra	Saxon	63 69 73
	Medieval	59 (2) 60 (2) 61 62 (2) 63 73 (2) 75 76 (2)
		78 82
Metacarpals	Saxon	55
	Medieval	39 (2) 53 (2) 56
Femur	Saxon	73 78 80
	Medieval	67 69 (3) 71 72 75 77 (2) 78 80 84
Tibia tarsus	Saxon	64 70 110
	Medieval	82 88 92 95 99 100 108 110 (2) 119 (3)
		121 132
	Saxon	63 73
	Medieval	59 60 62 67 72 76 (M) 78 (M)
		81 (M) 82 (M) 83 (2) 89 (M)

Table 8

Measurement goose bone.

Bone	Period	Length
Scapula	Medieval	88
	"	73
Humerus	"	154
Metacarpal	Saxon	88 92 (2) 93 (2)
	Medieval	80 83 84 96
Femur	Medieval	85 86
Tibia tarsus	Saxon	80 145
	Saxon	78