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TITLE	Animal Bones from Durrington Walls

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Introduction and Methods

The bones from this site formed three groups. By far the largest, comprising some 8,500 identifiable specimens, was made up of the material from the various features of the Neolithic levels. This has been treated as a single entity. The other groups are from the Late Bronze Age, 75 specimens, and the Iron Age, 180 specimens. The material is described in chronological order.

All measurements are in millimetres. The extremities of long bones were measured across the articular surfaces.

Description of Material

I Neolithic

The bones were in an excellent state of preservation and in particular there was an astonishingly high number of entire, almost perfect, pig bones, many with fully fused epiphyses. As a general rule the remains of this species preserve less well than those of other ungulates. This site however proved a remarkable exception. The species present were pig, cattle, aurochs, sheep, goat, dog, horse, red deer, roe deer, fox, badger, beaver, water-vole, birds and oyster.

All members of the skeleton of cattle and pigs were about equally represented with the exception of jaws, teeth and skull. These were very few and in particular was this so with the cattle horn cores - only 4 measurable - and skulls of which there was only one, but much damaged. (Plate I)

Table 1. Minimum numbers of each Species

Pig	198 (30)	Goat	8	Red Deer	14	Badger	1
Cattle	85 (12)	Horse	3	Roe Deer	2	Fox	2
Sheep	5 (2)	Aurochs	3	Dog	4	Beaver	1

The figures in brackets are those of minimum numbers in the 1952 excavations. These are derived from Grahame's table of the counts of bone type from each species. (18).

Pig (Sus scrofa)

This species far exceeded all others in number and from the absence of any specimens large enough to suggest wild boar, all were probably domesticated. There was one unusually long, curved but relatively slender tusk. (Plate II)

The measurements (Table 2.) show that the tallest of the Durrington Walls' pigs stood about the same height as Pitt Rivers' test animal which was 28" (71 cms) at the shoulder.

All age groups were represented, from very young piglets to fully mature adults with all epiphyses fused and the lower third molar heavily worn, but younger immature animals were much in the majority. It is unknown at what ages the various epiphyses of the long bones of prehistoric animals fused. It is likely however that the sequence in which fusion occurred has remained unaltered. Accordingly the long bone extremities were grouped into early fusing and late fusing moieties for both pig and cattle. For the pig, even in the early fusing group, about half the total number of bones had unfused epiphyses and in the late fusing group the proportion is less than one third. (Figs 3+4)

Table 2. Measurements of Pig Bones

Humerus

T.l.	184	191	192	196	198	198	–	–	203*	208	212	–
T.l.h.	162	175	174	177	173	173	151	182	180	186	187	–
m.s.d.	18	20	21	22	21	21	21	20	20	24	20	–
d.w.	29	33	34	34	32	31	31	32	34	32	35	27-35(22)

Radius

T.l.	137	148	151	155	156*
p.w.	27	27	30	32	33
m.s.d.	18	20	20	22	20
d.w.	29	28	29	31	32

Femur

T.l.	213	218	225	230*
m.s.d.	20	20	20	20
d.w.	45	49	48	50

Tibia

T.l./	180	182	184	186	187	188	188	189	192	194	195
p.w.	47	50	49	46	51	48	49	–	50	52	48
m.s.d.	19	22	22	22	23	22	23	23	22	24	22
d.w.	21	22	22	22	23	21	22	23	23	25	22
T.l.	196	197	198	198	198	199	200	203	203	204*	208
p.w.	–	48	–	48	51	–	51	48	51	52	51
m.s.d.	22	22	22	22	23	26	23	22	23	22	22
d.w.	22	22	22	23	23	24	23	22	23	23	22

Calcaneum

Total length 72 – 89 (31)

M3

Total length 31 – 38 (25)

T.l. = Total length. m.s.d. = mid-shaft diameter

T.l.h. = T.l. to head (humerus only) d.w. = distal width.

p.w. = proximal width.

* denotes a length identical to that of Pitt Rivers' test animal. (17.)

/ The tibial spine is not included in this measurement.

Figures in brackets denote number of specimens measured.

Cattle (Bos taurus)

The minimum number of animals represented was 85. The measurements (Tables 3. and 4.) show that these cattle were very similar to those described from other Neolithic sites (10. 16) and that their height was 48-56 ins. (122-143 cms).

Although the number of specimens available for the two methods requiring complete metapodials is small the derived indices (Table 4.), the histograms and the metapodial length/breadth indices (Figs 1+2) all seem to indicate that castration was practiced. If a cattle population consists only of entire males and females, as for example at Star Carr, the bone measurements will fall, with only slight overlap into two groups. (16). At Durrington Walls this is not the case. The metapodials of cows are shorter than those of steers but equally slender while, in the bull, they are relatively short and thick. (18). The bones from this site conform to this pattern. (Fig 2).

The epiphyseal fusion shows a preponderance of fully mature animals with few unfused epiphyses even in the early fusing group. (Figs 3-4). A similar finding was reported from the 1952 excavation. (18).

Table 3. Measurements of Cattle Bones

	T.l.	p.w.	m.s.d.	d.w.	
Humerus	260	-	38	71	
	-	-	-	65-87 (66)	
	-	-	-	90-102(2)	B.t.primigenius
Radius	270	68	41	-	
	274	71	40	60	
	-	-	-	57-78(37)	
	-	63-82(52)	-	-	
	-	101 (1)	-	-	B.t.primigenius
Tibia	318	96	41	57	
	-	-	-	43-60 (30)	
	-	108	-	-	
Horn Cores	Basal circumference 150*; 160; 175; 220; 226;				
	376 (Diameters 127 x 101)				B.t.primigenius

* On skull. Plate I.

Table 4. Cattle Metapodials

Metacarpals

T.l.	p.w.	m.s.d.	d.w.	m.s.d.100 / t.l.	d.w.100 / t.l.	Sex	Ht. ins.	Ht. cms.
194	55	31	58	16.0	29.9	Cow	48	122
203	55	31	59	15.3	29.2	Cow	51	129
205	55	34	61	16.6	29.9	Cow	51	129
205	61	38	65	18.6	30.7	Bull	52	131
215	-	35	65	16.3	30.3	Steer	54	138
215	67	38	69	17.7	32.1	Bull/Steer	56	144

Metatarsals

T.l.	p.w.	m.s.d.	d.w.	m.s.d.100 / t.l.	d.w.100 / t.l.	Sex	Ht. ins.	Ht. oms.
214	42	24	47	11.2	21.9	Cow	47	120
217	42	25	52	11.0	24.0	Cow	48	122
219	47	27	54	12.3	24.7	Cow	48	123
227	42	25	53	11.0	23.4	Cow	50	127
233	46	27	54	11.6	23.2	Cow/Steer	52	131

Sex determinations are based on the breadth/length indices. (13)
For calculations of the height the lengths of the metapodials were multiplied by the following factors - Metacarpals, 6.71, 6.40 and 6.31 for bulls, steers and cows respectively. The equivalent factors for the metatarsals are 6.0, 5.71 and 5.63.(2).

Ht. = height at the withers.

Aurochs (Bos taurus primigenus)

Several very large bovine bones were of aurochs (Fig. 1) as was the 46 mm. lower third molar. (7). A few of the largest identified as of domestic cattle may well have been aurochs as there is some overlap in the dimensions of the two species.

The most impressive specimen in the whole collection was a huge horn core with the tip missing and of basal circumference 376 mm. ~~(Diameters 107 x 101)~~. It is possible that this came from the same animal as the astragalus of 97 mm. There is only one specimen of this size figured by Grigson (11.) and neither Star// Carr nor Windmill Hill produced its equal so it was probably a very large bull.

Sheep (Ovis aries) (3.)

As seems usual from Neolithic sites this species was poorly represented. There were only 75 specimens from 5 individuals and these indicated small slender animals of the type found little altered throughout the archaeological record from the time of their original introduction in the Neolithic right up to the Mediaeval period.

Humerus - Distal width	24 - 28	(8)
Radius - Proximal "	24 - 28	(5)
Tibia - Distal "	21	(1)
Metatarsal- " "	24 - 25	(2)
Lower third molar - Length	19 - 23	(6)

Goat (Capra hircus)

The only bone definitely considered to be of goat from this collection was one complete metacarpal. Its measurements were

Total length	105 mm.
Proximal width	22
Mid shaft diameter	16
Distal width	25
M.s.d.100/t.l.	15.2

It is possible that some of the other bones ascribed to sheep may in fact have been of goat but as the total number of specimens from both species is so small this is of little consequence. ~~The complete skeleton of a young~~ Goat was found at Windmill Hill. (9), and it was also identified among the material from Whitehawk (6).

Dog (Canis familiaris)

The remains, eighteen specimens in all, were very scattered and fragmentary. They represented a minimum of four individuals. The only two complete long bones, both femora, suggest a shoulder height of 14-15" (35-38 cms.) and 18-19 (45-48 cms.) respectively.

Table 5. Measurements of Dog Bones

Femur	122 - 8 (*)						
	160 - 13						
M1 length:	20	21	22	22	23	24	24
Tooth row:	-	-	74	-	80	82	83

x Total length and mid shaft diameter

M1 = lower 1st molar, carnassial.

The Easton Down dog stood 39 cms and the Windmill Hill dog 43 cms. (Measured by skeletons at Salisbury and Avebury museums)

Horse (Equus caballus)

~~The remains of this species are normally rather rare from Neolithic sites.~~ ( ). ~~Here~~ three animals are represented; their heights were found to vary from 12.3 to 14.2 hands (129-148 cms.). This difference, which may seem large, is no more than could be explained by normal variation within a population. Even at the present day, with control of breeding, many breeds of horse and pony show a similar size variation. (19).

Table 6. Measurements of Horse Bones

	T.l.	p.w.	m.s.d.	d.w.	Ht. cms.	Ht. Hands
Radius	319	68	34	58	138	13.3
	-	70-75(2)	-	-	-	-
	-	-	-	58	-	-
Metacarpal	201	41	28	40	129	12.3
Femur	394	-	37	-	148	14.2
1st Phalanx	85	50	-	-	-	-
	70	-	-	-	-	-
	65	44	-	-	-	-
	64	42	-	-	-	-

Red Deer (Cervus elaphus)

The bone evidence suggests a minimum of five animals but the antlers, fourteen, possibly one or two more. There were great numbers of antlers including many broken tips and other fragments. A total of 287 were cast and 29 were from killed or dead animals. ~~While some selection in the use of cast antlers no doubt occurred there was none at all evident in their collection.~~ All sizes were included, from those of first or second year animals right up to the massive specimens of fully mature stags; immature specimens were, however, much less numerous.

Table 7. Red Deer Measurements

Radius	proximal width	50–57 (4)
	distal "	47
Humerus	distal "	46–56 (6)
Tibia	" "	41–45 (2)
	proximal "	72
Metatarsal	distal "	45
Metacarpal	t.l.250. p.w.37	
	m.s.d. 22. d.w. 40.	

Roe Deer (Capreolus capreolus)

There were fewer than 20 specimens including a few cast antlers.

Small wild mammals

This group, with the number of bone specimens from each in brackets, consisted of fox (6), badger (1), beaver (2) and water vole (3).

Birds

Five different species have been identified although the number of bird bones was only eight. These were wild duck, probably mallard, raven, woodcock, cormorant and kite. Even at the present day the cormorant can be seen on rivers quite far inland and in Neolithic times it is evident, not unexpectedly, that it came even further. It is possible however that both it and the Oyster were brought by a visitor or returning traveller from the coast. The kite and raven are both scavengers and were probably ~~both~~ very common in prehistoric times. The previous earliest record of the kite seems to be from the Iron Age. (8).

II Late Bronze Age

These bones were markedly less well preserved than those from the Neolithic levels. The surfaces were severely pitted and eroded. The animal species present were cattle, horse, sheep, pig, dog and red deer. There was also part of the shaft of a human femur. The total number of bones, seventy five, was too small to allow of any analysis. Sheep, pig and red deer together provided only nine specimens.

Cattle

It has been shown that cattle became progressively smaller from the Neolithic onwards (16) and, though the group is too small to draw conclusions, the measurements of those from this site reflect this pattern. (Table 8).

Table 8. Measurements of Cattle Bones

Humerus	distal width	67
Radius	" "	62.67
Astragalus	length	57
1st Phalanx	proximal width	22-23 (3)
M3	length	38.5

Metacarpals

t.l.	p.w.	m.s.d.	d.w.	~~Index 1~~. m.s.d.100 / t.l.	~~Index 2~~. d.w.100 / t.l.	Ht "	cms.	Sex
164	48	28	49	17.1	29.9	41	105	Cow.
182	-	27	50	14.8	27.5	45	116	Cow.

Horse

The only specimen of note was a substantially complete but damaged mandible. The length of the tooth row was 169 mm.

Dog

At the bottom of the East Ditch there was a nearly complete skeleton. Both mandibles were present but no other part of the skull. The bone dimensions suggest an animal about the size of a Labrador; 21-22" (53-56 cms.) at the shoulder.

Table 9. Measurements of Dog Bones

Humerus	164-12	Femur	176-12
Radius	164-12	Tibia	176-11
Ulna	192-11		
Mandible,	greatest length	136	
"	tooth row	72	
M1	length	20.7	

The total length and mid shaft diameter of each long bone is given.

III Iron Age

The remains of cattle, sheep, horse, pig, dog and red deer were present but the last two species provided only three specimens between them and those of the pig were too few to warrant further mention.

Cattle

Table 10. Measurements of Cattle Bones

Radius	proximal width	70
"	distal "	56.63
Tibia	" "	46
Astragalus	greatest length	57

Few bones were measurable but some of these were as large as or larger than any recorded for the Iron Age. All three specimens of radius lie within the Neolithic range as shown in Fig. 1. The metatarsal (225 mm.) in particular is noteworthy. The longest recorded by Jackson was 213 mm. (14) and Cornwall gives a maximum measurement of 218 mm. for the Celtic Ox. (4). However, it should be remarked that while the difference may seem large in a separate bone, in the living animal it would amount to only some 3 cms. difference in height which would scarcely be appreciable. (2)

Sheep

Twelve identifiable specimens showed the presence of two adults and three lambs, two of them approximately six months old.

There was one complete metatarsal, (123 t.l., 18 p.w., 14 m.s.d., 21 d.w.).

Horse

One nearly complete mandible was from an 8 year old stallion and a complete metacarpal indicated the typical Iron Age pony of about 12½ hands. (131 cms.) (205 t.l., 45 p.w., 28 m.s.d., 44 d.w.).

Pathology

(a) Neolithic

Pig The tibia of a young animal had a deep cavity on its medial aspect caused by an abscess. The periosteal reaction had extended over the posterior surface. (Plate III). A last thoracic vertebra showed marked osteophytic lipping. As far as could be seen the articular surface was not affected so that this was probably a senile change. (Plate IV).

Red Deer. A fracture in the lower part of the shaft of the tibia had united but with much distortion and shortening. (Plate V). Injuries of this sort are not uncommon among red deer and cause them little inconvenience.

(b) Iron Age

Cattle A first phalanx showed widespread periosteitis but without involvement of the articular surfaces. (Plate VI). This might have been a sequel to a penetrating wound which subsequently became infected or to the condition known as necrotic pododermatitis. This starts in the interdigital space but if neglected can spread and involve the rest of the foot. It is caused by the soil organism Fusiformis necrophorus and is often associated with wet muddy conditions.

Discussion

General It is likely that the character of a bone collection from a ritual site such as this will be different from that of a contemporary settlement site and it would be an error to assume that the relative proportions of the bones of different domestic species found here necessarily reflect those of Neolithic live-stock as a whole. At no other Neolithic site known to the writer has the number of pigs been so much in excess of all other species.

The bones on a settlement site will be a mixture in varying proportions,

of those of animals killed for food and of others that died from natural causes. Moreover there is no reason to doubt that these were eaten more often than not. (5.12). On a sacred site, however, the bones are more likely to have been those of animals killed for ritual purposes. It is possible that one species might be more highly valued than another in this context which would give a false idea of its importance. This may be the explanation of the preponderance of pig at Durrington Walls although pigs seem to have been numerous in Neolithic times. (3).

As already noted the skulls of pigs and cattle were poorly represented. For example there were five bovine skulls at Maiden Castle (16) and at Windmill Hill, 14 skulls and 64 horn cores. (9). The amount of bone from Durrington Walls was greater than from either of these sites but there was only one skull and four horn cores which would seem to indicate that animals were mostly killed elsewhere and the dismembered carcases or portions of them brought on to the site. This, it is tentatively suggested, may perhaps be evidence that the act of slaughtering was not in itself important from a ritual point of view. However, only a small portion of the whole monument has been excavated and there may well be great concentrations of skulls as yet undiscovered.

The age structure of the cattle population, (Figs 3-4) with a great majority of older beasts shows that the herdsmen of the time were successful in bringing their beasts through a succession of winters. A similar finding was noted at Windmill Hill and indeed, in the writer's experience, the same relative age structure, with older animals predominant, is seen again and again throughout the archaeological record.

Aurochs. The bones of wild cattle are usually found on Neolithic sites and while meat from these was clearly a part of the diet it does not seem to have provided a large contribution, presumably because that of domestic animals, however large or small a proportion of the total diet meat may have comprised, was sufficient. For this reason it seems almost incredible that the aurochs, as so commonly implied, can ever have been hunted solely for meat at this period. The bulls stood up to 6 ft. (183 cms) at the shoulder and were obviously formidable animals. The cows were probably little, if at all, less dangerous and, although early man was quite capable of killing prey as large as these, to have hunted them when easier meat was readily available does not make sense. Among various primitive tribes in different parts of the world the young men were, until recently, expected to prove their manhood in one way or another; by killing an enemy, a large carnivore or other wild animal (e.g. 1). The remains of the very large aurochs may perhaps be explained in this way.

Red Deer That hunting alone was not regarded as a reliable method of obtaining the large number of antler picks required in the construction of the monument is clearly shown by the 10:1 ratio of cast to killed antlers. Red deer shed their antlers in the spring, [illegible], and if, as seems most likely, work was carried out from the late spring to harvest time and then again after the harvest was in, presumably great numbers of antlers were collected and stored till

required. Three hundred and sixteen were found in the part of the ditch excavated in 1967 and this, as hinds have no antlers, would represent a minimum of 316 animals if the sex ratio were equal. Owing to differential mortality and the stresses of the rutting season hinds outnumber stags so the true figure was probably higher. If antlers were distributed more or less equally round the ditch and this may or may not have been so and if, as seems likely, construction took not less than two years then, as only about one tenth has so far been excavated, the total represented may have been as high as 1500 animals. This number of red deer would have required a large tract of forest, perhaps up to in extent (Chaplin, R. E. pers. comm.) so that the search parties must have been numerous and have ranged over a considerable area; a small facet of the high degree of social organisation and forethought which must have gone into the building of such a structure.

Horse The remains of horse are usually few from Neolithic sites and the decision whether they are of wild or domesticated animals is not easy. (3. 10.). A reduction in size from the wild progenitor is usually associated with domestication but two of the specimens from this site indicated animals bigger than some of those from Last Glaciation sites*. Furthermore, Zeuner states that the domesticated horse did not appear anywhere in Europe before the Bronze Age (20). so these animals were therefore probably wild.

*Fisherton; Salisbury Museum; Brixham Cave, Devon and Battersea Power Station; British Museum (Natural History).

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Summary

1. The material was from three levels, Neolithic (8,500 specimens), Late Bronze Age (75) and Iron Age (180).

2. The species represented in the Neolithic were pig (minimum: 198 individuals) cattle (85), sheep (5), goat (1), horse (3), aurochs (3), red deer (14), roe deer (2), dog (4), badger (1), fox (2), beaver (1), birds (5 species) and oyster (1).

3. In both Bronze and Iron Age groups there were cattle, horse, sheep, pig, dog and red deer.

4. The material is described and tables of measurements, bone frequency diagrams and height estimations are included. Evidence is presented for the practice of castration of cattle at this and other Neolithic sites.

5. Most of the pigs were killed young and most of the cattle when fully mature.

6. Descriptions and photographs of the pathological alterations encountered are included.

7. Various aspects of the interpretation of this material are discussed and conclusions drawn.

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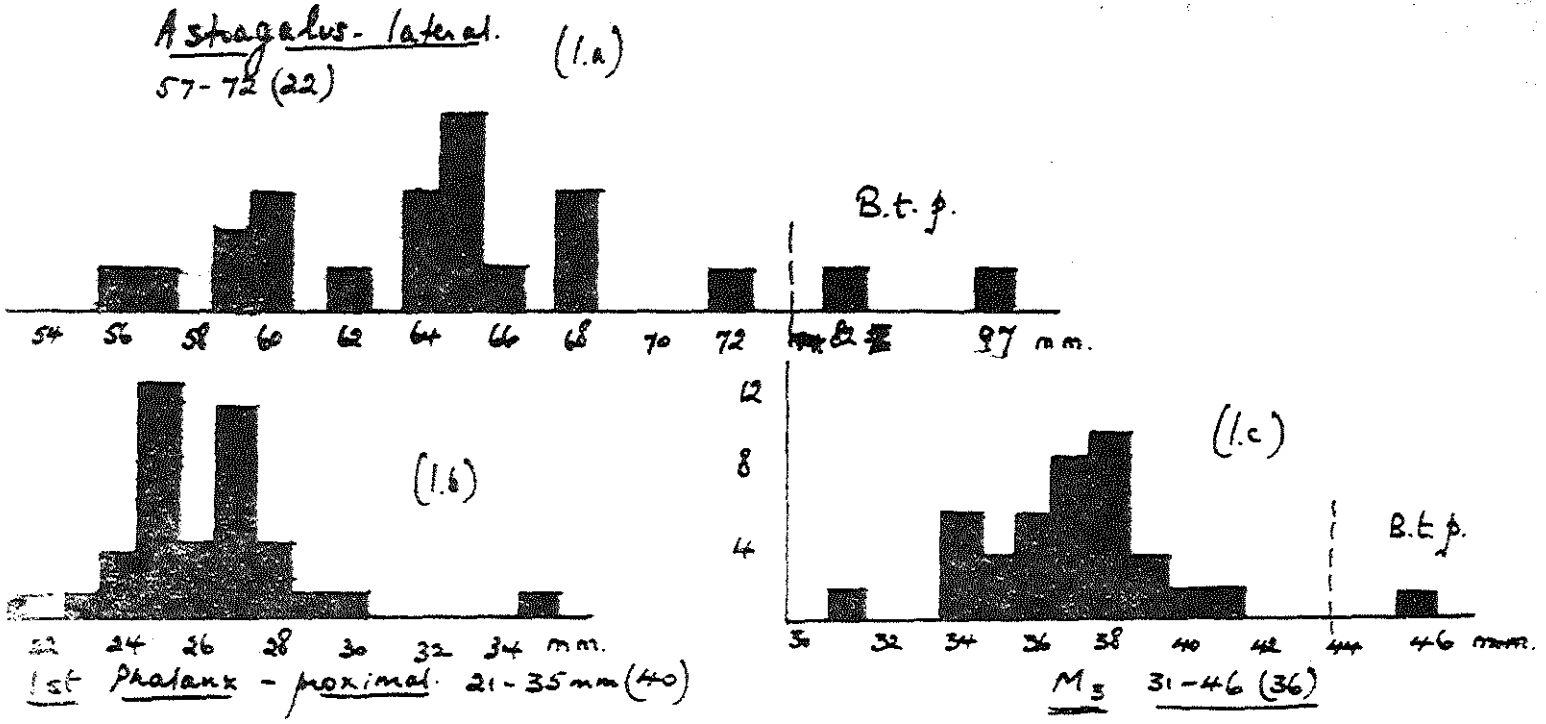
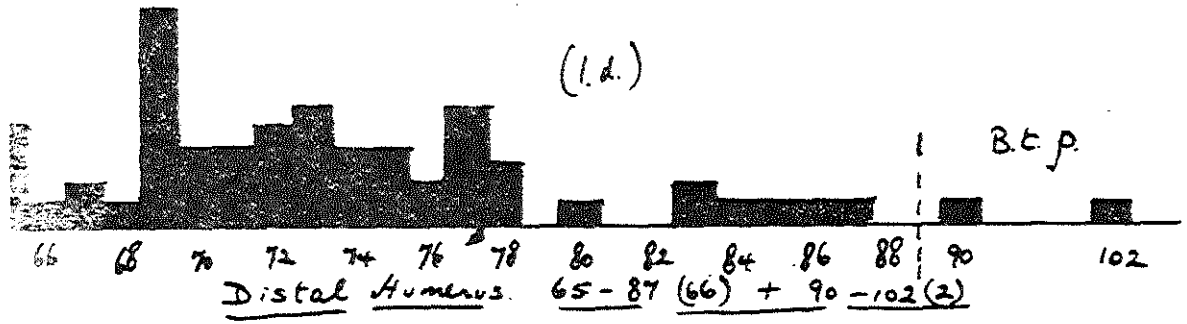




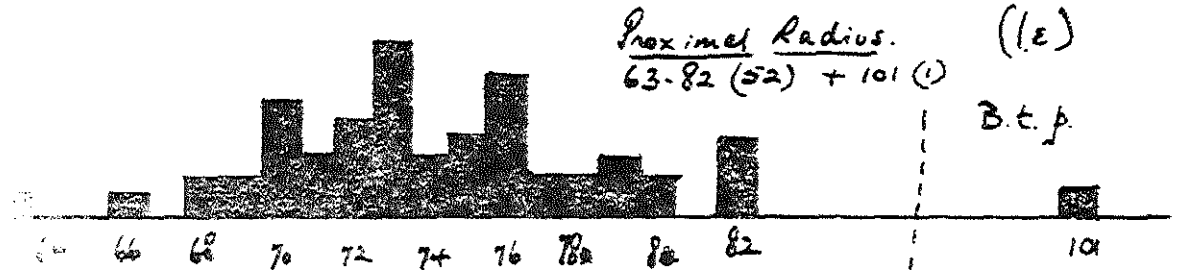
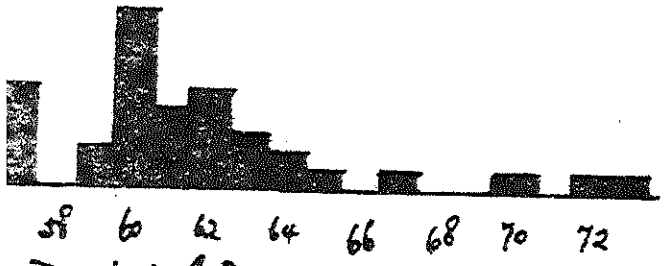
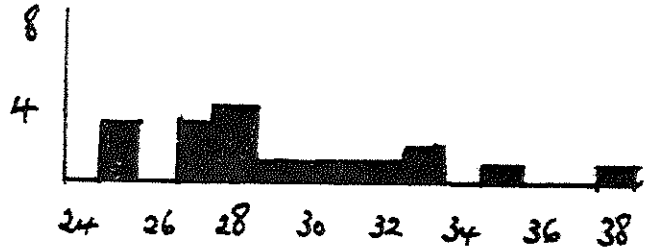


Fig 1. (a - g). Frequency diagram of bone dimensions of domestic and wild cattle from Neolithic levels.



Distal Radius 57 - 73 (35)

Fig 1.f.



Proximal 2nd Phalanx 25-38 (18)

Fig 1.g.

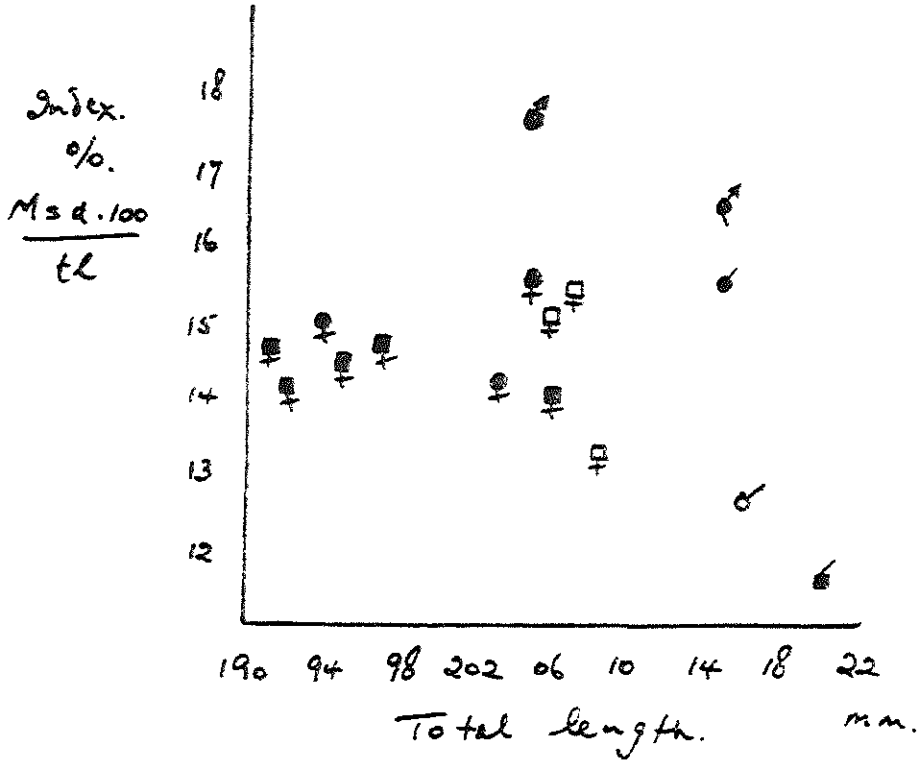
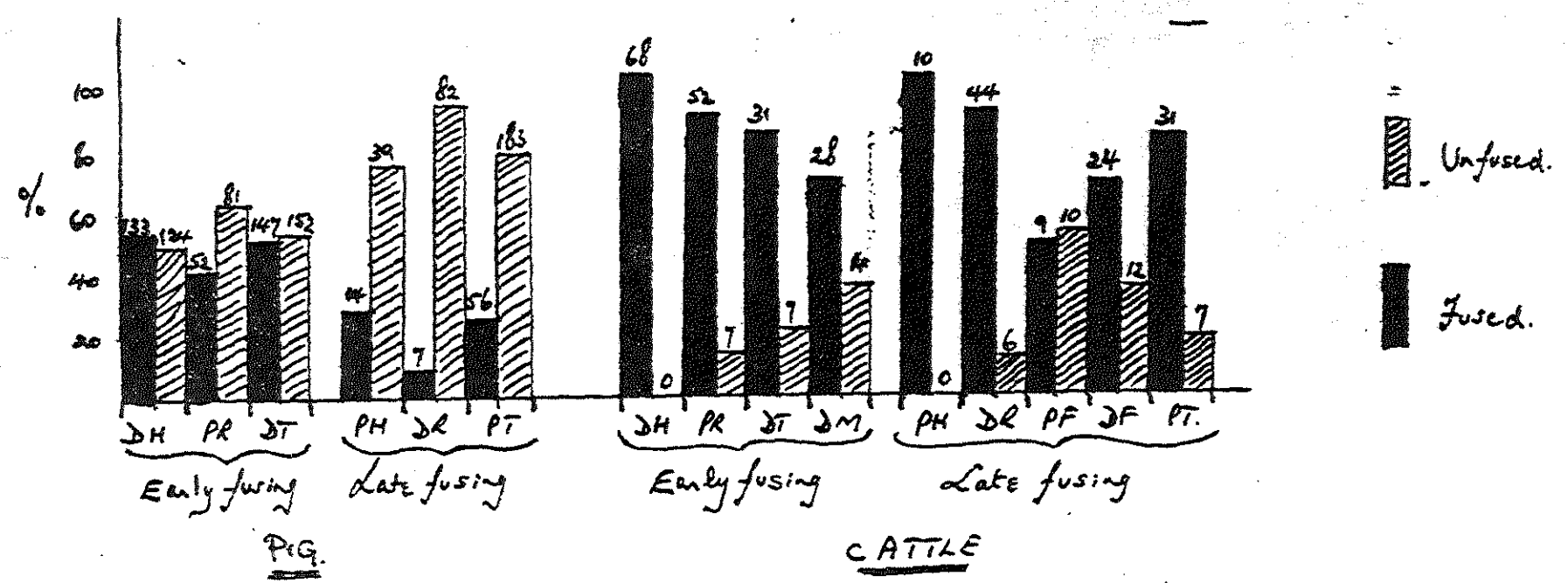


Fig 2. Bovine Metacarpals. Total length plotted against mid shaft diameter expressed as % of total length to show bone proportions of bulls, cows and steers, as evidence for practice of castration at 4 Neolithic sites.



D = Distal extremity
P = Proximal "
H = Humerus.
R = Radius.
M = Metapodial.
F = Femur.
T = Tibia.

Numbers on top of columns are the number of specimens of each bone type.

Fig 3. Histogram to show age structure of pig and cattle population by comparison of percentage fused and unfused epiphyses of long bones.

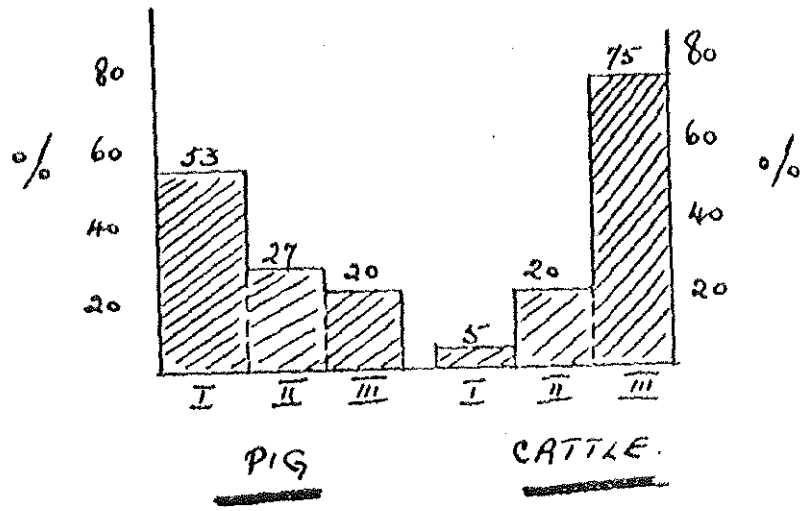


Fig 4. Data from Fig 3. showing percentages of animals in each of 3 age groups at death.
Group I = Juv. Group II = young adult. Group III = Fully mature.