APPENDIX 1 - ANIMAL BONE

1.1 Assessment of the Animal Bone

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Introduction

1.1.1   A substantial assemblage of animal bone was recovered during excavation works at Thurnham Roman Villa (ARC THM 98).

1.1.2   The majority of the material was hand retrieved on site, but a substantial minority of fragments were recovered from sieving of environmental samples.

1.1.3   The recovery and study of the animal bone was undertaken in accordance with the Fieldwork Event Aims for the site, which are set out in section 2 of the main report, above. The recovery of animal bone was designed to contribute to study of the status and economic orientation of the villa, and of its interaction with its hinterland, and whether the composition of the bone assemblage reflected change between the Late Iron Age and Romano-British periods. It was also recovered in order to provide information about the local environment of the villa. In terms of the wider Landscape Zone Priorities, animal bone was perceived as important for the study of the rural economy, agricultural regimes, and natural resource exploitation.

Methodology

1.1.4   A total of 7085 fragments of hand retrieved animal bone were recovered, of which 3728 (31,429g) were assessed thoroughly, whilst the remainder was scanned. Many of these fragments were reassembled, reducing the count of assessed fragments to 2743. A further 3525 fragments of bone were recovered from sieved environmental samples of which 2528 fragments (1637g) were assessed, while the remainder was scanned. Reassembly reduced the fragment count of assessed sieved samples to 2459.

1.1.5   The calculation of the species recovered from the site was carried out by the total fragment method. All fragments of bone were counted including elements from the vertebral centrum, ribs and long bone shafts, as well as individual teeth. In addition the minimum number of individuals (MNI) was calculated for the main domestic species. MNI was implemented using the most commonly identified fragments of bone identified from each species according to each phase. Where possible, mandibles were used. However, when the mandibles were not the most numerous elements identified, the long bone elements were used following the calculations suggested by Chaplin (1971).

1.1.6   An attempt was made to separate the sheep and goat bones using the criteria of Boessneck (1969), Prummel and Frisch (1986), in addition to the use of the reference material housed at the OAU. However, since no goat bones were positively identified from the assemblage, all caprine bones have been referred to as sheep in the text.

1.1.7   The ageing of the animals was based on tooth eruption and wear as well as the epiphyseal fusion rates of the long bones. Silver's (1969) tables were used to give timing of epiphyseal closure for cattle, sheep, pigs and horses. Sheep's tooth eruption and wear was measured using a combination of Payne (1973) and Grant's (1982) tables. Cattle tooth eruption and wear was measured using Halstead (1985) and Grant's (1982) tables. Pig tooth eruption and wear was measured using Higham

(1967), Bull and Payne (1982) and Grant (1982), as defined by Hambleton (1999). Horse tooth eruption and wear was measured using Levine's (1982) tables.

1.1.8   The determination of the sex of the cattle and sheep was based on examination of the medial wall of the acetabulum since the majority of innominate bones were incomplete.

1.1.9   Horses were sexed through the recording of the presence of the canine teeth; pigs were sexed through differentiation of tusks.

1.1.10   The measurements taken were those defined by von den Driesch (1976). Since not all the bones were assessed, the measurements of the bones are not discussed in the assessment. However, the results have been tabulated, and are displayed in Tables 9.4-9.15.

Quantification

1.1.11   The condition of the bone was variable throughout all phases of occupation, and the majority of bones showed pitting, probably due to plant roots. There was also a considerable degree of fragmentation present across the site, which contributed to the high number of unidentified fragments. Overall, 625 fragments (20,755g) of hand retrieved bone could be identified to species, representing 22.7% of the assessed material. Of the sieved fragments, 263 (560g) were identified to species, representing 10.7% of the assessed material. The percentages of bone identified to species are shown by phase in Tables 9.1 and 9.2, and by context in Tables 9.16-19. Table 9.3 shows minimum numbers of individuals (MNI) for main domestic species according to phase.

1.1.12   In general the assemblages of identified bones for each phase are small, but allow a number of observations to be made.

Prehistoric (Phase 1)

1.1.13   Very little bone was recovered from phase 1, comprising three fragments of cattle bone and the proximal half of a red deer metatarsal, from fills 10293 and 10294 of the probable Bronze Age waterhole.

Late Iron Age – Early Roman (Phase 2)

1.1.14   Cattle and sheep are the most numerous species represented, followed by pig. The ages of the cattle shown in Tables 9.5 and 9.9 appear to indicate a mixture in ages at death. This suggests that cattle were kept as draught animals as well as for their meat. It is probable that sheep would have been kept for their wool and milk as well as for their meat, although too few identifiable fragments were present in this phase for any clear conclusions to be drawn. The pigs would have been kept for their meat, since they provide little in secondary products.

1.1.15   Four fragments of dog bone were found within contexts 10469 and 10790. It is likely that they were kept as working animals, guard dogs or as pets.

Main Roman occupation (Phases 3 – 7)

1.1.16   Cattle were the most numerous animals kept at the site during all periods of Roman occupation (Table 9.1). However, the minimum number of individuals seen in Table 9.3 shows that sheep appear to have been more numerous during the earlier periods of occupation. This is also observed in the sieved material (Table 9.2) and is likely to be a result of retrieval bias as well as taphonomic attrition of the smaller bone.

1.1.17   The limited data indicating the age of the sheep suggest that the animals were slaughtered at varying ages, although the majority appear to have been young animals. Maltby's analysis of data from numerous Roman sites (1981) has shown that the majority of sheep tended to be killed during their second or third year. Since some of the sheep at the site, during phase 3 particularly, appear to have been slightly older, it may indicate that sheep were kept for their wool as well as for their meat.

1.1.18   Interestingly, during the later periods of Roman occupation a clear change appears to have occurred in the relative numbers of cattle and pigs kept at the site. Data in Tables 9.2 and 9.3 for phase 7, the latest period of Roman occupation, appear to show a dramatic change in animal husbandry, with pigs becoming the dominant species, followed by cattle. The increase in the cattle may be due to a greater number required for ploughing, indicating a possible increase in arable farming. The pigs are likely to have been the main providers of meat to the site during this period.

1.1.19   Although data are limited, it appears that cattle were kept until mature in all phases of activity. This may reflect an emphasis on the use of the animals for draught purposes rather than for meat production. However, it is possible that the bones from younger individuals have not survived as well.

1.1.20   Pigs have been shown to increase in numbers during the Roman period (King 1978), and a gradual increase is shown at this site. Most of the pigs appear to have been less than two years of age through all phases. It is unlikely that the inhabitants of the site would have wanted to keep the animals beyond two years of age since they did not provide many secondary products, and only a few animals would be required for breeding purposes. Two female pigs were identified from phase 3.

1.1.21   Horses were also kept at the site during most phases of Roman occupation. It is unlikely that the animals would have contributed to the meat economy of the site and they were probably kept for transport, as pack animals and possibly for hunting. They would have been more costly to keep than cattle and may have been a symbol of status. At least some of the horses kept at the site died at a young age, which may indicate that they were being bred on site.

1.1.22   A small number of dog bones were recovered from the early and late periods of Roman occupation.

1.1.23   The majority of wild species present in the assemblage were from Roman deposits and consisted of red deer, roe deer, badger and smaller mammals. The red deer bone consisted mostly of antler fragments found within phase 7 deposits 11026 and 22258.

1.1.24   Four roe deer metapodials (feet bones) were found in phases 3, 5 and 7. A fragment of badger mandible and a canine tooth almost certainly belonging to the same jawbone were found in context 11036 (phase 5). It is possible that the bone was intrusive as a result of animal burrowing. The majority of the small mammal bones including rodent and lagomorph bones were retrieved from the sieved material and will require further analysis for identification to species.

1.1.25   A small quantity of bird and fish bone was recovered from the site, most of which was from the sieved assemblages. The bone has not been identified to species.

1.1.26   The best-preserved group of animal bone was found within waterlogged well 11010, dated to the later and latest Roman period. This included the complete skeleton of a roe deer, a partial skeleton of a tawny owl, part of a pig, part of a horse skull, part of an immature roe deer, and red deer antler fragments.

1.1.27 There were no obvious special deposits from the Roman period of occupation. However, a small fragment of cattle rib was discovered within an infant grave (10634). The bone appeared to have been intentionally placed next to the head, although it is possible that the bone was re-deposited during burial. Faint gnaw marks were found on the bone but, as yet, it is not clear whether they were made by a human or an animal.

Medieval (Phase 8)

1.1.28 Only twenty fragments of identified bone were retrieved from the medieval features. Cattle bones were the most numerous from the assemblage (Table 9.1). However, the MNI indicates that pigs were still the most numerous animals at the site. Two mandibles from young animals suggest it is unlikely that many of the pigs were kept to maturity. A single female pig was identified from the assemblage. It is possible that the bones from smaller animals did not survive as well as the larger bones of the cattle and horses, which would suggest that sheep and pig are underrepresented in the assemblage. It is unlikely that the same percentage of horse and sheep would have been kept.

Post-Medieval to Modern (Phase 9)

1.1.29 Very little bone was collected from this period of occupation. It consisted of three fragments of cattle: rib, vertebra and a tooth from contexts 11000 and 11157.

Provenance

1.1.30 The condition of the bone was graded from 1 to 5 using the criteria stipulated by Lyman (1996). Grade 1 was the best preserved bone and grade 5 indicates that the bone had suffered such structural and attritional damage as to make it unrecognisable. The condition of the bone was quite variable through all periods of occupation. However, the majority of the bone surfaces showed varying degrees of pitting with fine crevices, typical of mining by plant roots. On the whole the bones were judged to be around grade 2 to 3. The best-preserved group of bone came from the waterlogged well 11010.

1.1.31 A high degree of fragmentation was also present throughout the site, which contributed to the high number of unidentified bones and loose teeth. In addition to this, the majority of the bone from the hand collected assemblage were elements from the larger mammals which appears to indicate that the smaller bones did not survive as well.

1.1.32 Very few of the bones from the assemblage had clear butchery marks, which is likely to be a result of the poor surface condition of many of the bones. There were no particular deposits of butchered bone, and the assemblage is likely to represent animals killed for domestic purposes. None of the bones had signs of pathological changes, although this again may be as a result of the condition of the bones.

Conservation

1.1.33 The present packaging of the animal bone in finds boxes in a dry environment is satisfactory for long term storage. It is recommended that all bone is retained until final decisions are made about further analysis.

Comparative material

1.1.34 A number of important studies of animal bone from Iron Age and Roman sites have been published (Maltby 1979: Maltby 1981; Maltby 1984; Grant 1975; Grant 1989; Noddle 1993; Holmes and Rielly 1994). However, the lack of substantial published

assemblages in the immediate region suggests that comparanda will have to be sought over a wider area. A small assemblage of animal bone has recently been published from The Mount Roman Villa at Maidstone (Bendrey 1999), which would provide a useful local comparator for Thurnham. It would be of value to look at different types of sites from towns, fortresses and villas in order to contrast diet, supply and farming practices.

1.1.35　Bone survival on other CTRL sites in this area has generally been poor, and it is unlikely that there will be many comparable assemblages. Animal bone from the Late Iron Age/Roman phase at Northumberland Bottom is reported to be in a very good state of preservation (URS 1999), and might therefore be expected to produce good comparative material. The contemporary material from sites closer to Thurnham Villa, such as South of Snarkhurst Wood, is generally in too poor a condition to offer any potential for comparative study. The animal bone from White Horse Stone is in better condition, and may offer evidence for change in animal husbandry between the Early and Late Iron Ages.

Potential for further work

CTRL Landscape Zone Priorities and Fieldwork Event Aims

1.1.36　The following section discusses potential for further work in the light of the Landscape Zone Priorities and Fieldwork Event Aims.

1.1.37　The fragmentary state of much of the bone has meant that the percentages identified to species are low, and the assemblage will not support detailed statistical analyses. The poor surface condition of much of the bone means that studies of butchery and pathology cannot be undertaken. Nevertheless, the assemblages do have the potential to provide useful information at a general level about diet, agricultural regimes and natural resource exploitation, and bone disposal patterns may help to characterise structure functions and functional zones. This will be of value, since evidence of this kind is very limited in the region.

1.1.38　In this respect, it is important to note that the animal bone has the potential to complement and augment other environmental evidence relating to agriculture and the palaeo-environment. The need to identify regional diversity in agricultural production during the Iron Age and Roman occupation of the country through the use of environmental indicators has been highlighted by Van der Veen and O'Connor (1998).

1.1.39　The results of the assessment, carried out on approximately half the assemblage, suggest that analysis of the remainder of the bone present from the site would be worthwhile, and would probably approximately double the numbers of identified fragments for each phase.

1.1.40　Bird, fish and minor mammal bones have not yet been identified to species, and it is recommended that this be carried out. This material provides particularly valuable evidence for natural resource exploitation (birding, hunting and fishing), and for the nature of the local environment.

New research aims and objectives for the CTRL archaeology project

1.1.41　Although the assemblages are small, recording and analysis of the biometric data would be of value for wider studies of possible stock improvement, and the success of farming practices, during the Roman occupation.

1.1.42　The general lack of good animal bone assemblages in the region, both from CTRL sites and elsewhere, has been noted above. Although its potential for statistical

analysis is limited, the Thurnham Villa assemblage will nevertheless provide a rare source of data for the broad characterisation of animal husbandry and diet, both at the villa itself, and in the region in this period.

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Table 9.1: Thurnham Roman Villa ARC THM 98: Animal Bone, Percentage of identified hand collected bone according to phase

Phase	% of identified fragments							Count	Weight (g)
	Sheep	Cattle	Pig	Horse	Dog	Bird	Other		
1	0	75	0	0	0	0	25	4	128
2	30	47	15	4	4	0	1	105	2801
3	29	43	20	5	1	1	1	251	6253
4	26	63	5	5	2	0	0	62	1629
5	21	54	9	9	0	0	7	57	2609
6	26	63	11	0	0	0	0	27	1378
7	15	47	17	5	1	2	3	123	4644
8	10	55	25	10	1	1	1	20	1227
9	0	100	0	0	0	0	0	3	86
Total								**652**	**20755**

Table 9.2. Thurnham Roman Villa ARC THM 98: Animal Bone, Percentage of identified sieved bone according to phase

Phase	% of identified fragments								Count	Weight (g)
	Sheep	Cattle	Pig	Horse	S. Mammal	Bird	Fish	Other		
1	0	0	0	0	0	0	0	0	0	0
2	47	6	19	0	22	6	0	0	32	98.25
3	15	8	1.5	1.5	74	0	0	0	66	186.75
4	0	0	100	0	0	0	0	0	1	8
5	33.5	4	0	0	58.5	0	4	0	24	32
4 - 6*	36	8	22	0	28	0	6	0	36	81.25
6	7	7	15	0	59	0	11	1	88	108
7	6	12	31	0	50	0	0	0	16	46.5
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0
Total									263	560.75

* All bones from this row were from context 15201

Table 9.3: Thurnham Roman Villa ARC THM 98: Animal Bone, Minimum number of individuals for main domestic species from hand collected bone according to phase

Phase	Sheep	Cattle	Pig	Horse
1	0	1	0	0
2	2	3	1	1
3	5	4	3	2
4	5	2	2	0
5	2	3	1	1
6	1	1	1	0
7	1	4	5	7
8	1	1	2	1
9	0	0	0	0

Table 9.4: Thurnham Roman Villa ARC THM 98:. Epiphyseal fusion in sheep bones

Age	Element	Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 7		Phase 8	
		F	Uf	F	Uf	F	Uf	F	Uf	F	Uf	F	Uf	F	Uf
10 m	Humerus D							1				1			
	Radius P													2	
1.5 – 2y	Tibia D	1		3		1				1		2			
	Metacarpal D				1			1							
20 - 28m	Metatarsal D	1													
2.5 – 3 y	Calcaneum			1											
	Femur P				1										
3 – 3.5 y	Femur D			1	1										
	Tibia P														

F = fused epiphysis Uf = unfused epiphysis. Only the bones present are listed in the column titled 'Element'

Table 9.5: Thurnham Roman Villa ARC THM 98: Epiphyseal fusion in cattle bones

Age	Element	Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 7		Phase 8	
		F	Uf	F	Uf	F	Uf	F	Uf	F	Uf	F	Uf	F	Uf
7 - 10 m	Scapula D			3				1				1		1	
12 -18 m	Humerus D			1		1				1		1			
	Radius P	2		1				1				2			
2 – 2.5 y	Metacarpal D			1								5			
	Tibia D	1		2		2				1		1			
2.25 -3y	Metatarsal D			2											
3.5 y	Calcaneum P	1												1	
3.5 – 4 y	Radius D				1								1	1	
	Femur D		1												
	Tibia P			1								1	1		

Table 9.6: Thurnham Roman Villa ARC THM 98:Epiphyseal fusion in pig bones

Age	Element	2		3		8		6	
		F	UF	F	UF	F	UF	F	UF
1 year	Humerus D							1	
	Radius P	1							
	Scapula			1					
2 years	Tibia D				1		1		
2.25years	Metatarsal D								
3-3.5 years	Ulna		1						

Table 9.7: Thurnham Roman Villa ARC THM 98: Epiphyseal fusion in horse bones

Age	Element	Phase 3		Phase 7		Phase 8	
		F	UF	F	UF	F	UF
15 – 18 mo.	Radius P	1					
	Metatarsal D	1					
18 – 24 mo.	Scapula D	1					
3 – 3.5 yrs.	Radius D		1	1		1	
	Femur P		1				
	Femur D		1				

Table 9.8: Thurnham Roman Villa ARC THM 98: Tooth sequences of sheep

Estimated Age	Stage *	Phase 3	Phase 4	Phase 6
1 – 2 y	D	2		
2 – 3 y	E		1	1
3 – 4 y	F		2	

* age stages as defined by Payne (1973)

Table 9.9: Thurnham Roman Villa ARC THM 98: Ages at eruption and wear of mandibular teeth in cattle

Estimated Age	Stage*	Phase 2	Phase 4	Phase 7	Phase 8
0 - 1 m	A				
1 - 8 m	B				
8 - 18 m	C	1			
18 - 30 m	D				
30 - 36 m	E				
Young adult	F	1		1	1
Adult	G				
Old adult	H	1			
Senile	I		1		

* age stages as defined by Halstead (1985)

Table 9.10: Thurnham Roman Villa ARC THM9 98: Ages at eruption of mandibular teeth in pig

Estimated Age	Stage*	Phase 3	Phase 4	Phase 6	Phase 7	Phase 8
2-7 m	B	1		1		
7-14 m	C	1				1
14-21 m	D				2	
21-27 m	E		1		1	1

* age stages as defined by Halstead (1985)

Table 9.11: Thurnham Roman Villa ARC THM 98: Ages at eruption and height-wear curves in horses

Estimated Age	Phase 5
2 - 3 y	2*

*left and right mandibles from same context belonging to same individual

Table 9.12: Thurnham Roman Villa ARC THM 98: Sheep bone measurements by phase and element

Phase	Element	Measurements	Range (mm)	Mean (mm)	Number
3	Metacarpal	GL	134.5	134.5	1
		Bd	25	25	1
2	Metatarsal	Bd	19.1	19.1	1
2	Tibia	Bd	22	22	1
3	Tibia	Bd	21.9	21.9	1
6	Tibia	Bd	23.7	23.7	1
5	Humerus	Bd	27.5	27.5	1
7	Humerus	Bd	28	28	1
8	Radius	Bp	26.5	26.5	1

GL = Greatest length of the bone, Bp = (Greatest) breadth of the proximal end, Bd = (Greatest) breadth of the distal end

Table 9.13: Thurnham Roman Villa ARC THM 98: Cattle bone measurements by phase and element

Phase	Element	Measurements	Range (mm)	Mean (mm)	Number
3	Metatarsal	GL	206	206	1
		Bd	63.5	63.5	1
7	Metatarsal	GL	187-204	193.5	3
		Bd	56-64.5	60.6	4
2	Tibia	Bd	65.8	65.8	1
4	Tibia	Bd	45.1	45.1	1
6	Tibia	Bd	59.9	59.9	1
7	Radius	Bp	84	84	1
8	Radius	Bd	66	66	1

GL = Greatest length of the bone, Bp = (Greatest) breadth of the proximal end, Bd = (Greatest) breadth of the distal end

Table 9.14: Thurnham Roman Villa ARC THM 98: Pig bone measurements by phase and element

Phase	Element	Measurements	Range (mm)	Mean (mm)	Number
2	Radius	Bp	27	27	1
6	Humerus	Bd	36.1	36.1	1

Bp = (Greatest) breadth of the proximal end, Bd = (Greatest) breadth of the distal end

Table 9.15: Thurnham Roman Villa ARC THM 98: Horse bone measurements by phase and element

Phase	Element	Measurements	Range (mm)	Mean (mm)	Number
3	Metatarsal	GL	239.5	239.5	1
		Bp	41.1	41.1	1
		Bd	39	39	1
5	Tibia	Bp	92	95	1
8	Radius	Bd	61	61	1

GL = Greatest length of the bone, Bp = (Greatest) breadth of the proximal end, Bd = (Greatest) breadth of the distal end

Table 9.16: Thurnham Roman Villa ARC THM 98: Percentage of identified species retrieved by hand according to phase and context number.

Context	Feature	Phase	% of identified species									Count	Weight (g)
			Sheep	Cattle	Pig	Horse	Dog	Small Mammal	Bird	Fish	Other		
10294	Pit	1	0	0	0	0	0	0	0	0	100	1	34
10324	Pit	1	0	100	0	0	0	0	0	0	0	3	94
10469	Ditch	2	0	65.5	27.5	0	0	0	0	0	0	29	506
10528	Layer	2	0	75	0	0	0	0	0	0	25	4	623
10654	Layer	2	50	50	0	0	0	0	0	0	0	2	82
10692	Layer	2	50	0	50	0	0	0	0	0	0	2	20
10789	Ditch	2	0	100	0	0	0	0	0	0	0	1	77
10790	Ditch	2	17	17	33	0	33	0	0	0	0	6	22
10804	Pit	2	67	33	0	0	0	0	0	0	0	3	17
10828	Hollow way	2	0	0	100	0	0	0	0	0	0	2	47
10830	Pit	2	0	100	0	0	0	0	0	0	0	1	4
10832	Ditch	2	0	0	0	100	0	0	0	0	0	1	71
10841	Ditch	2	0	100	0	0	0	0	0	0	0	1	34
10865	Layer	2	82	9	9	0	0	0	0	0	0	11	122
10875		2	25	0	25	50	0	0	0	0	0	4	88
10908	Ditch	2	0	100	0	0	0	0	0	0	0	3	126
10954	Ditch	2	100	0	0	0	0	0	0	0	0	1	5
10956	Ditch	2	0	100	0	0	0	0	0	0	0	1	7
10957	Ditch	2	0	100	0	0	0	0	0	0	0	1	31
10968	Ditch	2	0	100	0	0	0	0	0	0	0	1	172
11301	Ditch	2	67	33	0	0	0	0	0	0	0	3	98
11439	Pit	2	50	50	0	0	0	0	0	0	0	2	37
11447	Ditch	2	50	50	0	0	0	0	0	0	0	2	103
11468	Ditch	2	73	18	9	0	0	0	0	0	0	11	120
11475	Ditch	2	100	0	0	0	0	0	0	0	0	1	6
11493	Ditch	2	0	50	0	50	0	0	0	0	0	2	106
20314	Ditch	2	0	50	0	0	0	0	0	0	0	1	14
20407		2	50	50	0	0	0	0	0	0	0	2	77
20459	Ditch	2	33	67	0	0	0	0	0	0	0	3	31
20477		2	0	100	0	0	0	0	0	0	0	4	155
10307	Gully	3	0	0	100	0	0	0	0	0	0	2	7
10417	Pit	3	0	0	100	0	0	0	0	0	0	1	1
10418	Pit	3	0	0	100	0	0	0	0	0	0	1	24
10467	Ditch	3	0	100	0	0	0	0	0	0	0	1	26
10516	Cobbled Surface	3	0	100	0	0	0	0	0	0	0	1	142
10517	Layer	3	30	30	0	40	0	0	0	0	0	10	1101
10548	Pit	3	0	44	0	33	11	0	0	0	11	9	911
10641	Ditch	3	0	75	25	0	0	0	0	0	0	4	150
10642	Ditch	3	33	67	0	0	0	0	0	0	0	6	61
10643	Ditch	3	11	67	22	0	0	0	0	0	0	9	258
10683		3	50	0	50	0	0	0	0	0	0	2	33
10684	Layer	3	0	50	0	50	0	0	0	0	0	2	56
10687		3	0	100	0	0	0	0	0	0	0	1	25
10693	Ditch	3	80	20	0	0	0	0	0	0	0	5	57
10706	Layer	3	67	33	0	0	0	0	0	0	0	3	23
10727	Posthole	3	100	0	0	0	0	0	0	0	0	1	6
10801	Gully	3	71	14.5	14.5	0	0	0	0	0	0	7	52
10866	Layer	3	50	25	25	0	0	0	0	0	0	4	7
10870	Cobbled Surface	3	16	47	32	5	0	0	0	0	0	19	308
10871	Foundation cut	3	67	33	0	0	0	0	0	0	0	6	77

Context	Feature	Phase	% of identified species									Count	Weight (g)
			Sheep	Cattle	Pig	Horse	Dog	Small Mammal	Bird	Fish	Other		
10936	Construction cut	3	0	100	0	0	0	0	0	0	0	1	14
11317	Ditch	3	9	91	0	0	0	0	0	0	0	11	364
11318	Ditch	3	14	43	43	0	0	0	0	0	0	7	85
11333	Layer	3	0	33	67	0	0	0	0	0	0	3	91
11134		3	0	0	100	0	0	0	0	0	0	5	5
11341	Layer	3	0	100	0	0	0	0	0	0	0	1	70
11342	Layer	3	100	0	0	0	0	0	0	0	0	1	6
11343		3	0	100	0	0	0	0	0	0	0	4	67
11344	Layer	3	0	50	0	50	0	0	0	0	0	2	185
11345	Layer	3	50	0	50	0	0	0	0	0	0	2	30
11343		3	0	100	0	0	0	0	0	0	0	1	4
11352	Layer	3	0	100	0	0	0	0	0	0	0	1	18
11353	Layer	3	20	80	0	0	0	0	0	0	0	5	49
11381	Ditch	3	70	10	10	0	10	0	0	0	0	10	80
11387	Layer	3	43	57	0	0	0	0	0	0	0	7	178
11391	Layer	3	0	0	100	0	0	0	0	0	0	1	3
11392	Layer	3	21	21	46	7	0	0	0	0	4	28	417
11394	Find Ref 11394	3	33	33	33	0	0	0	0	0	0	9	155
11437		3	100	0	0	0	0	0	0	0	0	2	8
11444	Layer	3	33	56	11	0	0	0	0	0	0	9	128
11445	Layer	3	0	100	0	0	0	0	0	0	0	3	91
11472	Gully	3	33	67	0	0	0	0	0	0	0	3	70
20174		3	33	44	22	0	0	0	0	0	0	18	153
20227	Ditch	3	0	100	0	0	0	0	0	0	0	1	207
20237	Ditch	3	71	29	0	0	0	0	0	0	0	7	109
20239	Ditch	3	0	50	50	0	0	0	0	0	0	2	20
20252	Ditch	3	0	100	0	0	0	0	0	0	0	1	26
20257	Ditch	3	50	25	0	25	0	0	0	0	0	4	63
20275		3	0	100	0	0	0	0	0	0	0	1	23
20291	Ditch	3	50	50	0	0	0	0	0	0	0	2	13
20341	Ditch	3	0	100	0	0	0	0	0	0	0	1	88
20395	Ditch	3	0	100	0	0	0	0	0	0	0	1	16
20431	Ditch	3	0	100	0	0	0	0	0	0	0	1	68
20487	Ditch	3	100	0	0	0	0	0	0	0	0	2	24
10461	Layer	4	0	40	0	60	0	0	0	0	0	5	166
10527	Posthole	4	100	0	0	0	0	0	0	0	0	1	3
10532	Ditch	4	0	100	0	0	0	0	0	0	0	1	390
10565		4	100	0	0	0	0	0	0	0	0	1	1
10609	Ditch	4	50	44	6	0	0	0	0	0	0	16	280
10616	Ditch	4	0	100	0	0	0	0	0	0	0	19	537
10662	Posthole	4	67	33	0	0	0	0	0	0	0	3	35
10755	Posthole	4	10	70	10	0	10	0	0	0	0	10	159
10772	Pit	4	40	40	20	0	0	0	0	0	0	5	54
20311	Pit	4	100	0	0	0	0	0	0	0	0	1	4
10349	Layer	5	0	100	0	0	0	0	0	0	0	1	8
10436	Layer	5	0	0	50	50	0	0	0	0	0	2	228
10472		5	100	0	0	0	0	0	0	0	0	1	30
10604	Ditch	5	33	33	0	0	0	0	0	0	33	3	127
10634	Grave	5	0	100	0	0	0	0	0	0	0	1	15
10657	Layer	5	0	100	0	0	0	0	0	0	0	2	28
10665	Posthole	5	100	0	0	0	0	0	0	0	0	1	7
10689	Post-pad	5	0	100	0	0	0	0	0	0	0	2	27
10759	Ditch	5	0	67	0	33	0	0	0	0	0	3	57
10935	Ditch	5	0	83	17	0	0	0	0	0	0	6	141

Context	Feature	Phase	% of identified species									Count	Weight (g)
			Sheep	Cattle	Pig	Horse	Dog	Small Mammal	Bird	Fish	Other		
10959	Post-pad	5	100	0	0	0	0	0	0	0	0	1	1
11033	Cobbled Surface	5	30	60	0	0	0	0	0	0	10	10	473
11036	Gully	5	33	0	0	0	0	0	0	0	37	3	8
11063	Pit	5	29	42	29	0	0	0	0	0	0	7	139
11155	Ditch	5	100	0	0	0	0	0	0	0	0	1	12
11235	Gully	5	0	67	33	0	0	0	0	0	0	3	98
11268	Post-pad	5	0	100	0	0	0	0	0	0	0	1	58
11303	Ditch	5	0	100	0	0	0	0	0	0	0	2	56
11306	Ditch	5	0	0	0	100	0	0	0	0	0	3	1035
11313	Posthole	5	0	100	0	0	0	0	0	0	0	1	11
11390	Find Ref 10503	5	50	50	0	0	0	0	0	0	0	2	20
20307		5	0	100	0	0	0	0	0	0	0	1	30
10685	Layer	6	50	38	12	0	0	0	0	0	0	8	293
10756	Layer	6	25	50	25	0	0	0	0	0	0	8	364
11102	Find Ref 11130	6	0	100	0	0	0	0	0	0	0	8	686
11228	Find Ref 11208	6	50	50	0	0	0	0	0	0	0	2	17
11241	Posthole	6	0	100	0	0	0	0	0	0	0	1	18
10110	Trackway	7	0	0	0	100	0	0	0	0	0	2	192
10347	Ditch	7	29	57	14	0	0	0	0	0	0	7	107
10373	Well	7	17	50	17	0	0	0	0	0	17	6	129
10407	Layer	7	100	0	0	0	0	0	0	0	0	1	7
10476	Ditch	7	0	100	0	0	0	0	0	0	0	3	90
10505	Pit	7	0	0	0	50	0	0	0	0	50	2	16
11026	Layer	7	0	25	0	0	0	0	0	0	75	4	429
11044	Find Ref 11030	7	21	52	9	6	0	0	0	0	12	33	1736
11061	Pit	7	100	0	0	0	0	0	0	0	0	1	8
11107	Ditch	7	0	88	6	6	0	0	0	0	0	18	948
11143	Find Ref 11030	7	0	100	0	0	0	0	0	0	0	2	232
20058	Within Villa	7	14	27	34	0	2	0	5	0	18	44	750
10045	Posthole	8	0	100	0	0	0	0	0	0	0	1	2
10057	Posthole	8	0	100	0	0	0	0	0	0	0	1	4
10059	Layer	8	0	100	0	0	0	0	0	0	0	1	61
10063	Ditch	8	50	0	50	0	0	0	0	0	0	2	28
10084	Layer	8	0	0	100	0	0	0	0	0	0	1	35
10087	Ditch	8	0	50	33	17	0	0	0	0	0	6	439
10098	Ditch	8	0	50	50	0	0	0	0	0	0	2	140
10171	Ditch	8	0	0	0	100	0	0	0	0	0	1	115
10197	Ditch	8	0	100	0	0	0	0	0	0	0	1	66
10198	Ditch	8	100	0	0	0	0	0	0	0	0	1	6
10206	Gully	8	0	100	0	0	0	0	0	0	0	1	3
10237	Ditch	8	0	100	0	0	0	0	0	0	0	1	32
10242	Layer	8	0	100	0	0	0	0	0	0	0	1	296
11000	Ditch	9	0	100	0	0	0	0	0	0	0	1	15
11157	Ditch	9	0	100	0	0	0	0	0	0	0	2	71
Total												**652**	**20755**

Table 9.17: Thurnham Roman Villa ARC THM 98: Percentage of identified fragments of bone sieved at >10mm according to phase and context.

Context	Feature	% of identified fragments									Weight (g)
		Phase	Sheep	Cattle	Pig	Horse	Small Mammal	Bird	Fish	Other	Count	
11399	Posthole	2	100	0	0	0	0	0	0	0	1	3
11400	Posthole	2	100	0	0	0	0	0	0	0	1	25
11888	Ditch	2	40	0	60	0	0	0	0	0	5	11
11506	Pit	2	100	0	0	0	0	0	0	0	3	8
11867	Gully	2	0	0	100	0	0	0	0	0	2	3
12117	Ditch	2	100	0	0	0	0	0	0	0	1	1
12321	Ditch	2	0	0	100	0	0	0	0	0	1	4
12504	Pit	2	100	0	0	0	0	0	0	0	1	0.5
12444	Ditch	2	20	40	0	0	0	40	0	0	5	39
10641	Ditch	3	50	50	0	0	0	0	0	0	4	52
10642	Ditch	3	100	0	0	0	0	0	0	0	2	2.5
10693	Ditch	3	50	0	0	0	50	0	0	0	4	2.75
11444		3	0	100	0	0	0	0	0	0	1	64
11776	Ditch	3	100	0	0	0	0	0	0	0	1	0.5
11865	Ditch	3	0	100	0	0	0	0	0	0	1	6
12013	Layer	3	33	33	33	0	0	0	0	0	3	10
12471	Gully	3	100	0	0	0	0	0	0	0	1	2
12203	Ditch	3	100	0	0	0	0	0	0	0	1	4
11680	Pit	3	0	0	0	100	0	0	0	0	1	40
10772	Pit	4	0	0	100	0	0	0	0	0	1	8
11267	Post-pad	5	100	0	0	0	0	0	0	0	1	1
15058	Pit	5	100	0	0	0	0	0	0	0	3	3
10634	Grave	5	0	100	0	0	0	0	0	0	1	24
10627	Grave	5	100	0	0	0	0	0	0	0	1	3
15106	Posthole	6	25	0	75	0	0	0	0	0	4	12
15186	Layer	6	100	0	0	0	0	0	0	0	1	1
15190	Posthole	6	50	50	0	0	0	0	0	0	2	26
15021		6	0	50	50	0	0	0	0	0	2	1
15133	Posthole	6	0	100	0	0	0	0	0	0	1	23
15063	Posthole	6	11	22	0	0	45	0	22	0	9	5.25
15073	Posthole	6	0	0	100	0	0	0	0	0	1	12
15018		6	0	0	100	0	0	0	0	0	1	2
15054	Posthole	6	33	0	67	0	0	0	0	0	3	13
15081	Posthole	6	0	100	0	0	0	0	0	0	1	5
15022	Posthole	6	100	0	0	0	0	0	0	0	1	1
11039		7	0	33	33	0	33	0	0	0	3	11.25
11044	Layer	7	50	50	0	0	0	0	0	0	2	29
12369		7	0	0	100	0	0	0	0	0	1	4
15201		4-6.	55	14	18	0	9	0	4	0	22	81.25
Total											**100**	**544**

Table 9.18: Thurnham Roman Villa ARC THM 98: Percentage of bone sieved from 10 to 4mm according to phase and context.

Context	Feature	% of identified fragments									Count	Weight (g)
		Phase	Sheep	Cattle	Pig	Horse	Small mammal	Bird	Fish	Other		
11506	Pit	2	100	0	0	0	0	0	0	0	2	3
12047	Pit	2	100	0	0	0	0	0	0	0	2	0.5
10928	Ditch	2	0	0	0	0	100	0	0	0	2	
10941	Ditch	2	50	0	0	0	50	0	0	0	2	0.25
10726	Layer	3	0	0	0	0	100	0	0	0	36	3
15143	Pit	3	0	0	0	0	100	0	0	0	3	
12203	Ditch	3	0	0	0	0	100	0	0	0	2	
11224	Posthole	5	0	0	0	0	100	0	0	0	5	0.25
15187	Surface	5	100	0	0	0	0	0	0	0	3	0.5
11267	Post-packing	5	0	0	0	0	100	0	0	0	1	
10634		5	0	0	0	0	100	0	0	0	1	
11832	Ditch	5	0	0	0	0	100	0	0	0	5	0.25
15106	Posthole	6	0	0	8	0	88	0	4	0	24	2
15186	Layer	6	0	0	0	0	50	0	50	0	2	
15133	Posthole	6	0	0	0	0	50	0	50	0	2	
15083	Posthole	6	0	0	0	0	100	0	0	0	1	
15063	Posthole	6	0	0	0	0	80	0	20	0	10	1
15064	Posthole	6	0	0	0	0	88	0	12	0	8	0.25
15001	Layer	6	0	0	0	0	0	0	100	0	1	
15054	Posthole	6	0	0	20	0	80	0	0	0	5	1.25
15050	Posthole	6	0	0	100	0	0	0	0	0	2	2
15081	Posthole	6	0	0	0	0	75	0	0	25	4	0.25
15022	Posthole	6	0	0	0	0	100	0	0	0	1	
11044	Layer	7	0	0	25	0	75	0	0	0	4	0.75
11083	Ditch	7	0	0	0	0	100	0	0	0	1	
12358		7	0	0	100	0	0	0	0	0	2	1.5
15201		4-6.	8	0	30	0	62	0	0	0	13	
Total											**144**	**16.75**

Table 9.19: Thurnham Roman Villa ARC THM 98: Percentage of identified bones sieved from 4 to 2mm according to phase and context.

Context	Feature	% of identified fragments									Count	Weight (g)
		Phase	Sheep	Cattle	Pig	Horse	Small mammal	Bird	Fish	Other		
12013	Layer	2	0	0	0	0	100	0	0	0	4	
15143	Pit	3	0	0	0	0	100	0	0	0	6	
10634	Grave	5	0	0	0	0	67	0	33	0	3	
15021		6	0	0	0	0	100	0	0	0	1	
15133	Posthole	6	0	0	0	0	0	0	100	0	1	
11026		7	0	0	0	0	100	0	0	0	3	
15201		4-6.	0	0	0	0	0	0	100	0	1	
Total											**19**	