

than sheep/goat, though not by as much as in phase 1 or phase 3. Finds of horse were few. The dominance of cattle was greater in the bone group outside the precinct wall than within. Outside, 65% of 267 cattle, sheep, goat and pig bones were from cattle, compared to 51% (of 204) within. Similarly with the unidentified ribs, vertebrae and other bones, cattle-sized were always more common than medium-sized, but were 77% to 23% (of 226) outside, compared to only 54% to 46% (of 188) inside the precinct wall. This pattern of bones from larger species being discarded further away from immediate occupation has been observed on sites of many periods, and is discussed by Wilson (1985).

**Table 7 Anatomical Analysis of the Phase 1 Bone**

Figures show the total number of bones (BN), those classed as fragments (BNF), and those with at least one zone present (BNZ). Zones show the numbers found for different parts of the bones (see Method), with left and right sides combined, and the average number of zones present. Horncores and maxillae are included as skull and also shown separately. Identifications as 'probably sheep' are shown in square brackets and are not totalled.

	Cattle BN	BNF	BNZ	L + R Zones 1-6						av.	Sheep BN	Goat BN	Sheep + Sheep/Goat BN BNF BNZ			Pig BN	BNF	BNZ	L + R Zones 1-6						av.
Skull	50	20	30									20	1		1	49									
horncore	(5)		(5)									(20)													
maxilla	(9)		(9)													(12)									
Mandible	58	25	33	6	11	12	18	11	14	2.2	2		5		5	57	8	49	23	28	41	42	29	8	3.5
Tooth	25	4	21									1	5		5	42	8	34							
Head	(133)												(11)			(148)									
Vertebra	32	9	23										11	1	10	14		14							
Scapula	92	56	36	14	15	24				1.5	[5]		12	3	9	23	4	19	14	15	10				2.1
Humerus	37	12	25	2	2	11	17	10	5	1.9	[4]		15	2	13	22		22	0	10	15	20	17	6	3.1
Radius	25	2	23	13	14	13	10	6	2	2.5	[3]		26	3	23	9		9	6	7	7	6	5	2	3.7
Ulna	12	1	11	1	2	2	8	0	0	1.2	[1]		3		3	18		18	1	14	18	17	5	0	3.1
Pelvis	46	7	39	14	17	18	11	10		1.8	[6]		14	1	13	17		17	10	9	7	6	4		2.1
Femur	60	11	49	9	21	26	27	7	6	2.0			16	3	13	12	3	9	0	2	5	7	4	0	2.0
Tibia	47	14	33	4	5	15	16	15	14	2.1			28	2	26	30	3	27	0	11	25	21	18	8	3.1
Fibula																10	4	6	0	2	1	1	1	0	0.8
Main Body	(351)												(125)			(155)									
Carpal	3		3																						
Metacarp (3 + 4)	15	5	10	7	7	5	4	5	4	3.2	6	1	6		6	8		8	8	2	0				1.9
Astragalus	3		3										1		1	2									
Calcaneum	6		6	1	1	6				1.3			1		1										
Other tars.	1		1										1		1										
Metatars (3 + 4)	25	12	13	9	9	7	2	3	3	2.5	6[1]		11	2	9	6		6	6	5	1				2.0
Metapodial	1	1														7		7	4	5	3				2.0
1st phalanx	4		4	4	4	4				3						3		3	2	1	1				1.3
2nd phalanx	1		1	1	1	1				3						3		3	3	3	3				3
3rd phalanx	4		4													2		2							
Foot	(63)												(20)			(31)									
Total	547	179	368								14	22	156	17	139	334	41	293							
		33%	67%										11%	89%		12%	88%								
Unidentified		A	B	C	D																				
Vertebra		46	13		3																				
Rib		574	217		7																				
Other		234	259		9																				
Total	2563	854	489	1203	17																				

A - cattle-sized (hand-collected); B - sheep/pig-sized (hand-collected); C - large/medium-sized (sieved); D - small mammal (all from sieved)

Due to the brief method used for the phase 3 and 4 bone, comparisons of the main species should be made using table 5, which shows the phase 1 bone recorded in the same way. As expected from the deposition processes and consequent residual character of the phase 3 building backfill deposits (see p.80), proportions of species found were similar to phases 1 and 2. The chief value in studying the bone was in increasing the sample size for age and size information, and allowing this fairly large group from the construction of the probable kitchen to be compared with other bone groups. The phase 3 bone was well preserved, though of a lighter colour and with a less shiny surface than the phase 1 and 2 bone. There was a general similarity in species and skeletal elements found. Again, pig mandibles were numerous, there were few vertebrae of any species, few cattle or sheep horncores, but some goat horncores present.

The phase 4 bone, of early 15th- to mid-16th-century date, showed some distinct differences from the earlier groups. Cattle formed 58% of the recorded bone, and this would have been higher using the fragments-count method. Cattle-size ribs were also numerous. The bone was better preserved than earlier groups. For example, the distal (lower) end of the radius was more numerous than the distal humerus, the former being a bone element much more prone to decay. Astragali, also, were more numerous than for earlier phases, and there were more astragali than distal tibiae. Remains from the head and foot of cattle were very common: bones from the head, main body and foot formed 47%, 28% and 25% (sample size 237) in this group, compared with 18%, 72% and 10% (sample size 114, same method at phase 4) in phase 1. More of the waste bones from primary butchery were ending up in the deposits, compared to the earlier phases. Pathological bones, mostly of cattle, were quite



numerous in phase 4 (see Cattle and Pathology). Sheep bones were still fewer than pig, but the difference was not so great. Wild boar may be present (see Pig section).

Horse, dog and cat were less common than in the earlier groups, but deer were well represented, especially fallow. The range of species of small mammals, birds and fish was greater. As shown above, preservation conditions were good, which would favour survival of these fragile bones.

### *Butchery*

The description of butchery marks applies to phase 1 except where stated.

Most chopmarks on the cattle bones broke through the bone. Of the lighter marks most were quite heavy, and appeared to be butchery marks, not marks from carving. A cleaver or heavy knife seems to have been used. One very clearly marked cattle radius was chopped with a curved blade, perhaps an adze.

Marks on the mandible were seen at the angle of the jaw below the condyle; through the diastema; and – from the medial side – below the second or third molar.

Vertebrae were not numerous. Two cervical vertebrae were chopped through obliquely to one side of the midline. Thoracic vertebrae were mainly found either as just the centrum (not chopped through) or just the spinous process. Lumbar vertebrae were seen where the transverse process was chopped through on both sides of the centrum, in some cases from a ventral direction, giving the impression that meat was removed at either side, leaving the vertebral column as waste. No tail vertebrae were found.

A great discrepancy was found in the number of cattle-sized ribs compared to vertebrae. Ribs were not identified to species level, but clearly nearly all large ribs were from cattle, not horse or deer. For context 1424, only seven of 153 ribs retained the medial part where the rib articulates with the vertebral column, which, with the generally low number of vertebrae found, may mean that the vertebral column was deposited elsewhere. Ribs were very numerous: for example 332 large ribs, compared to 249 identified cattle bones, in contexts 1424 and 1557. Many of them were chopped through, and there appeared to be a preferred length of 10-20cms and, in particular, 12.5-17.4cms.

The most striking observation of the numerous chopmarks on scapulae was that the majority were on the medial side – they were done after the limb was separated from the rib-cage. They occurred mostly on the blade, chopping the scapula into two or more pieces. Rather few were on the distal end of the bone, suggesting that separation of the joint was done through the less dense bone of the proximal humerus. On the humerus, heavy chopmarks were common around the distal end. It was noted that humeri were quite often found with a substantial part of the shaft surviving fairly intact. Some were gnawed by dogs on the proximal end.

On the pelvis chopmarks were concentrated near the acetabulum, and also occurred on various parts of the ilium, both from a lateral and medial direction. Proximal and distal ends of the femur were rare; on the shaft marks were common but not concentrated in one area, and occurred both laterally and medially. Marks on the tibia were less common than on the femur. Bones from the lower leg were scarce and butchery marks few.

Marks on the goat horncores are mentioned in the section on Goat; marks on other sheep/goat bones and pig bones were too few for detailed comment, though most were heavy and broke through the bone. The bone with the most recorded marks was the scapula for sheep and the mandible for pig.

Butchery marks were not recorded in detail for other phases. In phase 2, as in phase 1, a low number of cattle-sized vertebrae and rib articulations compared to pieces of rib was observed. There were more proximal than distal cattle metapodials, and very few phalanges. Articulated groups were rare. Vertebrae chopped through sagittally, implying that the carcass was split into sides, were present in phase 4, but uncommon. Chopmarks were observed on 25%, 20%, 19% and 30% of the bones of the main species (cattle, sheep/goat and pig) for the four phases.

### *Cattle*

The sample size of cattle jaws on which an assessment of age at death can be made was small (table 8), but suggests that for phases 1 to 3 most cattle supplying the abbey were adults when slaughtered. Epiphyseal fusion confirms the lack of very young cattle, but suggests a rather higher proportion of sub-adults, with 13 of 31 late-fusing bone elements unfused. For phase 1, cattle would presumably have come from the abbey's own estates, and the cattle available would have been culled cows and plough oxen, plus some young adults surplus to requirements, most calves born being kept into adulthood.

The phase 2 and 3 mandibles suggest a similar slaughter pattern. From the early 14th century the demesnes were increasingly let instead of being worked directly (Kettle 1989, 86, 103), and cattle may have come from markets in Shrewsbury as well as from the abbey's estates, though this did not appear to change the age structure of animals supplied to the abbey. However, by phase 4 a change was observed, with a quarter of mandibles coming from calves and, of the adults, a higher proportion falling into the latest age class. In the ten calf



**Table 8 Age Stages for Cattle Mandibles**

Partial wear – distal cusp unworn (there were no M<sub>3</sub>'s with the distal cusp absent); CBJ below/above – the cement-enamel junction below or above the alveolar border lingually, at the point above the root arch, see Method.

Phase	1 12th- e.14th	2 14th	3 14th- e.15th	4 e.15th- mid-16th
1 Juvenile; M <sub>1</sub> not in wear	0	0	2	10
2 Immature; M <sub>1</sub> in wear, M <sub>2</sub> not	1	0	0	0
3 Subadult; M <sub>2</sub> in wear, M <sub>3</sub> not	0	2	0	1
4 Young adult; M <sub>3</sub> partial wear	3	0	1	1
5 Adult; M <sub>3</sub> in wear, CEJ below	7	2	6	11
6 Elderly; M <sub>3</sub> in wear, CEJ above	6	1	9	21
Total	17	5	18	44
Percentage at stages 4-6	94%		89%	75%

**Table 10 Age Stages for Sheep/Goat Mandibles**

Stages are defined in Payne 1973. B to E are the same as 1 to 4, see Cattle Age Data; F to I are adult to old.

Stage	A	B	C	D	E	F	G	H	I
Phase 1 12th - early 14th Century			1	2	1				
Phase 2 14th Century					4				
Phase 4 early 15th - mid-16th Century					2	2	7	2	

**Table 9 Cattle Measurements**

Height estimate: method of Matolcsi in von den Driesch and Boessneck 1974

	N	Range	Mean	SD
Height estimate (m)				
Phase 1	4	1.01-1.21	1.11	
Phase 2	3	1.02, 1.17, 1.20		
Phase 3	1	1.02		
Phase 4	11	1.06-1.29	1.17	0.074
Tibia Breadth distal end (Bd) (mm)				
Phase 1	7	50.6-60.0	55.2	2.62
Phase 2	3	51.0, 52.9, 56.0		
Phase 3	5	51.1-62.3	56.9	3.93
Phase 4	5	49.9-67.5	59.3	6.44
Astragalus Greatest length of the lateral half (GL1)				
Phases 1-3	8	56.1-63.4	58.8	2.06
Phase 4	7	59.1-68.5	62.2	3.18
Metatarsal Breadth of distal articulation (Bfd)				
Phase 1	3	43.4, 51.1, 53.4		
Phase 2	2	47.3, 53.8		
Phase 3	8	43.5-60.2	50.0	4.75
Phase 4	16	43.7-60.0	52.2	4.46

mandibles, the deciduous fourth premolar, where present, was at early wear stages (seven at tooth wear stage 'b', one each at 'c' and 'd', method of Grant 1982) and the first molar was visible or erupting (two at 'V', five at 'E', three missing) – that is, not newborn, but less than about six months old. They are close in developmental stage, suggesting a regular slaughter practice. Epiphysial fusion confirmed the presence of bones from calves but in a lower proportion than indicated from the jaws (of 99 counted epiphysial elements, six were very immature, five others unfused and the rest were all fused). By this date, cattle husbandry must have been so organised to create surplus young animals, and it is of note that these were slaughtered at a young age. They may have originated from cows kept for supplying dairy products to the abbey or town. After the mid-14th century, much arable land in Shropshire had been converted for pastoral farming (Kettle 1989, 83-4) and it was thus possible to produce the beef or veal as demanded, rather than as a by-product of arable farming. A similar change in age at slaughter was observed in 16th-century compared to medieval cattle at Exeter (with larger sample sizes), and at other sites (Maltby 1979; Grant 1988).

As well as more younger mandibles, more of the adult mandibles had well-worn teeth. Of age classes five and six, an increasing proportion were classed as elderly in the later phases and, additionally, pathological bones were commoner (see section on Pathology). If most of the young mandibles are from bull calves, it is expected that more of the stage four to six mandibles are from cows than oxen/bulls, though scattergrams of distal metacarpal measurements from phase 4 did not show a clear pattern of sexual dimorphism. Cows kept for producing veal and dairy products may have been kept to a greater age than plough beasts.

The size of the cattle was comparable with cattle from other sites of the period (e.g. Armitage 1982, Audoin-Rouzeau 1991). Withers height estimates for phase 1 were an average of 1.11m. These measurements and a selection of others are shown on table 9. They suggest, as expected, the presence of some larger cattle by the early 15th to mid-16th century, with the average withers height for phase 4 at 1.17m. Note that the upper end of the ranges increases, but the lower end remains similar – small cattle were still present in phase 4.

The position of the nutrient foramen at the supracondylar fossa of the femur was recorded, either as within or outside the fossa:- phase 1: 3 within/7 outside; phase 3: 2/6; phase 4: 5/6.

### Goat

Most of the bones identified as goat were horncores, mostly from phase 1. Their measurements fell into two distinct groups (fig. 93), presumed to be male (entire and/or castrates) and female, and descriptive identifications of sex while recording agreed entirely with the separation indicated by the measurements. The bone quality of the male horncores was more porous and immature-looking, and, where the frontal bones were present, in all cases the frontal suture was either unfused or only partially fused. By contrast the smaller, female cores were recorded as mature-looking. In only two cases were the frontal bones present: one with the frontal suture fully fused and obliterated (this specimen is the largest of the female group on fig. 93) and one partially obliterated.

There were ten males and five females from phase 1. Eleven of the horncores were from early contexts in this phase, and they probably indicate some trade or workshop in the vicinity using goat horn. By contrast, horncores



Figure 93 Basal Shape of Goat Horncores

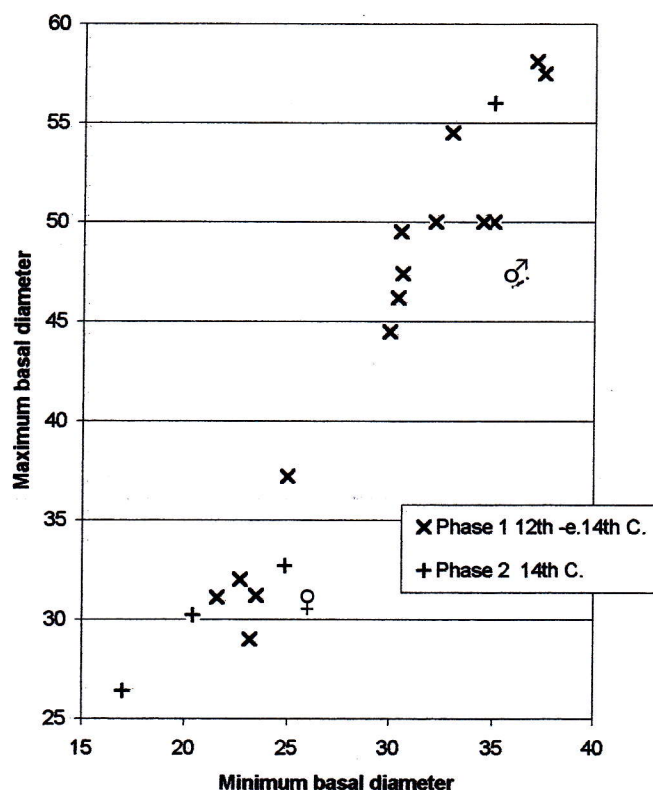


Fig. 93. Basal shape of goat horncores

as large as fifty were recorded. At Hereford, bones of goat continued to be found in small numbers (3-5% of identified fragments) into the 14th century and later groups (Noddle 1985).

Deposits of goat horncores with few post-cranial bones, usually associated with cattle horncores (but not sheep), have been found in other medieval urban deposits, in 11th-century Thetford and late 11th-/12th-century Skeldergate, York for example (Jones 1984; O'Connor 1984). At Exe Bridge, Exeter in the 13th century (Levitan 1989) and at Hereford (late Saxon to post-medieval) rather more post-cranial bones of goat were identified than at Shrewsbury. At several sites the number of horncores thought to be from males and females was given, showing that, as at Shrewsbury, both sexes were present (for example: 10 males and 3 females at Thetford, 14 and 19 at York, 19 and 16 at Hereford and rather fewer males than females at Exeter – sample size 422). The size of the Shrewsbury horncores was very similar to those found at Exeter (Levitan 1989, fig. 4).

#### Sheep and sheep/goat

The age stages of the sheep/goat mandibles found are shown on table 10. Even with such small numbers, it can be seen that mandibles from the latest phase include more older jaws, indicating a typical pattern with lambs of both sexes being kept into adulthood for wool production.

Some of the measurements are summarised on table 11. Numbers are too few for detailed study but the average size of the sheep appears to be smaller than at many medieval sites in the southern and eastern part of England, at Lincoln for example (O'Connor 1982). They are similar to those at Hereford (Noddle 1985) and Exeter (Maltby 1979; see proximal radius, distal tibia measurements and height estimates), and it is likely that the smaller size of sheep in the south-west and west of Britain observed in the Romano-British and Saxon periods continued into the Middle Ages (Maltby 1981). The average estimated shoulder height for sheep from the site was 58.6cms. A skull from one polled (hornless) sheep was found in phase 4.

#### Pig

The number of pig jaws found was larger than for either cattle or sheep; a summary is shown on table 12. The greatest number were slaughtered at between one and something over two years old (stage 3; age estimates from

from cattle and sheep were notable for their rarity. The element of selection for trade means that the age and sex of the horncores may not be typical of goats kept, but the pattern as found suggests both sexes being kept, with males being kept until sub-adulthood. Goat skin and meat was used (it is mentioned in historical records: Stamper 1989a, 61) but it seems to have been the horn, and probably the skin also, which was traded.

Eleven of the phase 1 cores were chopped, mostly through the frontal bone below the horncore, but sometimes through the base of the core. The chops were deep and would have separated the horn and horncore from the skull.

Of post-cranial bones, far more were identified as sheep or probably sheep than goat (see table 7, 'probably sheep' shown in square brackets; identifications made using reference material, Lawrence 1980, Payne 1985). Goat was present but rare in phases 3 and 4 (three horncores from phase 3 and one metatarsal from phase 4). Generally, documentary references to goats are more common in the early medieval period than later (Grant 1988, 155), and this pattern was probably also true for Shropshire (Stamper 1989a, 60). In Shropshire, goats were largely peasant-owned, though as late as 1280, herds



**Table 11 Sheep (goat) and Pig Measurements**

SD – Standard Deviation (n-1); BT – Breadth of trochlea; Bp/Bd – Breadth proxima/distal end; GL Greatest Length; L/Ht – Length/Height (v.d. Driesch 1976, Fig. 12b); WP/WA – posterior/anterior crown width (Payne and Bull 1988); L – Length; GLP – Length of Glenoid Process; SDmin – minimum Shaft Diameter, taken in the anterior/posterior plane. Height estimates: method of Teichert, in von den Driesch and Boessneck 1974.

		N	Range	Mean	SD
<b>Sheep (goat)</b>					
Humerus BT	Ph. 1	4	26.4, 26.9, 27.2, 27.4		
	3	5	26.8-28.3	27.7	
	4	7	24.2-28.2	26.7	
Radius BP	Ph. 1	7	26.6-31.3	28.4	
	2	3	30.3, 30.2, 31.1		
	4	4	28.8, 29.4, 30, 30.4		
Tibia Bd	Ph. 1	11	19.8-27.1	24.0	2.18
	3	6	21.8-27.0	24.6	
	4	15	22.4-26.3	24.6	1.25
<b>Height estimates</b>					
Phase 1			570, 603, 602		
(sheep metacarpal GL 117, sh/gt radius GL 150, tibia 200)					
Phase 3			552, 587		
(sheep metatarsals GL 122, 130)					
Phase 4			512, 580, 625, 611, 619		
(sheep metacarp. 105, 119, metatars. 138, sh/gt radius 152, 154)					
Ph. 1-4 ht. estimates		10	512-625	586	
<b>Pig</b>					
Lacimal L/Ht	Ph. 1	2	33/19; 38/22		
	4	1	47/25		
M <sub>1</sub> WP	Phase 1	18	9.3-11.4	10.75	.50
	2	6	9.6-11.7	10.33	
	3	14	9.4-11.5	10.41	.55
	4	11	9.4-11.5	10.39	.52
M <sub>2</sub> WP	Phase 1	23	12.3-14.1	13.27	.53
	2	5	12.0-13.1	12.62	
	3	11	12.1-14.2	12.93	.63
	4	21	11.3-13.9	12.76	.69
M <sub>3</sub> WA	Phase 1	10	13.4-16.0	14.74	.73
	2	2	14.3, 14.4		
	3	9	13.4-16.1	14.27	.77
	4	9	12.3-14.8	13.73	.75
M <sub>3</sub> L	Phase 1	8	28.0-35.6	31.31	2.51
	2	1	29.9		
	3	5	30.8-32.9	31.80	
	4	9	27.5-33.2	30.13	1.65
scapula GLP	Ph. 1	4	32.3, 33.3, 34.0, 36.2		
	4	3	32.7, 33.3, 37.0		
humerus Bd	Ph. 1	4	36.0, 38.4, 39.2, 40		
	3	4	36.1, 36.6, 37.3, 37.9		
femur SD	Ph. 4	1	24.6		
tibia Bd	Ph. 1	5	26.0-30.3		28.2
	3	3	26.0, 29.0, 31.0		
GL/SDmin/Bd/Dd	Ph. 3		172/13.1/26.0/23.8		
GL/SDmin/Bd/Dd	Ph. 4		-17.1/35.4/32.0		

**Table 12 Age Stages for Pig Mandibles**

Stages are the same as for cattle, with 5 and 6 combined. 'In wear', for pigs, began as soon as wear could be seen on the enamel, not the dentine as for cattle and sheep. Some jaws retained the canine tooth or its alveolus – the sex of these, by age stage, is shown to the right.

Stage Sex	1	2	3	4	5	N	1 m/f	2 m/f	3 m/f	4 m/f	5 m/f
Phase 1	2	4	16	9	8	39			7/6	/5	3/3
Phase 2	1	2	4	3	1	11			/1	1/1	
Phase 3		3	10	6	2	21		1/	1/3	1/1	/1
Phase 4		1	14	7	5	27			2/6	2/2	1/2
Total:											
12-16th C.	3	10	44	25	16	98		1/	10/16	4/9	4/6

decay intervened between the live pigs and the excavated bones, so that although the age stages found seem to suggest a continuation of extensive pig management in woodland, as may be expected for the earlier phases, other interpretations are possible.

A favoured medieval use of the boar's head and foreparts was to make brawn, the pig having been fattened up for the purpose (Wilson 1976, 88-90). At Shrewsbury, numbers of bones of the head was greater than might be expected from the number of post-cranial bones, but numbers from the foreparts were not greater than from the hind. Also shown on table 12 is the sex of those jaws where the canine tooth (or its socket) was present. It is

Bull and Payne 1982, table 1, and see discussion p.65), but an almost equal number reached later stages. This pattern is similar to that seen in Anglian York (O'Connor 1989) and in early phases at Lincoln (O'Connor 1982) but contrasts with later, post-1300, phases at Lincoln and urban samples at Exeter (Maltby 1979), where fewer adults were found. Little difference was seen between phases, suggesting a similar management throughout the period. It would be interesting to study pig age patterns from other sites in Shrewsbury and the surrounding area in order to test whether the number of adults found from the abbey was affected by selection of adults as boar's heads. Processes of selection for food, deposition and



interesting that several males at stages 4 and 5 were present – these might perhaps have been gifts of boar's head to the abbey. Overall, females outnumbered males by less than two to one at stages 3 to 5.

Bones from very young pigs were less common in the later phases, see stages 1 and 2, table 12. Post-cranial bones of 'piglet' formed 2%, 5%, 6% and 0% of the total pig bones for each phase.

Very few measurable long bones were found, so the information about size depended largely on tooth measurements (see table 11). No large change in size was observed: measurements are broadly similar to those from Prestatyn, North Wales, a millenium earlier (Jones 1989). For the lower first and second molars (width of posterior cusp) the mean was rather lower for later phases, and for the lower third molar the mean and also the lower end of the range were lower for phase 4 (early 15th to mid-16th century), suggesting that some smaller pigs were present. Lacrimal bone measurements are shown on table 11 and it was noted on these skulls that the upper part of the skull was nearly straight, or very slightly concave (a ruler could be laid between the Akrokranon and the Nasion: these points are defined in von den Driesch 1976).

Although the tooth measurements suggest the presence of some smaller pigs in phase 4, three bones from this phase – a partial skull, a femur and a tibia – were large. The tibia, from context 1245 (in which was found a pointed-toed shoe sole dating probably from the mid-15th century), with a distal breadth of 35.4mm was larger than any in the large collection from late Saxon Hamwih (52 examples, range 26.4 – 33.2mm: Bourdillon and Coy 1980, statistical appendix), and may be from wild boar. The femur is similar to one from Hamwih described as exceptionally large and perhaps from a wild boar. There is a reference to wild pigs in Condover Park, just south of Shrewsbury, in 1298 (Stamper 1989a, 43). The abbey's demesnes south west of Shrewsbury, which included Condover, were one of the principal groups of manorial demesnes at least until 1291 (Gaydon 1973, 31). At Hereford one pig bone large enough to have come from a wild boar was found (Noddle 1985). There is also a possibility that the large specimens are from a new type of large domestic pig, as may have been the case at Thetford at this date (Jones 1993 and see Wiseman 1986), though the number of hunted species found makes the presence of wild boar not unexpected.

#### *Other mammals*

Horse bones were occasional finds, forming 2%, 1%, 3% and 1% of the identified bone in the four phases. Horses, as pack-horses and for riding, were probably far more numerous than these numbers suggest, and there is other evidence for them. Botanical remains of grassland plants may originate from animal feed and bedding (chapter 9) and some of this was probably for horses. There were also finds of spurs and horse shoes (pp. 115-116). Height estimates are of 11½ and 14 hands (see table 13). No bones from young horses were found, and many of the teeth were very worn (tooth crown height measurements are to be found in the archive; method of Levine 1982). No butchery marks were observed. There was no evidence for donkey from the bone, though there was from the ironwork (p.116).

Dog and cat bones were quite numerous. Quite often groups of bones probably from one individual were found. The range in size of dogs was considerable, from an estimated shoulder height of only 38cms up to 63cms (table 13). Some bones may have been from hunting dogs, belonging perhaps to visitors to the abbey guest house. This applies to both the large and the small dogs – terrier-size dogs were and still are bred for hunting. But general guarding and herding and, along with cats, keeping down vermin, were probably commoner functions. The lower jaw of a young cat from phase 1 had cut marks, indicating use of the skin. The few measurable cat bones were of comparable size to domestic cats from other medieval sites.

Deer bones were from red, roe and fallow. As expected, red deer was more common than fallow in the earlier period, though a few fallow bones were found even in the earliest levels (table 4), but, by the fifteenth century, fallow predominated. Almost all remains were of bone not antler – from hunting rather than industrial activities. They were found as occasional finds in several contexts, with no articulated groups. More measurements are published (table 13) than for other species as such evidence is uncommon from archaeological sites. Most measurements were within the ranges found at medieval Facombe, Hampshire, though there are single specimens above (cheek tooth row length) and below (a metatarsal) for red deer, and one (a metacarpal) just above the range for fallow (Sadler 1990).

Other hunted species were fox, hare, rabbit (phase 4), pole-cat (phase 3) and possibly wild boar. Pole-cat would have been hunted or trapped for its fur (which is still traded); its present distribution includes Shropshire, and the Victoria County History of 1908 records it as 'a century ago quite common in Shropshire' (VCH Shrops., I).

Black rat (*Rattus rattus*) was present in phases 1 and 4. Rodent gnaw-marks on other bones were rare (all on pig bones, two from phase 1, one from phase 2). The water vole bones (phase 4, at least four individuals from one context plus three bones from other contexts) are probably part of the wild fauna of the river area.