Report: Analysis of faunal remains from 2011 excavations at Broo Site II, S Mainland, Shetland

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ABSTRACT: The 2011 archaeological excavation at Broo Site II, a 17th century settlement in the Quendale Links area of Dunrossness, S Mainland, resulted in the recovery of over 1,150 animal bone and shell fragments. The generally well-preserved archaeofaunal assemblage is comprised of a variety of domesticated and wild species. Fish (particularly gadids) make up the vast majority of material identified to species or taxon. Cattle, caprines and chickens dominate the domestic component of the assemblage. Also present, though in very small numbers, are pig, dog, and mollusks.

INTRODUCTION

In the summer of 2011, as part of the Shetland Islands Climate and Settlement Project (SICSP), archaeological excavations were conducted at Broo Site II, a 17th century settlement in the Quendale Links area of Dunrossness, S Mainland (Bigelow *et al*. 2005). These excavations resulted in the recovery of a total of 1,152 bone and mollusk shell fragments, nearly 70% of which were identified to species level. This report presents the results of the zooarchaeological analysis of the Broo Site II archaeofaunal assemblage.

LABORATORY METHODS

Analysis of the Broo Site II archaeofauna was carried out at the Hunter College Zooarchaeology Laboratory. All bone fragments were identified as far as taxonomically possible (selected element approach not employed), though all ribs, long-bone shaft fragments, and vertebral fragments were assigned to Large Terrestrial Mammal (cattle/horse sized), Medium Terrestrial Mammal (sheep/goat/pig sized), and Small Terrestrial Mammal (small-dog/cat sized) categories. Following NABO Zooarchaeology Working Group recommendations and the established traditions of North Atlantic zooarchaeology, we have made a simple fragment count (NISP) the basis for most quantitative presentation. Mammal tooth-eruption and wear recording follows Grant (1982). General presentation follows Enghoff (2003).

Digital records of all data collected were made following the 9th edition NABONE recording package (Microsoft Access database supplemented with specialized Excel spreadsheets, available as a free download at http://www.nabohome.org/index.html).

TAPHONOMY

Archaeofaunal assemblages are subject to a wide variety of factors that impact the degree to which the remains do or do not survive in the archaeological record (Grayson 1984; Lyman 1994). A great many processes—such as scavenging, trampling, wind or water erosion, soil acidity, and site disturbance—can affect how much, if any, of an animal will remain in the archaeological record after it dies. This report on the Broo Site II archaeofauna therefore begins with an examination of the taphonomic factors that likely had an impact on the assemblage.

Erosion and Weathering

The Broo Site II archaeofaunal material is fairly well preserved, with signs of degradation being relatively infrequent (Table 1). Only some 3.5% of the total number of bone and shell was damaged through erosion or surface weathering, while just over 1% of the material exhibited signs of bioerosion.

	Count	% Total
None	1099	95.23
Weathered/Eroded	41	3.55
Bioerosion	14	1.21
Total	1154	100.00

Table 1. Frequency of erosion, weathering and bioerosion.

Fragment Size

The maximum dimension of each bone fragment was measured and placed into one of five size categories. Table 2 presents the fragment size distribution for the medium- and large-sized animals in the Broo assemblage (fish, bird and mollusk remains were not included here, since these tend to be small even when unbroken). The Broo material is fairly fragmented, with nearly 55% of the bone fragments measuring no more than 2 cm in length. The somewhat high degree of fragmentation in the assemblage is most likely due primarily to butchery, scavenging, and post-depositional breakage.

Size	Count	% Total
0 – 1 cm	50	12.11
1 – 2 cm	174	42.13
2 – 5 cm	138	33.41
5 – 10 cm	45	10.90
> 10 cm	6	1.45
Total	413	100.00

Table 2. Bone fragment-size. These data do not include mollusk, small mammals, bird or fish.

Butchery

Signs of butchery appear on nearly 10% of the material from Broo Site II (Table 3). The butchery marks consists of heavy chop marks, lighter knife cuts, and impact marks from heavy percussion (dealt while the bone was fresh). The later type of butchery is associated primarily with longbones, while the former types are found on a variety of bone types.

Butchery Marks	Count	% Total
None	1041	90.21
Butchery	113	9.79
Total	1154	100.00

Table 3. Bones exhibiting some sign of butchery.

Gnawing	Count	% Total
None	1095	94.89
Dog	57	4.94
Possible dog	2	0.17
Total	1154	100.00

Table 4. Frequency of gnawing.

Scavenging

The Broo material displays a small amount of gnawing (Table 4); about 5% of the bones show clear signs of having been chewed on by a dog. On the whole, however, scavenging does not appear to have been a significant factor in the fragmentation of the site's archaeofauna.

Burning

Signs of burning are relatively infrequent in the Broo assemblage; over 92% of the material is completely unburnt (Table 5). Most of the bone that has been burnt is blackened, though some has been burnt white (calcined) and a couple bones were scorched. With the exception of one bird bone and one fish bone, all of the burnt material comes from domestic mammals.

Burning	Count	% Total
None	1068	92.55
White	11	0.95
Black	73	6.33
Scorched	2	0.17
Total	1154	100.00

Table 5. Frequency of burning.

SPECIES PRESENT

Overview of Taxa

Table 6 presents the total number of specimens for each species identified as well as a tally of the total number of identifiable specimens (NISP) and a grand tally of all specimens recovered

(total number of fragments, or TNF). The TNF count includes those specimens that were identifiable to species or taxon level (NISP) as well as those that were only identifiable as Small Terrestrial Mammal (STM), Medium Terrestrial Mammal (MTM), Large Terrestrial Mammal (LTM), or Unidentified Mammal (UNIM). In the Broo Site II assemblage, about 69% of the total assemblage was identified to species or taxonomic level.

The majority (approximately 83%) of identifiable material is fish bone (Table 6; Figure 1). Even allowing for the high rate of fragmentation for fish bone – which frequently leads to NISP inflation – fish remains are by far the most common in the Broo archaeofauna. European rabbit (*Oryctolagus cuniculus*) bones were a not-infrequent find in the assemblage, though these are clearly later intrusions and not contemporaneous with the remainder of the midden material.

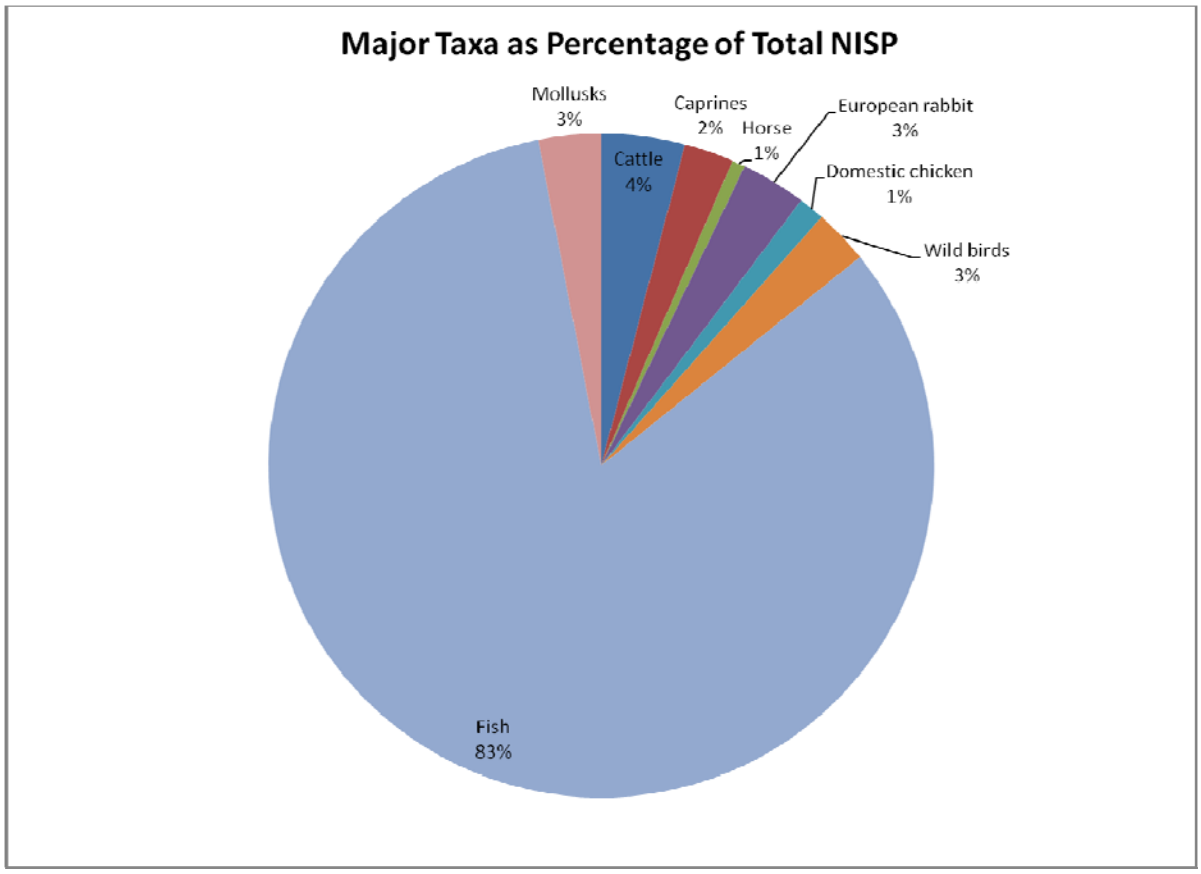

Figure 1.

Domestic Mammals

Cattle (*Bos taurus*) make up the majority of domestic mammals identified in the Broo Site II assemblage, and account for about 4% of the total NISP (Table 6). The second-most common domesticate in the assemblage are caprines, a category that is comprised of both sheep (*Ovis aries*) and goat (*Capra hircus*). Sheep and goat skeletons are morphologically very similar to each other and are distinguishable on only a very few elements (Zeder & Pilaar 2010). None of the Broo caprine material was distinguishable as sheep or goat specifically.

TAXON	NISP	% Whole
DOMESTICATES		
Bos taurus (cow)	32	4.04
Equus caballus (horse)	5	0.63
Canis familiaris (dog)	1	0.13
Sus scrofa (pig)	1	0.13
Ovis/Capra (sheep/goat)	19	2.40
Total domesticates	58	7.32
OTHER MAMMALS		
Oryctolagus cuniculus (European rabbit)	25	3.16
Total other mammals	25	3.16
BIRDS		
Fulmarus glacialis (fulmar)	1	0.13
Anser species (goose)	1	0.13
Gallus gallus domesticus (chicken)	10	1.26
Egg shell	11	1.39
Bird - indeterminate species	8	1.01
Total birds	31	3.91
FISH		
Gadidae	48	6.06
Gadus morhua (Atlantic cod)	18	2.27
Pollachius virens (saithe)	24	3.03
Brosme brosme (cusk/tusk)	3	0.38
Molva molva (ling)	7	0.88
Fish - indeterminate species	554	69.95
Total fish	654	82.58
MOLLUSCA		
Littorina littorea (periwinkle)	2	0.25
Patella vulgata (limpet)	4	0.51
Mollusca - indeterminate species	20	2.53
Total mollusca	24	3.03
TOTAL NUMBER OF IDENTIFIED SPECIMENS (NISP)	792	100.00
Small terrestrial mammal	5	
Medium terrestrial mammal	59	
Large terrestrial mammal	57	
Unidentified mammal	212	
Unidentified species	27	
TOTAL TNF	1152	

Table 6. Total counts of specimins per taxanomic category.

The Broo assemblage includes one pig (*Sus scrofa*) bone, a mandibular tooth. It is possible that at least some of the MTM (caprine/pig-sized) bone is also pig; the fragmented nature of the assemblage makes determination of species for much of the material impossible. Given the relative abundance of identifiable caprine bone in the assemblage, however, it is perhaps more reasonable to assume that at least the majority of MTM material is caprine.

A single dog (*Canis familiaris*) mandibular premolar was identified in the assemblage. The remaining STM material is not likely to be dog or cat – it appears almost certainly to be intrusive rabbit.

Age Profiles. By examining longbone epiphyseal fusion states and general bone morphology, a rough determination of age at death can be made for a number of cattle and caprine bones in the Broo Site II assemblage. The vast majority (nearly 94%) of cattle bones come from adults (Table 7). A high proportion of the caprine material is also adult (84%) (Table 8). It should be stressed here, however, that the sample size for both cattle and (especially) caprines is very small, conceivably representing no more than a few individuals each. The sample sizes are not large enough, unfortunately, to draw secure conclusions about the culling strategies employed at the site.

Cattle		
Age	**Count**	**% NISP**
Adult	30	93.75
Neonatal	2	6.25
Total	32	100.00

Table 7. Age-at-death profile of cows.

Caprines		
Age	**Count**	**% NISP**
Adult	16	84.21
Neonatal	3	15.79
Total	19	100.00

Table 8. Age-at-death profile of sheep/goats.

Location	Species	Tooth	Degree of Tooth Wear
Bldg. 1, W. end, sand rubble fill	Cattle	Premolar (P4)	Medium
Bldg. 1, W. end, sand rubble fill	Horse	Incisor	Light
Bldg. 1, W. end, sand rubble fill	Horse	Molar (M3)	Medium
Bldg. 1, W. end, sand rubble fill	Horse	Premolar or molar	Medium
W. passageway midden block, section cleaning	Cattle	Premolar	No wear
W. passageway exterior unit, basal deposits	Caprine	Molar (M1 or M2)	Light
W. passageway exterior unit, section cleaning	Pig	Premolar or molar	Very heavy
Sample #4032, 1m below sand rubble	Cattle	Molar (M1 or M2)	Medium
S. gable, rubble pile, upper sand fill	Cattle	Molar (M1 or M2)	Medium
Bldg. 2	Cattle	Premolar	No wear

Table 9. Domestic mammal tooth-wear states.

Age at death can also be determined by analysis of tooth rows, and the eruption and wear states of the teeth present. The Broo assemblage is unfortunately completely lacking whole tooth rows; there were, however, individual teeth recovered and their wear states are recorded in Table 9. As with the bone fusion and morphology data, the tooth wear data are comprised of a very small sample size and cannot be said with any certainty to accurately reflect actual livestock

demographics at the site. There are a total of five cattle teeth in the assemblage, three of which come from adult (though probably not old) animals, and the other two from young ones. There is only one caprine tooth, a molar from a young animal. The single pig tooth came from what was probably an older animal. The three horse teeth came from an adult and might represent only one animal, since they were recovered in the same general area of the site.

Element representation. Bearing in mind the small sample size – and the corresponding hazards involved in inferring too much from the data – the element representation for both cattle (Figure 2) and caprines (Figure 3) (pg. 9) should be at least briefly discussed. While the element representation for caprines is more or less evenly distributed (vertebrae and ribs are not identifiable to species and therefore do not appear in Figures 2 and 3), the same is not true for the cattle. Even if one takes into account the potential for inflation of cranial and foot elements (skulls commonly break into numerous pieces, while feet are comprised of several bones), the cattle bone distribution suggests an over-representation of feet. These foot bones (primarily 1st, 2nd and 3rd phalanges) were noted during excavation and were encountered primarily in the western midden block in the "passageway" between Buildings 1 and 2.

Birds

Most of the bird bones in the Broo Site II assemblage were not identifiable to species, though of those that were the clear majority came from domesticated chickens (Table 6). It should be noted that of the bones that were not securely identifiable to species level, all but two were nonetheless most likely also chicken. Aside from chicken, one fulmar (*Fulmarus glacialis*) bone and one goose (*Anser anser*) bone were also identified. As with nearly all taxa in the Broo assemblage, it should be noted that the sample size for this category is extremely small, numbering only 20 bones and 11 egg shell fragments in total.

Fish

As noted above, fish make up the vast majority of bone identifiable to species or taxon in the Broo archaeofauna (Table 6). Nearly 85% of the fish bone was unfortunately not identifiable to species; the majority of material that was, however, was primarily Atlantic cod (*Gadus morhua*) and other *Gadidae*, followed by saithe (*Pollachius virens*). Also present, though far less common, were cusk/tusk (*Brosme brosme*) and ling (*Molva molva*).

The element distribution graphs (pg. 10) for the gadids are somewhat ambiguous: while a comparison of heads versus tails seems to suggest a clear over-abundance of head bones (Figure 4), the vertebral distribution is more evenly distributed between head (thoracic) and tail (caudal) elements (Figure 5). Though the small sample size is certainly worth keeping in mind (the total number of gadid bones identified was only 66), it seems likely that the element representation data reflect the consumption of whole fish on the site.

Mollusks

The mollusk sample size is extremely small, with 24 fragments in total and only six of these identifiable to species (Table 6). Four of the identifiable shell fragments were limpet (*Patella vulgata*), while the remaining two were periwinkle (*Littorina littorea*).

CONCLUSION

Though generally well preserved, the Broo Site II archaeofaunal assemblage is not large; out of 1,152 bone and shell fragments only 792 are identifiable to species or taxon. The portion of the assemblage that is identifiable is dominated by fish bones, the majority of which are gadid. Cattle bones are the most numerous of the domestic animal remains, followed by caprines; pigs and dogs are also present, represented by a single tooth from each. With the exception of one goose bone, the birds in the assemblage are dominated by chickens. A small number of mollusk shell fragments were recovered, and though the majority is not identifiable to species the few that are include limpets and periwinkles.

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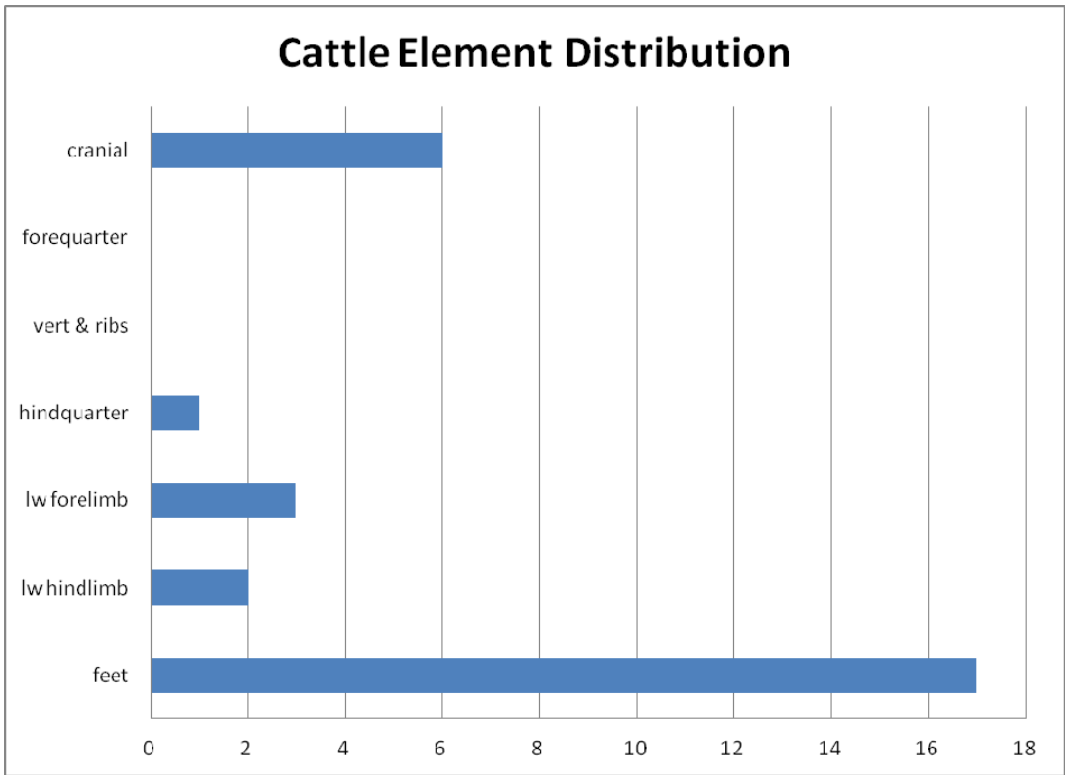

Figure 2. Element distribution for cattle bones. Total NISP = 29.

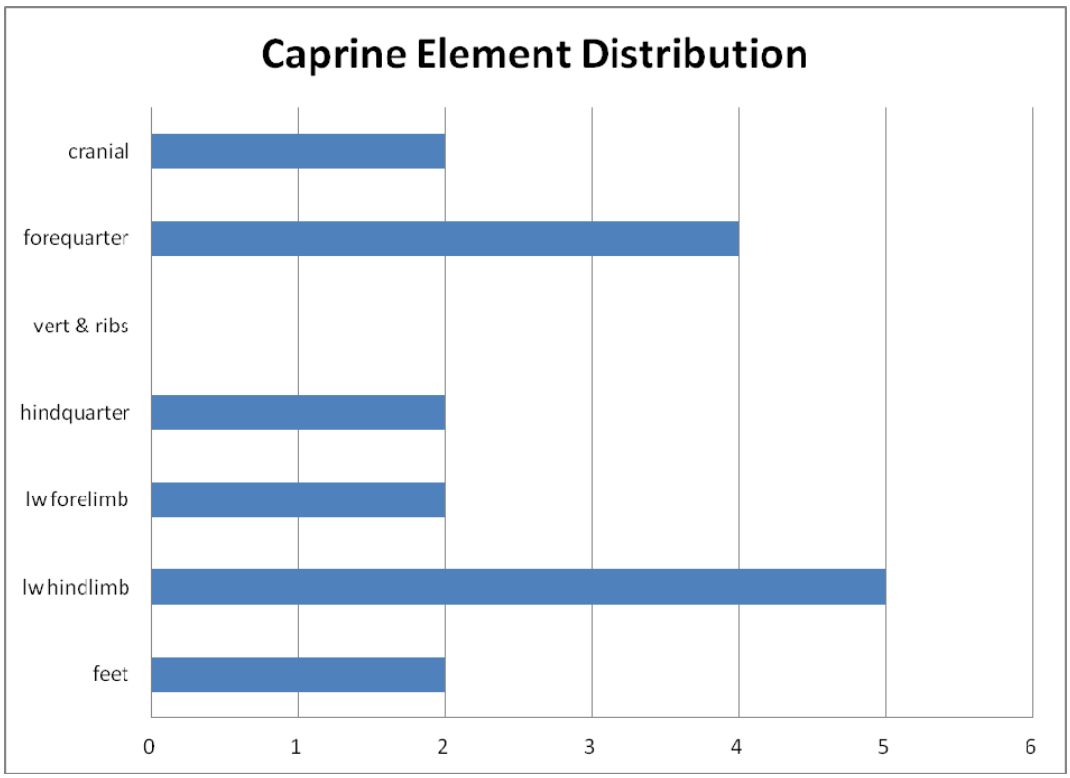

Figure 3. Element distribution for caprine bones. Total NISP = 17.

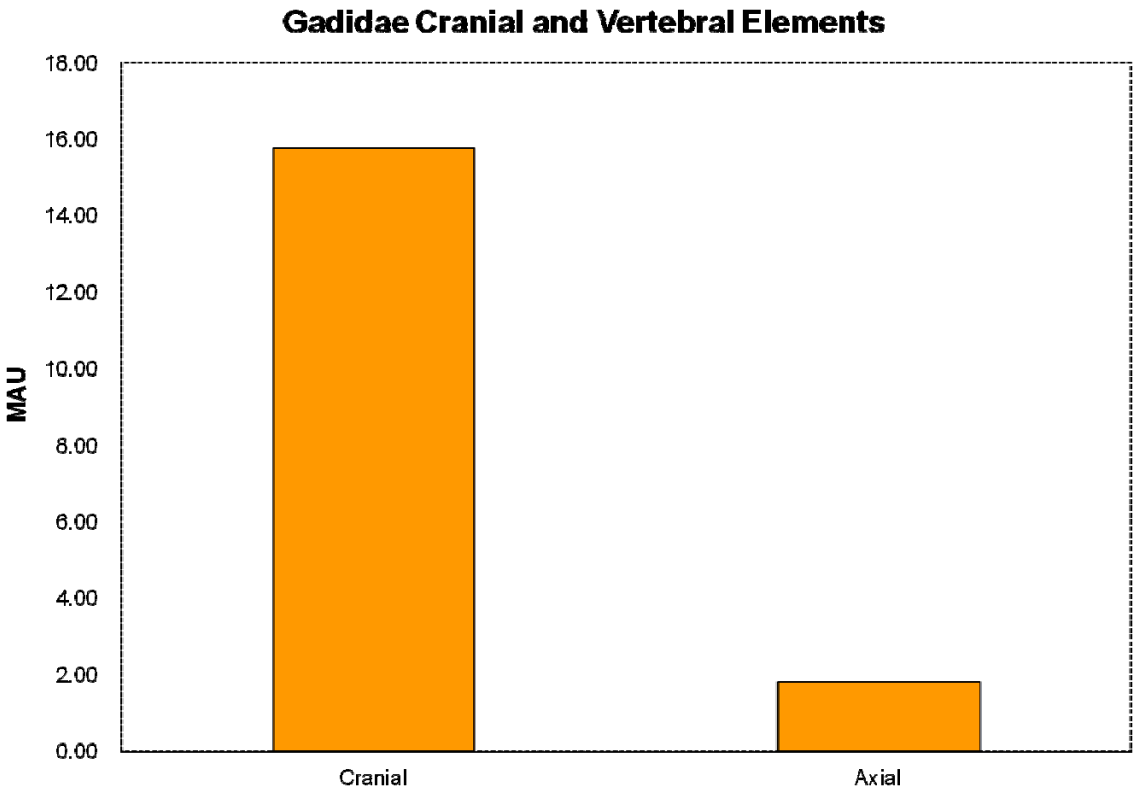

Figure 4. Relative comparison of gadid head (cranial) and tail (axial) elements.

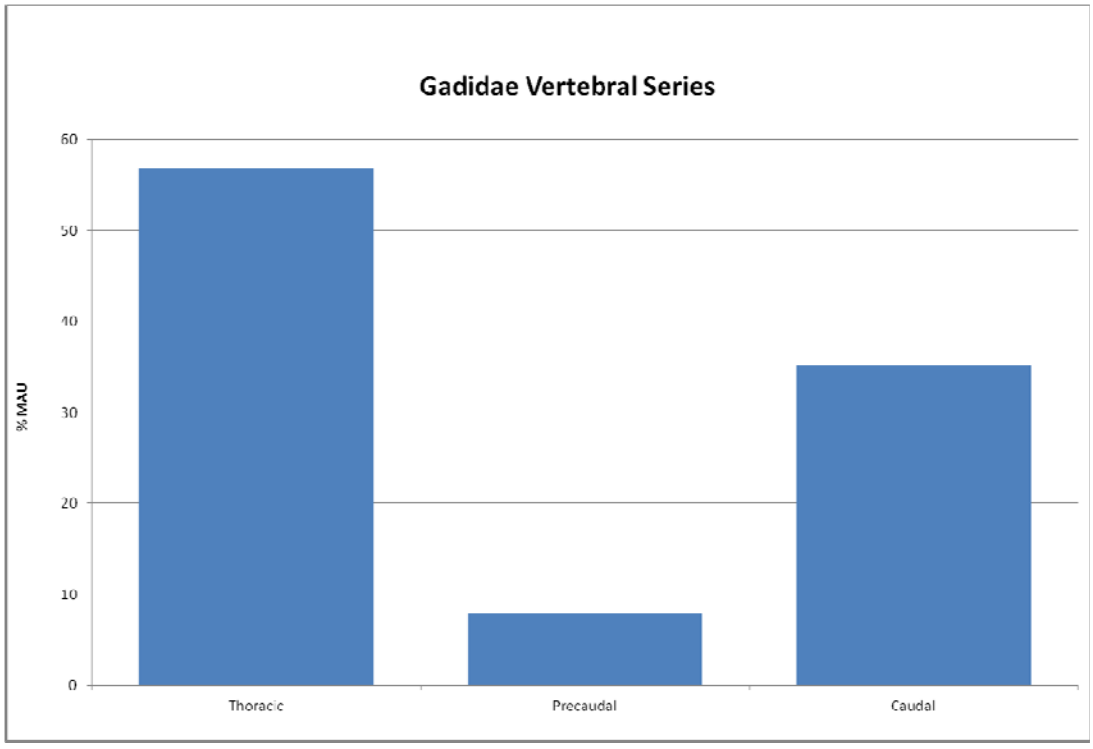

Figure 5. Relative representation of head (thoracic) compared with tail (caudal) vertebrae