9 Environmental Evidence

9.1 Botanical remains

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9.1.1 Introduction

The findings contained within this report constitute a compilation of botanical results from the site of Bruach an Druimein, Poltalloch, in the Kilmartin Valley of Argyll. They are obtained from analyses of some contexts by the late Camilla A Dickson in 1986, together with further work undertaken by Jennifer Miller and Susan Ramsay, both of GUARD, in 2002.

9.1.2 Method

The samples examined in 2002 constituted several bags of unsorted, dried material containing carbonized botanical remains, together with spot finds of charcoal and a collection of daub and clay deposits for examination. Material came from several different storage locations and in general was poorly labelled. A few samples had suffered during storage. There is no information available regarding the methods employed during initial processing for recovery of carbonized remains. The 16-year time differential between the two individual analyses means that two distinct methodologies were employed. Although this means that the two sets of results are not entirely compatible, it was felt that to replicate the methodology of 1986 was not satisfactory by modern standards. Consequently, many of the results of CAD were re-examined to ensure consistency wherever possible. In some cases the identified material had been mislaid in the intervening years, and in such situations the numbers and weights of materials are not recorded, except by a '+' to denote presence only.

9.1.3 Results

The results are shown in Tables 1–3 held in the archive.

Areas 1 and 2

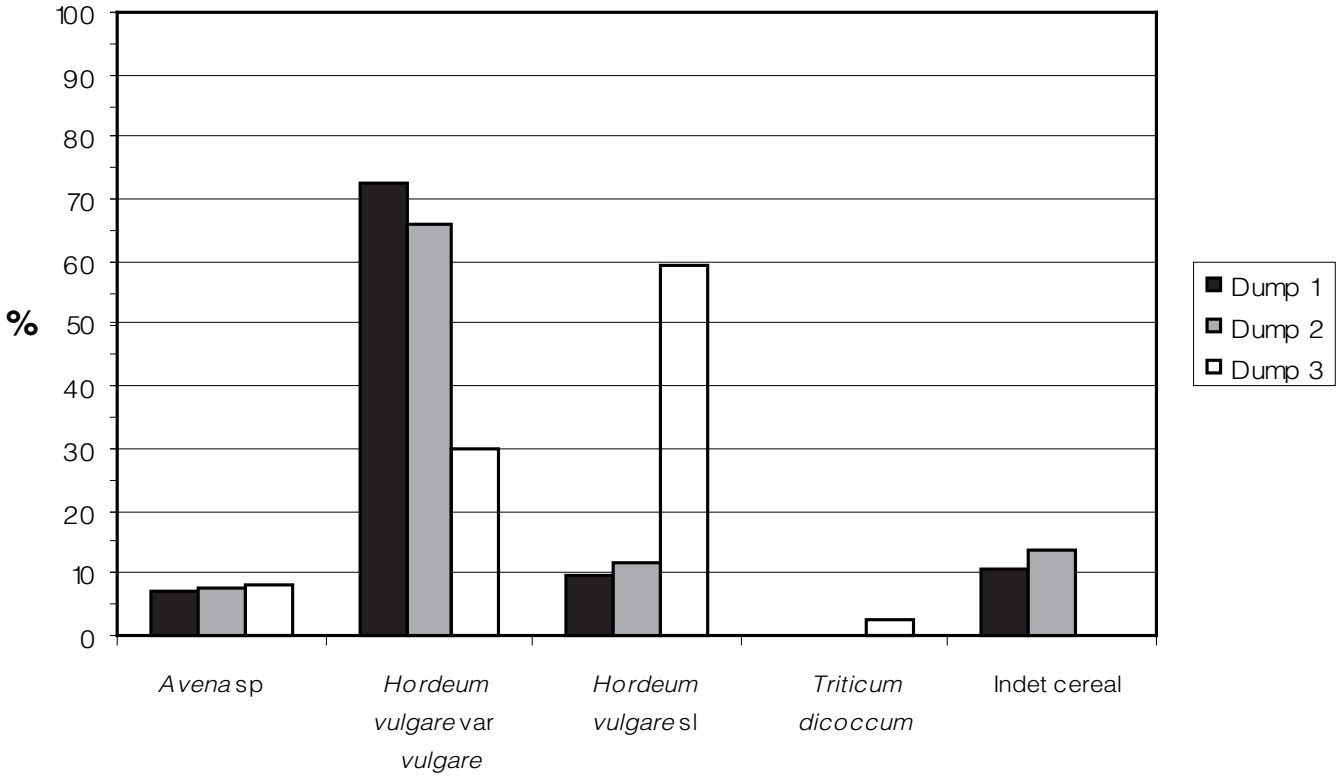
Samples were taken from context 001 (topsoil) in both Areas 1 and 2 for botanical analysis. Each sample contained only a single type of charcoal, either alder (*Alnus*) or hazel (*Corylus*), which may have originated as single fragments of charcoal within the topsoil. These may be of any age and cannot be added to the interpretation of the site with any confidence.

Layer 003 constituted an occupation level extending into both Areas 1 and 2. The carbonized assemblage from Layer 003 (Sample 053) contained charcoal of alder, hazel and willow (*Salix*), together with indeterminate cinder which Dickson tentatively identified as burnt meat. This combination would suggest waste material from a domestic hearth at this location.

Context 108 (Sample 103) represented the lower, sticky gravel fill of a pit (109) in the south corner of Area 1. Charcoal and calcined bone are recorded as being present in context 108. Closer botanical analysis indicated that charcoal of alder and hazel was present in moderate quantities, but nothing else.

Several fills of post-holes in Area 1 were examined for botanical remains. Post-holes 1, 22, 25, 28 and 43 came from putative House 1. Post-holes 36, 38, 46 and 50 came from possible House 2. As a group, charcoal of alder, birch, hazel and oak was recovered from these post-hole fills, with Post-holes 22, 25, 36 and 43 containing charcoal of a single taxon only. This suggests that they may contain evidence for the original upright itself, *in situ*. This is further indicated by the fact that much of the identified charcoal was from roundwood, which may have constituted part of a wattle structure. Post-holes 1, 46 and 50 disclosed a more mixed assemblage which may contain a scatter of material from occupation deposits or from other posts during a conflagration.

Dickson recorded oak (*Quercus*) as the only charcoal taxon from Post-holes 28 and 38, but the records and material have been misplaced since the first studies were undertaken in 1986. However, 68 cereal grains including oats (*Avena* sp) and hulled six-row barley (*Hordeum vulgare* var *vulgare*) remain as part of the record for Post-hole 38, and Dickson observed that Post-hole 28 also contained cereals, although without specifying numbers or types. Post-hole 28 is from House 1 and Post-hole 38 from House 2, although the post-hole circles overlap and these two features may be spatially fairly close. The notable presence of cereals in these two fills, at least in Post-hole 38, and not in any of the other post-hole deposits named above, must suggest that they were at some stage close to an area involved in the preparation or storage of cereal crops. This may have been a corn-drying or storage area, or have been related to food preparation at a hearth.



Illus 29 Relative percentages of cereal types from dumps 1, 2 and 3

Ditch sections

Context 406 was thought to represent a possible wall or revetment along the inner face of the ditch complex. The charcoal assemblage from context 406 consisted entirely of hazel roundwood and oak. Many of the hazel fragments were fairly large in size, and more than 10 years of age when collected. This suggests that a substantial wattle structure may have formed part of a revetment, perhaps in addition to a wall, to consolidate the inner face of the ditch.

Material from context 407, representing backfill of the ditch, contained only a few pieces of oak charcoal, which may have originally formed part of the revetment, or from another, indeterminate source.

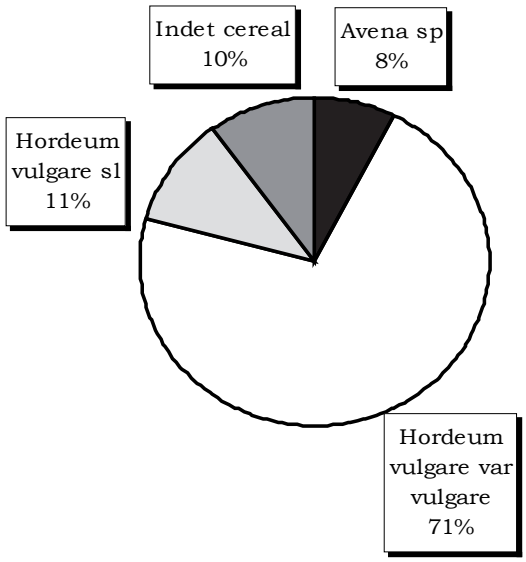
Context 409 represents an unusual stone-built structure in Ditch Section 3 which Cregeen interpreted as a possible oven or water-collecting feature. Samples 046 and 048 from context 409 contained very similar carbonized finds, primarily alder charcoal. Unfortunately, the presence of significant quantities of alder charcoal cannot help in the interpretation of the possible function of this feature, because alder is favoured for construction of features which will be subject to intermittent wetting and drying, as well as providing excellent quality charcoal for use in furnaces. However, it can be stated that the absence of a more random charcoal assemblage, or cereal grains, may suggest that a domestic oven is a less plausible interpretation for Structure 409.

Debris pits

Fills (502 and 504) of two large pits (501 and 503) in the north-east of settlement Area 1 contained large quantities of carbonized grain, together with charcoal and numerous daub fragments. The daub contained impressions of wattle, cereals and monocotyledonous leaf material, the latter of which may have been evidence of tempering. Most of the wattle work impressions were of 1–2cm diameter. Some of the daub had evidence of charring, although these fragments were in the minority.

More than 15,000 carbonized cereal grains were identified from three dumped deposits, mostly from Pits 1 and 2. The relative percentages of each type of grain are shown in Illus 29 below.

From this chart it is clear that Debris Pits 1 and 2 contain remarkably similar percentages of cereal types, dominated by hulled six-row barley (*Hordeum vulgare* var *vulgare*), with small quantities of indeterminate six-row barley (*Hordeum vulgare sl*), oats (*Avena*) and trace levels only of emmer wheat (*Triticum dicoccum*). Similar percentages of cereal grains in Debris Pits 1 and 2 were not further identifiable to type. An initial impression of Dump 3 is that the cereal assemblage is not consistent with Debris Pits 1 and 2. Unfortunately it is not clear from the site records where the Dump 3 material came from, though it was possibly from squares B1 and B2 in the area of the Houses 1 and 2. However, Dump 3 grains were sorted and identified by Dickson and the disparity observed can probably be explained



Illus 30 Relative percentages of cereal types from Bruach an Druimein

by a variation in the methodology employed rather than representing a true difference between the assemblages. It is suspected that indeterminate grains were not recorded for Dump 3 and that many of the grains noted as *Hordeum vulgare sl* may be further identifiable to *H. vulgare* var *vulgare*.

Assuming that all three dumps represent the same assemblage, the results can be combined to show the cereal assemblage for the site as a whole. This is shown in Illus 30 below, and indicates that the main cereal utilized was barley, with oats present as a minor crop component. It should be noted that wheat has been omitted from this diagram as it constitutes only 0.01% of the total sum. Oat grains were generally very small, with many floret bases showing characteristics indicative of wild oat (*Avena fatua*). This suggests that the oats were wild oats, growing as weeds within the barley crop, rather than cultivated/black oats (*Avena sativa*/*A. strigosa*) being grown as a crop in their own right.

A further, large deposit of grain and scorched soil was identified (context 504, Debris Pit 2). This material appeared at first sight to be a massive lump of clay *c* 30 x 20 x 20cm, with a light surface scatter of carbonized grain on the upper surface. However, closer inspection revealed it to be a massive deposit of grain and heat-reddened soil, densely compacted and dry. Light surface brushing of the grain deposit loosened more than 1200 cereal grains, and close inspection confirmed that they are present throughout the material. It cannot be said with any certainty whether this is a result of loose soil thoroughly mixed with grain becoming heated and compacted, or whether this material represents the remains of an earth floor from some domestic construction, perhaps a corn-drying kiln. What can be observed, though, is that there was a higher percentage of more poorly preserved grains than other grain contexts have shown, although obviously this value may be biased as only the outermost layers of grains have been examined. Cereals in the inside may be far better preserved, whether as a result of slower heating, or by the better protection afforded by the surrounding soil mass. As there are no processing records available to the authors to indicate whether other cereals had initially come from similar such contexts, albeit perhaps not on such a large scale, it cannot be stated whether this is unusual or normal for this site. Nevertheless, the find is a remarkable artefact in itself, and deserves preservation as such, no matter whether it has been formed by natural or anthropogenic means.

Miscellaneous contexts

Several contexts cannot be provenanced due to absent or poor labelling. Although the carbonized material within these contexts has been identified and included within the tables, results from these contexts will not be discussed further within this report as they are entirely consistent with the site as a whole and do not provide any information which cannot be obtained from better documented material.

9.1.4 Discussion

This discussion includes material from the initial botanical report written by the late Camilla Dickson (Dickson 1986).

Charcoal

The charcoal assemblage from this site includes alder (*Alnus*), birch (*Betula*), hazel (*Corylus*), oak (*Quercus*) and willow (*Salix*), with trace levels only of apple type (Maloideae), cherry type (Prunoideae) and elm (*Ulmus*). This is entirely consistent with the collection of wood from the type of lowland mixed deciduous woodland which is known to have grown in the Kilmartin Valley environs throughout the last few thousand years (Rymer 1974; Housley *et al* 2004). Alder and hazel were the most frequently identified taxa outwith the Debris Pits 1 and 2. This implies that alder and hazel were either intentionally selected for use, or perhaps were more frequently available in the local woodland. Pollen analysis from a meander of the River Add within the Kilmartin Valley would tend to suggest that they were indeed the dominant taxa within the local woodland, particularly on the damper soils of the valley floor (Miller *et al* forthcoming). However, hazel is particularly useful due to its ability to respond well to coppicing, producing long straight rods which can be utilized in a variety of ways, most notably for wattle. The majority of the larger hazel charcoal fragments were roundwood, mainly representing seven to 12

years of growth. This is entirely consistent with a managed system of coppiced woodland. The impressions on daub fragments from Debris Pits 1 and 2 were of 1–2cm diameter roundwood, which corresponds to a similar age of rod. Furthermore, Dickson records that wattle was observed in situ in some daub fragments. The original source material cannot be found, but Dickson noted in 1986 that:

> Also from debris pit 2 a piece of burnt daub has wattle preserved *in situ*, it measures 150 x 90 x 90mm. ER Cregeen's notes state that 'five pieces of wood lie roughly parallel and in a row, and each measures 0.3″–0.35″ (7.5 – 9.0mm).' These pieces are of hazel roundwood. Mr Cregeen's notes continue 'below this row can be made out a row at right angles to it, of possibly heavier calibre.' This wood is of alder and the existing fragments appear to be of more substantial wood than the wattle. Mr Cregeen noted possible evidence of interweaving and also that 'the ends of smaller twigs .15″ (4mm) diameter are visible below the broken ends of the first row and may be the bindings.' Other pieces of daub have channels on one or both sides, impressions from the wattle, ranging from 10 to 17mm wide (Dickson 1986).

Oak charcoal was recovered in moderate quantities from several contexts representative of post-holes and ditch deposits, but was most pronounced in the assemblage from the Debris Pits 1 and 2. In these samples, oak was recovered from nearly all deposits examined. This is relevant and may indicate the utilization of oak for a particular purpose in the original pits, although whether this was structural or artefactual cannot be stated with any confidence. Nevertheless, Dickson did tentatively suggest an oak storage box, and this explanation, or perhaps an oak-lined storage facility, are both reasonable interpretations. However, a diversity of charcoal taxa as well as daub within the debris pit deposits would imply that the assemblage recorded includes structural debris and possibly also hearth waste from the clearance of the site after it was destroyed by fire.

The charcoal assemblage from nearby Dunadd hillfort was identified (by Boyd 2000). He found evidence of the same utilization of alder, hazel, oak and birch as was found at Bruach an Druimein. He identified wattle structures and hearths, with mainly small diameter branches employed. This may indicate utilization of resources from open, scrub woodland rather than from a mature woodland stand. Hearth features, most notably those for metalworking, appeared to have no specificity of taxon selection, and the assemblage as a whole is remarkably similar to that found at Bruach an Druimein. This is thought to reflect the availability of local woodland resources.

Cereals

The main cereal type identified at Bruach an Druimein was six-row barley (*Hordeum vulgare sl*), of which an extensive proportion were well enough preserved to be confidently identifiable as the hulled type (*H. vulgare* var *vulgare*) (see Illus 30, lower). It is most likely that the great majority, if not all, the barley was of the hulled type. Six-row barley has always been the main crop on mainland Scottish archaeological sites, an accolade due to the ability of this cereal to be spring sown and produce a good infield crop, fairly independent of the vagaries of the Scottish weather (Dickson & Dickson 2000). The state of preservation of cereals at Bruach an Druimein was remarkable, which may indicate that the grain had been heated for a prolonged period in an enclosed area, rather than having burned quickly, such as would have happened if the grain had been subjected to an open fire. This may suggest that burnt grain was not dumped into the pits, but that it burned there in situ. Furthermore, none of the grains had the characteristic 'frothy' appearance which results from the combustion of damp grains during parching prior to storage. This fact, together with the remarkably low levels of chaff and weed seeds, are strong evidence towards the accidental destruction of a stored cereal cache which had been parched and gleaned previously. Unfortunately, the extremely low numbers of carbonized weed seeds in the cereal deposits means it is not possible to infer whether the crops were harvested by ear picking or by cutting/pulling lower down the culm.

Hulled six-row barley was also the dominant cereal type at the seventh- to ninth-century site of Dunadd hillfort (Milles 2000), which is in close proximity to Bruach an Druimein in the Kilmartin Valley, although at Dunadd a few naked grains (*H. vulgare* var *nudum*) were also recorded. It is not clear exactly what percentage of the total cereal assemblage at Dunadd was of the naked type of barley, although it is suspected that this cereal may have been present as a 'weed' or relict of earlier cultivation preferences.

Slightly less than 10% of the total cereal assemblage at Bruach an Druimein was oats (*Avena*), although whether these are of the cultivated (*A. sativa*/*A. strigosa*) or wild type (*A. fatua*) remains inconclusive. However, many of the identified grains were very small and the few glume bases recorded were more akin to those of *A. fatua*. This suggests that wild oat is at least the main component of the oat assemblage. Because wild oats are edible and of a somewhat similar size to cereal grains, it may be that they were not gleaned prior to storage, but kept in to boost the nutritive value of the crop as a whole, ie as a speirochore. This contrasts with the size descriptions available for Dunadd (Milles 2000) where the oats were thought to have been of a similar size to cultivated types. However, as with Bruach an Druimein, the lack of well-preserved glume bases at Dunadd means that was is not possible for Milles to be more conclusive.

Only eight wheat grains were identified from the site, of which seven were identifiable as emmer (*Triticum dicoccum*). Emmer has been recorded in

Britain from the Neolithic onwards, but the Bruach an Druimein examples are from an Iron Age context (GU–11096). Other Early Historic records include Barhapple Loch, Wigtownshire (Jessen & Helbaek 1944) and Dunadd (Milles 2000), but here they were believed to be from Iron Age contexts. Both of these sites also contained barley, and emmer cannot be claimed to be anything other than a minor component of the assemblage. The wheat in the two sites from Kilmartin Valley may be interpreted as relicts of earlier cultivation on good infield land, or trade.

It is regrettable that the 16-year differential between the initial botanical post-excavation analyses and the present study have meant that a good deal of information and sample labels have been lost or have become difficult to interpret. Nevertheless, enough material has remained to provide a good indication of the construction and arable agricultural practice of this site, together with an indication of the exploitation and management of the wider valley area with regard to woodland resources.

9.2 Mammal bone

Jennifer Thoms

9.2.1 Aims

The animal bones and the associated archive notes were submitted for re-analysis in order to consolidate the two sets of previous analyses. These analyses were conducted in 1961 and 1985, and consisted mainly of an attempt to identify the few bone fragments not rendered unidentifiable by the burning and fragmentation they had been subjected to. There have been several theoretical and methodological developments since the bones were examined, particularly since 1961, when the late Ian W Cornwall carried out the work. It was anticipated that the re-analysis of the material in the light of recent developments in the understanding of taphonomy (eg Binford 1978; Meadow 1980; Brain 1981; Hesse & Waspnish 1985; Lyman 1994; Reitz and Wing 1999; O'Connor 2000) might aid in the interpretation of site formation processes. The archive notes were mainly hand-written, and the work of several different people, so the data were collated and put onto a computer database. The possibility that some of the bone might represent ritual deposition, or 'special animal deposits' (Hill 1995) was considered throughout the re-analysis.

9.2.2 Methods

The bones retrieved can be regarded as belonging to two categories. The bones from the first excavation season were identified to species and element by the late Ian W Cornwall in the Institute of Archaeology at the University of London. These bones are no longer within the site archive, so were not re-examined.

Lin Barnetson identified faunal material retrieved from the second season of excavation in the Department of Prehistoric Archaeology in the University of Edinburgh. These bones were available for further examination and were studied for any taphonomic indicators such as gnawing, signs of burning and butchery marks.

Information from the paper archive was added to the database and is of two types. Firstly, the archived data relating to the bones are listed, including the number on the bag (ID no) the species and elements present within the bag and the condition the bones were in. Secondly, the location information present on the bag was listed in the most concise form possible in the first instance. Because there were often notes explaining further the bones' exact location within a trench, these are also listed. In some cases the precision level was felt to be to fine, statistics about distance from the top of a partially demolished wall are essentially meaningless and were not recorded. The very detailed contextual information is generally recorded on the bag in which the bones are contained, so will not be lost completely should they play any currently unforeseen role in the future. Many of the archive notes are copies of each other, hand-written and typed up, for example, and the production of a database will allow some of the notes to be discarded.

The other information presented in the database refers to the bone fragments. They have been identified as far as possible to element and species. In the case of some bones, such as ribs and vertebrae, it is generally only possible to categorize them by size. They are described therefore as being 'cattle sized' or 'sheep sized'. Bone fragments that cannot be identified to element and/or species are recorded as indeterminate ('indet').

The column 'ID no' refers to the number on the bag containing the bone sample, while the column 'find no' refers to any other information that distinguishes that bone sample from others; for example, one ID no (113) had two samples, 'a' and 'b'.

Use of a database allows specific questions to be asked of the information and the relevant data can be accessed quickly. Tables 1–10 in the MS Access Reports show the data on the bones from each context. These tables do not show any of the information about the exact location of the material, which can be accessed on the MS Access Table 'Bones'.

9.2.3 Results

The results are presented in Table 13 below.

9.2.4 Discussion

In all the above contexts the small amount and poor condition of the bone present precluded

Table 13 Results of the bone analysis

Context	Description	Description of bones
001	Topsoil	Fragmented and mainly calcined through burning
003	Burnt layer in Areas 1 and 2	Considerable amount of burned and fragmented bone
405	Burnt layer 003 in the outer Ditch 404	One bag of burnt, fragmentary bone was retrieved, containing a pig phalanx and a rib from a sheep-sized mammal.
406	Collapsed wall along the inner Ditch 401	Burnt fragments of a skull from an unidentifiable species.
407	Backfill of the Ditches 401 and 404	Calcined bone and a complete unburnt upper molar from cattle
409	Possible 'oven' or bore hole	Burnt bones, some crumbs. Some non-calcined bone including a fragmented cattle mandible and some tooth enamel
416	Hearth in context 407	Burnt and fragmented bone (and six carbonized barley grains)
502	Fill of debris Pit 501	Fragment of sheep calcaneum and some indeterminate burnt bone fragments
11	Post-hole 011	Burnt and fragmented bone and charcoal

further detailed analysis. As the overwhelming majority of the retrieved bone was burnt and very fragmentary, it suggests that unfavourable conditions prevented bone preservation, most probably due to the acidic soils in the area. Tooth enamel and burned bone are more resistant to chemical destruction and so taphonomy has been of prime importance in determining which bones survive. Natural processes can be said to have masked cultural processes, so it is unlikely that much can be learned about the culture of the site from the bone assemblage; even without the compounding factor of the difficulties encountered during the excavation. In addition, burnt, fragmented bone was common over the site, including in the topsoil (context 001); this reflects the acidic soil conditions and also suggests many of the bone-bearing contexts might be redistributed deposits. It is not advisable to attempt to investigate economy or culture from such an assemblage. The bone samples are, however, of interest in interpreting site formation processes.

The material present in context 003 does reflect what might be expected within an 'occupation layer'; small fragments of burnt bone derived from domestic animals. The bone may have been burnt during the cooking process, or, arguably more likely, it may represent bone material used as fuel. It is not possible to ascertain whether the bone fragments in context 003 are in a better state of preservation than those in context 405, because the bones from the two contexts were identified by the two different faunal workers. Some are therefore not available to the present worker to be assessed for preservation state.

Samples from the contexts from the ditch were very small and showed little variation in the state of preservation of the bone fragments. The sample from the possible hearth (context 416) includes barley grains and the bones are calcined and fragmented so the admittedly small sample does not refute the hypothesis that this is a hearth. There may be a bit of a circular argument here, however, as the 'hearth' might have been recognized because of the burnt bone and charred plant remains near it. The same may be true of the occupation layer.

The bones for which context information was not available were all calcined apart from one cattle molar tooth, again reflecting taphonomic agencies.

Bones from sheep, cattle and pig were present among the assemblage, as was one fragment of fish vertebra, the only one in the examined assemblage. Pig bones are comparatively well represented in the assemblage and there are several reasons why this should be so. All pig bones retrieved are structurally dense bones, such as patella, metapodials and phalanges, which may have survived the taphonomic processes better than other bones. It is possible that pig bones were favoured for use as fuel because of their high fat content.

Fish bones are greatly under-represented on sites where no sieving has taken place, also the acidic soils would tend to destroy them very quickly. Furthermore, fish bones, due to their delicate structure and small size, will fail to survive in redeposited soils.

9.2.5 Conclusion

The faunal material retrieved from Bruach an Druimein was mostly highly fragmented and calcined as a result of burning and due to being in this state they survived the acidic soils of the area. However, as these fragments have been selected for survival through their exposure to taphonomic agents, mainly fire, they do not lend themselves to further analysis of the cultural, economic processes of the site's occupants. The faunal remains are of some use in understanding site formation

processes, particularly as their ubiquity over the site indicates considerable re-deposition of material, also indicated by the archaeology of the site.