CHAPTER 6

Archaeological Data: 1. Standard Analysis

> It is only by paying regard to the butchery marks and fragmentation patterns of individual bones that a reliable understanding of the type of faunal assemblage being studied can be obtained ... It is clear ... that successful interpretation of butchery data relies on detailed recording not only of the location of the cuts but also of the part and the proportion of the bone present, and details of erosion, weathering and gnaw damage.
>
> (Maltby 1985b: 27)

6·1 Introduction

Between December 1986 and May 1987 excavations were conducted on the European Rubbish Tip of the former St Helena Penal Establishment, St Helena Island, Moreton Bay, Queensland. The excavations produced a wealth of faunal remains, which constitute the archaeological data base used to test the proposition essential for Lyman's butchering unit method: that butchery is a standardised process.

6·2 Background

St Helena Island was used as a prison by the Queensland Government from 1867 until 1933. St Helena Island is located near the mouth of the Brisbane River, 3·5 nautical miles from the currently used main shipping channel and 4 nautical miles from the entrance to the Manly Boat Harbour. It lies at latitude 27° 23' 30" South and longitude 152° 15' East and is a small island covering approximately 88 hectares above high water mark.

The history of St Helena as a prison began when overcrowding at Brisbane's goal at Petrie Terrace resulted in approximately 30 prisoners been transferred to an old hulk called the *Poserpine*, which was anchored near the mouth of the Brisbane River. In 1866 prisoners from this hulk were taken each day to St Helena, to work in building a quarantine station to replace the one operating at Dunwich. Prior to this development the island had been used as a base for a then thriving dugong oil industry.

As problems of overcrowding worsened at Brisbane's goal, the Queensland Government scrapped plans to transfer the quarantine station to St Helena. On 31 August 1866 St Helena was proclaimed a prison. Those prisoners who were sent daily from the *Poserpine* continued to be employed in quarrying stone, erecting buildings, sinking wells and clearing scrub. But now they were building a prison, their prison. On 14 May 1867, the Governor of Queensland signed a proclamation declaring the island 'a place whereat offenders under sentence of hard labour or penal servitude may be detained' (Finger 1986: v). It was only six days later that the first prisoners were confined on the island. However, it was not until the end of 1869 that long-sentence men were sent to St Helena and it became Queensland's maximum security prison, gaining a reputation as 'the hell hole of the Pacific' and 'Queensland's Inferno' (Finger 1986: v).

Conditions were harsh on St Helena, both in terms of the iron rule and isolation, and the incessant mosquitoes and sandflies. Throughout its history only one prisoner ever made a successful escape. The Establishment had by the turn of the century 'grown to accommodate over 300 prisoners in a maze of buildings surrounded by a high stockade wall' (Finger 1986: v). Already by March 1869 it was almost self-supporting, though certain supplies, such as meat, were never produced at such a level as to meet the institution's demands. It was also capable of exporting to the mainland some of the surplus products grown and manufactured on the island. From the late 1860s onwards workshops were established in which prisoners 'were taught such trades as bootmaking, tailoring, tinsmithing, saddlemaking, bread baking and butchery' (Finger 1986: v).

By the 1920s the prison had begun to show its age. In 1921 the workshops, together with the majority of the prisoners, were moved to Brisbane's Boggo Road Gaol. A few prisoners were kept on the island under a honour system, with the island being converted into a prison farm. Those prisoners who served time on the island from 1921 were also involved in the task of gradually dismantling the establishment. The last prisoner left the island on 15 February 1933.

The Brisbane City Council was given trusteeship of the island in 1933, which it surrendered in 1939. From then until 1979 the island passed through a number of hands in the form of grazing leases and then leases for tourist operations. Parts of the island are still leasehold. As early as 1910 the Mayor of Brisbane had suggested that the island become a national park. In 1979 this suggestion was realised with St Helena being gazetted as a national park. One year later it was also gazetted as an historic area.

6·3 Historically relevant documents

Interest in either the prehistoric or historical archaeology of St Helena is relatively recent. Dr Michael Morewood carried out a brief prehistoric survey in 1980, with subsequent test excavations being carried out in 1983 by Gillian Alfredson (Alfredson 1984). The excavations of the European Rubbish Tip were the first historical archaeological work carried out on St Helena. Information on the history of St Helena has been investigated and compiled by a number of researchers, either employed by or contracted to the Queensland National Parks and Wildlife Service since they took control of the island. Unfortunately, there is no documentary or oral evidence concerning the European Rubbish Tip (Allom n.d.: vol. 3 M513), which is the source of the archaeological fauna discussed in this thesis. There is, however, historical documentation relating to the use of domestic fauna during the operation of the penal establishment, which has a bearing on the archaeological fauna.

The historical records which relate to meat consumption during the operation of the St Helena Penal Establishment are varied and diverse. In some respects there is considerable data in the records on meat consumption and in other respects there is little. For some years there is considerable information and for others negligable information. The bulk of the data concerns amounts consumed for various periods, either by weight or by number of animals slaughtered. Data relates to the whole period of the institution's operation. For the purposes of this thesis it is important to have data on where the meat being consumed on the island was coming from, and who was processing the slaughtered carcasses. The historical documents give an insight into both of these facets of meat procurement.

From the General Regulations for the St Helena Penal Establishment, sent out by the Brisbane Colonial Secretary's Office (dated 14 May 1867), the daily ration of meat to prisoners is known (Harmon-Price 1981: 10). There were three scales of rationing to prisoners, based on the degree of punishment. Scale A rations were issued to prisoners on hard labour, Scale B to prisoners not on hard labour, and Scale C to prisoners in solitary confinement. Those prisoners on Scale A received 16 oz (453·59 g) of meat per day, those on Scale B 6 oz (170·10 g) of meat and those on Scale C none, their subsistence was made up of 24 oz (680·39 g) of bread and water daily. The Visiting Suregeon to the island at this time, a Dr. Purdie, stated that these ration scales, which also included bread, maize meal, vegetables, salt, soap, sugar, tea and tobacco, were ample (Harmon-Price 1981: 10). It is not known whether or not these rationing scales altered as time went on. What is important here, is that there was a daily allocation of meat to prisoners, and additional historical documents indicate that this remained the case throughout the history of the penal establishment.

From its beginnings, with the use of local materials such as beach rock, clay and lime in the building of the prison, an attempt was made for the institution to be self-sufficient. The procurement of meat was no exception to this. An 1869 plan of the island shows that already the western grass flats were used for sheep-grazing (Harmon-Price 1981: 2). These sheep were slaughtered as required, to supply the prisoners, warders and other staff with their meat requirements. However, the historical documents indicate that during the early period of the institution meat had to be imported onto the island. This means that the potential for the slaughtering and butchering of carcasses off the island exists, though in all probability meat imported onto the island would have arrived as sides, or else, in the case of beef, possibly quarters. The information which can be gleaned from the historical documents for each of the three domesticates will now be discussed.

Not only were sheep being grazed by the institution as early as 1869, but a document collected by Pamela Harmon-Price (source unknown) indicated slaughtering of sheep on St Helena as early as February 1868. This document (Fig. 6·1) is an inventory of the number of sheep killed daily and of the total weight of sheep meat from daily kills for the months of February, March and April 1868. The document does not state whether or not these sheep were raised on the island, merely fattened on the island, or brought live from the mainland for slaughter. For the purposes of this thesis, this is not important, what is important is that from early 1868 sheep were being slaughtered on a daily basis on the island and that the resultant carcasses were being butchered on the island.

Very similar documents are held in the Queensland State Archives for the early 1870s. These are all from letters sent by the then Superintendent of St Helena to the Colonial Secretary (Queensland State Archives 1870a; 1870b; 1870d; 1870e) and are records of the return of the number and weights of sheep slaughtered at the Penal Establishment on St Helena for the week ending 2.1.1870, 30.1.1870, 3.4.1870 and 8.5.1870 respectively. These are extremely valuable documents, for they not only record the number of sheep killed but they also tell us that this was a daily practice, give the average weight of sheep slaughtered, and show that secondary products were being processed from the sheep. The latter is known from the fact that the weight of tallow

Figure 6·1: Transcript of document recording the number and weights of sheep slaughtered on St Helena for the February, April and March 1868.

Return of the weights of Sheep Killed at St Helena = during the Months of Feby - March & April 1868 +												
Date =		No Killed	Weight	Date		No Killed	Weight	Date		No Killed	weight	Remarks
February	1	3	115 lbs	March	1	3	111	April	1	3	112	
"	2	2	78	"	2	2	76	"	2	3	108	
"	3	2	78	"	3	3	110	"	3	3	112	
"	4	3	110	"	4	2	76	"	4	3	109	
"	5	2	75	"	5	2	80	"	5	3	113	
"	6	3	112	"	6	3	120	"	6	3	112	
"	7	1	38	"	7	3	112	"	7	3	116	
"	8	3	114	"	8	2	76	"	8	3	111	
"	9	3	114	"	9	3	112	"	9	4	148	
"	10	2	76	"	10	2	76	"	10	2	79	
"	11	3	115	"	11	3	120	"	11	4	153	
"	12	3	114	"	12	1	38	"	12	3	116	
"	13	2	77	"	13	3	114	"	13	4	140	
"	14	3	114	"	14	1	40	"	14	4	142	
"	15	3	112	"	15	3	114	"	15	4	156	
"	16	3	116	"	16	1	38	"	16	4	140	
"	17	2	76	"	17	3	114	"	17	3	116	
"	18	3	114	"	18	1	38	"	18	4	156	
"	19	2	74	"	19	3	112	"	19	3	120	
"	20	3	117	"	20	2	72	"	20	4	152	
"	21	3	114	"	21	3	112	"	21	4	155	
"	22	3	120	"	22	1	38	"	22	4	150	
"	23	2	80	"	23	4	150	"	23	4	160	
"	24	3	114	"	24	2	76	"	24	4	158	
"	25	2	78	"	25	3	114	"	25	4	155	
"	26	2	80	"	26	3	112	"	26	4	157	
"	27	3	112	"	27	3	110	"	27	4	159	
"	28	2	80	"	28	3	120	"	28	---	----	Fresh beef issued
"	29	2	76	"	29	3	114	"	29	4	150	
				"	30	3	120	"	30	4	152	
				"	31	3	115					
Totals -		73	2,793			77	2,930			103	3'907	John McDonald
												Supt

processed from the sheep carcasses for the week is recorded. This all points to organised and efficient slaughtering and processing of carcasses, from the early days of the prison.

Additional documents (Queensland State archives 1870c; 1870d; 1870e; 1870f; 1871a; 1871b; 1871c; 1871d; 1871e; 1871f; 1871g; 1871h; 1872) provide similar information as those described above. These documents are ration balance sheets for the months ending February 1870, March 1870, April 1870, May 1870, March 1871, April 1871, May 1871, July 1871, August 1871, September 1871, October 1871, November 1871 and February 1872, respectively. These documents detail the weight of sheep-meat killed on St Helena for a particular month. Furthermore, these documents detail what happened to that meat. They itemise the weight of sheep-meat issued to prisoners, the penal guard, and warders and record meat which had been damaged (possibly spoiled) and therefore wasted.

Data of the type to be found in the above documents is sadly lacking for much of the history of the prison. It is not until the mid 1910s that such information is again available. This information is to be found in the Controller-General's Reeports and Prisons Department Reports, which are part of the Paliamentary Papers of Queensland. The report for the year 1915 informs us that 14,858 lb (6739·48 kg) of mutton was issued from sheep slaughtered on St Helena (Queensland Parliament 1916: 6). The report for the year 1916 states that sheep were slaughtered on St Helena as required (Queensland Parliament 1917: 6). It would appear that the practice of daily killing, due to a lack of storage facilities in a hot and often humid environment, continued throughout the time that the island functioned as a prison. The report for 1916 also states that a total of 404 sheep were slaughtered on the island, producing 17,843 lb (8093·45 kg) of mutton, valued at 6d per lb (453.59 g). Mutton would appear to have been exported from the island for sale by this time, as £446 1s 6d was obtained from mutton. Wool was also being sold, with an income of £34 14s 10d being realised. The report also indicates other by-products occuring from sheep, but does not state what these were (possibly tallow).

The 1918 report states that:

> A flock of sheep, which forms the mutton supply, is depastured on the island. More sheep are obtained in Brisbane, when required, from time to time. During the year 345 sheep were purchased.
>
> (Queensland Parliament 1919: 5)

This indicates that at this time the island was not self sufficient in terms of mutton production. However, the report is ambiguous as to whether the sheep were imported live or as carcasses. Since a number as opposed to a weight is used in the report, and the term sheep is used as opposed to mutton, it may be safe to assume that the animals were imported live, and not as carcasses. That the supply of sheep-meat was sometimes low, not only in 1918 but in earlier times, is indicated by a telegram (Queensland State Archives 1881) sent by the Superintendent of St Helena to the Colonial Secretary's Office on 19 August 1881, concerning the supply of sheep. The message read 'I have only sufficient sheep to last till Tuesday.' Another telegraph sent by the Superintendent to the Colonial Secretary's Office on 20 March 1882 (Queensland State Archives 1882a) stated that 'The Sheep received last are a very superior lot.' Interpretation of this information is that although some sheep husbandry may have taken place on St Helena, in general sheep were purchased on the mainland and shipped to St Helena for either imminent slaughter or else fatting prior to slaughter. One possible reason for this may have been the difficulty of transporting carcasses to the island without their spoiling. As will be discussed below for cattle, there were difficulties involved in the transportation of fresh meat to the island without it spoiling. A solution to this problem would have been the transportation of the animal in a live state. This is a far more viable option for sheep than for cattle, due to size and temperament differences between these animals.

The 1919 report states that '273 sheep were killed, and there were 12 on hand at the end of the year' (Queensland Parliament 1920: 16). This further supports the contention that at least in the later years of the prison, and possible throughout its history, sheep were not bred on the island in any numbers. Twelve sheep remaining at the end of a year do not represent a breeding flock. In 1920 there were 263 sheep on the island (Harmon-Price 1981: 2) but this brief note does not inform us as to whether this number represents those sheep brought to the island that year for slaughter, or the number which were slaughtered, or the number remaining at the end of the year. As the prison grew close to its end, the number of prisoners dropped and there was a corresponding drop in the number of sheep slaughtered. The 1925 report states that only 68 sheep were killed for prison use during the year (Queensland Parliament 1926: 1).

Far less information concerning cattle is contained in the historical documents, than for sheep. Virtually all the historical data on cattle dates from the 1890s, with the establishment of a prize Ayrshire dairy herd. Prior to this date it is unlikely that cattle were raised on St Helena. The earliest mention of cattle in the documents is 28 April 1869 (see Fig. 6·1), when fresh beef was issued. This was the only time that beef was issued for at least a three month period. It is not known whether or not this meat was from an animal slaughtered on the island or else from a carcass sent to the island. It is, however, known that by 1873 at least, cattle may possibly have been raised on the island, as a letter to the Colonial Secretary (Queensland State Archives 1873) states that a calf weighing 213 lbs (96·62 kg) was slaughtered on the island sometime in 1873. However, it is possible that this animal had not been raised on the island but merely shipped there for slaughter. A telegram (Queensland State Archives 1882b) sent to the Colonial Secretary's Office on 10 May 1882, lends support to the contention that until the 1890s beef was imported onto the island as carcass sides and not raised on the island itself. The telegram concerns a portion of fresh beef sent to the island which arrived in a state unfit for human consumption.

Ayrshire cows were purchased by the Establishment in 1891, and further purchases were made in 1892. These purchases were of pure bred stock. The stud herd which was established was eventually to win many prizes at the annual shows of the National Agricultural and Industrial Association of Queensland (Queensland Parliament 1919: 5). The herd was maintained on the island until the prison was closed. There is limited information available concerning the growth of the herd size and what became of surplus beasts. It is, however, known that on one occasion 'cattle sold during the year realised £471' (Queensland Parliament 1907: 4). It is also known that 2461 lb (1116·29 kg) of butter valued at £123 1s 6d was made on the island from the dairy herd. The amount of butter produced was in excess of the needs of the Establishment, with 671·5 lb (304·59 kg) being sold to officers of the Establishment and 1782 lb (808·30 kg) being supplied to the Benevolent Asylum at Dunwich. On 31 December 1906 the Ayrshire herd numbered 81. By this time the herd had become 'well and favourably known, with little difficulty experienced in disposing of those for sale'. At the Brisbane Exhibition in August 1906, four first and five second prizes were gained for the Ayrshires exhibited by the Penal Establishment.

It is not until 1916 that the size of the herd is mentioned again in reports, when it is stated that on 31 December 1916 the herd numbered 61, which included four purchased during the year (Queensland Parliament 1917: 6). It is also stated that £203 5s 9d was received in sales of cattle. From this it can be assumed that cattle were being purchased from time to time by the Establishment, presumably to improve the quality of the herd, and that sales of animals were also being made. It is also known that for the preceding year cattle from the herd were being slaughtered on the island for fresh beef (Queensland Parliament 1916: 6). For the year 1915, 1301 lb (590·12 kg) of beef were realised from cattle killed on the island, and this went some way to reducing the quantity of meat ordered from a contractor. Also in 1916, 459 lb (208·20 kg) of beef valued at £10 10s 4d, was slaughtered to be used on the island. This indicates that although cattle were being raised on the island, their primary importance was as a dairy and stud herd, and not as a herd to supply the Establishment with its requirements of fresh beef. This contention is supported by a statement in the Comptroller-General's Report for the year ending 31 December 1918, in which it is stated that 'Twice a week beef is shipped to St Helena' (Queensland Parliament 1919 5). This is despite an Ayrshire herd numbering 78 at the end of 1918. Clearly, this herd, which had become a renowned prize-winning one was too valuable to be slaughtered for fresh beef. At the end of 1919 the Ayrshire herd numbered 83 (Queensland Parliament 1920: 16). Harmon-Price (1981: 2) states that cattle were kept in 1920. The Prisons Department Report for 1925 gives a breakdown of the herd structure on 31

December that year (Queensland Parliament 1926: 1). At that time the 'herd consisted of 28 cows, 3 heifers, 2 bulls, and 12 heifer calves, of the Ayrshire breed.' It is also known that two bulls were sold during the year, for £33 12s and £18 respectively, and that 13 beasts from the herd were slaughtered for prison use. The last piece of information we have concerning cattle on St Helena, is that in 1929 seven cattle were slaughtered for beef and that half this amount was sent to Dunwich (Queensland Parliament 1930: 2).

Little is known about the consumption of pig-meat on St Helena prior to the mid 1880s. In 1885 a piggery was established (Harmon-Price 1981: 2). A letter (Queensland State Archives 1884) from the newly appointed Superintendent of the Establishment to the Colonial Secretary Brisbane, dated 10 November 1884, sheds some light on the use of pigs prior to the mid 1880s. This letter states:

> I have the honour to inform you, that I have 21 pigs here, which I would, with your permission, make over to this Establishment to be included in the list of the other livestock.
>
> These pigs are the increase of two pigs which I purchased from my predecessor Mr. McDonald soon after my arrival here.
>
> They are I believe a valuable breed.
>
> They could be killed as they mature, and would form an occasional change of food for the Warders at least, in lieu of mutton.
>
> I would further by permission to be allowed to kill one or two in winter for bacon for my own use.

From this letter, it can be deduced that pigs were present on St Helena prior to 1884 but that they were in all probability few in numbers and for the use of the Superintendent and senior staff. These people most likely privately owned them. Since pigs are not mentioned on any inventory for the establishment prior to 1886, it can be assumed that the pigs mentioned in the above letter, which were accepted by the Colonial Secretary two days after the letter was sent, formed the basis of the first pig stock for use by the Establishment. In 1887, members of a Board of Inquiry reported that a piggery was established on the island and that pigs were fed on the refuse of the Establishment (Harmon-Price 1981: 3). The 1886 statement for the year on island produce recorded that at the end of the year 36 pigs were sold from the island, and that 4750 lb (2154·56 kg) of pork was used, valued at 3d per pound (453·59 g) for an estimated value of pork used on the island of £59 7s 6d (Queensland Legislative Council 1887). Clearly, by the end of the mid 1880s pig production for off-island sale, and for supplying the staff and warders of the prison, had become a viable and important exercise.

From the Report of the Department of Public Works for the year 1906 it is known that on 31 December 1906 there were 171 pigs on St Helena, and that during the year £135

14s 1d worth of pigs were sold by the Establishment (Queensland Parliament 1907: 4). The Comptroller-General's report for the year 1916 stated that repairs were made to the piggeries and that on 31 December 1916 that there were 212 pigs present on the island. This report also indicated that the number of pigs being raised on the island at this time was such that they could not not entirely be fed on the refuse of the Establishment. Sweet potatoes, grown on the island and valued at £90, were also used to feed the pigs. In addition, in June of this year a pedigreed Berkshire boar was purchased from the Hospital for the Insane at Goodna. However, pig production did not run at a loss, for during the year 1916, 163 young pigs were sold, realising £189 7s 9d for the Establishment (Queensland Parliament 1917: 6).

It would appear that the number of pigs maintained on the island during the 1910s was in the order of 200. The Comptroller-General's report for the year 1918 stated that 'Approximately, 200 pigs are maintained on the island' (Queensland Parliment 1919: 5). The report goes on to state that there were 189 pigs present on 31 December 1918. The report also states that 100 young pigs were sold during the year for a total price of £218 1s 11d. The amount of island-raised pig-meat was 104 ton (105·67 tonne), valued at £208. This indicates that pig production on St Helena was self-sufficient. The numbers of pigs present on the island appears to have dropped during 1919, with the Prisons Department Report stating that there were 118 pigs present on 31 December 1919 (Queensland Parliament 1920: 16). The pig numbers may well have been reduced as the prison complex was slowly dismantled, with the only note referring to pigs for 1920 stating that they were only occasionally kept (Harmon-Price 1981: 3). The last piece of information comes from the Prisons Department Report for 1929. This states that pigs 'were wholly maintained by the island produce' (Queensland Parliment 1930: 2). The report also states that 58 pigs 'were disposed of'. Although not stated, the implication is that they were either sold, or else sent to another government institution.

From the historical documents the picture which emerges about the use of pigs on the island is that, prior to the mid 1880s, pig production and the use of pork on the island was insignificant. Following the establishment of a piggery and the stocking of this in 1885, significant numbers of pigs were raised and fed at first on waste from the Prison but, as numbers increased, also fed with food crops such as sweet potato grown on the island. The documents indicate that surplus pigs were sold, and that those pigs slaughtered on the island were for consumption by the officers, warders and staff, and not for consumption by the prisoners. Pork can therefore be seen as an elite food for the Establishment and consumption of it as an institutionally enforced barrier. Therefore, pig remains can be seen as one possible way to distinguish staff waste from prisoners' waste where distinct pockets of pig bones form in the midden.

It is known that sheep were grazing on St Helena as early as 1869, and it is known that from the 1870s two to three were slaughtered daily. What is not clear from the historical record is who performed this slaughter and butchery and where it took place. The first mention of butchery on St Helena comes from 1876. For 30 September 1876 an inventory of activities in which prisoners were engaged was made (Harmon-Price 1981: 13). This inventory informs us that one prisoner was employed as a butcher and soup boiler. What we are not told is whether or not prisoners were rotated through the various forms of work on the island, or held a position for some time. The specialised nature of butchering would indicate that if it were rotated it would have been a postion available only to those skilled in butchery. In 1885 it is known that not only was a piggery established on the island but that a slaughter house was also erected near the sheep yard (Harmon-Price 1981: 2). Also a butcher's shop was built in 1885 (Allom n.d.: Vol.1 B013). Some indication of the butchering process on St Helena is given in the Report by the Board of Inquiry in 1887 (cited in Harmon-Price 1981: Attachment 4). In this report it is stated that:

> Outside the stockade proper, built within a subsidiary fence at the north-west corner of the stockade is the butcher's shop, where the carcasses of sheep killed in the slaughter-house are dressed and cut up for the kitchen. There is also a boiling-down house, where the fat is saved from the refuse, and purified.

Quite clearly, the Establishment was well organised for processing its animals.

Little else is known of the history of butchery on St Helena. The building housing the butcher's shop also contained the bakehouse and blacksmiths. In 1894 there were modifications and building took place to adjust to increasing numbers of prisoners. In that year the smithy was shifted and its former location became a store room until 1901, when it became a bacon-curing room. The Comptroller-General's report for the year 1916 states that not only were repairs made to the piggeries, but that the bull-yard and slaughter-yard were re-erected (Queensland Parliament 1917: 6). The last piece of information concerning butchery on St Helena is from the Comptroller-General's report for the year 1918. In this report it is stated that: 'The new butcher shop, which was completed during the year, is a model for order, cleanliness, and coolness' (Queensland Parliament 1919: 5). Overall the historical documents indicate that the process of butchery on St Helena was well designed in terms of structures and well organised in terms of process.

From this section concerning the historical documents as they relate to meat procurement for the St Helena Penal Establishment, the following points emerge:

1. Sheep-meat in the form of mutton was the most important source of meat in the diet of the prisoners. It would also have been the most important source of meat in the diet of the warders in the early decades of the prison, but its importance may have been reduced by beef and pork subsequent to the establishment of piggeries and a cattle herd on the island, and more regular supplies of beef to the island.

2. All sheep were all slaughtered on St Helena, though they may not necessarily have been raised on the island. It is quite likely that sheep were purchased from the mainland and merely grazed or fattened until required.

3. Beef was a scarce meat-source in the early years of the prison, cattle not being raised on the island until the 1890s. As supplies became more regular, especially after the turn of the century, it increased in importance so that by the 1910s, at least, fresh beef was being imported to the island on a fairly regular basis, and that it was this source, not the island herd, which formed the major supply of cattle-meat to the St Helena Penal Establishment. Beef would have been imported onto the island as sides. With the establishment of a herd of Aryshire cattle in the 1890s, the potential to slaughter cattle on the island for beef was realised. This source of beef would not, however, have been as important as that which was shipped to the island. This is because the herd on the island was of far greater value as a stud and dairy herd.

4. Pork would have been a rare occurrence on the meal table for warders prior to the establishment of a piggery in 1885. Following this date, pork would have been available to the warders and staff on an occasional basis. It would not have been offically available to prisoners at any stage of the operation of the prison. Those pigs raised in excess of the requirements of the staff and warders, and of the carrying capacity of the piggery, were sold off the island.

5. The order of importance of the domesticates in terms of meat consumption on St Helena was sheep foremost, then cattle and then pigs.

6. The process of butchery on the island was well ordered and based around a number of well designed buildings.

From these points four predictions can be made as to the expected make-up of the archaeological assemblage used in this thesis. These predictions are made on the assumption that the assemblage represents approximately a ten year period of deposition dated to the beginning of the prison. The factors which support this assumption are discussed in detail below. The predictions are as follows:

1. The sheep bone component of the assemblage will evidence the presence of all skeletal elements in numbers proportional to their representation in the skeleton.

2. The cattle bone component of the assemblage will not contain cranial, facial, metapodial or phalanx bones. All other skeletal elements will be present in numbers proportional to their representation in the skeleton.

3. The MNI for cattle present in the assemblage will be significantly less than the MNI for sheep present in the assemblage.

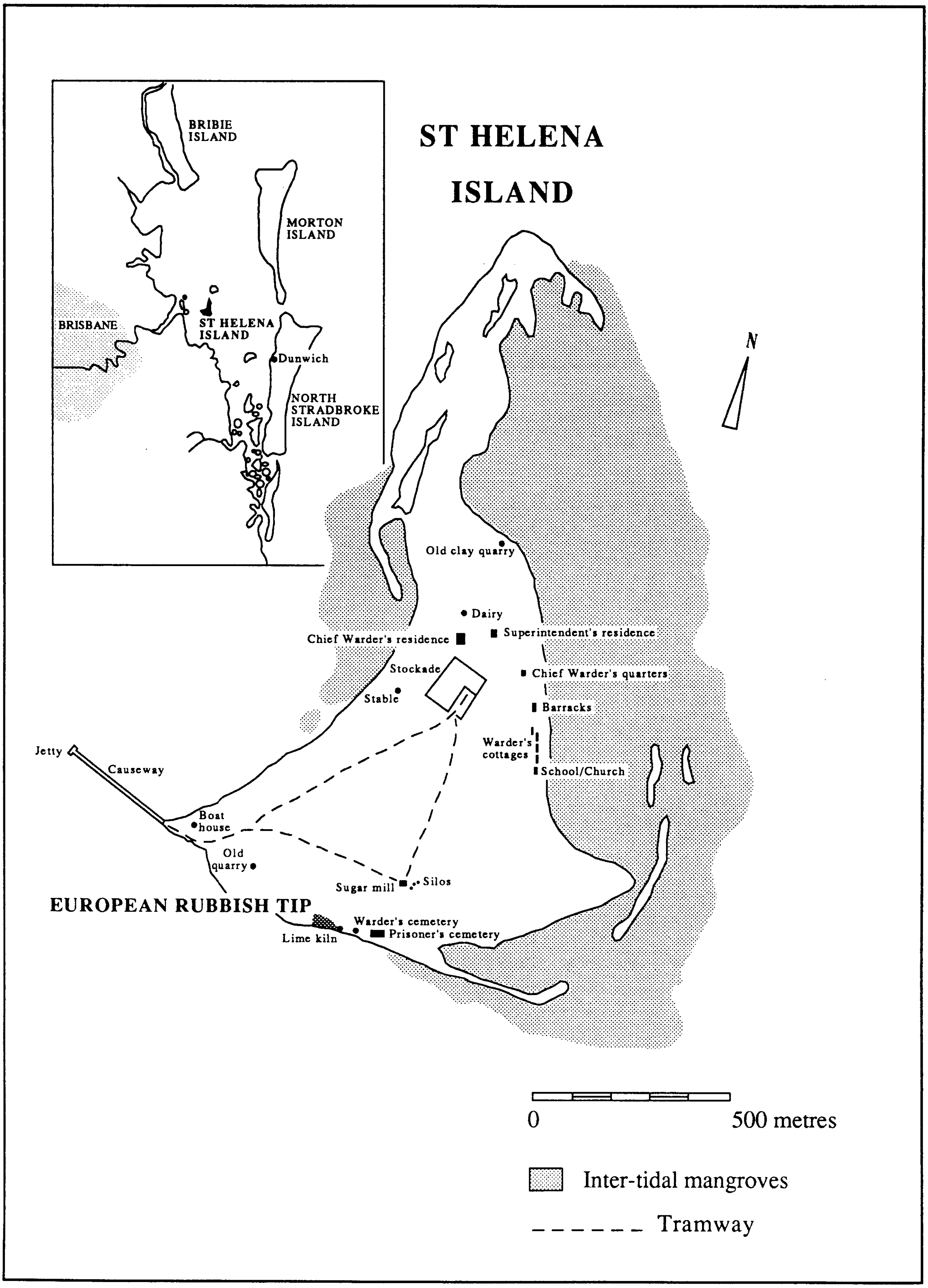
4. Pig bones will be absent or else virtually absent in the asemblage representing an insignificant proportion of the assemblage.

6·4 Procedures of Excavation

The European Rubbish Tip, so named to distinguish it from prehistoric Aboriginal middens present on the island, is an extensive ash midden approximately 50 metres wide by 150 metres long. It is located on the southern beach front of the island immediately west of the lime kiln and cemetery and east of the quarry (Fig. 6·2). It has deposits up to 3 metres in depth containing refuse from many facets of activity of the penal era, including workshop waste, domestic waste and industrial waste from operations such as lime burning and sugar refining. For a midden of such size it was necessary to devise a sampling strategy which would be able to not only produce a faunal assemblage but would also answer a number of cultural resource management questions posed by the Queensland National Parks and Wildlife Service. It was decided that the use of trenches as opposed to area excavation would best realise these objectives.

The midden has three distinct topographical features. Running parallel to the shore there is a bank which slopes sharply on the seaward side to a sandy beach. This bank is being undercut and eroded in some places by sea-action, particularly during frequent

FIGURE 6.2 : St Helena Island showing location of European Rubbish Tip



summer storms. On the landward side the bank again slopes sharply to a relatively level area of ground. This level area of ground is bordered on its landward side by a sharp steep slope of approximately 2 metres in height. This effectively creates a trough of level land between the two banks. The upper bank slopes gently inland, with a slight rise from the top of the sharp incline merging with the contours of the topography surrounding the midden.

These topographical features of the midden are interpreted as resulting from an attempt by the Establishment to reclaim land. There is an oral tradition (but no written confirmation) that attempts were made on the island at land reclamation using refuse as landfill (Thompson 1986). It is not being suggested that there was a desire for more land on the island, but that deposition of refuse in this manner made practical sense. Refuse was disposed of with the added advantage of producing over the long term, increased land for horticultural and agricultural activities on the island. The manner in which refuse was disposed of in this area was interpreted from surface features and subsequent stratigraphic evidence as follows:

1. The seaward bank was first built up with refuse on top of a beach ridge, and possibly had to be repaired from time to time. The function of this bank was to stop the sea from eroding the subsequent deposition of refuse on the landward side of this bank.

2. Next, deposits were built up behind the seaward bank. This was indicated by the appearance on the surface of the midden in this area of lime slag. This lime slag was interpreted as being refuse from the nearby lime kiln, or else unused slagged lime from the early building activities. This kiln was built and put into operation in April 1869 (Queensland state Archives 1869). As for other aspects of St Helena's history, documentation on the lime kiln is poor. However, what evidence there is indicates that the kiln was in all likelihood only in operation during 1869 and 1870 (Harmon-Price 1981: 12). Therefore the appearance of lime slag in this area was viewed as indicating early deposits.

3. The final stage of deposition is viewed as the creation of a tip face. Refuse was dumped on the landward side of the midden level with the surrounding topography. As this progressed forward towards the sea, the height of the tip face increased as the relative difference in height above sea level between the natural topography and the level at which land was being reclaimed too increased.

In order to realise the excavation objectives and to investigate the above-discussed topographical features of the midden, it was decided to orient the excavation trenches perpendicular to the beach front, producing a cross-section through each of the topographical features. Two trenches, 10 metres apart, 1 metre wide and 23 metres long were delineated into one metre squares, at the eastern end of the midden. These trenches were positioned at this end for a number of reasons. Firstly, the vegetation cover in this area consisted primarily of grasses and small trees such as oleander, as opposed to larger trees such as Moreton Bay Figs which covered other parts of the site. It was believed that the vegetation cover in this area of the site would not contain large and deep root systems, likely to complicate the micro-stratigraphy often associated with ash middens and which can also cause disturbance to artefact provenances. It was also believed that it would be a much easier job to clear vegetation in this area for laying out a grid system. In addition, other areas of the midden had the remains of large machinerym, such as boilers, which had presumably been dumped during the final years of the prison along with other material relating to the systematic demolition of the prison prior to closure. Much of this material consisted of large heavily corroded iron artefacts, which would have caused considerable difficulty in an excavation. Furthermore, where erosion of the site had taken place in this eastern end, there was evidence that this area contained considerable deposits of faunal material.

The two trenches were distinguished from one another by calling the eastern one 'Trench 1' and the western 'Trench 2'. For each trench, individual squares were designated by a capital letter, from A to W. Square A was closest to the sea while Square W was furthest inland. In order to distinguish the squares in one trench from those of the other, the trench number was used with the square letter, resulting in a full square designation, such as Square 1A.

The result of griding-out was a total of 46 squares, although due to various constraints, such as availability of volunteers, time and finances, it was not possible to excavate every square. A sampling approach was adopted, with three sections of Trench 1 and two sections of Trench 2 being excavated. For Trench 1, Squares A-E, K-O and U-W were excavated. Squares A-F, V and W were excavated for Trench 2. These squares were selected because they gave a representative cross-section of the three topographical features present in the midden. Squares A-E for Trench 1 and Squares A-F for Trench 2 covered the area from the beach , up the slope of the bank and along its top. Squares K-O for Trench 1 represented the earlier deposits between the seaward bank and the inland tip face; and Squares U-W for Trench 1 and Squares V and W for Trench 2 the top of the tip face.

No squares in the mid section for Trench 2 were excavated due to advice from the National Parks and Wildlife Service staff that this area had been fossicked by antique bottle collectors in the recent past. This was confirmed by the surface appearance of this area.

Each square was taken down until sterile deposits were encountered. These deposits were tested when first found to a depth of 1 metre. The sterile deposits consisted of concreted Pleistocene sands (Hall 1986), which were clearly distinguishable from the cultural layers deposited during the operations of the prison.

All trenches were excavated using trowels, an assortment of ash and dust pans, and brushes. The deposits were on the whole extremely loose and often fine, and were easily removed. The vast bulk of cultural debris was able to be excavated without fear of damage using standard tools. These stratigraphic units were encountered which contained fragile items. For those stratigraphic units were excavated using dental instruments and fine brushes.

The site was excavated in stratigraphic units wherever possible. For each square the first unit encounted was called Layer 1. However, each layer was subdivided into spits of 10 centimetres. That is, the first unit excavated for any square was Layer 1, Spit 1. The purpose of the spit numbering was to subdivide the individual sratigraphic units into smaller units, in order to keep a tighter control on the provenance of artefacts. This method was deemed to be useful particularly where there was not a clear-cut division between stratigraphic units, but rather a transition from one unit to another with no clear line of demarcation. This technique of excavating by arbitarily subdivided stratigraphic units also means that not all spits are of 10 centimetres in depth, but that the basal spit for any layer was generally less than that.

The stratigraphy of the site was extremely complex, consisting of many inter-weaving fine lenses and pockets of distinct deposits. The uniform grey of many of the deposits, with similar matrices, meant that the usual criteria for distinguishing changes in stratigraphy such as matrix colour and texture had to be superseded by criteria involving changes in the composition of artefacts present in the matrix.

It was not always possible to excavate by stratigraphic units. There were parts, of the site that had been disturbed (see Square O Fig. 6·3) possibly by antique bottle diggers. Where these problem areas in the stratigraphy were encountered, the deposits were excavated using arbitrary 10 centimetre spits until clearly defined stratigraphic units were encountered, whereupon the layer-spit system described above was re-established. Where clearly defined pockets of deposition were encountered, these were excavated separately and labelled as features, designated F1, F2, and so on. The relationship of the stratigraphy of the site to the manner in which it was excavated and the artefacts recovered is discussed in greater detail in the following sub-chapter section.

A detailed description of the stratigraphy as it relates to the manner in which the site was excavated and details of the excavation are viewed as not essential to this thesis. This information has been written up and will be presented in the final report of the excavation currently been written up.

6·5 Interpretation of stratigraphy and soil samples

The faunal remains used in the analysis of butchery patterns (see below) came from two sets of squares in Trench 1. These two sets are Squares 1A-1E and 1K-1O. Figure 6·3 presents the stratigraphy, as evident in the western sections of Squares 1K-1O. The results of soil sample analysis of the sratigraphic units evident in these squares can be seen in Table 6·1.

Ash middens are notoriously complex and the ERT midden was no exception. There were distinct pockets of deposit, many fine interlacing ash lenses, and stratigrapic units which did not cover the whole of the square. In addition, there was often no clear visual boundary between stratigraphic units, with transitional zones between units.

The complexity of the midden was not unexpected and by examining both the stratigraphy and the soil sample analysis data it is possible to gain an understanding of deposition at this site and also an understanding of site formation processes, as they relate to this deposition. The pattern of deposition was one in which refuse came from all the activities on the island. Both large and small volume discrete deposits were present, indicating that there was a range in the volume of individual dumping episodes. The fact that discrete units contain items which represent a spectrum of activities on the island, points to the pooling of refuse prior to deposition. Once the material was deposited on the site a number of subsequent activities took place. Often the ash from cooking activities, and from steam engines used on the island, was deposited with other refuse. This was in all likelihood still hot as evidenced from calcined bone in the assemblage and other burnt artefacts. This would have had the effect of burning the organic waste. However, this

Figure 6.3: West section for Squares 1K to 1O

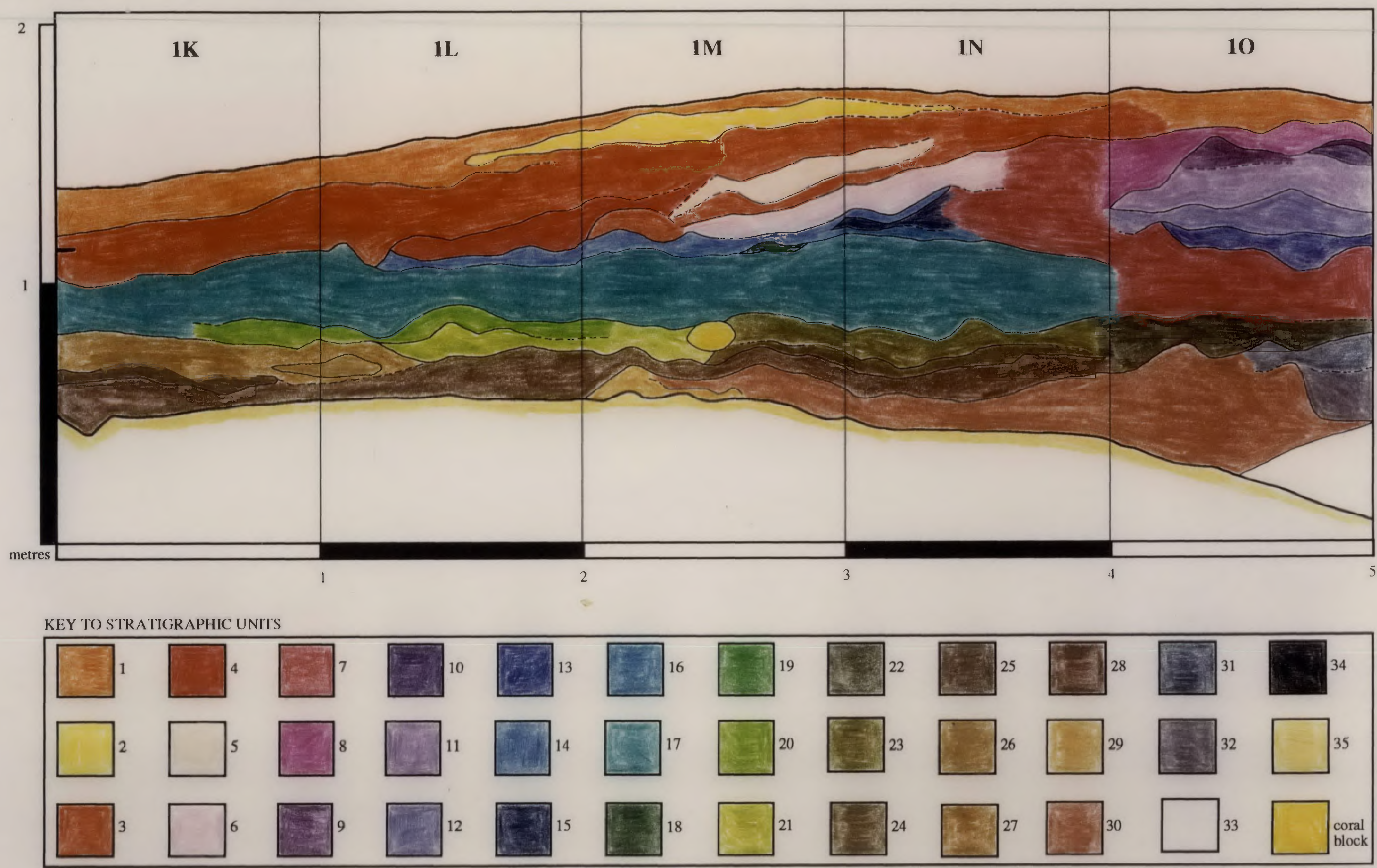


Table 6·1: Stratigraphic Unit Description for Squares 1K-1O

STRATIGRAPHIC UNIT	DESCRIPTION	COLOUR	pH
1	Ashy sandy silty loam with charcoal and burnt coal/coke.	Colour changes from south to north from dark reddsh brown to greyish brown.	8·5
2	Lime.	White	9·5
3	Sandy silt.	Bright brown	8·5
4	Sand.	Pale yellow	8·0
5	Ash with burnt coal/coke.	Grey	8·0
6	Sandy ash with burnt coal/coke and burnt stone.	Grey	8·5
7	Ashy sandy silt with charcoal, burnt coal/coke, burnt stone, corroded iron, stone, gravel and beach coral.	Dark reddish brown	9·0
8	Sandy silt with burnt stone, beach coral and shell.	Brown	8·5
9	Sandy ash with burnt coal/coke, burnt stone and stone.	Light bluish grey	9·0
10	Sandy clay loam with stone and gravel.	Reddish brown	8·5
11	Ashy sandy silt with charcoal, burnt coal/coke and stones, interspersed with lenses of charcoal.	Grey	9·0
12	Ashy sandy silt with burnt coal/coke, burnt stone, gravel, beach coral and nodules of red clay.	Reddish light grey	9·0
13	Sandy ash with burnt coal/coke, burnt stone and stone.	Light bluish grey	9·0
14	Sandy silty clay with some charcoal.	Dark reddish brown	8·0
15	Sandy ash with burnt coal/coke, burnt stone and lime.	Grey	8·0
16	Coarse sandy silty loam.	Dark reddish brown	9·0
17	Sandy silty ash with charcoal, burnt coal/coke, stone and clinker.	Brownish grey	8·5
18	Ash with burnt coal/coke.	Grey	8·0
19	Silty sand with corroded metal.	Dull reddish brown	8·5
20	Sandy ash with charcoal.	Black	9·0
21	Sandy silt with stone and gravel.	Reddish Brown	8·5
22	Sandy ash with burnt stone and burnt beach coral.	Light brownish grey	9·0
23	Sandy silt with charcoal and coal.	Brown	8·5
24	Ashy sand with charcoal and gravel.	Dull yellow orange	8·5
25	Loose coarse sandy silty loam with stones.	Dull orange	8·5
26	Sand.	Pale yellow	8·5
27	Sandy clay.	Dark reddish brown	8·5
28	Sandy ash with charcoal and stone becoming at its northern end a sandy silty ashy loam with gravel.	Colour changes from grey to dull reddish brown at its northern end.	pH changes from 8·5 to 8·0 at its northern end.
29	Sand.	Dull yellow orange	8·5
30	Sandy silt loam with some charcoal and and stones.	Reddish brown	9·0
31	Sandy ashy silt with burnt coal/coke, corroded iron, stone and gravel.	Greyish brown	9·0
32	Ashy sandy silty clay with burnt coal/coke, burnt stone, corroded iron, stone and beach coral.	Dark reddish brown	9·0
33	Sandy silt with charcoal and stones.	Dark reddish brown	8·5
34	Sandy ash with burnt coal/coke.	Bluish grey	9·0
35	Sterile silty coarse concreted sand.	Dull reddish brown	9·0

burning may have been insufficient to deter a growth in rat population due to the potentially large food source present on the midden, and it may also have not stopped strong odours developing from decaying organic matter.

The stratigraphy indicates that these were real problems and that measures were taken by the Establishment to solve them in two ways. The data relating to the first means, is open to alternative explanations. The preferred explanation is as follows. Evident in the stratigraphy were very fine lenses of wood ash, as opposed to the bulk deposits of coal or coke ash. These lenses of wood ash are thought to represent the deliberate burning of the midden surface, in order to destroy organic residues and thus remove a potential food source for rats, and also to reduce the stench of the midden.

The second means of solving the problems of rats and undesirable smells, was that of regularly burying deposits beneath soils introduced to the site. There were primarily two soil types used in covering deposits of cultural debris. Sand from the beach front was used, as was the red soil which is the natural soil type for the entire island and is found in immediate proximity to the midden.

6·6 Initial analysis procedures

Due to numbers of artefacts recovered and time constraints all artefacts were bagged together that came from the same excavation unit. The first step in the initial analysis procedures was to sort each of these bags into broad artefact classes. Each artefact class was then re-bagged separately with all the information contained on the original bag recorded on each of the new bags along with the artefact classification. An inventory of artefacts was made at this stage. Only the domestic mammalian bone, which was made up exclusively of sheep, cattle and pig bones is the concern of this thesis. The other bone items and other archaeological finds are not discussed in this thesis but will be discussed in the final report.

During the initial sorting stage all the domestic mammalian bone relevant to this thesis were cleaned of any adhering dried matrix using a soft brush. It was decided to dry clean these faunal remains because washing could have possibly caused further fragmentation, or else eroded important surface features such as butchery marks, carnivore or rodent marks, or evidence of plant-root etching.

The domestic mammalian faunal remains were examined in detail. Each individual bone or bone fragment was given a separate reference number beginning with 1. In some instances groups of related bones, such as tibia and tarsal units and fused radius/ulna bones, or fragments which exhibited the same features, were given the same reference number, but subdivided from one another for the analysis by use of a postscript lower case letter, for example 1a, 1b, 1c. This reference number was written in indelible ink on the outside of small plastic bags which contained the individual remains. Those plastic bags were then placed back into the original plastic bag that they had come from and this bag was, prior to sealing, given a bag number, commencing at 1.

The details of each faunal item were recorded on a series of analysis forms. The features exhibited on each bone or fragment of bone determined how many forms had to be filled out. There was a maximum number of six forms which could be completed for any one faunal item. Generally, however, three forms were sufficient to record the details for any one item. Once all the faunal remains selected for this thesis had been recorded, this information was computerised, using a database programme. A modified print out of this database forms Appendix 3, which is a summary of the faunal remains used in this study into butchery patterns. Each of the six forms will now be discussed.

Analysis Sheet 1 was a master reference sheet relating the subsequent analysis sheets to an individual bone, and to that bone's provenance and other information recorded during excavation (Fig. 6·4). This form recorded the following:

1. The reference number.

2. The site. In all cases faunal remains came from the European Rubbish Tip (ERT) on St Helena Island.

3. The bag number.

4. The square.

5. The excavation unit.

6. The excavators.

7. The date.

Figure 6·4: Analysis sheet 1

REF. No.	SITE	BAG No.	SQUARE	UNIT	EXCAVATORS	DATE	BONE	TOOTH	SPECIAL

8. Bone. A tick in this category signified that the faunal material contained bone. This was in order to distinguish between faunal remains which contained solely bone, or bone and teeth, and faunal remains which were either a single intact tooth or a fragment of an individual tooth.

9. Tooth. A tick in this category signified that the faunal remain under consideration contained, in addition to bone, teeth or a tooth, or was an individual tooth or fragment of one.

10. Special. Flag to special features which were recorded on Analysis Sheets 4, 5 and 6, which are discussed below. The number or numbers on the form or forms which record any special features were entered here.

Analysis Sheet 2 recorded information related to those faunal remains which consisted of, or contained, bone (Fig. 6·5). The information recorded was as follows:

1. The individual reference number.

2. The bag number.

3. Anatomical unit. The skeletal element that the item under examination represented was entered here. Where the specific skeletal element could not be identified, less precise descriptions were given, such as axial fragment or long bone shaft fragment.

4. Completeness of bone. Here was recorded the portion of the skeletal element present of the item being examined.

5. State of fusion. In this section was recorded the fusion state of the remain being examined. For long bones, a tick was placed next to the appropriate category detailing whether the proximal end was unfused, fusing or fully fused. The same procedure was followed for their distal ends. For axial bones, a note, using the same unfused, fusing, fully fused categories was recorded for their fusion centres, such as the acetabulum of the pelvis.

6. Side. This was recorded as left, right or mid (for bones such as the sternum which lie in the mid-line of the body). This data was entered as L, R or M. Where bones could not be sided, the abbreviation US was entered signifying unsided.

Figure 6·5: Analysis sheet 2

Analysis Sheet 2: BONE INFORMATION

REF NO ________

BAG NO ________

ANATOMICAL ELEMENT: ____________________________________

COMPLETENESS OF BONE: ____________________________________

STATE OF FUSION: Proximal epiphysis - UNFUSED
- FUSING
- FULLY FUSED

Distal epiphysis
- UNFUSED
- FUSING
- FULLY FUSED

OTHER: ________________________________

SIDE: ____________________

SPECIES: ________________

AGE: ____________________ **CRITERIA:** ________________

SPECIAL:
FRACTURE
BUTCHERY
BURNING
WEATHERING

PATHOLOGY

TOOTHMARKS
ROOT ETCHING

7. Species.

8. Age. Here was entered an age range based on Silver's (1969) fusion tables. Where fusion data was not available, an age category was entered using two criteria: size when compared to elements of known age, and cortex texture and thickness. The criterior used was recorded in the adjacent section on the form.

9. Special. Here a tick was placed next to those special categories listed (fracture, butchery, burning, weathering, pathology, tooth marks and root-etching), if the element under examination exhibited any of those features. These special features were described in detail on Analysis Sheets 4, 5 and 6.

Analysis Sheet 3 recorded information related to those faunal remains which consisted of or contained teeth (Fig. 6·6). The information recorded was as follows:

1. The individual reference number.

2. The bag number.

3. Anatomical unit. The exact tooth/teeth position/s and whether the tooth/teeth came from the mandible or the maxilla was recorded in this section.

4. Completeness of tooth.

5. Side. Using the abbreviations L, R or US as for bone.

6. Species.

7. Tooth eruption sequence. The word 'erupted' or 'unerupted' was entered depending upon which state the tooth or teeth were in. Above this on the sheet, the tooth or teeth present were circled according to which side they originated from and whether they were deciduous teeth or permanent teeth.

8. Tooth wear sequence. The attrition status of the tooth or each of the teeth were diagramatically represented, using Payne's (1973) schematic system.

Figure 6·6: Analysis sheet 3

Analysis Sheet 3: TOOTH INFORMATION

REF NO ________

BAG NO ________

ANATOMICAL ELEMENT: ____________________

COMPLETENESS OF TOOTH: ____________________

SIDE: ____________

SPECIES: ____________

p3 p2 p1 dc di3 di2 di1 di1 di2 di3 dc p1 p2 p3

M3 M2 M1 P4 P3 P2 P1 C I3 I2 I1 I1 I2 I3 C P1 P2 P3 P4 M1 M2 M3

TOOTH ERUPTION SEQUENCE: ____________________

____

TOOTH WEAR SEQUENCE: ____________________

____

____

AGE: ____________ **CRITERIA:** ____________

SPECIAL: FRACTURE
BUTCHERY
BURNING
WEATHERING

PATHOLOGY

TOOTHMARKS
ROOT ETCHING

9. Age. Here was entered the age-range of the tooth or teeth at slaughter, as indicated by the tooth-eruption sequence and the tooth-wear seqence.

10. Special. Here a tick was placed next to those special categories listed (fracture, butchery, burning, weathering, pathology, toothmarks and root-etching), if the element under examination exhibited any of those features. These special features were described in detail on Analysis Sheets 4, 5 and 6.

Analysis Sheet 4 recorded the special features, fracture morphology, butchery marks, evidence of burning, and weathering (Fig. 6·7). These special features were recorded once the individual reference number and bag number had been recorded. For fracture morphology the location of the fracture was recorded and then the type of fracture present was recorded. Fractures were defined as being one of four types, or a combination of these four types. The four types were:

1. Transverse.
2. Longitudinal.
3. Spiral.
4. Jogged (right-angled off-set fractures).

For butchery marks, the first feature recorded was the type of mark present. Six types of mark were recognised:

1. Saw shearfaces (SSF).
2. Saw marks (SM).
3. Cleaver shearfaces (CSF).
4. Cleaver marks (CM).
5. Shearfaces for which it could not be determined whether a saw or a cleaver was responsible (SF).
6. Cut marks (marks made by a sharp-edged implement such as a knife).

The location of any butchery marks was recorded next, with the direction or orientation of the cut recorded below this.

For burning the first aspect to be determined was whether the bone had been burnt or calcined. This was recorded on the form by circling the appropriate section. Next, the extent and the location of the burning was recorded.

Figure 6·7: Analysis sheet 4

Analysis Sheet 4: SPECIAL CHARACTERISTICS

REF NO ________

BAG NO ________

FRACTURE MORPHOLOGY: ________________________________

____

____

BUTCHERY MARKS:

TYPE OF MARK: ________________________________

____

LOCATION: ________________________________

____

DIRECTION: ________________________________

____

EVIDENCE OF BURNING:

BURNT: YES / NO EXTENT: ________________

LOCATION: ________________

____

CALCINED: YES / NO EXTENT: ________________

LOCATION: ________________

____

WEATHERING: ________________________________

____

____

Figure 6·8: Analysis sheet 5

Analysis Sheet 5: SPECIAL CHARACTERISTICS

REF NO ________

BAG NO ________

PATHOLOGY: ________

Figure 6·9: Analysis sheet 6

Analysis Sheet 6: SPECIAL CHARACTERISTICS

REF NO ________

BAG NO ________

TOOTH MARKS: GNAWING PRESENT / ABSENT

AGENT: ______________________________

____

EXTENT: ______________________________

____

LOCATION: ______________________________

____

CARNIVORE TOOTH MARKS:

TYPE OF MARK: ______________________________

____

____

____

AGENT: ______________________________

EXTENT: ______________________________

____

LOCATION: ______________________________

____

ROOT-ETCHING: PRESENT / ABSENT

EXTENT: ______________________________

____

LOCATION: ______________________________

____

For describing the state of weathering evidenced by the remains, a generalised scheme based on Voigt's (1983) scheme was used (see section on taphonomic considerations below). This scheme had seven stages. The appropriate stage number was entered.

On Analysis Sheet 5 a written descrition of any pathological features observed on the item under consideration was recorded (Fig. 6·8). This was done once the individual reference number and the bag number had been entered.

Analysis Sheet 6 recorded the special features of tooth marks and root-etching, once the individual reference number and the bag number had been recorded (Fig. 6·9). The tooth mark section was divided into two sub-sections. The first section recorded evidence of gnawing, whether by a rodent or a carnivore, and the second dealt specifically with carnivore tooth marks on bones. In the first section the presence or absence of gnawing was indicated by circling the appropriate category. If gnawing was present then the agent, extent and location of this gnawing was recorded in the appropriately marked sections on the form. In the second section, the first feature to be recorded was the type of mark. Three types of mark recorded. These were:

1. Tooth perforation or puncture marks.
2. Striated marks.
3. Crunching marks.

The agent responsible for these marks, their extent and location were then recorded in the appropriately marked sections on the form.

Finally, Analysis Sheet 6 recorded the presence of root-etching by circling the appropriate category. If root etching was present, then the extent and location of this etching was recorded.

6·7 Taphonomic considerations

As stated in Chapter 3, it is important to have an understanding of the taphonomic factors which have influenced an assemblage. This is because taphonomic factors may result in differential preservation of the faunal remains and thus bias the results of analysis. It was not possible to investigate all the taphonomic variables which may have influenced the St Helena assemblage in this study. However, the recognised major taphonomic variables were investigated and are discussed below.

6·7·1 Chemical effects

Haynes (1981: 362) has stated that 'Under various soil and climatic conditions there are several different processes acting to destroy or preserve bones.' The interplay between these climatic factors and soil characteristics is a complex and dynamic one. Beck (1980: 42) has pointed out that 'There is no simple relationship between measurable soil variables and decomposition rates.' She has further stated (42-43) that: 'The environmental conditions are the result of numerous feed-back mechanisms acting on the physical, biological and chemical attributes of the soil, and contributing to the diurnal and seasonal changes in those attributes.' One of the soil attributes which influences the chemical weathering of bone is soil pH. Although the interaction of soil pH with other variables does result in differing chemical effects on bone, overall soil pH has a significant effect on bone preservation.

The morphology of bone changes at both the microscopic and macroscopic levels in recognisable stages as bone weathers. These morphological changes in the physical properties of bone are contemporaneous with chemical changes which occur in the organic and inorganic components of bone. The organic component is collagen, while the inorganic component is hydroxyapatite. Buried bone is to subjected diagenesis, which includes the processes of mineral leaching and mineral replacement or recrystallisation. These two processes are influenced by pH and temperature. White and Hannus in their 1983 paper on chemical weathering of bone in archaeological soils, outlined the stages which bone is likely to go through in the diagenesis process. According to them, chemical weathering commences with microbial decomposition of the collagen. This decomposition weakens the structure of bone and exposes individual hydroxyapatite crystals which are encased in a network of collagen. The decomposition also produces organic and carbonic acids, independent of soil properties, and it is these acids which react with the hydroxyapatite resulting in further chemical weathering through mineral leaching. Put simply, this further chemical weathering results from hydrogen ions in the organic and carbonic acids replacing calcium in the hydroxyapatite. As the collagen is depleted, the amount of hydrogen ions available from decomposition decreases. At this stage, further chemical weathering of hydroxyapatite may either continue if the soil in which the bone is deposited is acidic and therefore more hydrogen ions are available, or else weathering may be arrested and the bone stabilised if calcium ions are present in the soil. If calcium ions are present, then they may displace the hydrogen ions previously added to the hydroxyapatite, recrystallising the inorganic bone component, and thus stabilise the bone from further chemical weathering.

Pate and Brown (1985: 486) discuss experimental evidence which indicates that macrocrystalline secondary calcium phosphate forms from calcium phosphate solutions at a pH of 6·2 at room temperature. Once the pH of this secondary calcium phosphate reaches 6.9 or higher, it undergoes rapid hydrolysis and the spontaneous crystallisation of hydroxyapatite occurs. What this means for a bone which has undergone initial hydrogen ion replacement of calcium ions is that, if calcium ions are available in the deposit from calcium phosphate in solution, then chemical weathering can be arrested, if the soil pH is equivalent to, or greater than 6·9. The relationship between soil pH and chemical weathering can be summarised as follows. In alkaline soils (those with a pH greater than 7·0) hydroxyapatite is relatively insoluble, relatively stable, and undergoes little chemical weathering. The degree of chemical weathering as measured by increasing hydroxyapatite solubility, is more marked as the pH decreases to 6·5 or 6·0, and increases rapidly below a pH of 6·0 (Pate and Brown 1985: 486). What this means is that bone preserves best in alkaline soils which are warm and where there are free calcium ions available to replace those leached during the decomposition of the collagen.

Information on the annual range for soil temperature was not available for the ERT midden on St Helena. However, the annual air temperature range would suggest that the matrix of the midden fulfulled the temperature requirements for remineralisation and bone stability to take place. An analysis of the elements present in the matrix was not undertaken, but the presence of lime, coral and shell would suggest that calcium was available for the replacement of that lost in the initial decomposition of the collagen. Further, the pH levels of the matrix are all alkaline, with one exception of a neutral reading, indicating that hydrogen ions were not available for continued chemical weathering of hydroxyapatite following the decomposition of the collagen. Two hundred and twenty-nine soil samples were taken during the excavation of the ERT midden which overwhelmingly indicated that this midden was of a mid range alkaline nature, with 99·2% of soil samples evidencing a pH of 8·0 to 9·5 (Table 6·2).

Table 6·2: pH of the European Rubbish Tip Soil Samples

pH	NUMBER OF CASES	PERCENTAGE
7·0	1	0·4
7·5	1	0·4
8·0	23	10·0
8·5	114	49·8
9·0	88	38·4
9·5	2	0·9
TOTAL	229	99·9

Table 6·3: Weathering stages (based on Voigt 1983)

STAGE	STAGE NAME	STAGE DESCRIPTION
0	FRESH BONE	No cracks, bones still greasy, periosteal tissue covers the external surface.
1	INITIAL WEATHERING	All soft tissue has been eroded away. Surface may appear rough and exhibit some fine cracks.
2	SLIGHT WEATHERING	The surface of the bone shows some shallow cracks, and has been roughened by natural agents.
3	LIGHT WEATHERING	The cortex of the bone has commenced to exfoliate, that is, to peel away in thin flakes.
4	MEDIUM WEATHERING	The cracking process may have penetrated deeper into the bone surface and the bone has become friable. External features of the bone may be partially obliterated by the weathering process.
5	HEAVY WEATHERING	The surface of the bone has become soft and is distintegrating. Cracking may be so extensive as to result in a bark-like texture. Most external features have been destroyed.
6	TERTIARY WEATHERING	The texture of the bone has become powdery or chalk-like; the bone is so soft that it can be abraded with the fingers. Usually it is completely without recognisable external characteristics.

Table 6·4: Incidence of weathering in the ERT assemblage

WEATHERING STAGE	NUMBER OF CASES	PERCENTAGE
0	0	0·0
1	5178	93·2
2	145	2·6
3	87	1·6
4	67	1·2
5	70	1·3
6	10	0·2
TOTAL	5557	100·1

The analysis of the actual weathering exhibited by the faunal remains confirms that the nature of the matrix was such that only minimal chemical weathering took place. Bones were classified to one of seven weathering stages. These stages were based on a modified system designed by Voigt (1983), and are defined in Table 6·3.

As can be seen from Table 6·4, the ERT faunal assemblage displayed negligible weathering. Overall the assemblage consisted of 5557 items, of which 5178, or 93·2% displayed only minor weathering, which would have resulted from the initial decomposition of the organic component of the bone. This means that only 379 items, or 6·8% displayed any weathering which could be equated to post-collagen decomposition. Out of these 379 remains, only 80, or 1·5% of the assemblage, demonstrated that chemical weathering had proceeded to a stage where complete decomposition of the inorganic hyroxyapatite component of the bone was occurring. What this means is that chemical weathering has had little effect on this faunal assemblage and, of importance to this thesis, it is unlikely that evidence of butchery in the form of butchery marks would have been eroded as a result of weathering.

There is another form of chemical alteration to this assemblage: plant root etching. Carbonic acid produced by plant-root growth is believed to be responsible for dendritic surface alterations which are characterist of plant root-etching on bone (Bonnichsen and will 1980: 9). These dendritic surface patterns are present on only 19 items or 0·3% of the assemblage, and therefore plant-roots have had no real effect on either the preservation of the faunal items or on the eroding of surface butchery marks.

6·7·2 Mechanical effects

The greater the degree of fragmentation of an item the more likely it is not to be identified to skeletal element and species. Also, the chances of failing to detect a butchery mark increases. The St Helena assemblage evidenced a fair degree of fragmentation, most of which is interpreted as resulting from compression factors such as the weight of the overburden, and trampling during land reclaimation. Fortunately, it was still possible to identify many fragments to skeletal element and/or species. Some of the fragments in the assemblage were able to be connected to other fragments in which case, the connected fragments were counted as a single faunal item. Of the 5557 items in this assemblage, 368 or 6·6% were made up of more than one connecting fragment. It is likely that many of the remains may have joined one another at the time of deposition, but it was not possible to piece them together. Table 6·5 shows the incidence of items which were represented by more than one connecting fragment. Overall the assemblage evidenced 7074 fragments.

Table 6·5: Incidence of items consisting of more than one fragment

NUMBER OF FRAGMENTS IN ITEM	NUMBER OF CASES	PERCENTAGE
1	5189	93·4
2	220	4·0
3	47	0·9
4	32	0·6
5 or more	69	1·2
TOTAL	5557	100·1

6·7·3 Heat-alteration

There are several taphonomic factors which could have assisted compression factors in fragmenting the assemblage. Chief amongst these is heat-alteration. Four categories of heat-alteration were observed in this assemblage. These were as follows:

1. Unburnt: No heat-related changes apparent.

2. Burnt: A heterogeneous condition exhibiting various combinations of colour (ranging from bluish grey to black) and textural changes (burnt remains often exhibited a smooth or polished outer surface).

3. Burnt—> Calcined: Transitional between burnt and calcined; the outer surfaces calcined but not the inner.

4. Calcined: Condition identified by a white or grey colouration and a compact but brittle texture.

Burnt teeth tended to possess crazed or fractured enamel, whilst calcined teeth had typically lost the enamel cap altogether and possed a white, often powdery dentine core.

The incidence of burning can be seen in Table 6·6. What this table shows is that the ERT assemblage evidences a ratio of approximately 4:1 unburnt to heat-altered items. There were 4324 (or 77·8%) remains which evidenced no heat-related changes, but 1233 (22·2%) did evidence such changes. These heat-altered items are assumed to have been deposited in an unburnt state, but with hot coals from cooking fires and also from industrial sources. Those heat-altered items which demonstrate calcining are believed to indicate that the bone was in contact with the coals, which while still hot were covered with either sand from the foreshore or else red soil from sources elsewhere on the island. As stated in Chapter 3, burning, especially to the stage where the bone becomes calcined, greatly increases the chances that the bone will fracture under compression. The evidence from the fracture patterns exhibited by the remains would tend to support this.

Table 6·6: Incidence of burning in the ERT assemblage

HEAT-ALTERATION STATUS	NUMBER OF CASES	PERCENTAGE
UNBURNT	4324	77·8
BURNT	474	8·5
BURNT—> CALCINED	98	1·8
CALCINED	661	11·9
TOTAL	5557	100·0

6·7·4 Fracture patterns

During the initial identification of the faunal material fractures were only recorded if they fell into one of four classifiable fracture categories. These categories were based on Haynes' (1981: 393-395) fracture morphology, and can be defined as follows:

1. Transverse fractures: Linear breaks across the bone at right angles to the long axis.

2. Longitudinal fractures: Linear breaks running the length or part of the length of a bone.

3. Spiral fractures: Any break which occurs around the shaft of a bone. In this situation shaft is taken to equate to not only the shafts of long bones, but also to similar related structures on axial bones, such as rib shafts and pelvic ilium shafts.

4. Jogged fractures: Right angled offsets interrupting a smooth transverse, longitudinal or spiral fracture. Result of a fracture cutting across small longitudinal drying cracks.

Also during the identification stage was recorded if the item under examination displayed no fractures, displayed non-classifiable fractures or else, displayed fractures which were fresh. These fresh fractures would have resulted either during excavation or else transportation to the archaeology laboratory at the university of New England. These fractures were clearly recognisable by their clean, fresh (white as opposed to grey) appearance.

The manner in which the primary data sheets were summarised was such that items displaying non-classifiable fractures and unfractured items were grouped together. In hindsight this was inappropriate for an analysis of fragmentation and an analysis of the relationship between fragmentation and heat-alteration, which is an important taphonomic consideration. What this means is that it was possible to test if there was relationship between classifiable fractures and heat-alteration, but that it was not possible to test which heat-alteration stage may have been responsible for this fragmentation, nor was it possible to test the relationship between heat-alteration and all forms of fragmentation. This would involve a re-examination of the primary data, for which time was not available. This will be conducted for the final report.

Of the 5 557 items in the assemblage, 347, or 6·2% exhibited classifiable fractures. These 347 items displayed a total of 598 fracture. The numerical distribution of these fracture types can be seen in Table 6·7. There are three sub-types of jogged fractures and the breakdown of jogged fractures into their sub-types can be seen in Table 6·8.

What Table 6·7 demonstrates is that transverse fractures were the most common type of classifiabe fracture identified in this assemblage. It also shows from its total that some items must have two or more fractures. Fractures occur on items represented by a single fragment, and also on items represented by two or more inter-connecting fragments. Often the fracture recorded was that which caused the remain to break into two or more fragments. Out of the 347 items which displayed classifiable fractures, 207 (59·7%) had a single fracture, while the other 140 (40·3%) had two or more fractures. These items

Table 6·7: Numerical distribution of fracture types

FRACTURE TYPE	NUMBER OF CASES	PERCENTAGE
TRANSVERSE	274	45·8
LONGITUDINAL	154	25·8
SPIRAL	145	24·3
JOGGED	25	4·2
TOTAL	598	100·1

Table 6·8: Numerical distribution of jogged sub-types

JOGGED SUB-TYPE	NUMBER OF CASES	PERCENTAGE
JOGGED TRANSVERSE	7	28·0
JOGGED LONGITUDINAL	4	16·0
JOGGED SPIRAL	14	56·0
TOTAL	25	100·0

displaying multiple classifiable fractures did not always have repetition of the same fracture type, more often than not two or three fracture types are present. The reason for this is that when bones are freshly exposed to air, especially long bones, longitudinal cracks often appear within 12 hours. Haynes (1981: 394) has defined these cracks as desiccation splits. These desiccation splits are parallel to the prevailing alignment of collagen and hydroxyapatite crystals in the bone. These are usually arranged in fibres or strings running in the longitudinal plane of bone shafts. The bone breakages which occur after drying cracks appear are therefore a mixture of spiral, transverse, longitudinal and jogged fractures.

Table 6·9 shows the relationship between bones demonstrating both classifiable fractures and burning. What this table shows is that 135 items (38·9%) which had classifiable fracture patterns also evidence alteration by heat. The figures in this table demonstrate that there is a greater percentage (approximately 20%) of heat-altered items evidencing classifiable fracture patterns than unburnt items. The ratio of all unburnt items to heat-affected items was approximately 4:1, while the ratio of unburnt classifiable fractured items to heat-affected classifiable fractured items is approximately 3:2. This indicates that in this assemblage, heat-affected items have a much higher probability of being subjected to subsequent classifiable fragmentation, and thus have an increased chance of not being identified to skeletal element or species.

TABLE 6·9: Relationship between bones evidencing classifiabe fractures and the incidence of heat alteration

HEAT-ALTERATION STATUS	NUMBER OF CASES	PERCENTAGE	NUMBER OF CASES	PERCENTAGE
UNBURNT	212	61·1	212	61·1
BURNT	54	15·6		
BURNT—> CALCINED	13	3·8	135	38·9
CALCINED	68	19·6		
TOTAL	347	100·1	347	100·0

In order to determine if there was a relationship between classifiable fractures and heat-alteration, the null hypothesis that there was no significant difference between the incidence of unburnt to heat-altered items which were either unfragmented or displayed non-classifiable fractures to those which displayed classifiable factures was tested. The data used to test the null hypothesis is as follows:

HEAT-ALTERATION STATUS	NON-CLASSIFIABLE FRACTURED AND UNFRACTURED ITEMS	CLASSIFIABLE FRACTURED ITEMS	TOTAL
UNBURNT	4112	212	4324
HEAT-ALTERED	1098	135	1233
TOTAL	5210	347	5557

A Chi-square test on the above data produced a X^2 value of 58·877. This means that there is a very highly significant difference in the incidence of unburnt to heat-altered items in the two categories and thus the null hypothesis is rejected. This result supports the claim that heat affected items have a much higher probability of being subjected to classifiable fragmentation then non-heat-affected items.

There would appear to be a relationship between classifiable fracture types and burning. Table 6·10 presents the data which shows this relationship. This table indicates that there is a relationship between heat-alteration and transverse fractures. Table 6·9 shows that 61·1% of items which evidenced classifiable fractures were unburnt, but Table 6·10 shows that only 38·0% of transverse fractures were present on burnt remains. What this indicates is that approximately 33% of transverse fractures on heat-affected items almost certeainly resulted after burning had taken place. This confirms Shipman's (1981: 177) observation that burning of faunal remains is likely to weaken the bone structure in such a manner as to induce transverse fractures.

As can be seen from Table 6·10 there would appear to be a similar relationship between longitudinal fractures and burning. Longitudinal fractures are seen as resulting from lines of structural weakness in bones which are caused by initial weathering of the bone when it dries out. This drying out of the bone produces fine longitudinal cracks, which may, if weathering continues lead to longitudinal fractures under compression. One of the effects of longitudinal cracking is that the bone develops longitudinal lines of structural weakness. One of the effects of burning is to cause a bone to become brittle, especially in the case where burning proceeds to the stage when the bone is calcined. Also, burning bone to the calcined stage causes the bone to shrink and the longitudinal lines of weakness to expand into wide cracks. Under compression, a burnt bone because of its brittle nature is more likely than an unburnt bone to fracture, and this fracturing is most likely to follow pre-existing lines of structural weakness. This results in longitudinal fractures.

Table 6·10 also shows the relationship between spiral fractures and the incidence of burning. Unlike transverse and longitudinal fractures, the figures in this table indicate that there is not a relationship between burning and spiral fractures. There is an approximate 25% greater incidence of spiral fractures on unburnt bone than that which would have been expected if the fracture pattern followed the burning pattern exhibited by all remains evidencing classifiable fractures. Spiral fractures are viewed as occurring prior to burning taking place. Indeeded these fractures are seen as resulting while the bone is still fresh, that

Table 6·10: Relationship between classifiable fractures and the incidence of heat-alteration

	TRANSVERSE FRACTURES		LONGITUDINAL FRACTURES		SPIRAL FRACTURES		JOGGED FRACTURES	
HEAT-ALTERATION STATUS	No. of cases	Percentage	No. of cases	Percentage	No. of cases	Percentage	No. of cases	Percentage
UNBURNT	104	38·0	52	33·8	119	82·1	13	52·0
BURNT	55	20·1	24	15·6	12	8·3	7	28·0
BURNT-> CALCINED	15	5·5	14	9·1	1	0·7	0	0·0
CALCINED	100	36·5	64	41·6	13	9·0	5	20·0
TOTAL	274	100·1	154	100·1	145	100·1	25	100·0

is unweathered or in Weathering Stage 1. Those burnt bones exhibiting this fracture pattern are seen as indicating burning taking place after the fracture had occurred.

It is possible that spiral fractures may have resulted during the butchery process. This is because there was evidence on the remains to indicate that not all shearfaces were taken completely through bones, but that some cuts only went partially through the bone. Subsequently, in order to produce a division, the bone was bent and a force applied resulting in the division being accomplished by snapping the bone. Apart from producing a division this snapping of the bone also produces a spiral fracture. This pattern of snapping bones was most evident on long bones. It is therefore not surprising to note that 128 (88·3%) of the recorded spiral fractures were present on long bone shafts.

Another possible cause of spiral fractures, other than as a result of butchery practices, deliberate breaks for marrow extraction, or non-deliberate breaks resulting from compression factors prior to Weathering Stage 1 being completed, is that spiral fractures can result from carnivore (in this case, dog) activity. Haynes (1981) has documented carnivores causing spiral fractures on bones. The possibility that a dog or dogs may have been responsible for some spiral fractures, comes from the fact that seven long bone remains which evidenced spiral fractures also evidenced dog tooth marks.

The relationship between jogged fractures and the incidence of burning is also set out in Table 6·10. This table demonstrates that there is no relationship between heat-alteration and jogged fractures. In all likelihood, those items evidencing jogged fractures, which are heat affected, were fractured prior to heat-alteration. The jogged fracture pattern is seen as occurring once the weathering of the bone had proceeded beyond Stage 1, but was still relatively fresh. Longitudinal drying cracks would have formed prior to fracture. Due to compressional factors, possibly the deposition of refuse, the bone fractures along the lines of structural weakness. Depending on the degree of freshness of a bone, a spiral, transverse or longitudinal fracture (in that order, from least weathered to most weathered) occurs. However, due to the presence of pre-existing lines of weakness from the drying of the bone, the fracture jumps transversely between the longitudinal cracks, resulting in a jogged appearance to the fracture.

6·7·5 Carnivore action

Those dog tooth marks present were classified into three types: tooth perforation or puncture marks, striated marks, and crunching marks. This tooth mark classificatory system was based on the work of Bonnichsen and Will (1980) and Crader (1983). Tooth perforation or puncture marks are represented on a faunal item as either circular punch holes or as depression fractures which may penetrate the bone or merely be evidenced by slight indentations. They are thought to be created by either a canine or carnassial, where it has punctured the bone creating a small hole or depression, usually filled with crushed bone.

Striated marks include lineal scratches, scoring marks and what Crader (1983: 112) calls drag marks (shallow, fairly wide, furrows). These marks are present on the cortical surface of bones, generally located at the diaphyseal ends of long bones. According to Bonnichsen and Will (1980: 10) these marks are 'apparently caused when the carnassial teeth are drawn across the bone surfaces'. Crader (1983), however, states that canines can also be responsible for these marks. These marks are seen as resulting when a carnivore is 'attempting to gain access to the marrow cavity by stripping away flesh and removing periosteum' (Bonnichsen and Will 1980: 10). These marks also evidence an attempt by a carnivore to gain access to the marrow cavity as a result of subsequent crunching. The removal of the epiphyseal ends weakens the structural strength of the bone, allowing for a more successful splitting of the shaft with a crushing bite.

Crunching marks result from the action of carnassial teeth once the epiphyseal end or ends have been gnawed off. The diaphyseal ends are then crunched between the jaws, in a vice-like manner in order to allow the carnivore to gain access to the marrow cavity. This crunching of the ends of bones is portrayed by a series of longitudinal splinters which result when the bone wall collapses.

Those remains which did exhibit dog tooth marks did not just show one type of mark. Indeed five remains displayed the presence of two mark types. The incidence of the different types of dog tooth marks can be seen in Table 6·17. The distribution in the site of those remains evidencing dog tooth marks was a single item from Squares 1A-1E, and a fairly even distribution both vertically and horizontally through Squares 1K-1O. This means that any biasing of the sample that dogs may have caused, will be affecting the assemblage as a whole, and not just specific stratigraphic units.

Table 6·11: Incidence of dog tooth marks

MARK TYPE/S	NUMBER OF CASES
1	6
1 and 2	4
2	22
2 and 3	1

As stated above dogs, may be resposible for some of the spiral fractures. Of far greater importance to faunal analysis is the role dogs and other carnivores may play in altering the representation of skeletal elements and species. Carnivores can alter the composition of faunal assemblages in three main ways. They can remove or add bones to an assemblage at the site of deposition, they can reduce bones at the site of deposition to unidentifiable fragments, and bones can be fed to dogs before they ever reach a midden. All the carnivore marks on the faunal remains from the ERT midden were made by dogs. It is known from historical photographs that at least one dog was present on the island in its early years. The items which evidence dog tooth marks are extremely few. In fact only 33 remains (0·6%) of the assemblage evidenced such marks. This would tend to indicate that dogs may have played an insignificant role in altering the representativeness of the assemblage. However, this cannot be stated with assurance. This is because the source of these bones is not known. It is not known whether or not a dog or dogs had access to the midden, or else these remains represent bones cleaned up from the dogs' feeding area after it had finished with them and then deposited on the midden.

What the presence of these bones indicates is that a dogs have had access to bones, of unknown numbers, at some stage. In many situations this could be a major problem, but on St Helena, since the source of meat is known and the skeletal element representativeness is known, this is not a problem. This is further the case because this analysis is concerned with butchery patterns. Had consumed meat calculations or nutritional questions been the concern of this study, then a problem may have resulted. But there are also additional problems relating to just how justified it would be to relate findings from the area excavated to the whole midden. This however is a topic beyond the scope of this thesis. Overall, for the purposes of this study, the action of carnivores would appear to have had minimal affect on the validity of the conclusions.

6·7·6 Rodent action

Rodents, (in the case of St Helena rats) like dogs are capable of biasing the representativeness of a faunal assemblage. Rats are capable of moving bones considerable distances from a midden. This fact was observed in an experiment conducted on St Helena, where rats were observed to move a ranged of butchered cattle and sheep axial bone and sheep long bone at least 100 metres in the space of a single night. There were 11 items (0·2%) in the assemblage which did evidence rat gnawing. This indicates that rats did have access to the midden. It is therefore quite likely that they may have removed faunal remains from the midden. It is not possible to determine what affect this might have had on the representativeness of the assemblage. Of far more importance to this thesis is the effects of rat gnawing on bone. Because rodent incisor teeth are constantly growing, rodents must gnaw objects in order to maintain an effective biting length. The straight-edged, chisel-shaped nature of rodent incisor teeth leaves very characteristic marks on the bone they gnaw. These are roughly parallel longitudinal scrap marks which are orientated perpendicular to the bone edge where they occur. The significance to this study of this gnawing is that rodent gnawing can remove diagnostic features on bones, making them difficult to identify, but more importantly, they remove marks which evidence butchery. The extremely low incidence of bones evidencing rodent gnawing, however, suggests that in this instance, taphonomic loss of butchery data via rodents is negligible.

6·7·7 Summary of taphonomic considerations

Overall, this discussion of the taphonomic factors which have influenced the preservation and representativeness of faunal remains from the ERT site, indicate that the assemblage has suffered little attrition due to taphonomic factors and therefore is representative of the utilisation of meat from domestic animals on St Helena Island.

6·8 Quantification of faunal remains

This section interprets the primary data obtained during the initial faunal identification and recorded on the analysis sheets. Three types of secondary data are presented. These are minimum numbers of skeletal elements (MNE), minimum numbers of individuals (MNI), and information on likely age at slaughter based on fusion data and tooth-eruption sequences. This information is presented for each of the three domesticates in turn. All the fusion data and tooth-eruption sequences are based on the tables set out by Silver (1969).

In order to get an overall picture of faunal quantification the assemblage was considered as a whole. This decision was made for three reasons:

1. The rapid deposition of the assemblage under consideration.

2. In order to minimise the effects of post-depostional disturbance.

3. In order to minimise the effects of errors made in excavation due to the complex nature of the stratigraphy.

The faunal items chosen for this study came from an area of the midden where there was firm evidence from other artefact classes that the time depth of the deposit was much shorter than that for the Establishment. The faunal items came from an area from which associated artefact classes represent some of the earliest deposition in the midden with a time-depth of possibly no more than two decades. The assemblage came from the foreshore bank and the trough between the foreshore and inland banks. These two areas are viewed as being the earliest depositional zones in the midden based upon the stratigraphy and the inferred site formation process. That these zones represent the earliest deposition was confirmed by the capping of waste lime in this area and from artefacts present in the deposit. Too date, only the glass and ceramic artefacts have been looked at in detail. These two artefact classes contained items which could be dated to the period 1860-1890, with the bulk dating to the 1870s. Further work still has to be done on the dating of all the artefacts excavated. However, a visual inspection reveailed no artefacts from Squares 1A-1E and 1K-1O which could be said to post-date 1890. The sum of the evidence is that the faunal items came from a maximum time-frame of 20 years.

Post-depositional disturbance was evident in the stratigraphy (see Square 1O, Fig. 6·3). This disturbance was most likely caused by antique bottle collectors based upon observations by National Parks and Wildlife Servive staff of such activities immediately adjacent to the area selected for excavation. From personal observations made elsewhere of these types of activities, bottle collectors are interested solely in intact bottles, and possibly clay smoking pipes. Other items such as broken bottles and bones are not taken but redeposited by the collector upon back-filling the hole which has been dug. This means that the bulk of the archaeological items are dug are left at the site but their provenance is disturbed. Because of this, these items have to be quantified and analysed as a whole.

The grey colour of many of the deposits, in conjunction with poor horizon clarity between many of the stratigraphic units, made it difficult to detect stratigraphic changes until after they had been excavated. This meant that it is not possible in some instances to relate faunal items precisely to specific stratigraphic units. This is essential if an assemblage is to be quantified and analysed using divisions based upon stratigraphic units. It was for this reason, and the two above discussed reasons that the assemblage was considered as a whole.

The MNE and MNI for sheep bone remains are presented in Table 6·12, and the MNE and MNI for sheep teeth remains are presented in Table 6·13. What these tables present is a picture of sheep skeletal remains indicating the utilisation of whole sheep on the St Helena. With the exception of some carpal and tarsal bones, and some cranial and facial bones, all the elements of the sheep skeleton are represented. From these remains it is possible to conclude that slaughter and butchery of sheep took place on St Helena. It is also clear from these two tables, when compared to those for cattle and pig remains, that sheep were by far the most important domesticate on St Helena Island in terms of the numbers killed for consumption. However, cattle offer a far higher meat weight yield per individual than do sheep. According to Lyman (1979: 542) the average consumable meat weight for a cow is 500 pounds (227 kg) while that from a sheep aged 12 months or more is 80 pounds (36kg). This means that it takes 12·5 sheep to equate the value in terms of consumable meat weight of one cow. The ratio of sheep to cattle in the assemblage studied is approximately 3:1 (based on MNI). This indicates that cattle were more important than sheep as a dietary source of meat, and is contrary to the historical documentation which clearly states that sheep were more important than cattle prior to the 1910s. Possible reasons for this discrepancy is that the sample size is too small to reflect the true situation, or else more cattle meat was consumed than is reflected in the historical documents.

Table 6·12: Minimum numbers of sheep skeletal elements

SKELETAL ELEMENT	MNE R	MNE L	MNE US	MNE MID	MNE	MNI
HORN			18		18	9
FRONTAL	5	6			11	6
TEMPORAL	7	6			13	7
ZYGOMATIC	4	5			9	5
SPHENOID	1				1	1
BASISPHENOID			1		1	1
NASAL			1		1	1
MAXILLA	7	5			12	7
PREMAXILLA			2		2	1
INTERPARIETAL				1	1	1
PARIETAL				7	7	7
OCCIPITAL				5	5	5
PERIOTICUM	4	5	2		11	6
MANDIBLE	6	11			17	11
HYOID				5	5	5
CERVICAL VERTEBRA				63	63	9
THORACIC VERTEBRA				64	64	5
LUMBAR VERTEBRA				68	68	10
SACRUM				11	11	11
COCCYGEAL VERTEBRA				10	10	1
UNPOSITIONED VERTEBRA				2	2	1
RIB	57	64	19		150	5
CALCIFIED RIB CARTILAGE			3		3	1
STERNUM				3	3	3
SCAPULA	9	8			17	9
HUMERUS	13	6			19	13
RADIUS	9	14			23	14
ULNA	6	6			12	6
RADIAL CARPAL	3	4			7	4
INTERMEDIATE CARPAL	3	1			4	3
ULNAR CARPAL	1	2			3	2
CARPAL 2+3	1	3			4	3
CARPAL 4	2	2			4	2
METACARPAL	6	3			9	6
SESAMOID			1		1	1
PELVIS	13	18			31	18
FEMUR	19	17			36	19
PATELLA	2	5			7	5
TIBIA	14	23			37	23
TALUS	14	11			25	14
CALCANEUS	13	15			28	15
CENTROQUARTAL	5	2			7	5
LATERAL MALLEOLUS	1				1	1
METATARSAL	7	6			13	7
METAPODIUM			11		11	3
1ST PHALANX	11	8			19	3
2ND PHALANX	3	8			11	2
3RD PHALANX	3	5			8	2

Table 6·13: Minimum numbers of sheep teeth elements

TOOTH POSITION	MNE R	MNE L	MNE US	MNE	MNI
UPPER M3	13	11		24	13
UPPER M2	16	14		30	16
UPPER M1	7	7		14	7
UPPER P4	7	9		16	9
UPPER P3	5	3		8	5
UPPER P2	1	1		2	1
UPPER P2 OR P3			3	3	1
LOWER M3	7	11		18	11
LOWER M2	9	11		20	11
LOWER M1	6	9		15	9
LOWER P4	3	9		12	9
LOWER P3	6	8		14	8
LOWER P2	1	1		2	1
MOLAR OR PREMOLAR			1	1	1
LOWER CENTRAL INCISOR	1	1		2	1
LOWER MIDDLE INCISOR	1	1		2	1
LOWER LATERAL INCISOR	1	1		2	1
UNPOSITIONED INCISOR			16	16	2

Two predictions were made concerning the make up of the archaeological assemblage based upon historical documents. The first of these, that the assemblage should contain all the skeletal elements of a sheep has been realised by the assemblage. The second was that these elements should be present in the archaeological sample in the same proportions as they are in the skeleton. Using a Chi-square test it is possible to determine whether the observed numbers of skeletal elements in the archaeological sample differ from those expected from numbers present in the skeleton. These values are set out in Table

6·14. The expected numbers are arrived at by multipling the occurance of a skeletal element in the body by MNI for the archaeological sample, in this case 23.

Table 6·14: Expected and observed numbers of sheep skeletal elements

SKELETAL ELEMENTS	EXPECTED NUMBERS	OBSERVED NUMBERS
Skulls	23	11
Cervical vertebrae	161	63
Thoracic vertebrae	299	64
Lumbar vertebrae	161	68
Sacrums	69	11
Ribs	598	150
Sternums	23	3
Scapulae	46	17
Humeri	46	19
Radii/ulnae	46	23
Carpals	276	22
Metapodials	92	33
Pelves	46	31
Femora	46	36
Patellae	23	7
Tibiae	46	37
Tarsals	276	61
Phalange	552	38

The result of a Chi-square test on the data in Table 6·14 produces a X^2 value of 1689·319. This value means that there is a very highly significant difference between the expected and the observed numbers of skeletal elements. Therefore, the second predicition, that the skeletal elements present in the archaeological sample would be proportional to those in the skeleton is not met. There are two reasons as to why this is thecase. The first has to do with sampling and the second with taphonomic processes. Without complete excavation of the site it is unlikely that the proportions present in an archaeological sample would equate to those present in the body due to the possibility of differential deposition in different localities within the site of different skeletal elements from the same individual. This could occur as a result of separation of elements due to slaughter, butchery, cooking and consumption activities. The differential effects of taphonomic processes, such as fragmentation on different skeletal elements means that certain are more likely to be identified than others. This means that even if the entire site was to be excavated, the proportions of identified archaeological elements in the St Helena ERT site would still ot equate to those proportions present in the skeleton. It is therefore not surprising that the second prediction is not met. Overall, what this demonstrates is yet another failure on the part of the MNI to be an analytically useful tool in interpreting archaeological faunal assemblage

Data relating to the age of sheep at slaughter is presented for the bone items in Table 6·15, and for the tooth items in Table 6·16. Fusion data (as discussed in Chapter 4) is often frustrating in determining ranges for age at slaughter and the relating of this to husbandry practises. This is because fusion data is generally not specific enough, and generally fails to give reliable estimates for older animals for which fusion has occurred at all ossification centres. This study is however concerned with butchery patterns. Here animal size is more important than state of fusion. Not only does age influence the decision of whether or not to slaughter an animal but so does the stage of physical maturity reached, and this may be determined by the weight of the animal. There is of course a strong correlationship between size and age. For sheep, as for most animals, physical maturity (or optimum body weight) is reached prior to the completion of the fusion of all bones, what we might call skeletal maturity. Generally sheep are regarded as having reached maturity at the time of the eruption of their permanent middle incisors. At this point in time they are referred to as 'two-tooths'. This eruption takes place at between 18-24 months of age. The meat from such animals at this age is commonly referred to as 'hogget', being known as 'mutton' at 2.5-3 years of age. Prior to the eruption of the middle incisors, sheep meat is referred to as 'lamb'. Generally hogget and mutton are butchered in the same manner, but lamb, because of its smaller size and greater tenderness, is often butchered differently, as recorded in the documentary sources presented in Appendix 2. In terms of this study, which is oriented towards butchery analysis, it is important to know whether the butchered remains are evidencing different patterns of butchery due to the age of the animal at slaughter, or as a result of other factors such as individual butcher variation or desire for different cuts from the same area of the carcass.

Table 6·15: Sheep bone age-determination data (fusion based on Silver 1969)

SKELETAL ELEMENT	OSSIFICATION CENTRE	FUSION STATE	AGE	NUMBER OF CASES
HUMERUS	DISTAL EPIPHYSIS	FUSED	>10 m	17
RADIUS	PROXIMAL EPIPHYSIS	FUSED	>10 m	17
SCAPULA	BICIPITAL TUBEROSITY	FUSED	>10 m	17
1ST PHALANGE	DISTAL EPIPHYSIS	FUSED	>13-16 m	19
2ND PHALANGE	DISTAL EPIPHYSIS	FUSED	>13-16 m	11
TIBIA	DISTAL EPIPHYSIS	UNFUSED	<1.5-2 yrs	1
METACARPAL	DISTAL EPIPHYSIS	FUSED	>1.5-2 yrs	6
TIBIA	DISTAL EPIPHYSIS	FUSED	>1.5-2 yrs	33
METAPODIUM	DISTAL EPIPHYSIS	UNFUSED	<18-28 m	2
METAPODIUM	DISTAL EPIPHYSIS	FUSED	>18-28 m	9
METATARSAL	DISTAL EPIPHYSIS	FUSED	>20-28 m	6
ULNA	DISTAL EPIPHYSIS	UNFUSED	<2.5 yrs	1
ULNA	PROXIMAL EPIPHYSIS	FUSED	>2.5 yrs	12
ULNA	DISTAL EPIPHYSIS	FUSED	>2.5 yrs	6
FEMUR	PROXIMAL EPIPHYSIS	UNFUSED	<2.5-3 yrs	4
CALCANEUS	TUBER CALIS	FUSED	>2.5-3 yrs	20
FEMUR	PROXIMAL EPIPHYSIS	FUSED	>2.5-3 yrs	28
RADIUS	DISTAL EPIPHYSIS	FUSED	>3 yrs	18
HUMERUS	PROXIMAL EPIPHYSIS	UNFUSED	<3-3.5 yrs	4
FEMUR	DISTAL EPIPHYSIS	UNFUSED	<3-3.5 yrs	2
TIBIA	PROXIMAL EPIPHYSIS	UNFUSED	<3-3.5 yrs	3
HUMERUS	PROXIMAL EPIPHYSIS	FUSED	>3-3.5 yrs	14
FEMUR	DISTAL EPIPHYSIS	FUSED	>3-3.5 yrs	31
TIBIA	PROXIMAL EPIPHYSIS	FUSED	>3-3.5 yrs	29
PELVIS	PUBIS-ACETABULAR BONE	FUSED	>3.5 yrs	31

Table 6·16: Sheep tooth age-determination data (eruption based on Silver 1969). NB: All teeth fully erupted and permanent.

TOOTH POSITION	AGE	NUMBER OF CASES
UPPER M3	>18-24 MONTHS	24
UPPER M2	>9-12 MONTHS	30
UPPER M1	>5 MONTHS	14
UPPER P4	>21-24 MONTHS	16
UPPER P3	>21-24 MONTHS	8
UPPER P2	>21-24 MONTHS	2
UPPER P2 OR P3	>21-24 MONTHS	3
LOWER M3	>18-24 MONTHS	18
LOWER M2	>9-12 MONTHS	20
LOWER M1	>3 MONTHS	15
LOWER P4	>21-24 MONTHS	12
LOWER P3	>21-24 MONTHS	14
LOWER P2	>21-24 MONTHS	2
MOLAR OR PREMOLAR	>21 MONTHS	1
LOWER CENTRAL INCISOR	>12-18 MONTHS	2
LOWER MIDDLE INCISOR	>18-24 MONTHS	2
LOWER LATERAL INCISOR	>27-36 MONTHS	2
UNPOSITIONED INCISOR	>12 MONTHS	16

The fusion data presented in Table 6·14 has been graphed in Figure 6·10. From the different age zones present in Figure 6·10 it is possible to produce a table (Table 6·17) showing the incidence and frequency of occurrence of the different age categories of sheep (as defined above) in the assemblage.

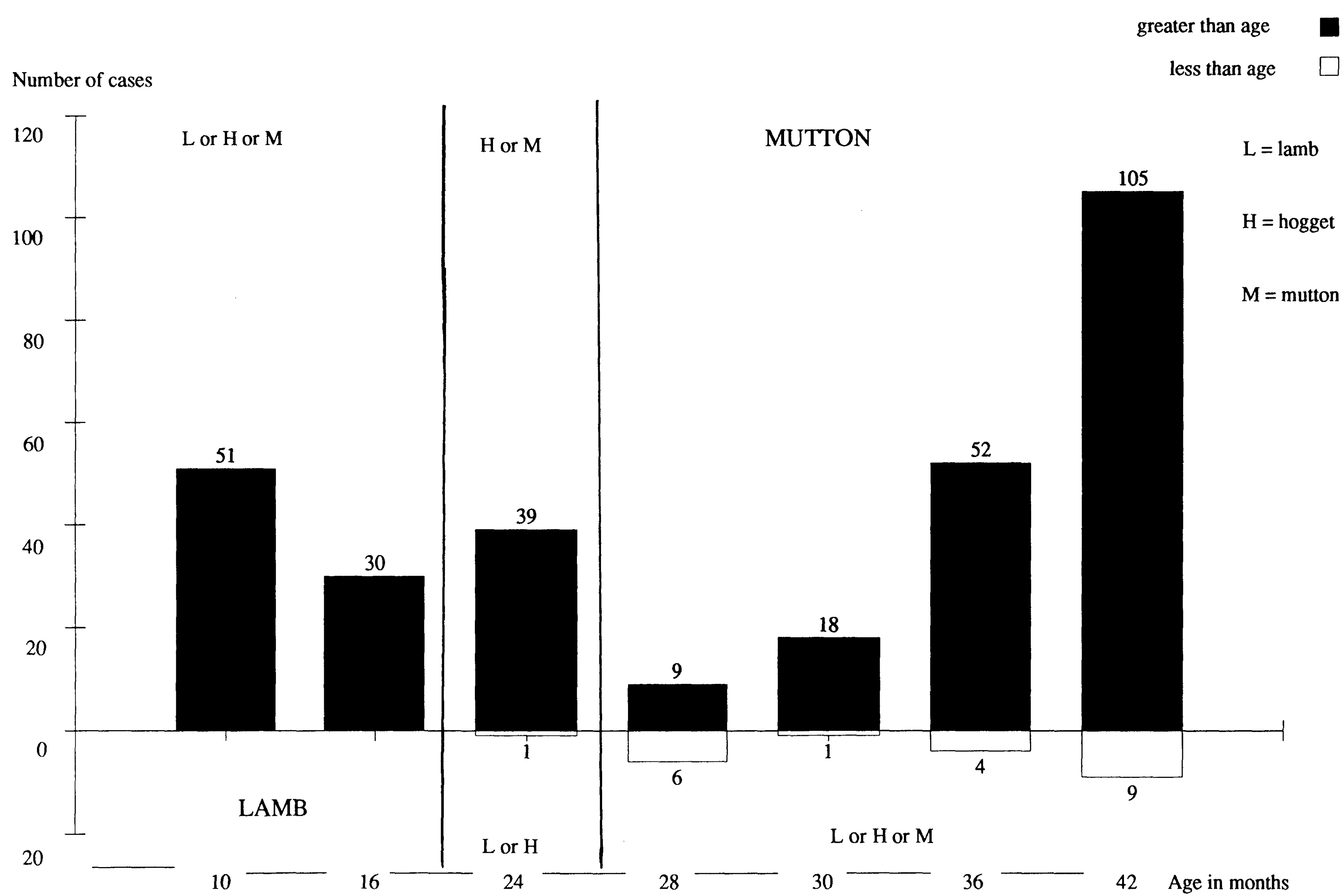


Figure 6.10: Incidence of fusion indicating different sheep age zones

Table 6·17: Incidence and frequency of occurance of lamb, hogget and mutton based upon fusion

AGE CATEGORY	NUMBER OF CASES	FREQUENCY
LAMB	0	0·0
LAMB OR HOGGET	1	0·003
HOGGET OR MUTTON	39	0·120
MUTTON	184	0·566
LAMB, HOGGET OR MUTTON	101	0·311
TOTAL	325	1·000

If the 101 cases from the last age category in Table 6·17 are diaregarded, as it is not possible to state whether these cases represent lamb, hogget or mutton, it is then clear that mutton and not lamb was being consumed. With the exception of one case (0·3%), which may be evidencing lamb or hogget consumption, all other cases demonstrate the consumption of hogget or mutton for which the documentary data in Appendix 2 records no differences in butchery strategies. The overwhelming evidence is that mutton was the most significant sheep meat consumed on St Helena. One hundred and eighty-four cases (56·6%) contain fusion evidence clearly indicating that they were from animals which had reached an age of two-and-a half years or more at slaughter. What this means in terms of the following section on butchery analysis, is that variation for sheep is not the result of differences in the ages at which they were slaughtered.

The MNEs and MNIs for cattle remains are given in Table 6·17. With the exception of a single 2nd phalanx, this table supports the prediction based on historical documentation that cattle were not slaughtered on St Helena, but that they were imported to St Helena following slaughter as sides of beef or possibly as quarters of beef. This is evidenced by the lack of cranial, facial and metapodial bones and the virtual total absence of phalanges. The prediction that cattle skeletal elements would be present in numbers proportional to their representation in the skeleton is not met. This is for the same reasons outlined for sheep. The final prediction made for cattle based upon the historical documentation was that the MNI for cattle would be significantly less than that for sheep. This is met, there being an MNI for cattle of 7, approximately 200 per cent less than the MNI of 23 for sheep.

As for sheep, cattle are generally butchered differently depending upon their age. From discussions with elderly retired butchers in New Zealand, who were trained by butchers who practiced their trade in the nineteenth century, there appeared to be a single age-class distinction where butchery practices differed. Up until one year of age cattle were referred to as vealers, and subjected to a different pattern of butchery from those animals older than one year of age, which were known as beef cattle. Table 6·19 presents the age determination data for the cattle remains in the St Helena assemblage. This data has been graphically depicted in Figure 6·11. None of the remains offering fusion data could be said to be younger than one year of age at slaughter, whereas 47·4% could definately be said to have come from animals more than one year of age at slaughter. As for the sheep the age zones presented in Figure 6·11 have been tabulated (Table 6·20) to show the incidence and frequency of veal and beef age categories. Therefore, it can reasonably be assumed that any variation evident in the butchery pattern of cattle arises from factors other than the age of the animal.

The MNEs and MNIs for pig remains are presented in Table 6·21. The picture that this table presents is one indicating that pigs were of negligible importance in the diet of St Helena. This supports the prediction based on historical records that pigs represent an insignificant aspect of the prisoners' diet, and that they only became an aspect of the warders' and senior officers' diet after the mid 1880s. Prior to this time, pig meat would have been extremely rare. The few pig items indicate that the determination of the butchery pattern is not possible (see discussion in following section).

Table 6·22 outlines the fusion data for pig remains. Pigs were slaughtered at a much younger age than was the general practice applied to the other two domesticates. All the pig remains come from individuals which were younger than 2·5 years of age at slaughter. Pigs are usually slaughtered at between 6 months to one year of age. This is because at this age weight increase related to fed input reaches its peak. The fusion data does indeed indicate that pigs were slaughtered in this age range. The data also indicates that piglets were slaughtered; there were at least 2 items younger than 3-6 months in age at the time of slaughter. Clearly, if more pig remains were present, which protrayed butchery variation, then age would have to be considered as a factor influencing that variation.

Table 6·18: Minimum numbers of cattle skeletal elements

SKELETAL ELEMENT	MNE R	MNE L	MNE US	MNE MID	MNE	MNI
CERVICAL VERTEBRA				7	7	2
THORACIC VERTEBRA				8	8	1
LUMBAR VERTEBRA				5	5	1
SACRUM				1	1	1
UNPOSITIONED VERTEBRA				1	1	1
RIB	3	8	1		12	1
CALCIFIED RIB CARTILAGE			2		2	1
STERNUM				1	1	1
SCAPULA	1	1			2	1
HUMERUS	2	1			3	2
RADIUS	4	4			8	4
ULNA	4	7			11	7
RADIAL CARPAL	2	1			3	2
INTERMEDIATE CARPAL	2	1			3	2
ULNAR CARPAL		1			1	1
ACCESSORY CARPAL	2				2	2
CARPAL 2+3	2				2	2
CARPAL 4	1				1	1
PELVIS	1	2			3	2
FEMUR	2	2			4	2
PATELLA		1			1	1
TIBIA	1	1			2	1
TALUS	1				1	1
CALCANEUS		2			2	2
CENTROQUARTAL	1	1			2	1
TARSAL 2+3	1				1	1
2ND PHALANX	1				1	1

Table 6·19: Cattle age-determination data (fusion based on Silver 1969)

SKELETAL ELEMENT	OSSIFICATION CENTRE	FUSION STATE	AGE	NUMBER OF CASES
SCAPULA	BICIPITAL TUBEROSITY	FUSED	>7-10 m	2
HUMERUS	DISTAL EPIPHYSIS	FUSED	>12-18 m	1
RADIUS	PROXIMAL EPIPHYSIS	FUSED	>12-18 m	7
TIBIA	DISTAL EPIPHYSIS	UNFUSED	<2-2.5 yrs	1
2ND PHALANX	DISTAL EPIPHYSIS	FUSED	>2.5 yrs	1
FEMUR	PROXIMAL EPIPHYSIS	UNFUSED	<3.5 yrs	2
CALCANEUS	TUBER CALIS	FUSED	>3-3.5 yrs	2
HUMERUS	PROXIMAL EPIPHYSIS	UNFUSED	<3.5-4 yrs	2
RADIUS	DISTAL EPIPHYSIS	UNFUSED	<3.5-4 yrs	2
ULNA	PROXIMAL EPIPHYSIS	UNFUSED	<3.5-4 yrs	6
ULNA	DISTAL EPIPHYSIS	UNFUSED	<3.5-4 yrs	2
FEMUR	DISTAL EPIPHYSIS	UNFUSED	<3.5-4 yrs	2
TIBIA	PROXIMAL EPIPHYSIS	UNFUSED	<3.5-4 yrs	1
HUMERUS	PROXIMAL EPIPHYSIS	FUSED	>3.5-4 yrs	1
RADIUS	DISTAL EPIPHYSIS	FUSED	>3.5-4 yrs	4
PELVIS	PUBIS-ACETABULAR BONE	FUSED	>4.5 yrs	2

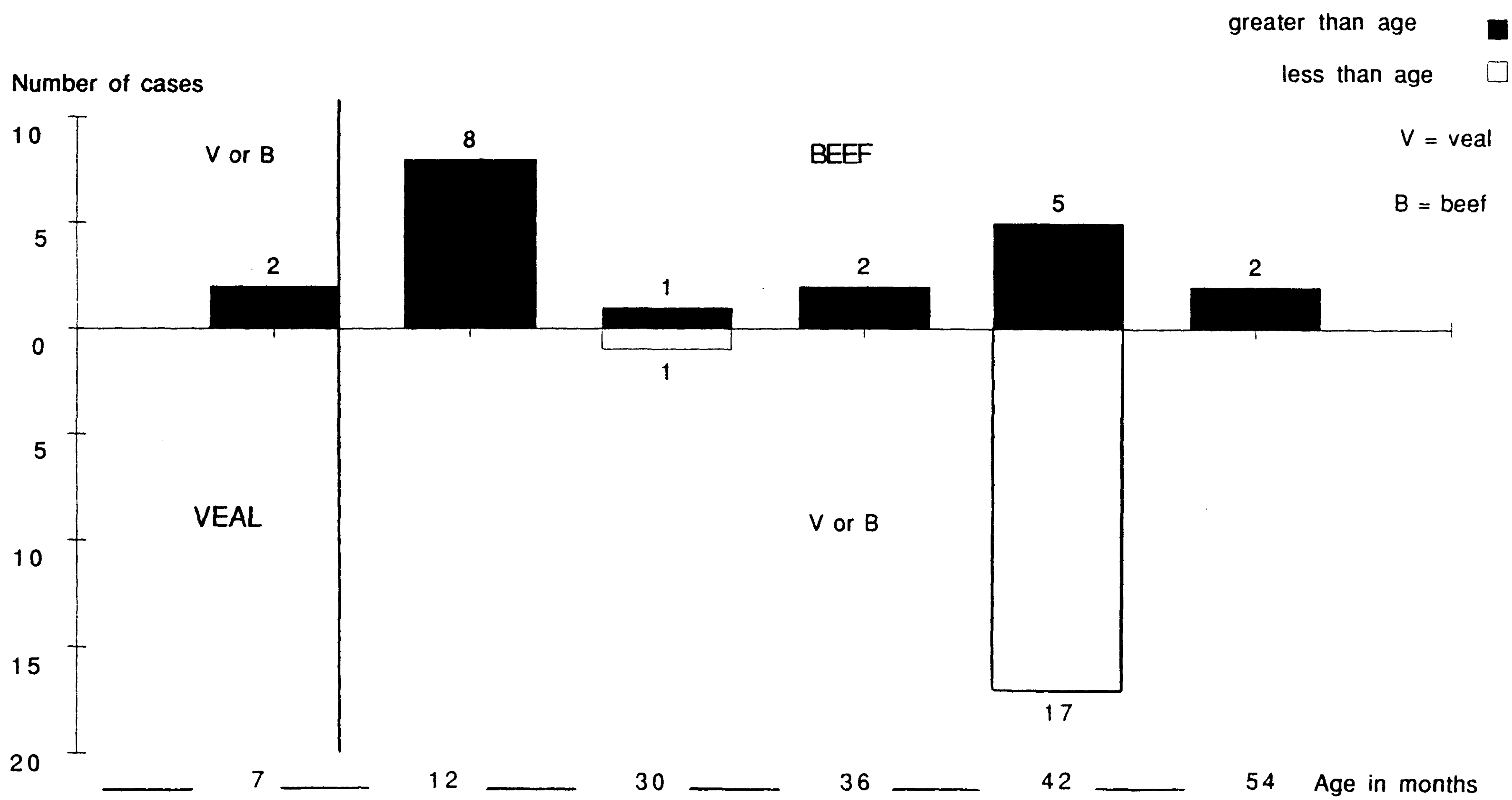


Figure 6.11: Incidence of fusion indicating different cattle age zones

Table 6·20: Incidence and frequency of veal and beef based upon fusion

AGE CATEGORY	NUMBER OF CASES	FREQUENCY
VEAL	0	0·0
BEEF	18	0·474
VEAL OR BEEF	20	0·5226
TOTAL	38	1·000

Table 6·21: Minimum number of pig skeletal elements

SKELETAL ELEMENT	MNE R	MNE L	MNE MID	MNE	MNI
CERVICAL VERTEBRA			1	1	1
LUMBAR VERTEBRA			1	1	1
RIB	1			1	1
HUMERUS		2		2	2
RADIUS		1		1	1
3RD METACARPAL	1			1	1
4TH METACARPAL		1		1	1
2ND METATARSAL		1		1	1
3RD METATARSAL		1		1	1
4TH METATARSAL		1		1	1
CALCANEUS	1			1	1
CENTRAL TARSAL	1			1	1
TARSAL 3	1			1	1
TARSAL 4	1			1	1

Table 6·22: Pig age determination data (fusion based on Silver 1969)

SKELETAL ELEMENT	OSSIFICATION CENTRE	FUSION STATE	AGE	NUMBER OF CASES
CERVICAL VERTEBRA	ARCH+BODY	UNFUSED	<3-6 m	1
LUMBAR VERTEBRA	ARCH+BODY	UNFUSED	<3-6 m	1
HUMERUS	DISTAL EPIPHYSIS	UNFUSED	<1 yr	1
RADIUS	DISTAL EPIPHYSIS	UNFUSED	<1 yr	1
3RD METACARPAL	DISTAL EPIPHYSIS	UNFUSED	<1 yr	1
4TH METACARPAL	DISTAL EPIPHYSIS	UNFUSED	<1 yr	1
2ND METATARSAL	DISTAL EPIPHYSIS	UNFUSED	<1 yr	1
3RD METATARSAL	DISTAL EPIPHYSIS	UNFUSED	<2.25 yrs	1
4TH METATARSAL	DISTAL EPIPHYSIS	UNFUSED	<2.25 yrs	1
CALCANEUS	TUBER CALIS	UNFUSED	<2.25 yrs	1

Overall, the ERT assemblage supports the historical data which lists in order of importance sheep, cattle, and then pigs. It also supports the historical evidence that sheep were slaughtered on the island, and that cattle were imported following slaughter at an off-island location. The skeletal remains also indicate from fusion data, that age-at-slaughter differences are not a factor causing butchery variation in either sheep or cattle, but that this would be a factor to be taken into consideration for pig butchery.

6·9 Summary

A number of points have emerged from the data presented and discussed in this chapter. These are as follows:

1. The source of meat utilised on the island, and the points of slaughter have been determined. Sheep were the most important source of meat in the early years of the Establishment and they were imported live to the island, fattened or kept until required and then slaughtered and butchered on the island. Cattle were not raised on the island until relatively late in its use as a prision, and then primarily not for

consumption, but for diary production and for stud purposes. The major source of beef, which would have been minimal in the first decade or first couple of decades, was from sides or quarters of beef, imported to the island for butchery following slaughter at some off-island location. Pig production on the island did not commence in earnest until the mid 1880s, and even then pig meat would not have been part of the prisoners diet.

2. The St Helena Island Establishment had a very organised system of butchery both in terms of management and facilities.

3. As a result of recent disturbances to the stratigraphy and on temporal grounds the analysis of the faunal remains were conducted using the assemblage as a whole.

4. Examination of taphonomic factors indicate that the faunal remains have evidenced an extremely high degree of preservation, and that those specimens present are a fair representation of the utilisation of animals on St Helena. Taphonomic factors will not to any significant degree bias the conclusions of the following butchery analysis.

5. The ages from bone fusion data and tooth eruption sequences at which animals were slaughtered indicate that age differences will not be responsible for any variation which may be present in the butchery patterns evidenced by the sheep and cattle remains, but may be responsible for any variation evident in the pig faunal remains.

6. The archaeological data supports the historical data in terms of animal utilisation and the location of where slaughter took place.