

Does the study of animal bones tell us what people ate in the past, or does it simply tell us what animals were on and around sites?

Brú na Bóinne, a Neolithic complex including Newgrange, Knowth and Dowth, are be used to demonstrate how archaeozoology has advanced knowledge of the prehistoric complex's social, economic, religious and funerary functions.

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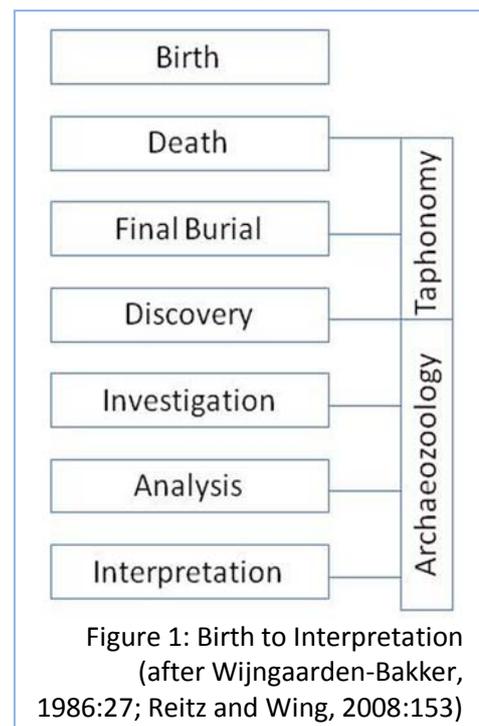
### 1. Introduction

Archaeozoologists study the relationship between people, their environment and their association with animals through the interpretation of faunal remains recovered from archaeological sites (Reitz and Wing, 2008:1-2, 5).

Zooarchaeology and archaeozoology have slightly different methodologies (McGovern et al, 1995:96). Realistically they are alternative ways to study the same material and the terms are often used interchangeably (Reitz and Wing, 2008:4-5; Broderick, 2011).

A broad array of standard methods and techniques are used to analyse assemblages (Landon, 2005:5) and for an equally varied range of interpretive purposes. These are designed to extend our understanding of the animals, from birth-to-death, and the ways that people exploited them (Figure 1) (Butler, 1989:105). This study has the potential to reveal ancient cultural systems such as the people's environment, economy, ideology, social stratification and technological/craft sophistication.

This essay considers how archaeozoologists move from



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analysis of animal remains to an interpretation of their wider environment. Brú na Bóinne (Figure 4.1), a Neolithic complex including Newgrange (Figure 4.2), Knowth (Figure 4.3) and Dowth (UNESCO, 2010), will be used to demonstrate how archaeozoology has advanced our knowledge of the prehistoric complex's social, economic, religious and funerary functions.

## 2. Archaeozoology and Brú na Bóinne

Landon (2005:8) wrote that there are two primary steps in zooarchaeology; analysis, which is empirically based and uses directly measurable artifacts such as bone size/weight and interpretation, which is derived from mathematical manipulation and extrapolation of the analysed data. Reitz and Wing (2008:153-154, 182) classify analysis as Primary Data and interpretation as Secondary Data which is subjective and less descriptive and is inevitably subject to disagreement but allows us to understand how and why people domesticated and exploited animals.

The units used for analysis and interpretation are currently NISP (Number of Identified Specimens), MNI (Minimum Number of Individuals), bone-weight, meat-yield and biomass (estimated weight). Analysis includes NISP and bone-weight. MNI, because archaeozoologists use different criteria, meat-yield and biomass (Figure 2.1), which are used to derive the dietary importance of individual taxa, are used for interpretation (Landon, 2005:8-10).

### 2.1 Identification

Taphonomic knowledge significantly helps to determine whether remains are the result of human behaviour or natural action such as carnivore gnawing, weathering or soil

acidity. Landon (2005:6) observes that when assemblages are subject to natural action the densest bones are more likely to survive and less dense bones, such as those with unfused epiphyses, are less likely to survive. Butchery practices such as smashing the cranium to extract brain material and long-bones to extract bone marrow results in a high percentage of fragmented remains; although at Newgrange poor preservation has prevented any fractures or cuts caused by butchery to be firmly identified (Wijngaarden-Bakker, 1986:40). Butchery practices also impact the survival of bone remains; pigs, for example, were typically slaughtered at a younger age than cattle and this can result in an under-representation of pig bones compared to cattle.

### 2.2 Analysis

Wijngaarden-Bakker (1986:18, 27-28) reported on the animal remains recovered at Newgrange, the largest passage tomb within the Brú na Bóinne complex, and the area surrounding it. She initially eliminated extraneous taxa, intrusive remains from later periods and unidentifiable bones. Taphonomy, especially weathering studies, the stratigraphy and spatial patterning of recovered material and known butchery practices were used to make judgements on which remains could be safely included within the analysis.

Animal domestication, which is intimately linked with crop management through grazing, winter-fodder and manure, is one of the most important changes to the agrarian culture's economic and social activities (O'Connor, 2008:147-148, 174). Gordon Childe identified animal

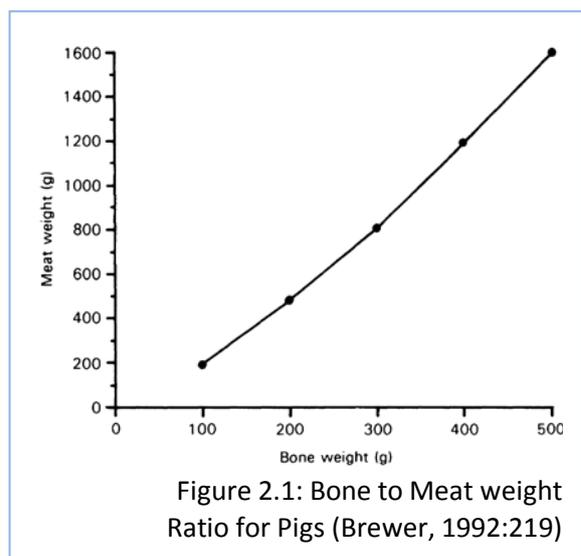


Figure 2.1: Bone to Meat weight Ratio for Pigs (Brewer, 1992:219)

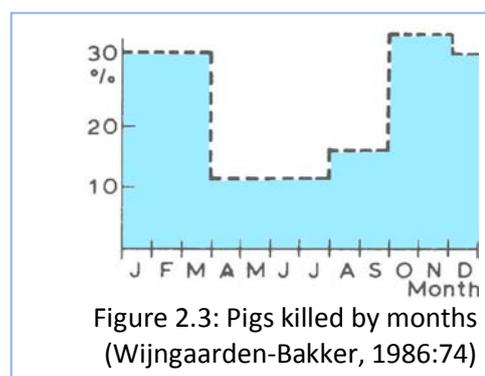
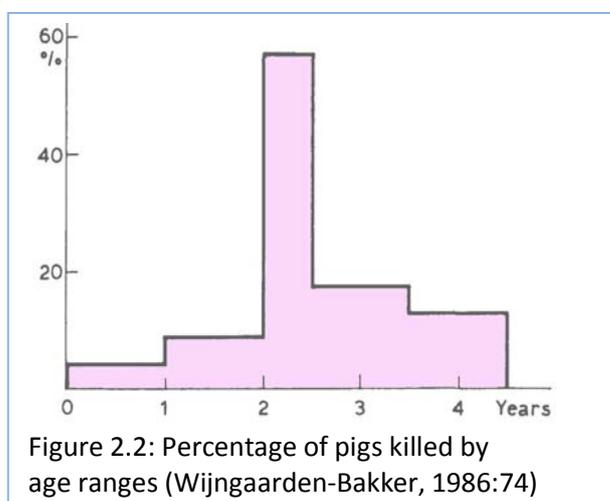
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husbandry as one of the aspects of the 'Neolithic Revolution'. The ability to exploit animals and the environment allowed people to live in different ways, such as in marginal locations or, importantly, in a settled existence. O'Connor (2008:150-151) wrote that bone size and shape, especially teeth, can be used reliably to differentiate between domestic or wild taxa.

Brú na Bóinne had vast quantities of animal bone concentrations in different locations within the site, comprising of living-floors, hearths, ritual and burial offerings within its forty passage graves in a 'fairly intensive' and continuous occupation from the Late Neolithic (O'Kelly, 2009:74-75; Wijngaarden-Bakker, 1986:2, 18). Landon (2005:10) stresses that the effective analysis of remains, especially those such as at Newgrange which are fragmented, requires a level of expertise in archaeology, biology and ethnography.

Wijngaarden-Bakker's (1986:19, 22) analysis identified and counted the remains at Newgrange. Her analysis and interpretation was sub-divided by taxa, domesticated/wild, location and NISP/MNI within the Late Neolithic/Beaker stratigraphic layer (<sup>14</sup>C dating of samples confirmed the chronological horizon). Wild animals, including red deer, wild boar and brown bears, represented, at most, 5% of the remains. NISP of the domestic animals identified 7,067 (58%) of the remains as cattle and 4,208 (35%) as pig - MNI gave a more realistic interpretation of the remains as 106 (27%) cattle and 206 (53%) pigs. This analysis proves that pigs and cattle were reared for meat-production and they were the staple meat consumed at Newgrange (Wijngaarden-Bakker, 1986:94). Bahn (2008:291) makes an interesting observation that the MNI is probably a tiny percentage of the actual animals that existed at Newgrange.

Bone measurements and the determination of age and sex are well established methods to determine historic animal husbandry and rearing practices (Landon, 2005:8) – noting that the most useful results come from larger samples. Sexual dimorphism of animals at Newgrange (Wijngaarden-Bakker, 1986:26, 74-75) was only possible on a small number of remains and metric differences were the main method used, which is less reliable. Ages were estimated using tooth eruption, tooth wear and crown heights (for certain taxa), where the jaw was available, and epiphyseal fusion. As Figure 2.2 demonstrates there is a spike identifying that 57% of pigs were slaughtered between 2 and 2½ years old and only 30% lived beyond this age. Figure 2.3 shows that seasonal slaughtering was more common during the fallow period; 70% happened between October and April - possibly when animal feed was less available or the need for meat was greater.



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Wijngaarden-Bakker's metric analysis of bones established that Newgrange pigs were long-legged and had visible similarities to their wild ancestors, although their teeth had more differences. Analysis of their teeth proved that boars and sows were slaughtered in equal numbers.

Pig age and sexual composition suggest to Wijngaarden-Bakker (1986:75) that herds, either by design or chance, were late-maturing and bred exclusively for meat. Cattle may have been castrated because steers are approximately 38% fatter but with a reduction in muscle and longitudinal bone growth. Unfortunately Newgrange bone assemblages, which were primarily either from food or butchery refuse, didn't include sufficient cattle bones to determine whether historical cattle husbandry practices included castration (Wijngaarden-Bakker (1986:54). Wijngaarden-Bakker's (1986:94) careful interpretation of cattle and pig remains confirmed that there was a cattle/pig slaughter ratio of 3:2 and, when combined with biomasses, it shows that the settlement produced four times as much beef as pork.

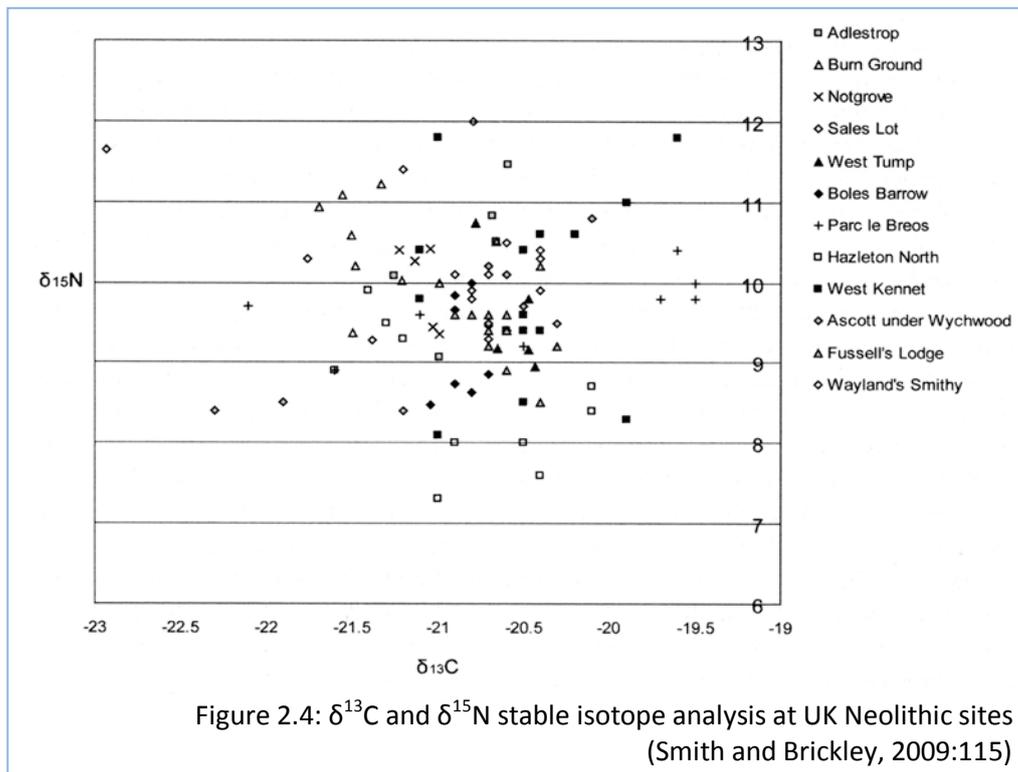
### 2.3 Interpretation

Site excavation and investigation typically produces reports and publications which focus on demonstrating the researcher's goals (Reitz and Wing, 2008: 154) and researchers strive to produce unique, innovative and challenging research. Reports usually include summaries of the analytical material and most of the reports present the material in a similar style. This makes inter-site comparisons possible.

Faunal remains at Brú na Bóinne indicate that animal domestication and exploitation was employed. I agree with Landon (2005:11) that it is possible that simple collections of fragmented bones can help to reveal ancient people's management of natural resources, including the preparation, consumption and disposal of animals. Interpretation might infer a society's economy or, through funerary-offerings, its social hierarchy and religious symbolism. In some sites it may be possible to identify and historically place the introduction of new taxa and therefore identify trade or social networks.

The 1986 study at Brú na Bóinne was the first "comprehensive archaeological study" in Ireland (Stout and Stout, 2008:62). It calculated that the production of animal products was twice the level required for subsistence (Wijngaarden-Bakker, 1986:99). This may have encouraged exchange networks but the study did not find evidence which could be used to interpret trade, ethnicity or social stratification - nor could it determine any gender relations described by Hastorf (2008:460-461). Wijngaarden-Bakker was not able to identify any secondary products, such as wool, milk, animal-fats, or manure, and field systems could not be identified at the complex - although the average age-at-death of horses was high which suggests that the Beaker people used horses as draft animals. A re-examination of the site/remains using newer techniques, such as DNA and stable isotopes, or emerging techniques may achieve this. For example Smith and Brickley's (2009:113-114) analysis of UK Neolithic sites, using the isotopic ratio of carbon and nitrogen in human bone collagen, have helped to identify the diet of individuals during the last decade of their lives. Figure 2.4, with many samples having  $\delta^{15}\text{N}$  of  $9^{0/100}$  or above, suggests that the individuals had a diet with significant levels of animal proteins.

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Interpretation varies considerably in inter-site and even intra-site reporting and this makes it challenging to compare studies from sites where different researchers produce reports with different objectives.

### **3. Conclusion**

Wijngaarden-Bakker's 1986 study at Newgrange, within the Brú na Bóinne complex contains a methodical approach to the analysis through the use of commonly accepted methods and a careful interpretation of this information. Its value, 25-years after it was written, is still evident.

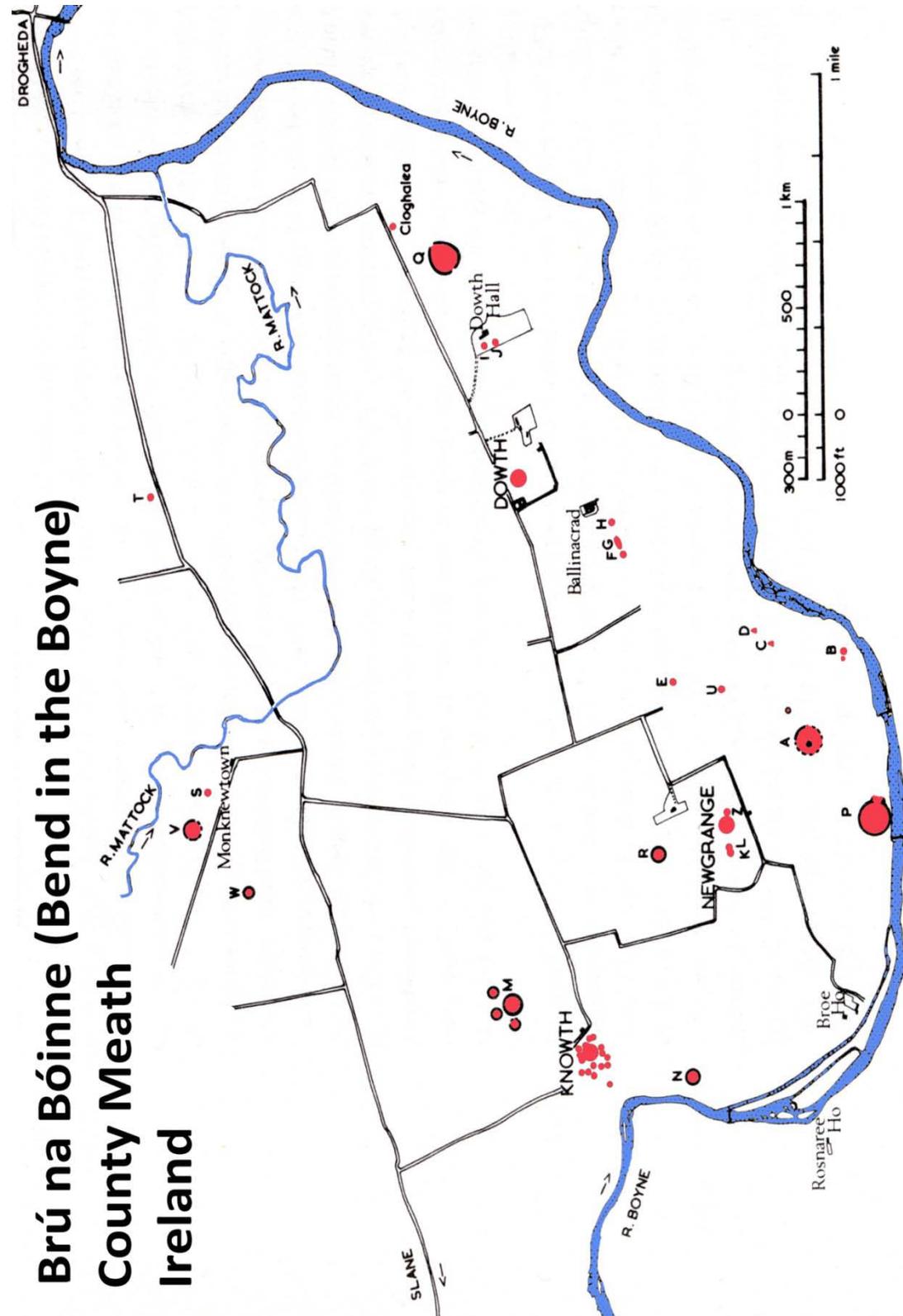
Newer methods, such as using stable isotopes analysis, have great potential for unlocking the complexity and plurality of ancient people through broader comparative studies. The future contribution, significance and advancement of archaeozoology is assured.

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#### 4. Figures

4.1: Map of Brú na Bóinne (Bend in the Boyne)

(after O'Kelly 2009:15)



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4.2: Ariel view of Newgrange  
(Jones 2007:196)



4.3: Ariel view of Knowth  
(Jones 2007:187)



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