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KEYWORDS: Cattle; milking; abortion; neonates; age diagnosis; tooth development analysis; Neolithic, Iron Age, Viking and Norse era Orkney; colostrum; lactation; mastitis.

ABSTRACT: A methodology for ageing foetal and neonatal cattle is developed, involving radiographic examination of infant mandibles for early developmental stages in molariform teeth; tooth-wear methodologies are imprecise at this stage before wear commences. Known-age modern bovine foetal and neonate material are collected as a control assemblage for method development (n=73); six Neolithic to Norse era assemblages from Orkney are examined using the modified technique together with standard tooth-wear analysis and other methodologies. Foetal and died-at-birth material is diagnosed at most sites using the new technique, together with a range of other peri-natal age-groups. Ageing at this early stage is highly relevant in the diagnosis of milking as a palaeoeconomy: the accepted view is that unwanted (male) calves were slaughtered to maximise milk for human consumption, hence a surfeit of neonate calf remains, as at the study sites. The diagnosis of foetal and died-at-birth material challenges this view, suggesting that attritional causes may have contributed to deaths at this stage. Although milking was probably carried out at most of the study sites, this may have been combined with slaughter of cattle for meat in a pragmatic exploitation strategy. Literary research shows possible attritional causes of abortion and early death in calves, in particular dietary insufficiency in pregnant cows, microbial infections, and also inadequate colostrum uptake. Additionally, research is used to consider the challenges to health that early milking might have posed, to the calf as mentioned, but also to the cow, where three main health issues are highlighted: infertility, mastitis and lameness.

CONTENTS

Volume 1:

CHAPTER 1: INTRODUCTION	Page
1.1: The problem	1
1.2: Aims	3
1.3: Methodologies	5
1.4: Thesis structure	6

CHAPTER 2: THEORETICAL BACKGROUND	Page
2.0: Introduction	13
2.1: The ‘Secondary Products Revolution’	14
2.2: Kill-off patterns – Payne’s models	18
2.2.1: Alternative interpretations of animal population data	22
2.3: Alternative evidence for milking/dairying	34
2.3.1: Evidence for milking: historiography	35
2.3.2: Evidence for milking: material culture	37
2.3.3: Evidence for milking: changes in metapodial bone mass	41
2.3.4: Evidence for milking: bone histomorphometry	42
2.3.5: Evidence for milking: isotopic analysis	44
2.3.6: Evidence for milking: lipid and protein residues in ceramics	45
2.3.7: Evidence for milking: Lactose intolerance	47
2.4: Chapter summary	55

CHAPTER 3: AGEING TECHNIQUES	Page
3.0: Introduction	56
3.1: Epiphyseal fusion	57
3.1.1: Epiphyseal fusion: discussion	61
3.2: Estimation of foetal age by metrical analysis of post-cranial elements	62
3.2.1: Metrical analysis: discussion	62
3.3: Tooth eruption	63
3.3.1: Tooth eruption: discussion	64
3.4: Tooth-wear analysis	65
3.4.1: Tooth-wear analysis: discussion	74
3.5: Tooth development	75
3.5.1: Tooth development: Gjesdal (1969)	75
3.5.1.1: Tooth development: Gjesdal (1969): discussion	79
3.5.2: Tooth development: Brown & Chapman 1991a, b.	80
3.5.2.1: Tooth development: Brown & Chapman 1991a, b.: discussion	82
3.6: Neonatal line	83
3.6.1: Neonatal line: discussion	83
3.7 Ageing methodologies: discussion	84

CHAPTER 4: ARCHAEOLOGICAL CONTEXTS	Page
4.0: Introduction	87
4.1: The Orcadian environment	89
4.2: Study Site 1: Mine Howe, Tankerness	95
4.3: Study Site 2: Pool, Sanday	100
4.4: Study Site 3: Howe, by Stromness	106
4.5: Study Site 4: Toft's Ness, Sanday	114
4.6: Study Site 5: Earl's Bu, Orphir	121
4.7: Study Site 6: Snusgar, Sandwick	126
4.8: Archaeological control site 7: The Bedern, York	128

CHAPTER 5: THE AETIOLOGY OF BOVINE FOETAL AND NEONATAL DEATH	Page
5.0: Introduction	131
5.1: Bovine neonatal death	132
5.1.1: Foetal and neonatal calf ecology in health and disease	132
5.2: Bovine abortion	136
5.2.1: Causes of abortion: brucellosis	137
5.2.2: Causes of abortion: aspergillosis	140
5.2.3: Causes of abortion: neosporosis	141
5.2.4: Causes of abortion: leptospirosis	144
5.2.5: Causes of abortion: juniper/pine needle poisoning	145
5.2.6: Causes of abortion: listeriosis	146
5.2.7: Causes of abortion: malnutrition/hypothyroidism/Vitamin A deficiency	147
5.2.8: Causes of abortion: viral infections	148
5.2.9: Causes of abortion: epizootic abortion	149
5.2.10: Causes of abortion: Q fever (<i>Coxiella burnetti</i>)	149
5.2.11: Causes of abortion: <i>Salmonella dublin</i>	150
5.2.12: Causes of abortion: <i>Bacillus licheniformis</i>	150
5.2.13: Causes of abortion: <i>Arcanobacterium pyogenes</i>	151
5.2.14: Causes of abortion: <i>Campylobacter</i> species	151
5.2.15: Causes of abortion: trichomoniasis	152
5.2.16: Causes of abortion: 'mummification'/maceration/trauma or stress/twin foetuses	153
5.2.17: Dystocia	154
5.3: Foetal-neonatal mortality syndrome	154
5.4: Neonate calf death; the importance of colostrum uptake	155
5.4.1: Calf diarrhoea - enterotoxigenic <i>Escherichia coli</i>	161
5.4.2: Calf diarrhoea - <i>Cryptosporidium</i> species	162
5.4.3: Calf diarrhoea - bovine rotavirus	162
5.4.4: Calf diarrhoea - <i>Salmonella</i> species	163
5.4.5: Calf diarrhoea - <i>Clostridium perfringens</i> toxins	163

5.4.6: Navel-ill (Omphalophlebitis)	164
5.5: Summary	164

CHAPTER 5: THE IMPLICATIONS OF PUTATIVE HUSBANDRY PRACTICES IN ANTIQUITY ON BOVINE HEALTH, WITH PARTICULAR EMPHASIS ON DAIRYING	Page
6.0: Introduction	166
6.1: Management implications of secondary products strategies	168
6.2: Lactation: udder physiology and let-down	174
6.2.1: Udder physiology: species differences	177
6.3: Hand milking	180
6.4: Application of Hazard Analysis Critical Control Point (HACCP) system	188
6.4.1: Speculative HACCP flow chart as applied to hand milking in antiquity	192
6.4.2: Hazard analysis: critical control points	195
6.4.3: Archaeological evidence and possible relevance	198
6.5: Calf husbandry	198
6.5.1: Colostrum intake	199
6.5.2: Calf feeding	200
6.5.3: Calf housing and cross-infections from other calves	202
6.6: Adult bovine disease & conditions	203
6.6.1: Infertility	203
6.6.2: Bovine mastitis	205
6.6.3: Lameness	212
6.6.4: Metabolic dysfunction	218
6.6.5: <i>Mycobacteria</i> species in adult cattle	220
6.7: Summary	221

CHAPTER 7: BOVINE MOLARIFORM TOOTH DEVELOPMENT AND CONFIGURATION	Page
7.0: Introduction	224
7.1: Mammalian tooth structure	225
7.2: Tooth embryology and development	225
7.2.1: Initiation	226
7.2.2: Proliferation	226
7.2.3: Morphodifferentiation	227
7.2.4: Histodifferentiation	228
7.2.5: Apposition	228
7.2.6: Calcification	230
7.2.7: Eruption	230
7.2.8: Attrition	231
7.2.9: Resorption and exfoliation	231
7.3: Specialist processes in bovid tooth development	232
7.4: Configuration of bovine molar and premolar teeth (Dental Formulae)	234

7.5: Macroscopically demonstrable sequential development of the bovine dentition	234
7.5.1: Foetal stages	235
7.5.2: Post natal sequence and chronology of tooth eruption in the bovine mandible	237
7.6: Bovine mandibular tooth morphology	241

CHAPTER 8: MODERN CONTROL ASSEMBLAGE: MATERIALS AND METHODS	Page
8.0: Introduction	245
8.1: Modern control material: sourcing and collection	247
8.2: Modern control sample age and breed distribution	252
8.3: Modern control sample diagnoses	255
8.4: Defleshing techniques	256
8.5: Tooth-wear analysis	256
8.6: Metrical examinations: mandibles	259
8.7: Radiographic analyses of modern control assemblage	262
8.7.1: Film preparation	262
8.7.2: Assessment of radiographs of mandibles from modern control assemblages, using Gjesdal (1969) tooth development chronology	264
8.7.3: Tooth development scoring of radiographs from modern control assemblages, based on Brown & Chapman (1991a, b) methodology	271

Volume 2:

CHAPTER 9: MODERN CONTROL ASSEMBLAGE: RESULTS	Page
9.0: Introduction	287
9.0.1: Modern controls: age unit standardisation	287
9.1: Results of tooth-wear analysis	290
9.1.1: Tooth-wear analysis applied to control assemblage: discussion	294
9.2: Metrical results: mandibles	294
9.2.1: Metrical analysis of mandibles: discussion	302
9.3: Examination of mandibles using Gjesdal (1969) foetal tooth-development chronology	302
9.3.1: Gjesdal (1969) chronology: discussion	308
9.4: Tooth-development scores and totals, using definitions of Brown & Chapman (1991a, b)	309
9.4.1: Analysis of tooth development scores	317
9.4.2: Analysis of tooth development scores in mandible fragments	327
9.4.3: Tooth-development score methodology (based on Brown & Chapman (1991a, b)): discussion	339
9.4.4: Alternate method of analysis of tooth-development scores (Carter 2006)	342

9.5: Summary and assessment of methodologies used with modern control assemblage	348
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CHAPTER 10: ARCHAEOLOGICAL ASSEMBLAGES: MATERIALS AND METHODS	Page
10.0: Introduction	352
10.1: Access to and composition of the archaeological assemblages	352
10.2: Metrical analysis of mandibles and metacarpals from archaeological material; examination of metacarpal epiphyses and proximal articulations	355
10.3: Tooth-wear analysis: variations for archaeological material	355
10.4: Radiographic techniques	364
10.4.1: Use of tooth development score methodology (Brown & Chapman 1991a, b) in predicting the age of archaeological material	365
10.4.2: Assessment of radiographs of archaeological assemblages, using Gjesdal (1969) tooth development chronology	366

CHAPTER 11: ARCHAEOLOGICAL ASSEMBLAGES: RESULTS i)	Page
11.0: Introduction	367
11.1: Metrical analysis of mandibles	368
11.2: Tooth-wear analysis of mandibles	370
11.2.1: Mine Howe tooth-wear analysis results	371
11.2.2: Howe tooth-wear analysis	373
11.2.3: Tofts Ness tooth-wear analysis	377
11.2.4: Earl's Bu: tooth-wear analysis	379
11.2.5: Snusgar: tooth-wear analysis	382
11.2.6: Pool: tooth-wear analysis	382
11.3: Examination of radiographs from archaeological material for tooth development, using definitions of Brown & Chapman (1991a, b).	386
11.3.1: Mine Howe: tooth development	388
11.3.2: Howe: tooth development	391
11.3.3: Toft's Ness: tooth development	394
11.3.4: Earl's Bu: tooth development	396
11.3.5: Snusgar: tooth development	397
11.3.6: Pool: tooth development	398
11.4: Examination of radiographs from archaeological material using Gjesdal (1969) foetal tooth-development chronology	402
11.5: Results comparisons; quality checks	404
11.5.1: Comparison of unequivocal diagnoses by tooth-development analysis with those using tooth-wear analyses.	405
11.5.2: Examination of radiographs from archaeological material using Gjesdal (1969) foetal tooth-development chronology	408
11.5.3: Comparison of results from metrical examination of mandible with those from tooth-development	408

11.5.4: Examination of material from control site at The Bedern, York.	409
11.6: Archaeological results: summary.	411

CHAPTER 12: ARCHAEOLOGICAL ASSEMBLAGES: RESULTS ii) & INTERPRETATIONS	Page
12.0: Introduction	413
12.1: Mine Howe	416
12.1.1: Mine Howe: Mid-Later Iron Age phases	418
12.1.2: Mine Howe: Later Iron Age phases	423
12.1.3: Mine Howe: summary	425
12.2: Howe	427
12.2.1: Howe: Early Iron Age phases	427
12.2.2: Howe: Middle Iron Age phases	429
12.2.3: Howe: Later Iron Age phase	432
12.2.4: Howe: combined Mid-Later Iron Age phases	435
12.2.5: Howe: summary	437
12.3: Tofts Ness	438
12.3.1: Tofts Ness: Neolithic & Bronze Age phases	439
12.3.2: Tofts Ness: Early Iron Age phase	441
12.3.3: Toft's Ness: summary	445
12.4: Earl's Bu	447
12.4.1: Earl's Bu: Viking phases	447
12.4.2: Earl's Bu: Late Norse phases	448
12.4.3: Earl's Bu: summary	450
12.5: Snusgar	450
12.6: Pool	453
12.6.1: Pool: Early Iron Age phase	453
12.6.2: Pool: Later Iron Age phases	454
12.6.3: Pool: Scandinavian Interface phase	457
12.6.4: Pool: Norse period phases	460
12.6.5: Pool: summary	462
12.7: The Bedern, York	464
12.8: Palaeoeconomic inferences for contemporaneous site phases	464
12.9: Published report comparisons	467
12.10: Brief summary of palaeoeconomic inferences at the study sites	467
12.11: Summary of neonate age diagnosis results	468
12.12: Overarching inferences	470

CHAPTER 13: SYNTHESIS	Page
13.0: Introduction	476
13.1: The fate of neonates?	478
13.2: Methodological issues: critical reviews of the methodologies utilised in the study	485

13.3: Issues arising from the study; potential further work	489
13.3.1: Application of the tooth-development methodology to other sites	489
13.3.2: Lameness	489
13.3.3: Colostrum uptake	490
13.3.4: Mastitis	491
13.3.5: Possible appearance of the neonatal line in the bovine dentition	491
13.3.6: Application of the tooth-development technique to other ungulate species	492
13.3.7: 'Holistic' approach	492
13.4: Conclusion and overview	493

REFERENCES	496
APPENDIX I: DEFRA proforma	536
APPENDIX II: COSHH assessment for defleshing, incorporating standard operating procedure (SOP)	537
APPENDIX III: Tooth-wear analysis record form	542
APPENDIX IV: Radiography protocols	543

On accompanying CD-ROM:

APPENDIX V: Tooth-wear data for archaeological assemblages	CDR
APPENDIX VI: Tooth-development data for archaeological assemblages	CDR

Also on CD-ROM:

- Photographic images of all control and archaeological material.
- Scanned reproductions of radiographs used in analysis of control and archaeological material.
- Age-grouped data for each tooth-development combination, showing mean values and 2 standard errors for pre- and post-natal control assemblages; presented as tables and hand-drawn best-fit curves (referred to in section 9.4.2).

DEDICATION AND THANKS

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