[Supplementary Online Material]

Feeding Stonehenge: cuisine and consumption at the Late Neolithic site of Durrington Walls

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Lipid extraction and analysis

Lipids were extracted and analysed by GC-MS and GC-C-IRMS using well-established protocols (Craig *et al*. 2007; Craig *et al*. 2012). Each sample (1–2g drilled from the potsherd interior surface) was solvent-extracted by ultrasonication with dichloromethane:methanol (2:1 vol/vol; 3 × 5ml, 15 min). The solvent was removed from the foodcrust and evaporated under a gentle stream of N_2 to obtain the total lipid extract (TLE). An aliquot of each TLE was silylated with BSTFA, dissolved in hexane and analysed by high temperature gas chromatography (HTGC) on a Agilent 7890A gas chromatograph (Agilent Technologies, Cheadle, Cheshire, UK) equipped with a FID detector and with H_2 as the carrier gas. Samples were injected into a fused silica capillary column (30m × 0.32mm i.d.) coated with dimethyl polysiloxane stationary phase (J&W Scientific; DB1-HT, 0.1mm film thickness). The temperature programme comprised a 2 min hold at 50°C followed by an increase to 350°C at 10°C min^{-1}; the temperature was held at 350°C for 10 min. HTGC-mass spectrometry was carried out on specific samples using an Agilent 7890A series gas chromatograph connected to an Agilent 5975C Inert XL mass-selective detector with a quadrupole mass analyser (Agilent Technologies, Cheadle, Cheshire). Helium was the carrier gas, the ionisation energy was 70 eV, and spectra were obtained by scanning between *m/z* 50 and 800. GC conditions were similar to those used for the HTGC analyses.

A separate aliquot, was hydrolysed with 0.5 M NaOH in MeOH/H_2O (9:1 vol/vol; 2ml, 70°C, 90 min), cooled and then acidified to pH 3 with 6 M HCl. Fatty acid methyl esters (FAMEs) were prepared from the hydrolysed extract by treatment with BF_3-Methanol complex (14% w/v; 70°C, 1hr. FAMEs were extracted with hexane (3 × 1ml) and analysed by GC-MS and by GC-combustion-isotope ratio MS (GC-C-IRMS). Instruments and instrument conditions for GC-MS and GC-C-IRMS were exactly as previously reported (Craig *et al*. 2012). For GC-C-IRMS, instrument precision on repeated measurements was ±0.3‰ (s.e.m.) and the accuracy determined from FAME and *n*-alkane isotope standards was ±0.5‰ (s.e.m.).

Statistical analysis

All statistical analyses were carried out using SPSS (version 20). A Pearson product-moment correlation coefficient was computed to assess the relationship between thickness and rim diameter. Non-parametrical tests were conducted to examine differences in the distribution of the vessels thicknesses and $\Delta^{13}C$ values between contexts.

Faunal analysis

The animal bones were recorded following a modified version of the method described in Davis (1992) and Albarella and Davis (1994). The 'diagnostic zones' that have always been recorded ('countable') are listed in Table S1.

<TABLE S1>

Horncores and antlers with a complete transverse section and 'non-countable' elements, such as proximal ends of the four main long bones and others of particular interest were recorded and used in the ageing analysis, but not included in the taxonomic and body-part counts. The presence of large (cattle/horse size), medium (sheep/pig size) and small (cat size or smaller) vertebrae and ribs was recorded, but these have not been included in the countable totals.

The sheep/goat distinction was attempted on the following elements using the criteria described in Boessneck (1969), Kratochvil (1969), Payne (1985) and Halstead and Collins

(2002): horncores (non-countable), deciduous lower third premolar (dP_3), deciduous lower fourth premolar (dP_4), permanent lower molars (when more than one tooth is present), distal humerus, proximal radius, distal metacarpal, distal tibia, astragalus, calcaneum and distal metatarsal.

The number of identified specimens (NISP) was calculated for all taxa and the minimum number of individuals (MNI) was calculated for the most common taxa, such as cattle, pig and red deer.

Wear stages were recorded following Grant (1982) for mandibular cattle and pig teeth, and Payne (1973, 1987) for sheep/goats. In addition, a recently designed system by Wright *et al.* (2014) was used to record wear on pig upper teeth and, in addition to Grant's system, on pig lower teeth. In all cases, wear was recorded on both deciduous and permanent fourth premolars, and permanent molars, whether they were found in jaws or loose.

Tooth measurements and wear stages were only recorded when sufficient enamel was preserved. Measurements of fused, fusing and unfused bones were taken following the criteria described in von den Driesch (1976), Payne and Bull (1988), Davis (1992), Albarella and Davis (1994) and Albarella and Payne (2005). For all foetal and neonatal bones, the greatest length of the diaphysis and the smallest width of the shaft were taken.

Collagen extraction and stable isotope analysis

Collagen extraction was based on Longin's method, modified by a two-step filtering process (Longin 1971; Brown *et al*. 1988). Whole bone samples were demineralised in 0.5 M HCl at 4°C. The remaining product was denatured in pH 3 aqueous solution at 70°C for 48 hours. The solution was filtered using Ezee® filters, followed by centrifugal filtering using Millipore ultrafilters that separated molecules smaller than 30kD. The larger, less degraded molecules were then freeze-dried and weighed to tin capsules for combustion to N_2 and CO_2, which was analysed using a Thermo Finnigan DELTA Plus XL continuous helium flow gas isotope ratio mass spectrometer coupled with a Flash EA elemental analyser. All human samples were analysed at the Max Planck Institute for Evolutionary Anthropology, Leipzig, except for Find 1349, which was analysed at Oxford University. All animal samples were analysed at the University of Bradford. Inter-laboratory comparisons between these Bradford data and the human data analysed in Leipzig have been undertaken and they are considered comparable. The analytical standard deviation, averaged from laboratory working standards run with the samples (methionine), amounted to ±0.1‰ for $\delta^{13}C$ and less than ±0.1‰ for

$\delta^{15}N$. Two replicates were run for each sample, analysed in separate batches and the results averaged. The widely accepted quality tests for collagen $\delta^{13}C$ and $\delta^{15}N$ data in terms of atomic C:N ratios of 2.9 to 3.6 and appropriate elemental percentages (approximately 30–47% for carbon and 10–18% for nitrogen) (DeNiro, 1985; Ambrose 1990; van Klinken 1999) were met for all samples

Paleobotanical analysis

A 25% sample of layers such as the midden contexts was recovered using a grid of 0.5 × 0.5m squares, with every fourth square being sampled in its entirety. A 100% sample was recovered from the house floor deposits, also with the use of a grid of 0.5 × 0.5m squares. Discrete features such as pits and post holes were sampled in their entirety or to a minimum sample size of 40l. In total, 1177 samples, representing over 13 600l of soil, were processed using a water-separation machine. Floating material was collected in sieves of 1mm and 300µm mesh, and the heavy residue was retained in a 1mm mesh. Each sample was scanned using a low-power binocular microscope (×7–45) and the presence of charred plant material was recorded using a scale of abundance. Where identifiable charred plant remains were found to be present, samples were sorted in full and the charred plant remains fully quantified.

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Table S1. List of diagnostic zones of mammal bones recorded for the Durrington Walls assemblage

Skeletal element	Zone/part
Loose teeth	> half occlusal surface
Mandible/maxilla	With at least one tooth present (> half occlusal surface)
Cranium	Zygomaticus > half
Atlas	> half
Axis	> half
Scapula	Glenoid articulation > half
Humerus	Distal end > half
Radius	Distal end > half
Ulna	Articular end (proximal) > half
Carpal 2–3	> half
Pelvis	Ischial part of the acetabulum
Tibia	Distal end > half

Femur	Distal end > half
Astragalus	Lateral half
Calcaneum	Sustentaculum
Scafocuboid	> half
Metatarsal	Proximal end > half
	At least one distal condyle
Metacarpal	Proximal end > half
	At least one distal condyle
Phalanges 1, 2 & 3	Proximal end > half

Table S2. Description of the pottery sherds analysed and details of the absorbed lipid residues detected by HTGCMS and the measured stable carbon isotope value ($\delta^{13}C$) of the major saturated fatty acids.

Sample number*	SF/Museum cat	Context number	Context type	Compounds classes detected†	$\delta^{13}C_{16:0}$ (‰)	$\delta^{13}C_{18:0}$ (‰)
3117	–	586	Layer/bank	FFA, MAG, DAG tr	-28.99	-32.29
3142	9328	586	Layer/bank	FFA, MAG	-27.58	-29.81
5002	445	64	Borrow pit	FFA, DAG	-26.21	-25.79
2052	7519	641	Layer	FFA, MAG	-27.33	-28.21
P193	4	ditch 5–6B	ditch 5–6B	FFA, MAG, DAG	-28.40	-33.20
P171	C312	ditch 8	ditch 8	FFA, MAG, cholesterol	-28.04	-28.59
P72	C304	ditch 8	ditch 8	FFA, MAG	-27.79	-28.43
P63	C305	ditch 8	ditch 8	FFA	-26.35	-29.62
P467	C309	ditch 8	ditch 8	FFA	-25.60	-26.44
3982	9400	852	House 851	FFA, MAG	-29.24	-33.84
3981	9400	852	House 851	FFA, DAG, cholesterol, WEtr	-28.87	-33.72
3999	–	852	House 851	FFA, MAG, DAG, cholesterol	-28.58	-30.95
3993	9512	852	House 851	FFA	-28.26	-34.10
4019	9576	856	House 800	FFA, MAG, DAG, TAG	-30.00	-32.78
4032	–	856	House 800	FFA, MAG, DAG, TAG	-27.34	-29.30
3055	8925	547	House 547	FFA, cholesterol, DAG, TAG	-29.56	-32.59
3075	9145	547	House 547	FFA, MAG, DAG, TAG	-27.06	-27.46
1138	8903	547	House 547	FFA, MAG, DAG, TAG	-26.93	-27.15
2965	8627	547	House 547	FFA, MAG, DAG	-26.34	-27.54
5067	–	772	House 772	FFA, ME	-26.59	-28.18
3979	9454	849	House 848	FFA, MAG, DAG	-26.51	-27.03
P297	C530	Surface of	Surface of platform	FFA	-27.68	-32.29
P60	C598	Surface of	Surface of platform	FFA 2, MAG tr	-27.00	-27.93
P487	C574	Surface of	Surface of platform	FFA	-26.35	-29.13
P25/P169	C601	Surface of	Surface of platform	FFA, MAG, DAGtr, TAGtr	-29.23	-31.31
6199	9739	593	Midden	FFA, MAG, DAGtr	-29.56	-32.33
2122	7662	593	Midden	FFA, MAG	-31.14	-33.99
1889	7261	593	Midden	FFA, MAG, K, DAG	-29.95	-32.69
5039	11835b	593	Midden	FFAC 7:1, 8:2, 8, MAG, K	-29.91	-33.32

1591	248/606	593	Midden	FFA	-29.83	-32.33
5058	249/614b	593	Midden	FFA	-29.80	-33.95
3298	9264	593	Midden	FFA, 8, MAG, OH, 8 alkane	-29.65	-33.37
5014	9879	593	Midden	FFA, 8	-29.65	-32.08
5033	11835a	593	Midden	FFA C3	-29.14	-33.47
2156	7704	593	Midden	FFA, MAG, cholesterol, Ktr,	-29.13	-32.90
5060	9791	593	Midden	FFA, MAG, DAG	-29.12	-31.34
1735	7100	593	Midden	FFA, MAG, DAG cholesterol,	-29.11	-31.06
2265	7808	593	Midden	FFA, MAG, Ktr	-29.11	-32.35
3297	9253	593	Midden	FFA, MAG, cholesterol	-29.09	-31.09
1665	7022	593	Midden	FFA, MAG	-29.08	-31.53
5032	251/615	593	Midden	FFA, DAG, K	-29.00	-31.98
1653	7007	593	Midden	FFA, MAG, DAG	-28.99	-30.67
5010	11825	593	Midden	FFA	-28.97	-33.49
1619	6897	593	Midden	FFA, MAG, DAG	-28.91	-30.13
5016	249/616b	593	Midden	FFA, WE	-28.77	-30.60
2463	8064	593	Midden	FFA, MAG, DAG, TAG,	-28.75	-29.61
1910	7319	593	Midden	FFA,	-28.72	-30.60
5055	248/616	593	Midden	FFA, MAG, DAG, TAG	-28.71	-33.49
3266	8115	593	Midden	FFA, MAG, DAG, TAGtr,	-28.70	-33.43
3341	9496	593	Midden	FFA, MAG	-28.62	-30.13
5036	9852	593	Midden	FFA, MAG	-28.58	-32.66
5057	249/614a	593	Midden	FFA	-28.53	-30.06
1959	7354	593	Midden	FFA	-28.38	-30.67
5008	9914	593	Midden	FFA, DAG, cholesterol	-28.19	-29.58
5022	250/613	593	Midden	FFA	-28.19	-30.26
5056	11846	593	Midden	FFA, MAGs, DAGs TAGS	-28.16	-30.71
1836	7211	593	Midden	FFA, MAG, ME, cholesterol,	-28.04	-32.90
5038	11847	593	Midden	FFA, MAG, cholesterol	-27.98	-30.20
5054	11840	593	Midden	FFA, MAG, DAGtr, TAGtr	-27.95	-30.69
3282	8166	593	Midden	FFA	-27.95	-31.03
5017	11844	593	Midden	FFA, MAG, DAG	-27.91	-29.97
3323	9366	593	Midden	FFA, ME, MAG, DAG	-27.86	-29.66
5048	11472	593	Midden	FFA, MAG, DAG, TAGtr	-27.79	-30.15
5023	11893	593	Midden	FFA, DAG, cholesterol, K	-27.75	-31.88

1768	7136	593	Midden	FFA, MAG, DAG	-27.69	-29.43
1651	7005	593	Midden	FFA, MAG	-27.63	-28.64
5021	251/613	593	Midden	FFA, MAG	-27.48	-29.63
3325	9345	593	Midden	FFA, cholesterol	-27.35	-28.73
2175	7731	593	Midden	FFA, MAG, DAG, TAG	-27.32	-29.13
2144	7677	593	Midden	FFA, MAG, DAG, TAG	-27.29	-27.83
1558	247/617	593	Midden	FFA, MAG	-27.15	-27.89
1645	7001	593	Midden	FFA, MAG	-26.94	-28.39
1698	7058	593	Midden	FFA, MAG, DAG, TAG	-26.80	-28.76
2062	7618	593	Midden	FFA, MAG, DAG, TAG	-26.78	-27.80
1920	7324	593	Midden	FFA	-26.68	-27.10
1924	7327	593	Midden	FFA	-26.41	-29.15
1982	7367	593	Midden	FFA	-26.21	-26.57
2427	7929	593	Midden	FFA	-26.18	-27.34
2093	7638	593	Midden	FFA, MAG	-26.08	-26.28
2319	7847	593	Midden	FFA, MAG, DAG, TAG, Ktr,	-26.03	-26.55
5051	9744	593	Midden	FFA, MAG, cholesterol, K,	-25.93	-25.17
3331	9495	593	Midden	FFA	-25.69	-26.51
2435	8031	593	Midden	FFA	-28.42	-31.32
5075	9749	1381	Closing pit	FFA	-26.03	-25.29
5537	10191	1466	Closing pit	FFA, MAG	-28.51	-31.10
1343	3530	522	Eastern pit complex	FFA, MAG, DAG,	-28.10	-28.53
1137	3026	52	Groove ware pit	FFA, Ktr	-27.57	-29.60
1280	1862	77	Groove ware pit	FFA, MAG, DAG tr	-26.06	-27.27
1301	2976	109	Groove ware pit	FFA, MAG, DAG, Ktr	-26.48	-25.93
1311	2992	174	Groove ware pit	FFA, MAG, DAG,	-25.70	-26.10
1325	3600	184	Groove ware pit	FFA	-29.35	-34.25
1427	7407	184	Groove ware pit	FFA	-27.41	-28.27
1426	–	184	Groove ware pit	FFA, ME, DAGtr	-26.83	-27.71
1324	3599	184	Groove ware pit	FFA, MAG	-26.79	-26.98
1121	3196	187	Groove ware pit	FFA, MAG, DAG, Ktr	-26.81	-26.88
1126	3628	512	Groove ware pit	FFA, MAG, DAG	-26.91	-26.39
2849	7776	717	Post-hole fill	FFA, MAG	-27.75	-27.86
4704	–	710	Pit fill	FFA, ME	-29.92	-31.35
5006	–	870	Pit fill	FFA	-28.58	-29.06

5536	10181	1386	Pit fill	FFA, MAG	-28.11	-29.38
2764	6557	653	Post-hole fill	FFA, ME, K	-28.37	-30.32
2803	7749	704	Post-hole fill	FFA, ME, WE, K	-29.00	-32.02
–	2664	95	Southern Circle	FFA, MAG, DAG	-28.57	-30.42
P44	63	PH 70, 71	Southern Circle	FFA	-28.35	-30.04
P164	C726	PH21, 22	Southern Circle	FFA, MAG, DAG, TAGtr	-28.20	-30.28
P223	C858	PH42, PH65	Southern Circle	FFA, MAG	-29.34	-33.94
P172	C599c	PH45	Southern Circle	FFA	-29.08	-30.72
P77	166	PH90	Southern Circle	FFA, MAG, DAGtr	-25.63	-25.52
P207	182	PH91	Southern Circle	FFA	-29.66	-34.01
P50	C378	122	Southern Circle	FFA, MAG	-28.33	-32.12
P488	C421	–	Southern Circle	FFA, MAGtr	-30.79	-35.80
P320	C398	–	Southern Circle	FFA, MAG	-29.63	-34.87
2876	7937	726	Stone-hole under	FFA, MAG, DAG	-29.66	-31.26
2902	8265	768	Stone-hole under	FFA, MAG, DAGtr	-26.98	-29.02
4481	8546	652	Midden	FFA, MAG, DAG	-29.18	-30.66
2900	8075	725	Midden	FFA, MAG, DAG	-28.86	-31.07
5005	–	725	Midden	FFA	-28.13	-28.25
5001	8314	770	Midden	FFA	-23.96	-25.26
5003	9469	886	Midden	FFA, MAG, DAG	-27.79	-29.59
5026	561	311	Post-hole fill W	FFA	-27.83	-33.84
5012	821	88/504	Pit fill W Enclosure	FFA	-28.36	-30.37

*PRN—pottery reference number refers to the *Feeding Stonehenge* pottery database; P number = catalogue number from Wainwright and Longworth (1971).

† FFA = free fatty acids; MAG = monoacylglycerols; DAG = diacylglycerols; TAG = triacylglycerols; K = ketones; ME = fatty acid methyl esters; WE = wax esters; tr = trace amounts.