

Supplemental Text 1: The sites

The mtDNA d-loop legacy of cattle: Fluctuations in diversity from the Neolithic to Early Medieval times in Switzerland

Twann Bahnhof, lat. 47.0942, long. 7.157

Twann is located on the northern border of lake Biel, Switzerland, and has UNESCO heritage status. The site has a long stratigraphy of 13 settlement phases belonging to the Cortaillod and Horgen cultures, with three Horgen time phases registered. Cattle from this paper are dated to layer OH (obere Horgener Schicht = upper Horgen cultural layer) (Table S1). While pig was the most important domestic animal, cattle were found consistently and are rather small compared to earlier and later periods [1,2].

Zürich Versicherung, Mythenquai, lat. 47.37174, long. 8.54226

The excavation Zürich Versicherung is located in the town of Zürich, Switzerland and is one of many important prehistoric sites in Zürich. Pfyn, Horgen and Corded Ware layers were preserved waterlogged. The evaluation of the site is ongoing (Amt für Städtebau, Kantonsarchäologie Zürich). The cattle from Corded Ware layers were on average larger and more robust than cattle from previous Horgen layers at the same site. This is in keeping with the pattern seen at Corded Ware settlements across Switzerland [3,4].

Basel-Gasfabrik, lat. 47.55814, long. 7.58769

The site of Basel-Gasfabrik is situated 2 km north of modern Basel city centre on the left bank of the River Rhine. The unfortified Late Latène settlement stretched over 17 ha and dates from the Later La Tène period (170/150 to 100/90 BCE) [5]. The most common features within the settlement are the remains of almost 600 large pits, whereas stratified archaeological layers rarely survived. The amount of archaeological finds from the pit fills is immense, and among them are more than 1 million animal remains. Countless coins and shards of Mediterranean wine amphorae emphasise the settlement's importance within long-distance trade networks [6]. Two cemeteries with about 200 known inhumations are situated north of the settlement [7].

Cattle and pigs were the two most important animal species kept in and around the settlement. Sheep, goats, horses, dogs, chicken, and the occasional wild animal complement the array of animals accounted for.

Augst/Kaiseraugst Augusta Raurica, lat. 47.533, long. 7.7167

The Roman *colonia* Augusta Raurica and the Castrum Rauracense are located in Augst and Kaiseraugst (cantons Basel-Landschaft and Aargau). Augusta Raurica is located within the region/area of the Celtic tribe of Raurici, and was founded around 15 BC. Within a few years the site rose to economic importance as a trading center, growing to about 15'000 inhabitants by 200 CE [8] and stretching to more than 100ha. Cattle were kept in the *villae rusticae*, often managed by retired Roman military personnel. About 100 *villae rusticae* were known in the immediate area of Augusta Raurica around 200 CE [9] illustrating the agronomical potential of the area.

The cattle samples were taken from the following excavations:

a) Theater Nordwest Ecke:

Theater NW Ecke is located in the town center at the corner of the scenic theatre. Here a more than 4m deep stratigraphy dating from the 1st to the middle of the 3rd century CE existed. Diverse cattle remains were found, among them waste from smoked products consumed in the surrounding *tabernae* and also from handicraft waste. Male animals are dominant in this early phase due to the bone/horn industry located in this part of the town [10].

b) Insula 23, 1987.56

Insula 23 is located in the west of the insula within the upper town. Living quarters and workshops, including a smoking oven were present. The cattle bones were found within a reconstruction horizon (Umbauhorizont) [11].

c) Kastelen, 1991-1993.51

Kastelen is located on a plateau between the so-called "upper town" and the "lower town" of Augusta Raurica, inhabited at first by upper class residents. At around 275 CE it was surrounded by a defensive wall. The consumption of cattle meat seems to have been an important part of the diet here, and the animals were slaughtered in old age, indicating their additional use for traction [12,13].

d) Kaiseraugst Hotel Adler

The site lies in the area of the late Roman Castrum Rauracense which was built in the 4th century CE. A thick "dark earth" layer was carefully excavated above the cultural layers. The archaeological material revealed a continuous settlement during the 5th – 7th centuries CE. Note that, as common for "dark earth" layers, there is no stratigraphy visible by eye. The early medieval dates are based on the latest archaeological finds in the lowest layers (terminus post quem: late 4th century CE) and the youngest finds in the dark earth layers themselves (late 7th century CE). These "dark earth" layers are to an unknown extent mixed with older Roman material [14][15]. In the Castrum cattle are less frequently represented in the faunal remains than in the third and fourth centuries in Augusta Raurica, this in favor of pig [16]. Reasons could be the need for more self-

sufficiency in terms of food production but also the smaller space for animal husbandry within the walls of the Castrum.

Pratteln Kästeli, lat. 47.5171, long. 7.6948

The Roman *villa rustica* of Pratteln-Kästeli lies to the west of Augusta Raurica and is one of the most important *villae rusticae* in its hinterland. Agriculture seems to have been the main activity here from the 1st to the 4th century CE. The size of the site is quite large, and also includes rare structures including a generous garden with a 14 x 20 m water basin lined with fretted sandstone, in which fish may have been kept. In the economic part of the *villa rustica* there were various farm and workshop buildings and stables. It is assumed that fenced pastures for both horses and cattle would have been located in the surrounding area, and there is evidence that at least two sod wells supplied water. A roughly rectangular clay-lined manure treatment pit measuring 6 x 11 m underlines the importance of animal husbandry on the *villa rustica*. After some destructions in the 3rd century CE, the *villa* existed on a reduced scale until around 400 CE [17-19].

Reinach Brunngasse, Alte Brauerei, Gemeindezentrum, lat. 47.49313, long. 7.58948

Reinach (canton Basel-Landschaft) is situated about eight kilometers south of Basel. It has been occupied from the Roman period until today. The Roman *villa* estate was mainly inhabited during the 1st and 2nd centuries CE, and later Roman finds are rare. In the 2nd half of the 6th century the settlement was re-founded by immigrants from the Upper Rhine area [20]. The early medieval settlement structures are mainly rural pithouses (Grubenhäuser) but include also four pottery kilns dated to the 7th / 8th century CE. It is suggested that Reinach was part of a major pottery manufacturing network in the region at that time [20]. Domestic cattle have been an important part of the livestock population throughout the life of the settlement. In the earliest structures from the early medieval founding phase, higher proportions of pigs and wild animals occur than in later contexts. This suggests that at the earliest stage of the resettlement the cattle stock was still small and the food supply was more based on pig husbandry and hunting than in the later phases [16,21].

Lausen Bettenach lat. 47.4726, long. 7.7598

Lausen Bettenach (canton Basel-Landschaft) is situated about twenty kilometers southeast of Basel. It was established as a Roman *villa* estate and was continuously inhabited until the 13th century CE [14]. Although the site is in a rural setting similar to Reinach, it is in an unusual location at the edge of a former lake from which an aqueduct supplied the nearby Roman city of Augusta Raurica with fresh water [22]. During the Early Medieval period the presence of stone buildings and a 5th / 6th century CE sepulchral church underline the continuing importance of the settlement [23]. Further stone buildings were erected in the 8th to 10th centuries. Domestic cattle were an important part of local livestock farming throughout the occupation of the settlement. In many phases of the settlement cattle are less or equally represented (number of identified species,

NISP) as pig. Regarding species proportions differences in social status and diet between the residents could have played a major role [16,21].

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