The Medieval Agricultural Revolution. New Evidence

Helena Hamerow

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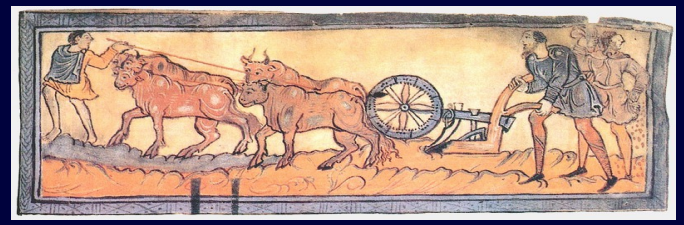
The Medieval Agricultural Revolution, c AD 800-1300



1. The ‘cerealisation’ of the English countryside and the link to wealth disparities
2. The ‘FeedSax’ Project: New scientific evidence for the conditions in which medieval crops were grown
3. Conclusions: A ‘long’ revolution and the endgame of extensive cereal farming.

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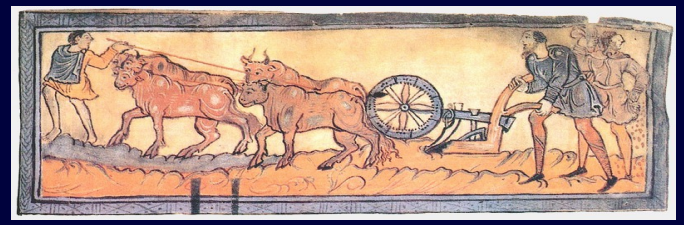

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-- Population of late Roman Britain: 2.5-3 million
--Post-Roman collapse of perhaps > 1 million
-- By 1086 (Domesday Book): 2-3 million (c 6 million acres under the plough)
-- By 1300: 5-6 million (c 10.5 million acres under the plough)

How did medieval farmers feed such a rapidly growing population?

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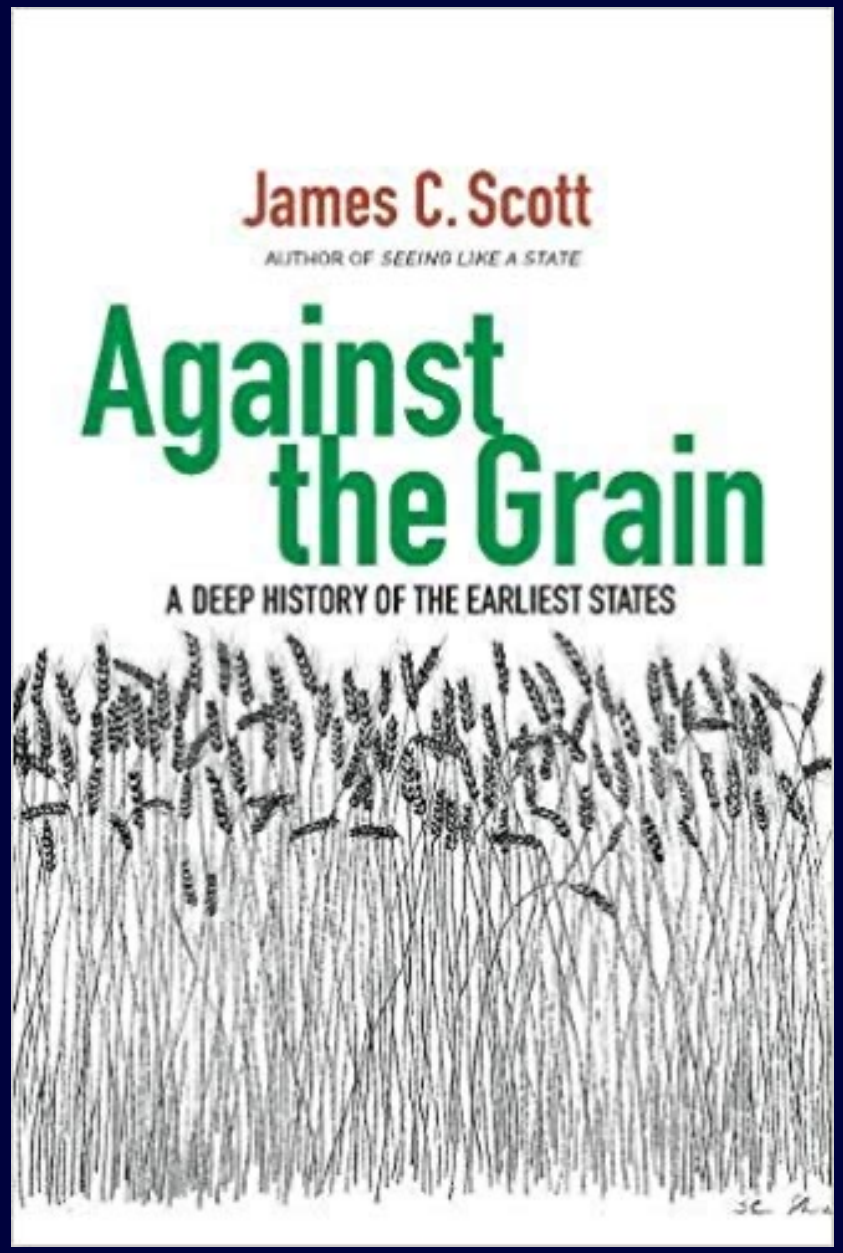
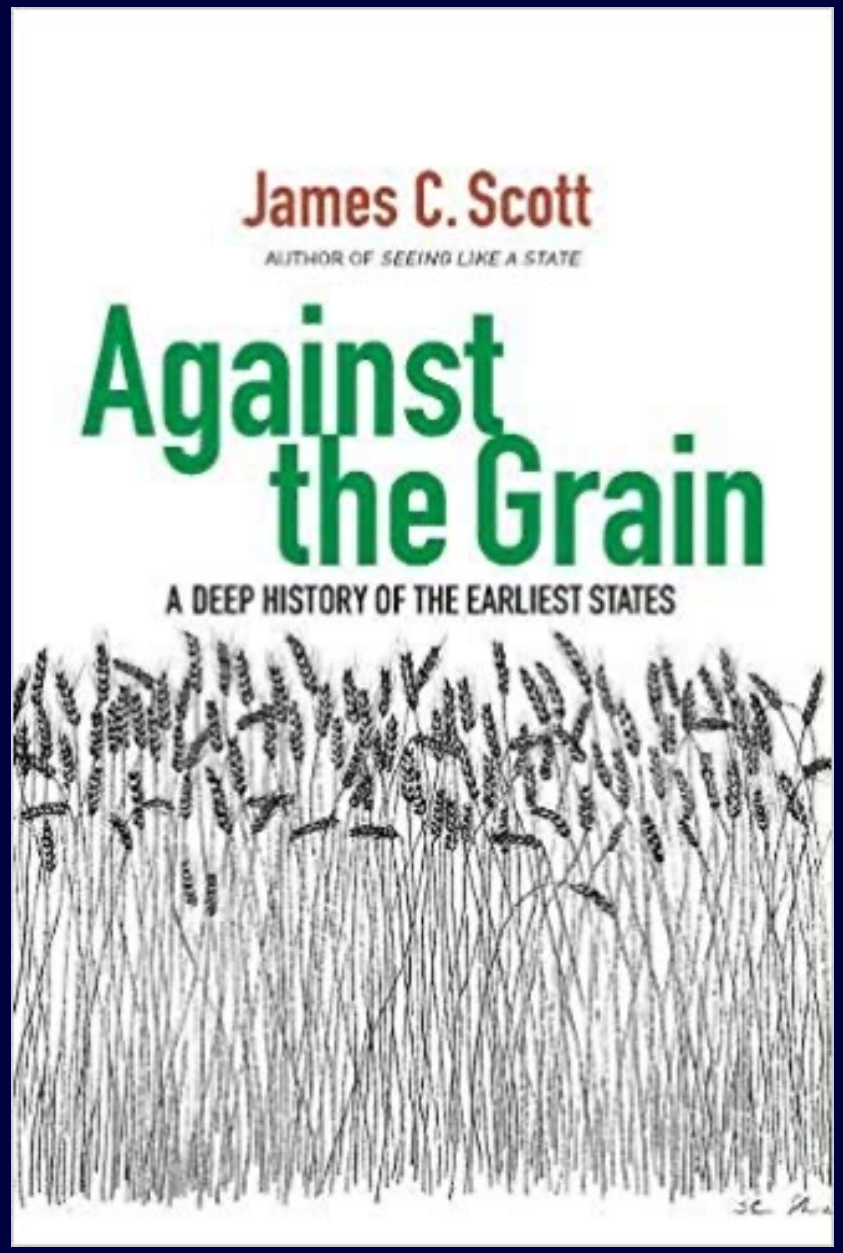
The grand narrative: An ‘agricultural revolution’ impelled by technological innovation– the invention of the mouldboard plough, 3-field crop rotation, communally managed open fields with nucleated villages, etc.


James C. Scott
AUTHOR OF SEEING LIKE A STATE
Against the Grain
A DEEP HISTORY OF THE EARLIEST STATES

‘The key to the nexus between grains and states lies…in the fact that only…cereal grains can serve as a basis for taxation’ (Scott 2017)



Why can’t we agree about the ‘medieval agricultural revolution’?

1. Because we lack direct, closely dated evidence for early medieval fields and for the conditions in which crops were grown

2. The evidence we do have is indirect and ambiguous: later manorial records, post-medieval maps, manuring scatters, place-names etc.

The Laxton map, 1635

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3. We need new evidence!

The Laxton map, 1635

FeedSax

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European Research Council

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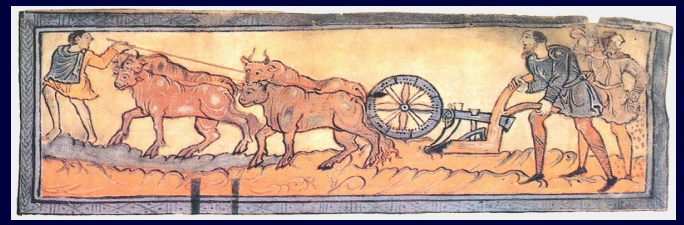

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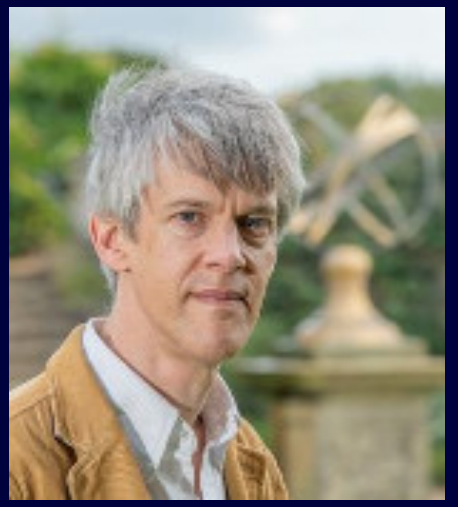
The FeedSax Team: Helena Hamerow, Amy Bogaard, Mike Charles, Christopher Bronk Ramsey, Richard Thomas, Mark McKerracher, Liz Stroud, Emily Forster, Sam Neil, Matty Holmes.

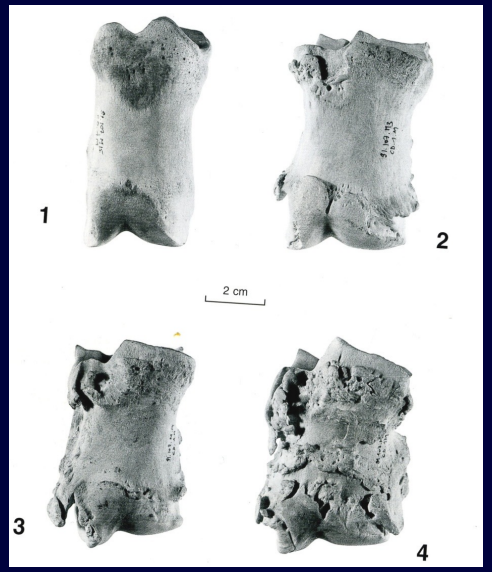


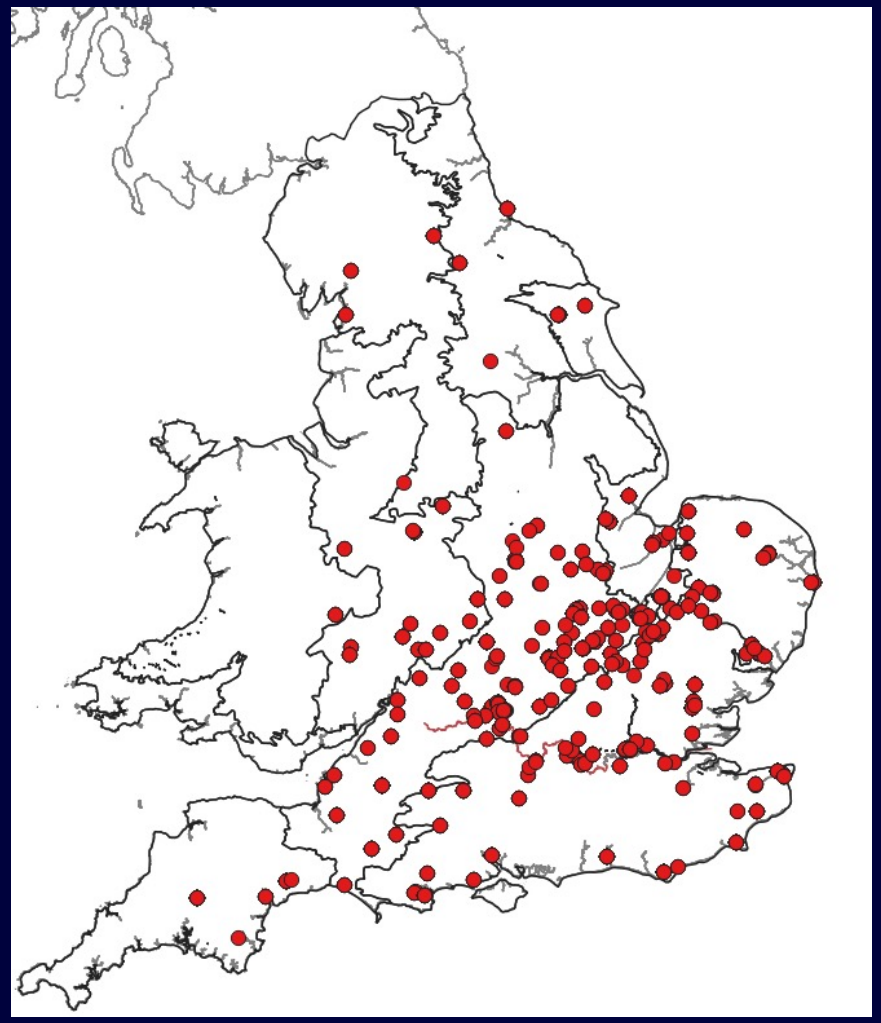


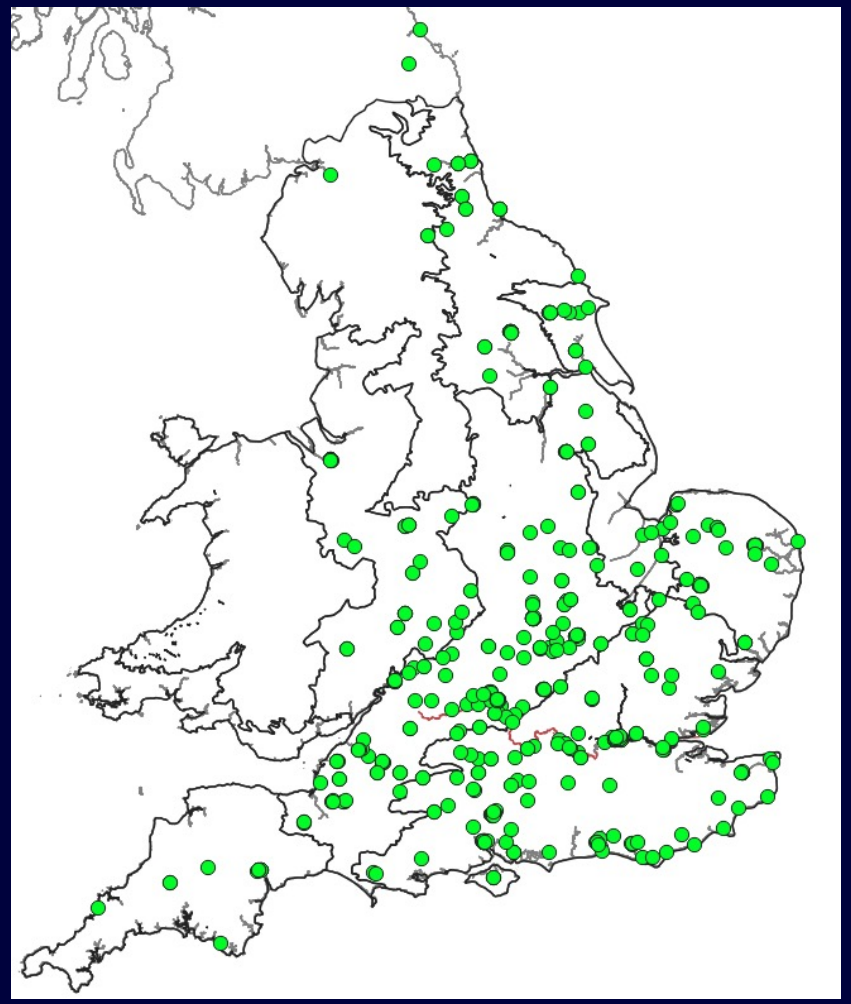


FeedSax (‘Feeding Anglo-Saxon England’): Our primary source materials: preserved grains and seeds, animal bones and pollen grains



Feedsax: Analyzed plant remains from 300 sites (L) and animal bones from 400 sites (R)





FeedSax: Our Methods

i. Functional weed ecology
ii. Zooarchaeology
iii. Archaeobotany
iv. Crop stable isotope analysis

Some results relating to 3 key elements of the 'revolution', i.e. the 'mouldboard plough package':

i. The 'extensification' of cereal farming: implications for soil fertility and the scale of cultivation
ii. Systematic crop rotation: When was it introduced and how did it spread?
iii. The mouldboard plough: When did it come into widespread use?

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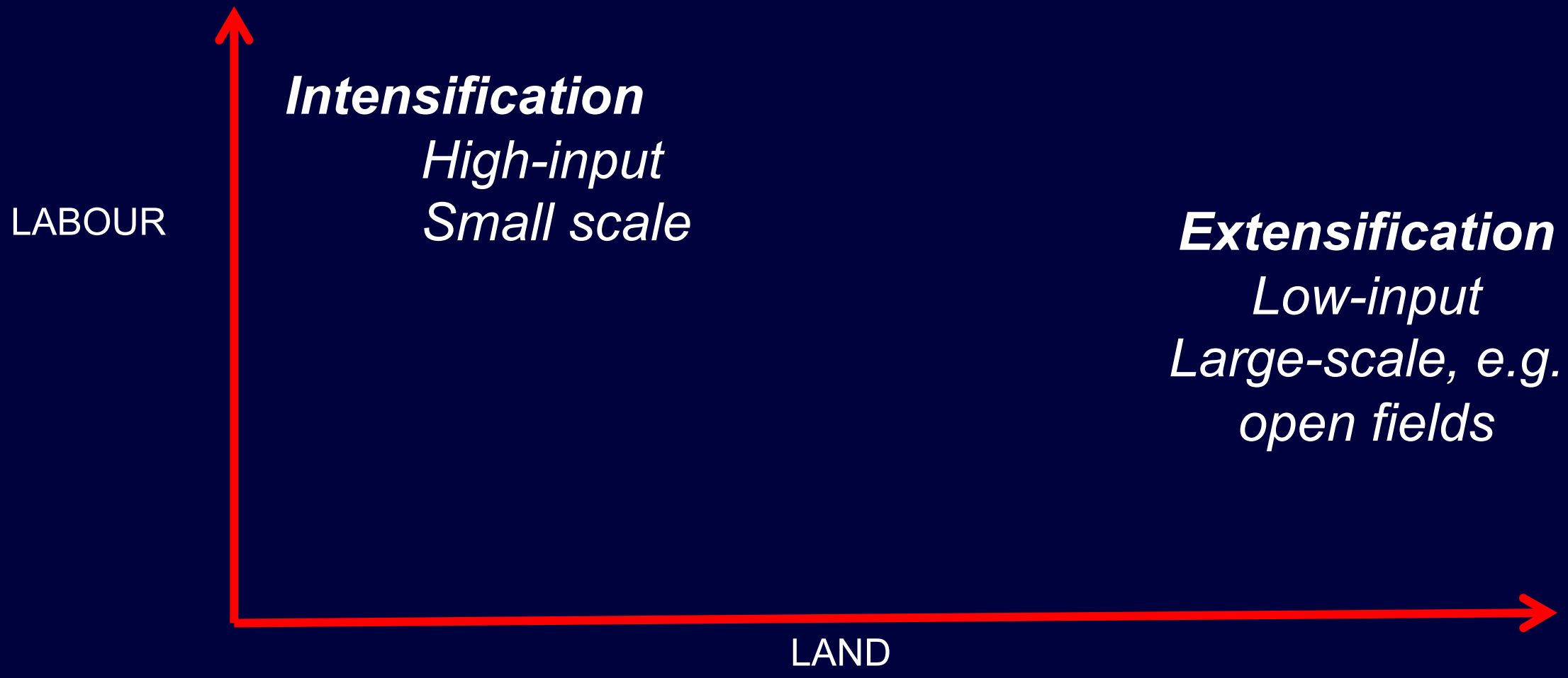
Extensification: increase production by cultivating more land and investing less labour/input per unit of land (A. Bogaard)

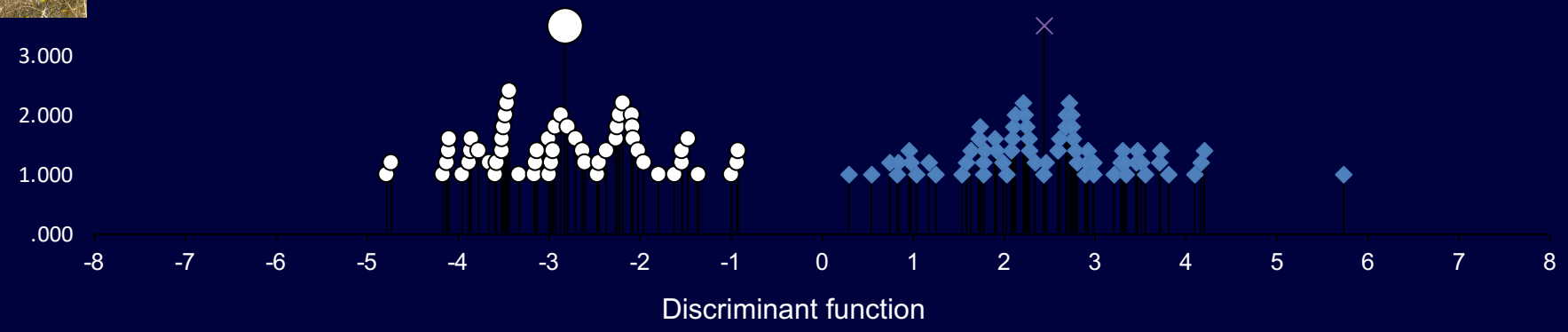


Functional Weed Ecology: Arable weeds hold the key!

Why are weeds useful to archaeobotanists?
Arable weeds reflect the soil conditions in which the associated crops grew:
e.g. stinging nettles thrive in high-fertility conditions while others prefer poorer soils.

Low input

High input



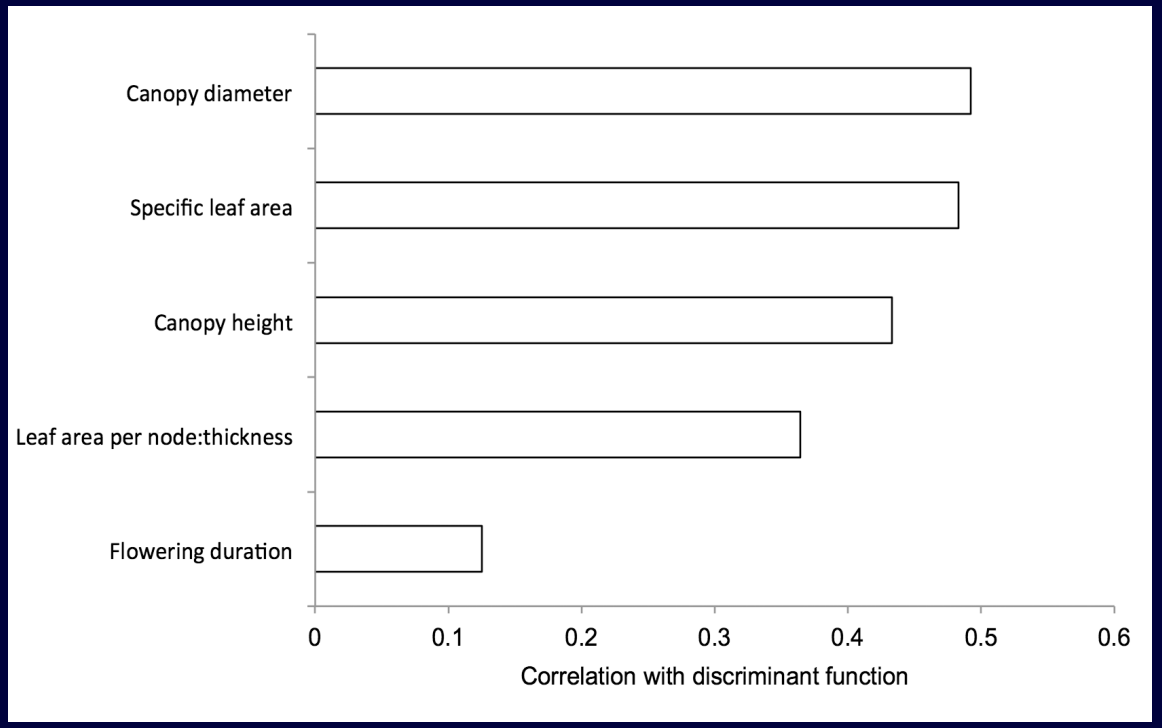
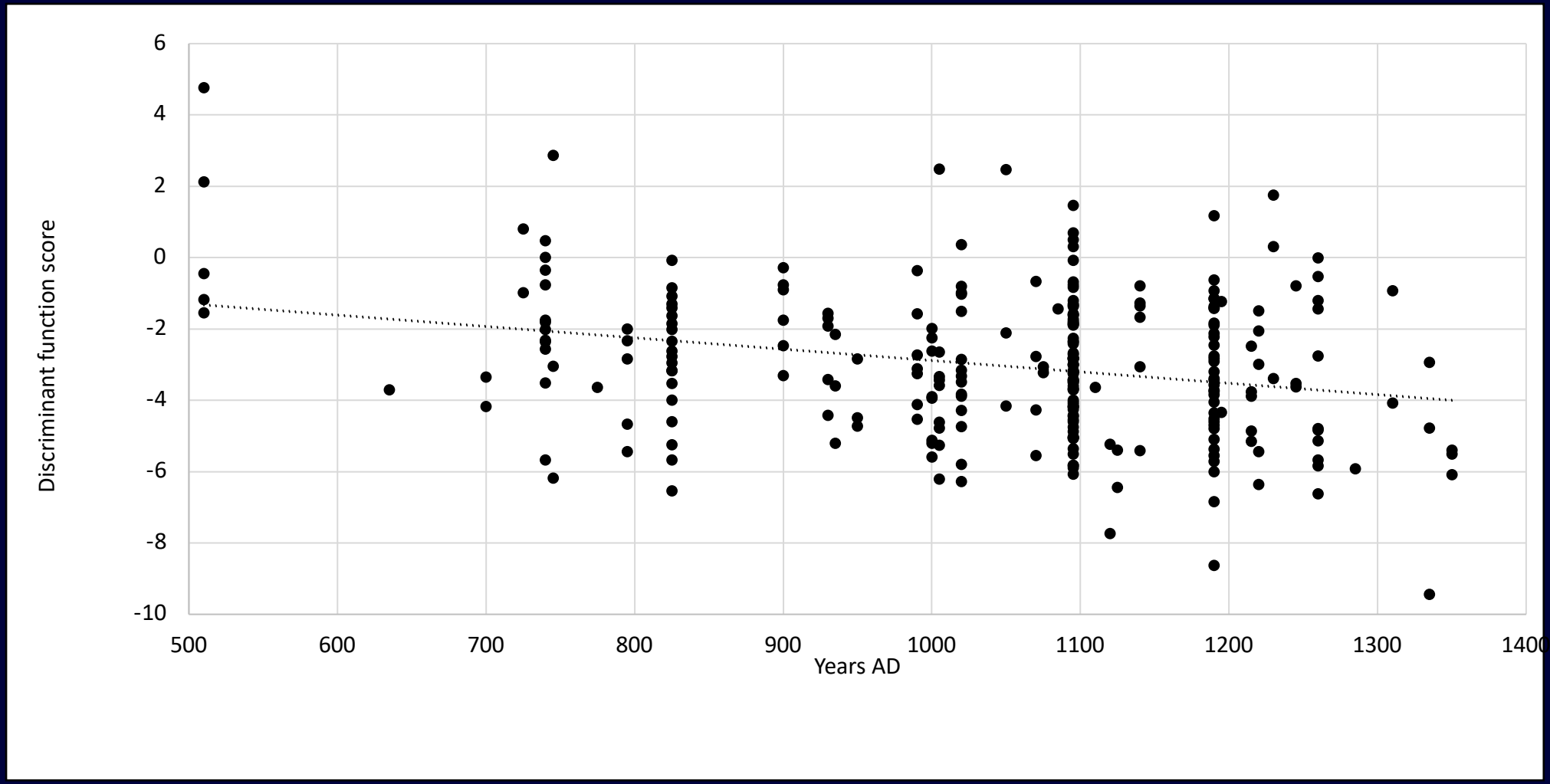


Fig. AB1

Extensification in the Central Zone: Weeds reveal declining fertility over time, with shift to larger-scale cultivation c 8th c.



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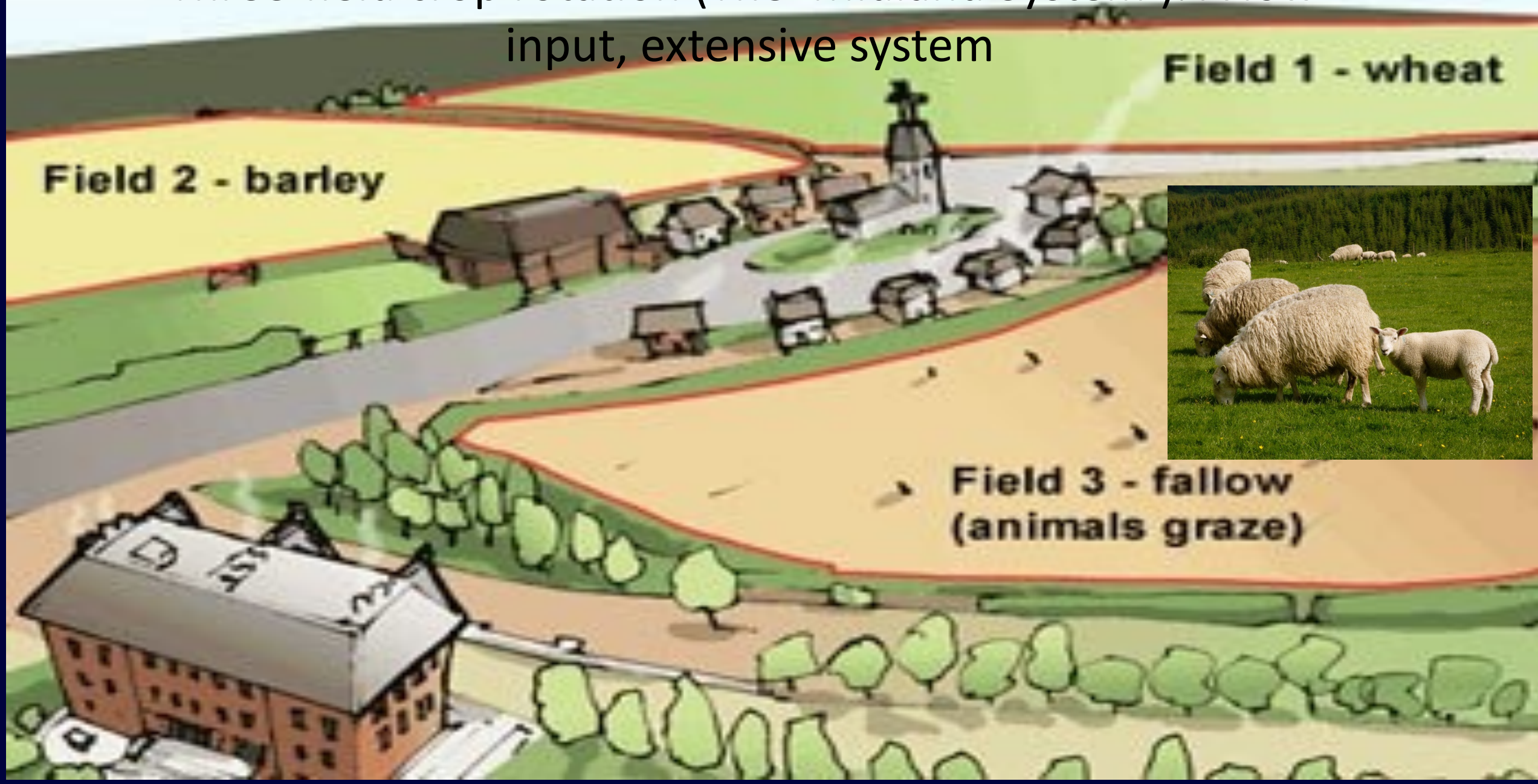
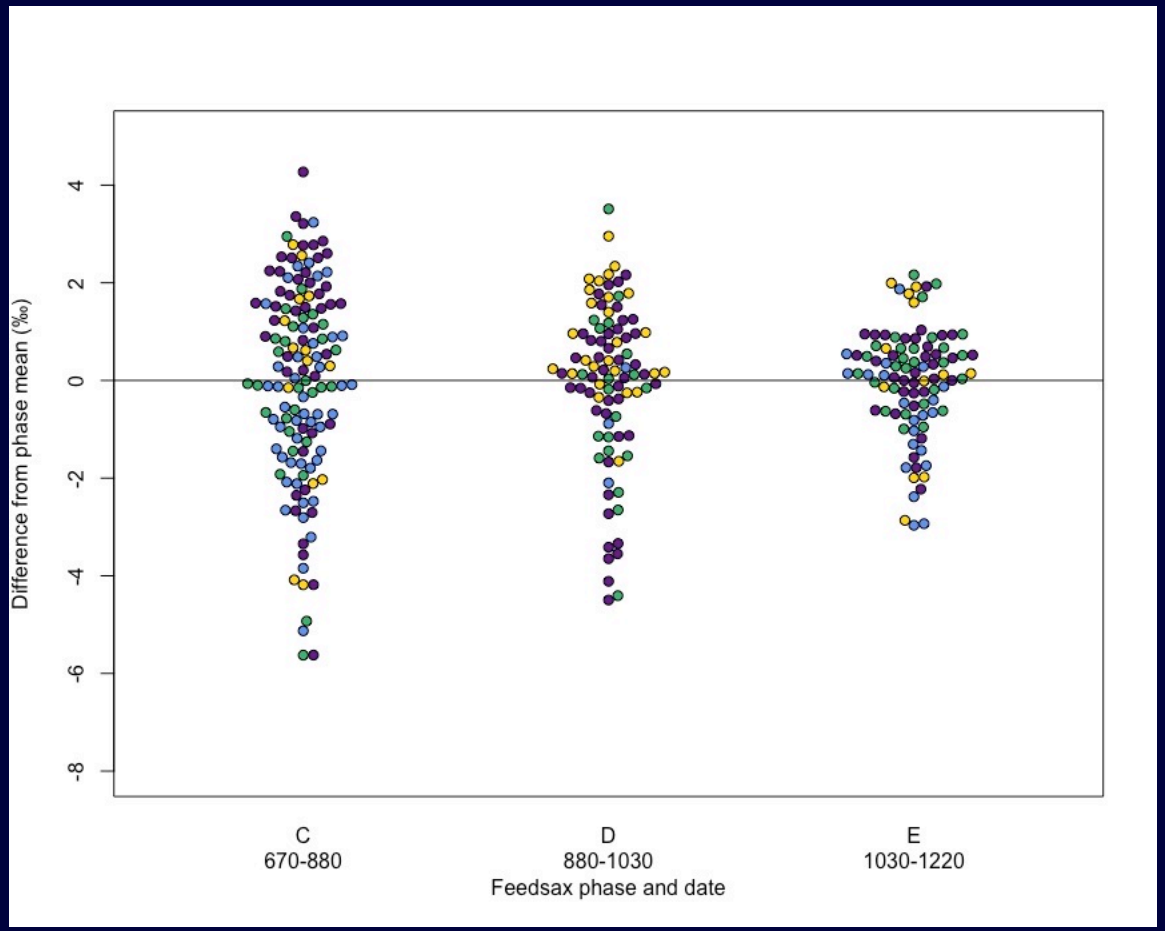
Three-field crop rotation (The ‘Midland System’). A low-input, extensive system



Systematic crop rotation: Crops grown in rotation in the same fields display similar stable isotope (d15N) values. Isotopic variability between different cereals indicates that they grew in different soil conditions, i.e. not in rotation. When results are normalized across all sites, we see high variability in the 7th-9th , i.e. little evidence of rotation; reduced variability from the late 9th c; and a marked reduction in variability from the second quarter of the 11th c.
Slide: E. Stroud

Yellow = oat; green= rye; purple = wheat; blue = barley



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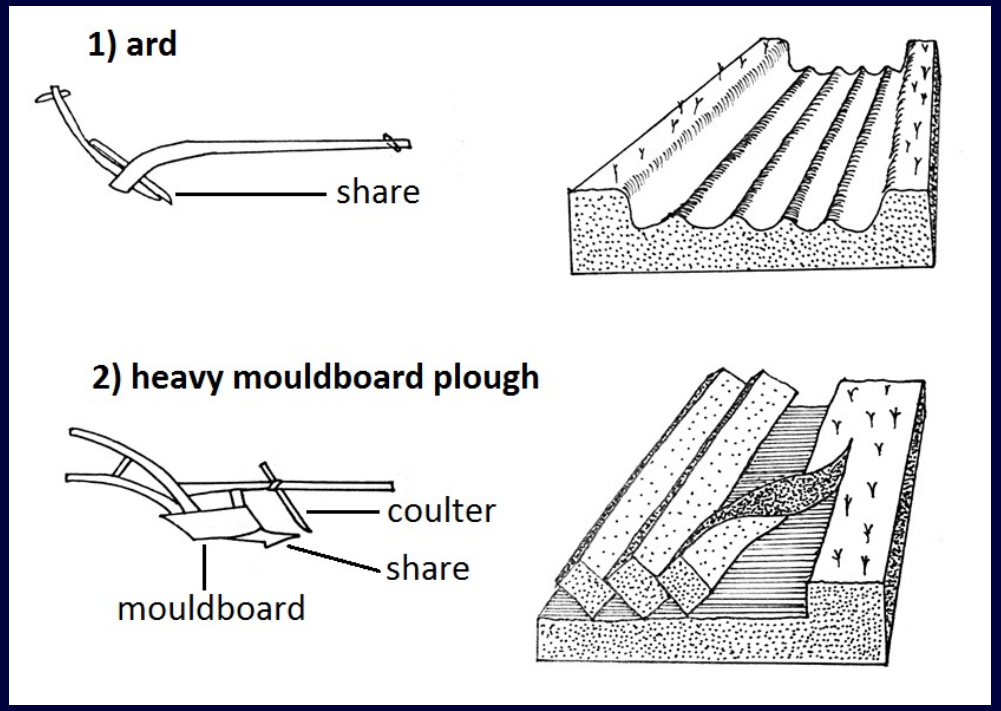
1) ard
share
2) heavy mouldboard plough
coulter
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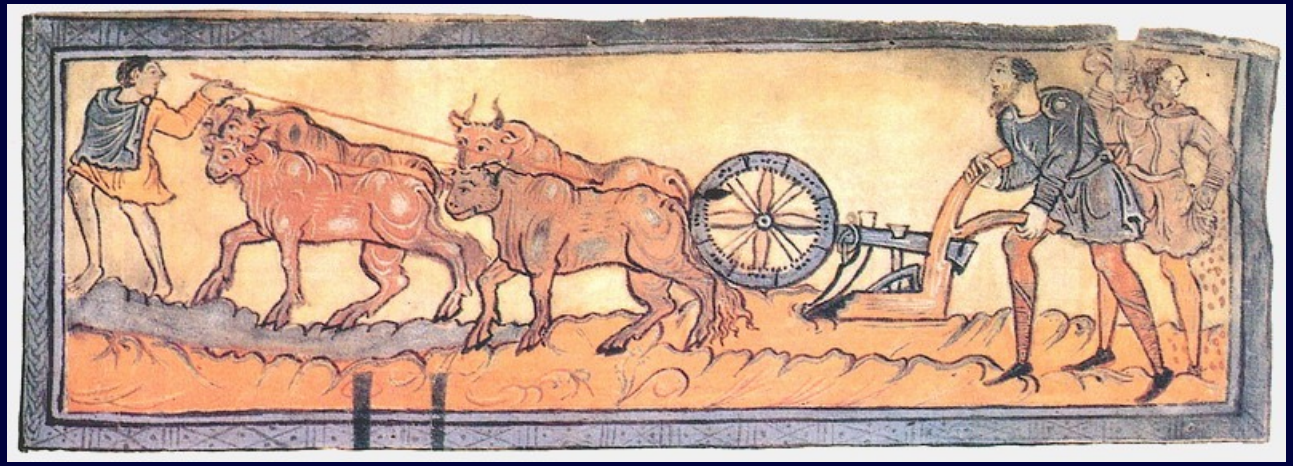
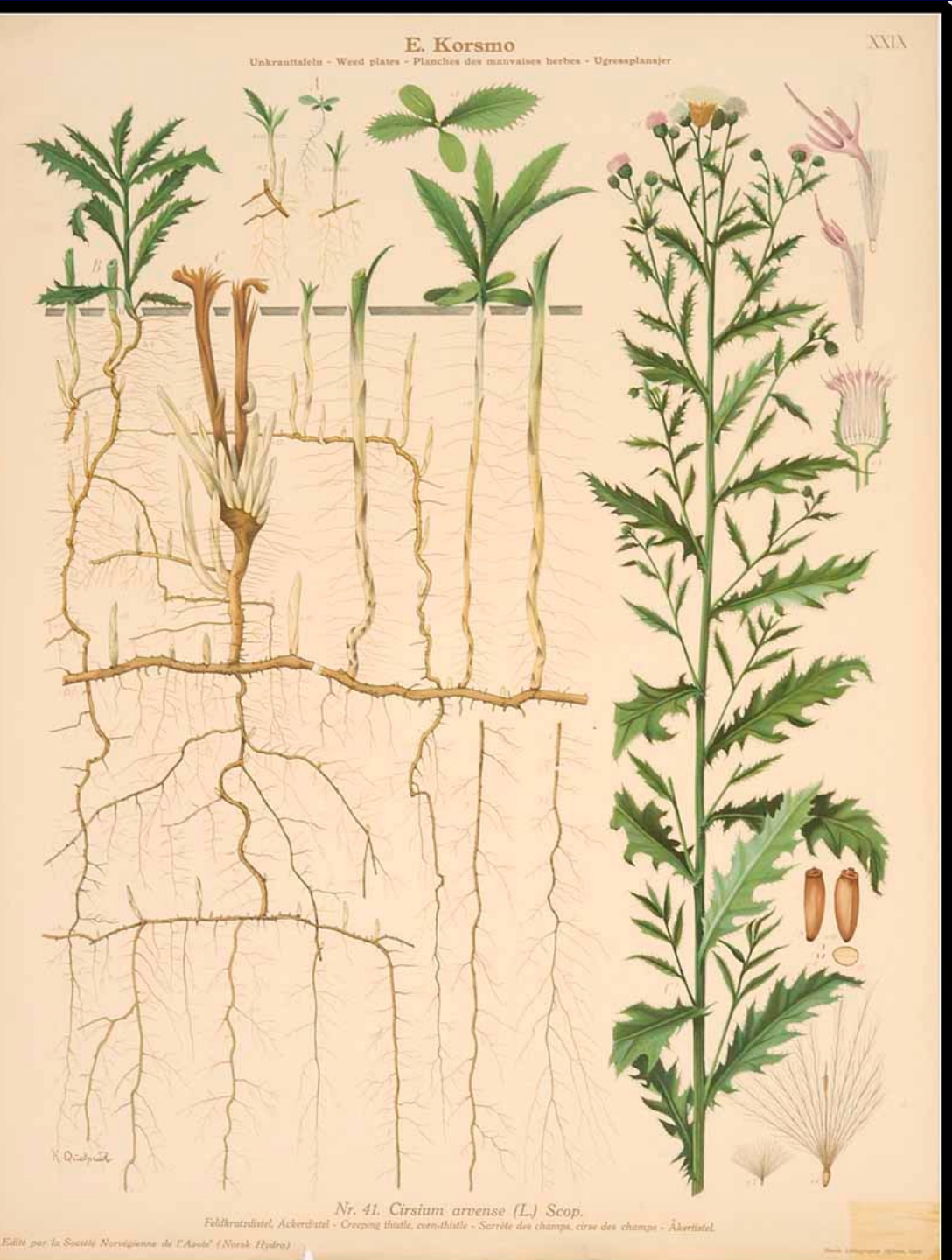
mouldboard





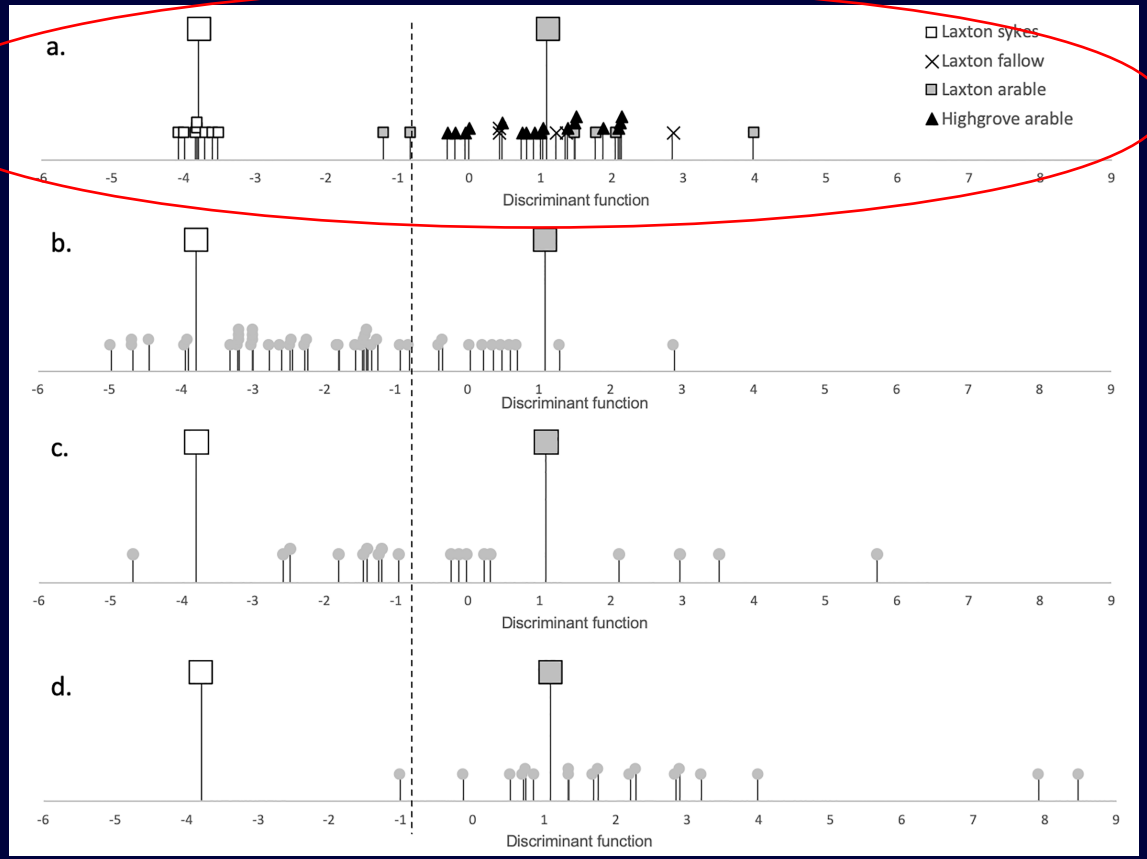
Weeds are key: Arable weeds reflect levels of soil disturbance. Weeds that regenerate from tiny fragments (e.g. creeping thistle/*Cirsium arvense)* thrive in ‘high disturbance’ conditions such as those produced by the mouldboard plough.

Walter of Henley (13th c): If thistles are ploughed up before midsummer, ‘for each one shall come up two or three’.

Establishing a modern baseline: Botanical surveys at Laxton (Notts) and Home Farm, Highgrove (Glos)

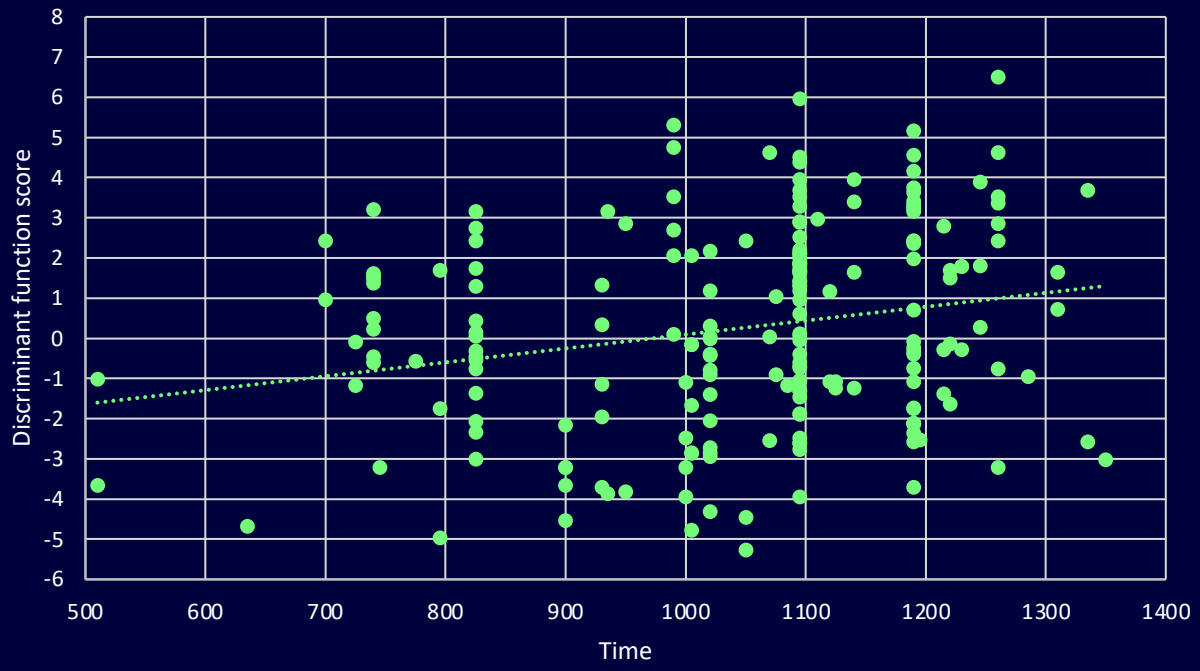
Discriminant function scores for soil disturbance [see top graph (a) only.]
(a) Laxton meadow (white squares) v. Laxton and Highgrove arable fields)

Dotted line = ‘Lauresham baseline’, the minimum score expected with mouldboard ploughing. Samples to the right of this are consistent with the use of a mouldboard plough. (A. Bogaard)



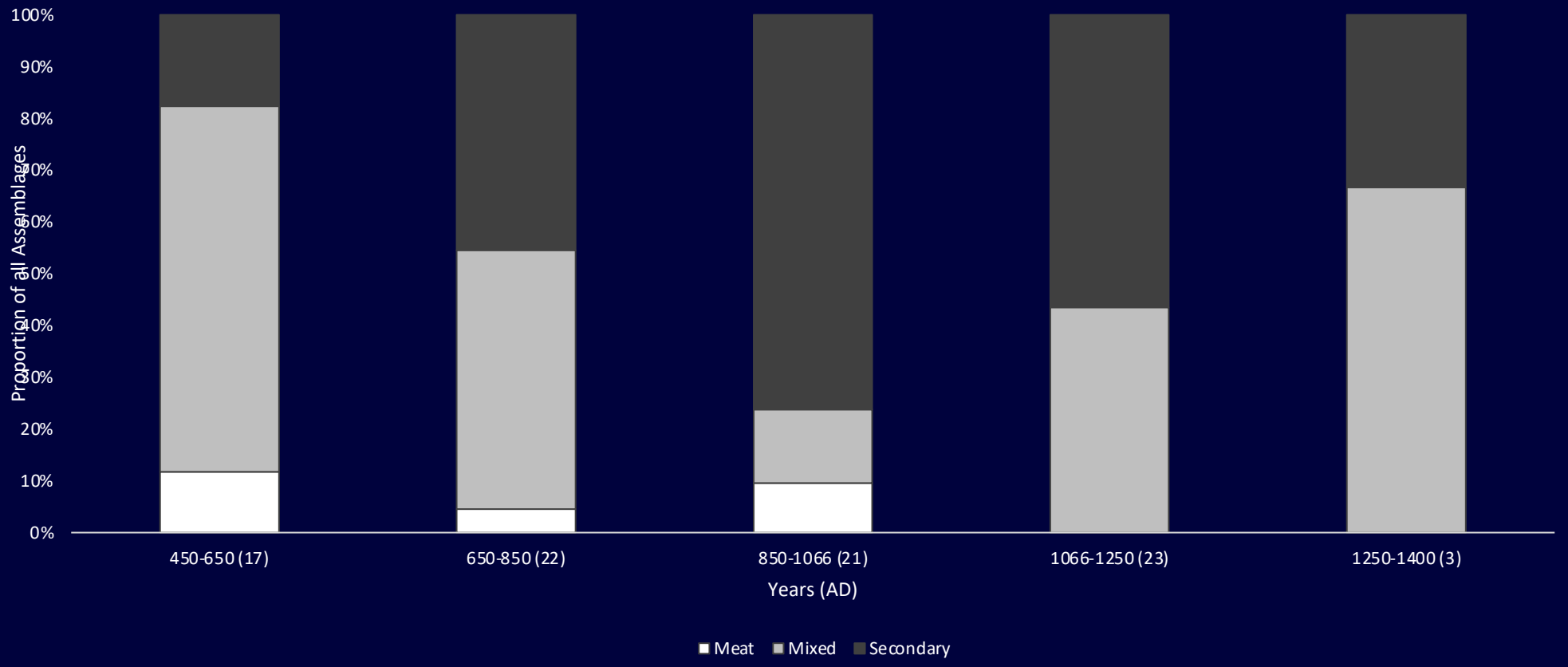
A mouldboard plough in action. Baseline weed data supplied by the Lauresham Laboratory for Experimental Archaeology. (Photo: C. Kropp)

Spread of the mouldboard plough: Weeds reveal increasing levels of soil disturbance over time in Central Zone (A. Bogaard)

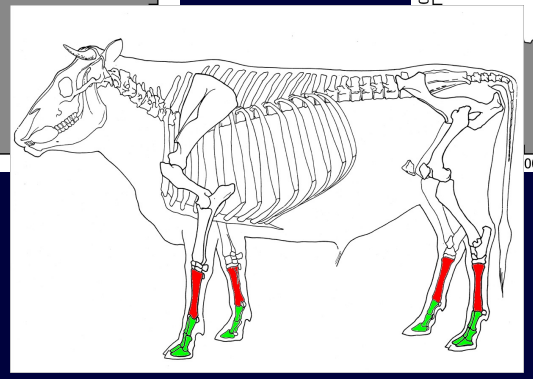


Green dot = 1 sample

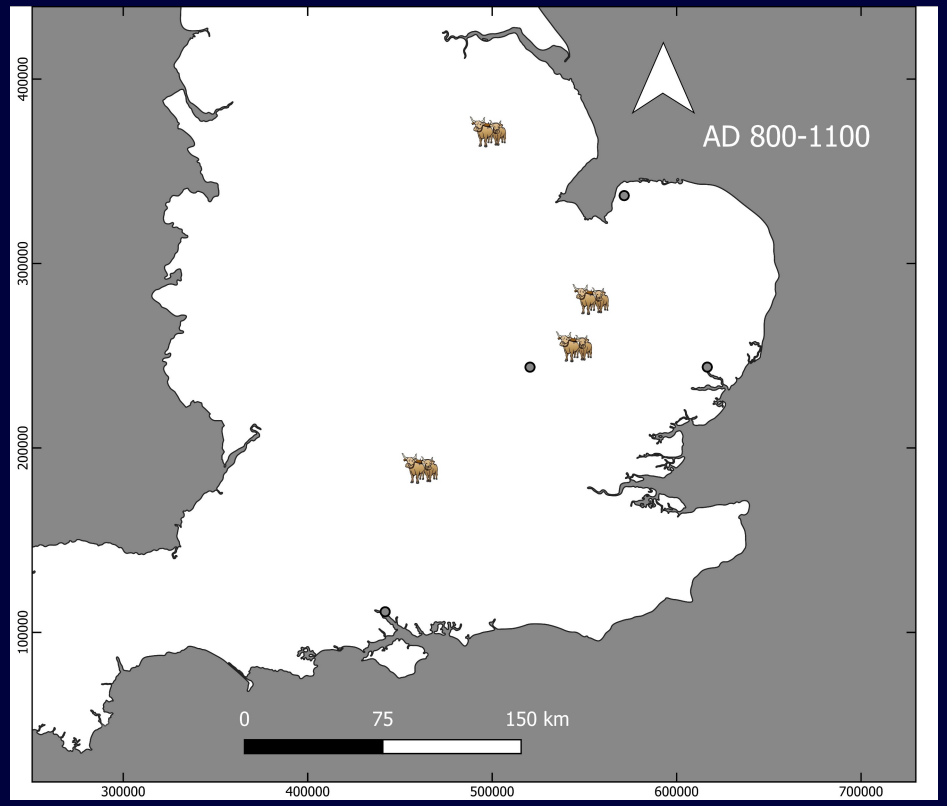
Cattle bones & the spread of the mouldboard plough: Mortality profiles for cattle, showing relative significance of meat versus secondary products (milk, traction) over time. (M. Holmes)

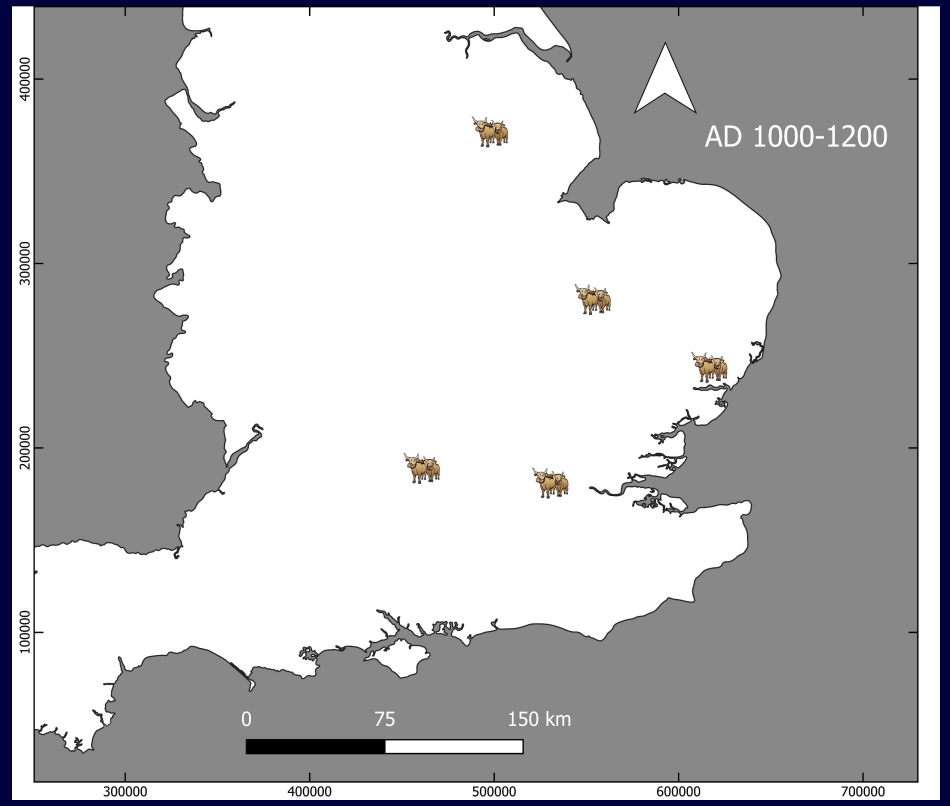


Pathological changes to cattle foot bones and the ‘draught cattle’ signature (M. Holmes).



Pathological changes to cattle foot bones and the ‘draught cattle’ signature (M. Holmes). A ‘tipping point’ c. 1000.





Settlement archaeology and farming regimes: 3 periods of change

i. The ‘long 8th century’
ii. The 10th century
iii. The 12th & 13th centuries

The ‘long 8th century’ (c 680 – 830):

--Droveways
--Extensive systems of ditched livestock enclosures (pens, etc.)
--Hay meadows
--Centralised crop storage
--Centralised crop processing

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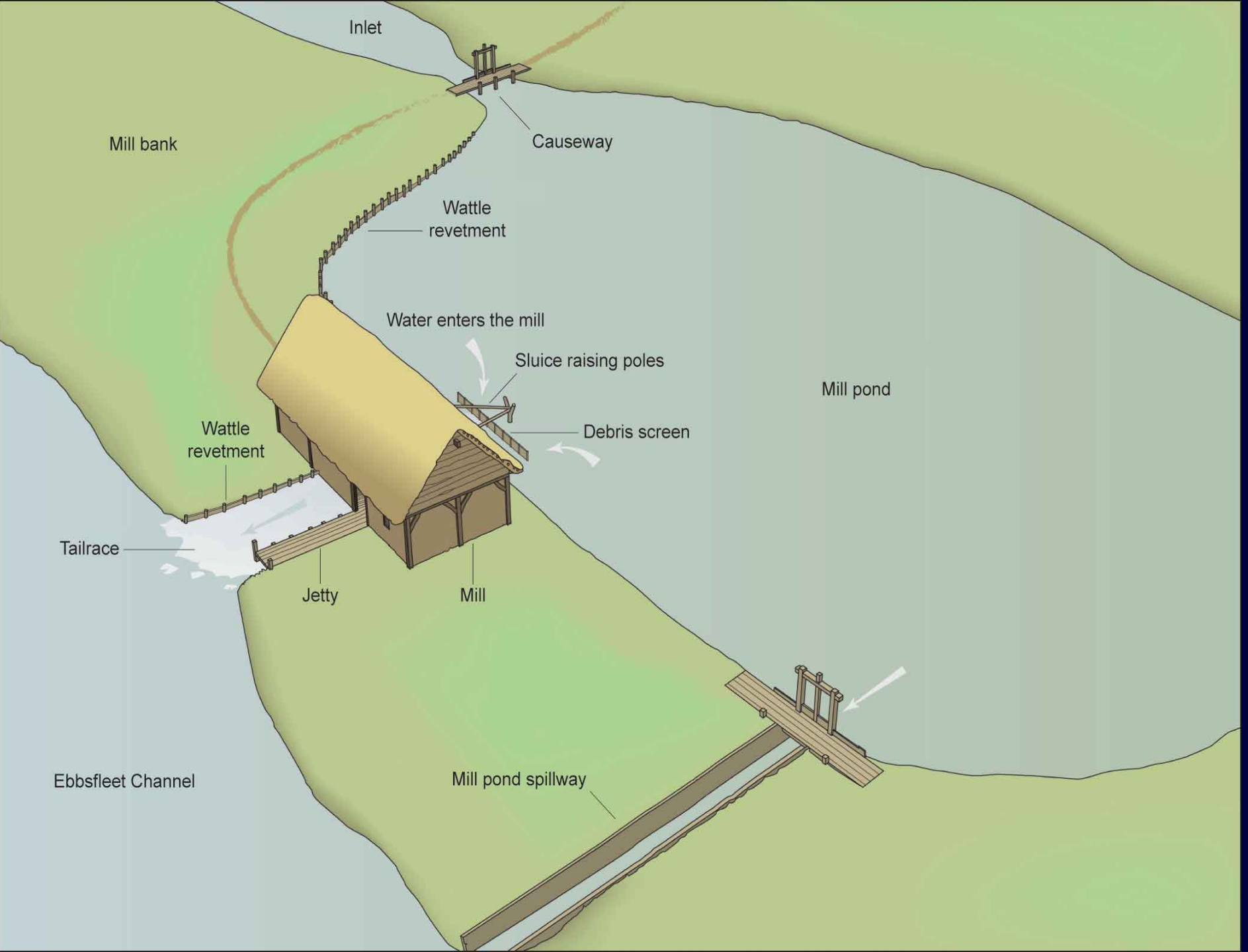
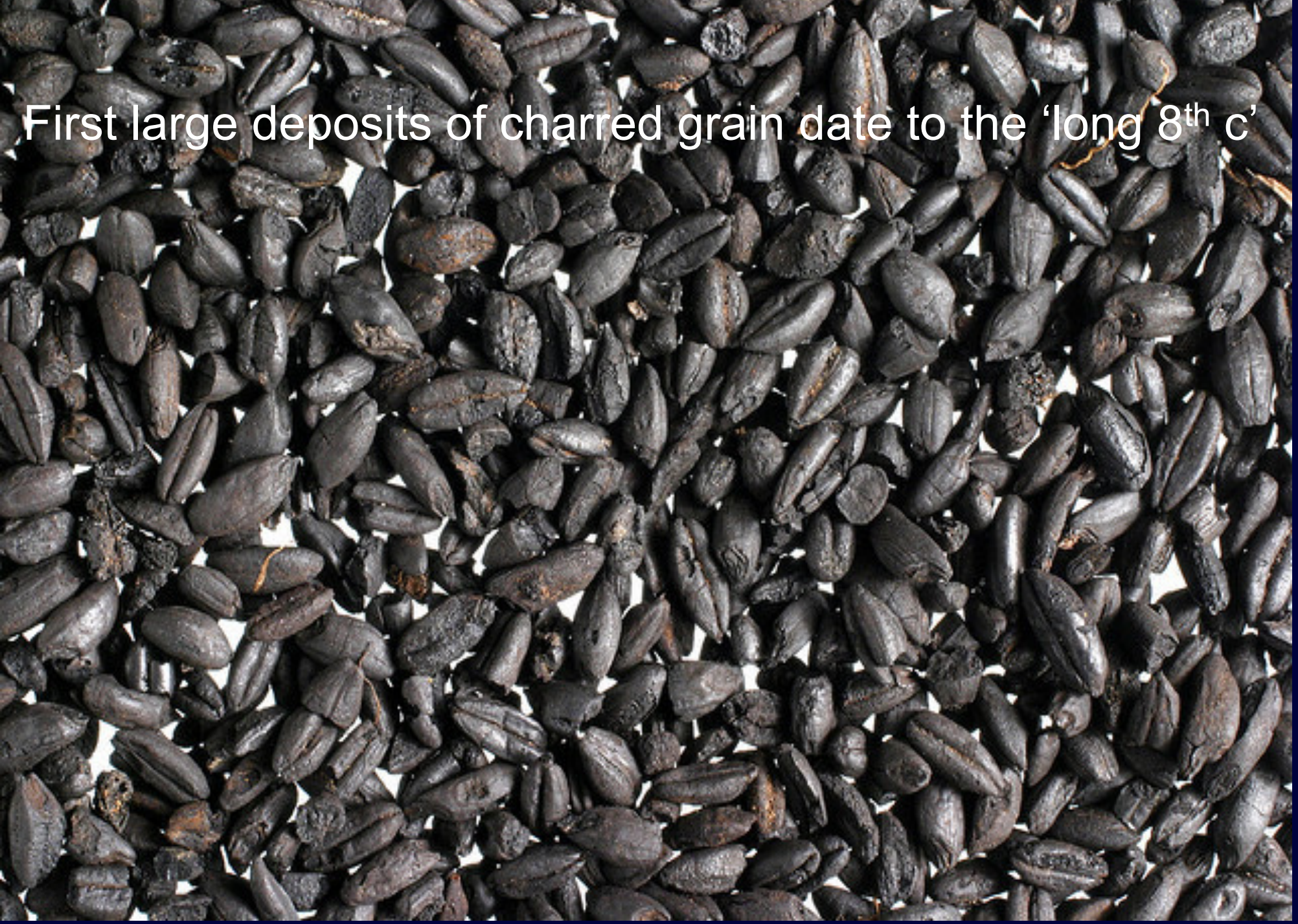
Implications: 1. Livestock were being managed in new ways that required their movements to be controlled.
2. Farmers were pooling their labour to construct extensive systems of banked & ditched enclosures.

Investment in the storage and processing of agricultural surpluses (e.g. 8th/9th c malting oven from Higham Ferrers, Northants.)

Plate 5.2 Reconstruction of the malting oven



Watermill from Ebbsfleet, Kent (c 700). A ‘capital project’ based on wealth generated by cereal surpluses.



First large deposits of charred grain date to the ‘long 8th c’

10th century: Appearance of first distinctively aristocratic settlements, i.e. the residences of local lords (‘proto manors’).

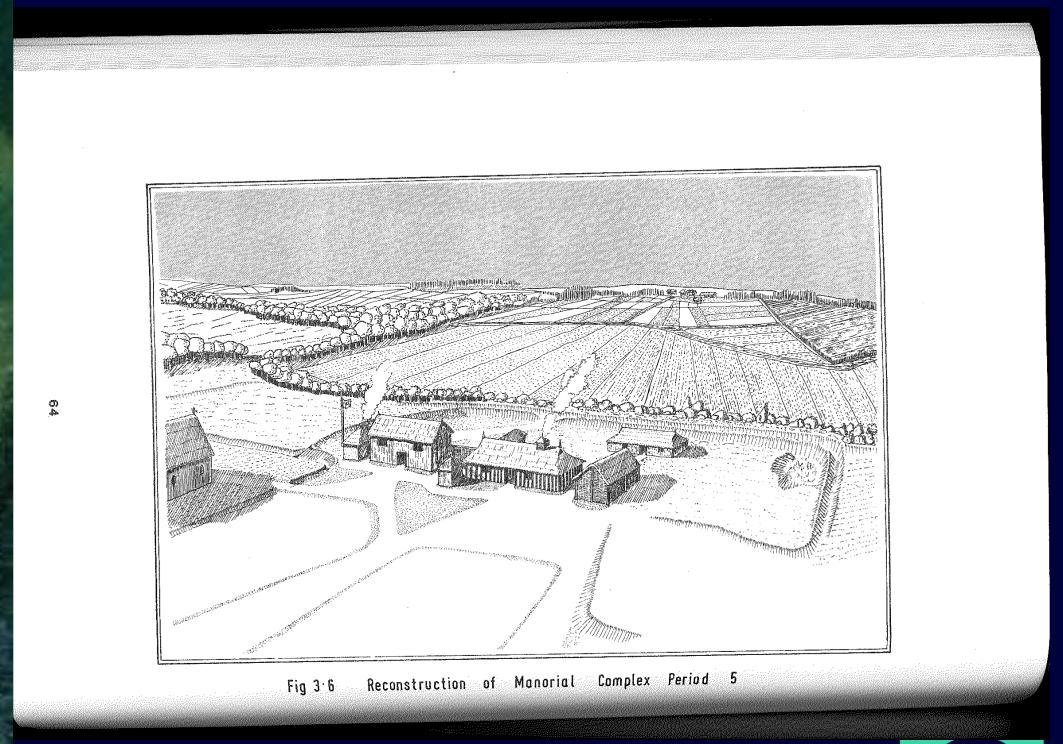


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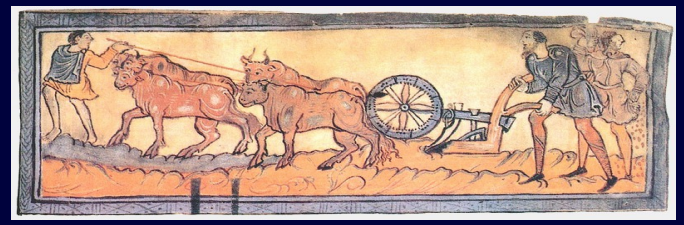
Fig 3·6 Reconstruction of Manorial Complex Period 5

12th -13th c: Emergence of the nucleated village in parts of England, above all in the Central Zone

The Medieval Agricultural Revolution, c AD 800-1300



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Some conclusions from the FeedSax Project: A ‘long’ agricultural revolution, but a revolution nonetheless

-- 8th /9th c: A shift to low-input regimes and some use of the mouldboard plough. Driven by population growth and led by royal and monastic innovation.

-- 10th/11th c: Use of crop rotation and the mouldboard plough becomes widespread, along with some regional specialization, suggesting some top down pressure from local lords (but also buy-in from prosperous peasants) seeking to optimize outputs

-- 12th/13th: Increased density of charred grain deposits implies a scaling up of production while a shift to bread wheat in some regions suggests a new emphasis on cash crops. The proliferation of markets drives a regional ‘fine tuning’ of cereal farming to maximize outputs, but no obvious innovations. Soil fertility continues to decline despite manuring, planting legumes, rotation, etc.

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--If by ‘revolution’ is meant a ‘great leap forward’ impelled by technological innovation…well, no.

So, was there a medieval ‘Agricultural Revolution’?:

--If by ‘revolution’ is meant a ‘great leap forward’ impelled by technological innovation…well, no.

--Instead, a series of innovations and changes, some incremental, others with a long gestation (e.g. the plough), which had a cumulative impact that was transformative.

The Great Famine 1315-17: The Endgame of Extensification?

R: The Apocalypse in a *Biblia Pauperum*, 14th c. Death sits astride a beast whose tail ends in a ball of flame (Hell). Famine points to her hungry mouth.

Can Experimental archaeology provide some answers? Ploughing the first furrow in the ‘Oxford field’ at Lauresham.

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