How it all began: the prehistoric origins of dairying and cheese-making in Ireland and continental Europe

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Lactase Persistence (LP) – allows digestion of milk beyond infancy

Lactase = enzyme

Lactose = sugar in milk
Lactase persistence varies greatly across globe, even across Europe

*LACTASE HOTSPOTS*
Only one-third of people produce the lactase enzyme during adulthood, which enables them to drink milk.

LP and milk-drinking cultures – how old is this relationship?
The spread of farming through Europe – the Neolithic


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‘Secondary Products’ Revolution


Appearance of domesticated cereals, animals, pottery etc. widely acknowledged as a Neolithic ‘Revolution’

‘Secondary Products Revolution’ – idea that dairying, wool, traction came afterwards, emerging in the Bronze Age

Very influential interpretation of prehistoric farming societies
Detecting dairying in the archaeological record

Analysing the animal bone on sites

Quite often, very little animal bone (acidic soils, badly preserved)

'Kill-off' profile – ages animals are being slaughtered

(Left) Typical kill-off profile of a dairy herd

We have to look at other sources of evidence...
Fats preserved in prehistoric pottery vessels

6000 year-old Neolithic houses
Upper Campsie, Derry/Londonderry

2-3 grams of cleaned potsherds crushed to a powder

Ancient lipid residues extracted from this powder with solvents
Identifying archaeological fats

Microscopic
Grain of sand - millions of fat molecules

Micrograms (µg)
1 millionth of a gram!

Fat extracted from pot

C₁₆:₀ Fatty acid
C₁₈:₀ Fatty acid

Degraded animal fat

Triacylglycerol (fats & oils)
TAGs

C₁₄:₀ FA
MAGs
DAGs

Relative intensity

Time (min)
What kind of animal? What kind of fat?

Milk fat and carcass fats are produced in different ways

This is reflected in different carbon isotope values in their fatty acids
Dairying present very early in development of farming

Milk fats present in pots from early Neolithic 7th millennium BC – northwestern Anatolia

High incidence in pots where cattle most abundant in archaeological record

Regional variability

The first central European farmers - *Linearbandkeramik* (LBK)

Named after their distinctive pottery with linear bands of decoration

**c. 5400 – 4900 BC**

- Lived in timber longhouses
- Garden plot agriculture
- Livestock
Earliest evidence for dairying in central Europe

Perforated vessels or ‘sieves’
Kuyavia region, Poland
c. 5200 BC

19th/20th century and contemporary cheese strainers

Ludwinowo settlement, Poland

Dairying (and cheese production) taking place in central Europe by late 6th millennium BC

Evidence so far:
- specialised
- limited?
- regionally varied

From Central Europe to Atlantic Europe...
Lipid residues from Irish Neolithic pottery

- Values for over 200 Neolithic pots
- 90% of samples had dairy fats as predominant fat type
- Dairying is one of the earliest farming practices in Ireland

Smyth & Evershed. 2015. Milking the megafauna: the role of organic residue analysis in understanding early farming practice. *Environmental Archaeology*
Cheese in prehistoric Ireland?

**Mid-chain ketones**

- Formed at temperatures >270 degrees celsius
- Present in 40% of the Irish pottery lipid residues
Lactase Persistence (LP) and ancient DNA

New aDNA evidence from Ireland

Neolithic and Bronze Age migration to Ireland and establishment of the insular Atlantic genome

Middle Neolithic burial from Ballynahatty
Female, black hair, brown eyes
Lactase non-persistent

Giant’s Ring, Ballynahatty, Co. Down

Same picture emerging across Europe – LP not visible in populations until Bronze Age/Iron Age
Significance of dairy products in prehistoric Ireland

Island environment, with no native wild predecessors

Shipped across sea

Earliest dairy farmers could not digest milk; cheese and other low-lactose products crucial