

Prehistoric dairying as an agent for Late Holocene ecological and biological change

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The beginnings of milk exploitation were a revolutionary shift in human subsistence strategy, which completely reshaped the prehistoric European culture, biology and economy in ways that underlie life virtually worldwide.

The introduction of this new staple into the human diet led to significant changes in human biology, with the increase in frequency of the lactase persistence-associated (LP) allele allowing adults to digest lactose from milk. Nowadays, almost 2/3 of Europeans are tolerant to lactose through lactase-persistence. This genetic adaptation is described as *gene-culture-co-evolution*, with populations possessing an history of dairying having higher frequencies of LP. Genetic changes are also observed in domesticated animals with dairy breeds having been improved to maximise milk production capacities.

The shift from the Mesolithic hunter-gatherer lifestyle to a Neolithic economy based on the exploitation of domesticated plants and animals provided a fertile ground for the use of milk and dairy products. Milk may have even been the catalyst for the domestication of cattle, sheep and goats, as seen by archaeozoological studies on animal remains allowing past herd structure to be reconstructed and herding strategies to be unravelled.

Direct evidence for milk use in Prehistory rely on the detection of milk-derived lipids trapped in the porous walls of ceramic vessels. Degraded animal fats are the most abundant fats detected during lipid residue analyses. The introduction of gas chromatography-combustion-isotope ratio mass spectrometry (GC-C-IRMS) in the early 1990s allowed the isotopic composition of individual compounds to be determined, such that non-ruminant/ruminant fats and carcass/dairy fats could be distinguished. The analyses of >6,000 sherds from across Europe performed over the last 20 yrs have allowed the exploitation of milk in the Neolithic to be investigated extensively, with early evidence for milk exploitation and cheese-making being revealed.