More Meat, Fewer Cows: How Detailed and Context-Specific Herd Modeling Unlocks Unexplored Synergies in the European Food System

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Global and regional food system models often oversimplify cattle production and fail to distinguish between dairy and suckler systems. This makes it challenging to assess how improved herd management strategies influence total food output. One such strategy is extending the productive lifespan of dairy cows. This reduces the need for replacement animals while increasing the number of calves available for fattening. Another strategy is the dual-use dairy production system—dual-purpose breeds or a combination of sexed semen for replacement animals and meat-genetic crossbreeding for non-replacement animals—leading to fattening calves with the genetics for meat production. Rather than being limited to veal, they can be raised to maturity, contributing to overall bovine meat production. Most models overlook that calves are traded, failing to capture the cross-border effects of herd management changes. A context-specific herd model covering all NUTS2 regions in the EU, the UK and Switzerland, is a part of the GeoSOL baseline within the PATHWAYS project. It reconstructs regional herd dynamics using statistical data, explicitly differentiating between dairy and suckler herds and the different fattening schemes while accounting for live trade. It evaluates the impact of extending dairy cows' productive lifespan on beef production under different fattening and slaughter strategies, including the adoption of dual-use production systems. Results indicate that extending the productive lifespan of dairy cows within a dual-use system can enhance beef production compared to current systems. When this additional meat from the dairy sector replaces beef from suckler herds, total meat output can be maintained with fewer cattle overall. Accounting for herd structure and trade dynamics allows to move beyond simplistic narratives that assume reducing livestock to mitigate environmental impacts comes with a proportional reduction in bovine meat consumption. More detailed and context-specific models are essential to unlock synergies within the food system, minimizing trade-offs and supporting the development of balanced and pragmatic PATHWAYS for a sustainable livestock management.