Dynamic duo: Exploring mortality rate shock effects in integrated livestock models

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Abstract

This paper explores the synergies between the Dynmod model and the multi-market partial equilibrium model (also known as SectorM), two crucial tools for understanding the dynamics of the livestock sector. Dynmod model excels in capturing intricate herd dynamics over time, representing factors such as offtake rate, mortality rate, parturition rate, age, sex, size, and various demographic attributes. However, Dynmod operates under the assumption of constant prices and economic variables during simulations, limiting its ability to incorporate the dynamic economic conditions that characterise the real-world livestock sector. In contrast, SectorM is proficient in capturing economic factors, considering prices and other variables as endogenous, allowing them to vary over time based on influencing factors. While SectorM excels in economic intricacies, its representation of herd dynamics and demographic factors is comparatively less detailed than Dynmod. Recognizing the complementary strengths of these models, this research bridges the gap by linking Dynmod and SectorM, using the General Algebraic Modelling System (GAMS) software and focusing on Tanzania's livestock sector as a case study. By doing so, the aim is to harness the detailed herd dynamics of Dynmod alongside the economic adaptability of SectorM, creating a more comprehensive and realistic simulation of the livestock sector. This approach addresses the weaknesses of each model with the strengths of the other, enriching the simulation results and providing a more accurate depiction of the dynamic interplay between herd dynamics and economic factors. To evaluate the linkage's efficiency and simulation accuracy, we introduce a shock related to animal mortality. The rationale for considering this shock is that it significantly influences livestock sector resilience, impacting production outcomes, market dynamics, and farmers' livelihoods. High mortality rates pose economic losses and food security risks at household and national levels, reflecting underlying health issues within livestock populations. By integrating animal mortality scenarios, our study aims to reveal their implications on Tanzania's livestock production, trade, and livelihoods. Understanding mortality rate effects is crucial for policymakers and stakeholders to devise interventions enhancing sector resilience and farmer welfare.

Keywords: Animal mortality, dynmod, multi-market partial equilibrium

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