

Assessing income-based economic efficiency in PDO Manchega sheep breed dairy farms: preliminary results

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Dairy sheep farming in Mediterranean regions operates under structural, climatic, and market constraints that shape production strategies and economic outcomes. In Castilla-La Mancha (Spain), the Manchega breed constitutes the basis of the PDO Manchego cheese supply chain, in which milk payments are directly linked to compositional quality and technological suitability for cheesemaking. In this context, competitiveness cannot be assessed solely in terms of milk yield, as revenue depends on the interaction among flock size, milk composition, price, and management practices. Due to the lack of consistent and comparable cost records across farms, milk sales revenue was used as a direct indicator of economic performance. In regulated PDO systems, where prices are closely tied to quality parameters, revenue-based approaches provide a coherent framework for assessing relative efficiency.

The study analysed 737 monthly observations (2019-2024) from 11 farms participating in the official breeding and technical-economic programme managed by AGRAMA. Milk revenue was modelled using Cobb-Douglas and translog production functions as a function of flock size and fat-and-protein-corrected yield per ewe (FPC). A deterministic frontier approach was applied to estimate efficiency, and panel Tobit models were used to identify determinants of inefficiency. The translog model showed superior goodness of fit ($R^2 = 0.809$). FPC per ewe exhibited the highest elasticity, exceeding that of flock size, confirming that technological milk quality is the main driver of revenue under PDO payment schemes. Although increasing returns to scale were identified, herd expansion alone does not guarantee higher efficiency. Inefficiency was primarily associated with management factors affecting milk quality, particularly elevated somatic cell counts, prolonged milking times, and suboptimal milking routines. Overall, the findings indicate that improving cheese yield potential and strengthening sanitary and managerial performance are more decisive for competitiveness than merely increasing production scale.