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Linking formality and productivity in smallholder dairy systems: A case from Tajikistan

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Abstract

Tajikistan's transition to a market-oriented economy has encountered institutional and policy reform challenges, contributing to persistent informality, especially in agriculture. This has led to a mix of formal and informal agri-food value chains, markets, and production systems. The livestock sector has undergone substantial restructuring, with smallholders, managing over 93 % of the national cattle stock, now dominate livestock farming and milk production, a vital income source for 72 % of the rural population experiencing poverty, food and nutrition insecurity, and climate risks. Global policies increasingly promote intensification, commercialisation, and formalisation as complementary strategies to enhance food systems, with growing emphasis on reducing livestock-related emissions. However, the link between formality and productivity in transitional economies remains understudied.

This study investigates how formal practices in livestock farming relates to milk productivity among smallholder dairy producers in transition context. Using data from 302 farms collected through a two-stage random sampling approach in Northern Tajikistan, we construct a novel formality index comprising 12 indicators across legal, institutional, financial, and technical domains. The composite score of 0.43 reveals a relatively low level of formal engagement in the sector. The regression analysis using an Ordinary Least Squares (OLS) model indicates a positive association between the formality index and milk productivity, though the effect is only marginally significant ($p = 0.097$). Stronger predictors of productivity include ownership of milk processing machinery ($p < 0.001$), livestock-specific equipment ($p = 0.028$), higher milk prices ($p < 0.001$), precipitation levels ($p = 0.033$), and market participation ($p = 0.006$). Regional differences are also evident, with farms in Gafurov ($p = 0.038$) and Mastchoh ($p = 0.001$) districts exhibiting higher productivity levels. The model accounts for 35.5 % of the variation in milk productivity, underscoring the complex interplay between formalisation and productivity in Tajikistan's evolving livestock sector.

The study suggests policy interventions such as promoting formalisation by strengthening institutions, improving market access, and easing regulatory barriers; expanding access to farm equipment through subsidies and credit programs; ensuring price stability; and supporting climate-resilient practices to mitigate environmental risks and enhance productivity. Additionally, targeted regional support through infrastructure development and extension services can address local disparities.

Keywords: Agricultural development, climate-resilient agriculture, formality index, informality, livestock sector, milk productivity, Northern Tajikistan, rural livelihoods, smallholder dairy farms