Gender, labor, and sustainable technologies in Amazonian dairy systems: Evidence from Colombia

Triana Ángel, Natalia[1]; Pazos Cárdenas, Mateo[1]; Sánchez Castillo, Verenice[2]; Burkart, Stefan[1]

[1]*International Center for Tropical Agriculture (CIAT), Colombia*
[2]*Universidad de la Amazonía, Florencia, Caquetá, Colombia*

Contact: n.triana@cgiar.org

Introduction

- Women play essential but often invisible roles in tropical dairy systems, combining productive, domestic, and caregiving responsibilities.
- Gender norms shape labor, decision-making, and access to technologies.
- Sustainable livestock technologies can both reduce and unintentionally increase women's workload.
- Evidence on how women perceive the labor impacts of sustainable livestock innovations remains limited in Latin American dairy systems
- This study evaluates gendered labor dynamics and technology adoption in the Colombian Amazon.

Objectives

Analyze the gendered division of labor in Amazonian dairy households.

Assess women's participation in household and farm decision-making.

Evaluate how sustainable livestock technologies affect women's workload, well-being, and daily activities.

Generate recommendations for gender-responsive livestock development.

Methodology

- **Study area:** Puerto Rico, Caquetá, Colombian Amazon.
- **Data collection:** 20 farm visits (2023–2024); 12 women-led farms; 25 family units; 80 farmers; 4 gender-specific participatory workshops (2 women, 2 men)
- **Mixed-methods approach:** participant observation, ethnographic field notes, structured surveys, participatory exercises; Principal Component Analysis (PCA), Multiple Correspondence Analysis (MCA)
- **Technologies assessed:** living fences and paddock subdivision, water harvesting systems, mixed forage banks.

Results

Gendered labor division (Figure 1)

- Women performed nearly all domestic activities while also participating extensively in dairy production.
- Men concentrated on physically demanding and occasional field activities.
- Women-managed farms were common where male partners worked off-farm.
- PCA and MCA clearly separated male and female labor responsibilities.

Decision-making

- Women contributed ideas and advice.
- Men retained primary control over financial transactions and major production decisions.

Labor burden (Figure 2)

- Women were consistently described as: first to wake, last to sleep, responsible for productive, domestic and care work.
- Rest time remained substantially lower than men's.

Technology impacts – positive effects

- Living fences & paddock subdivision: reduced time spent gathering cattle; lower physical effort; improved animal management.
- Water harvesting systems: eliminated daily water carrying; reduced livestock watering labor; improved household water access.

Technology impacts – trade-offs

- Mixed forage banks: increased forage handling and cleaning tasks; added indirect domestic responsibilities (meal preparation for workers); increased women's overall workload despite production benefits.

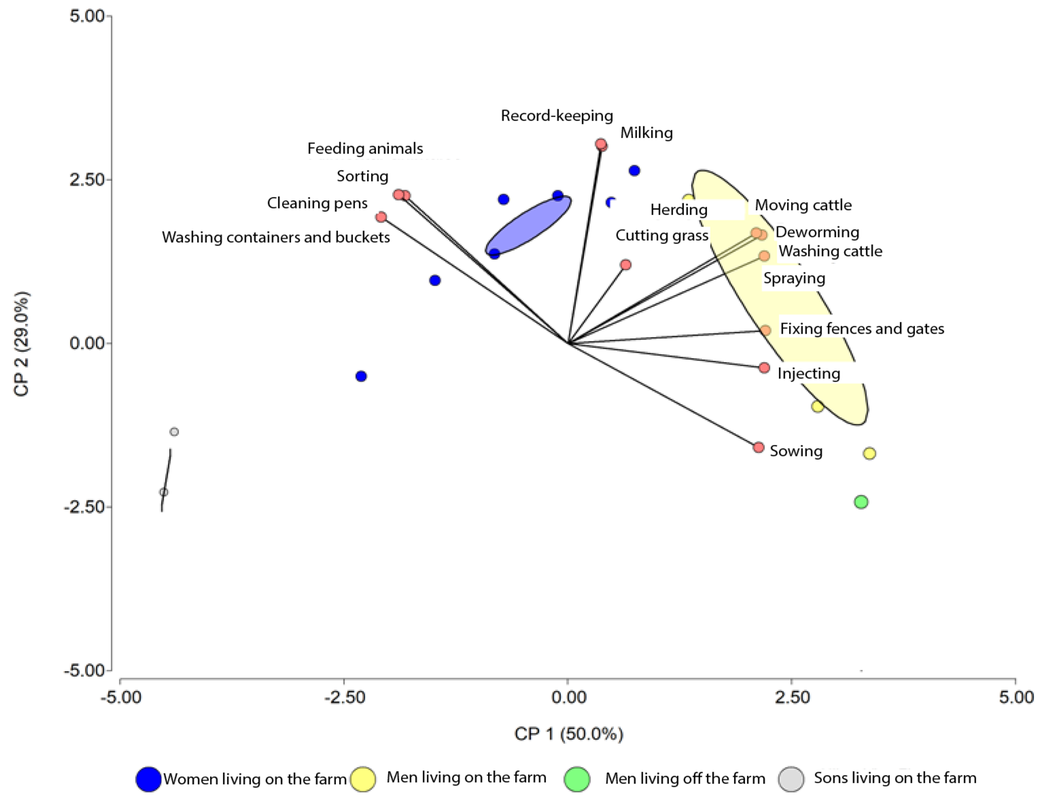

Figure 1. PCA biplot of productive activities by household member and gender.

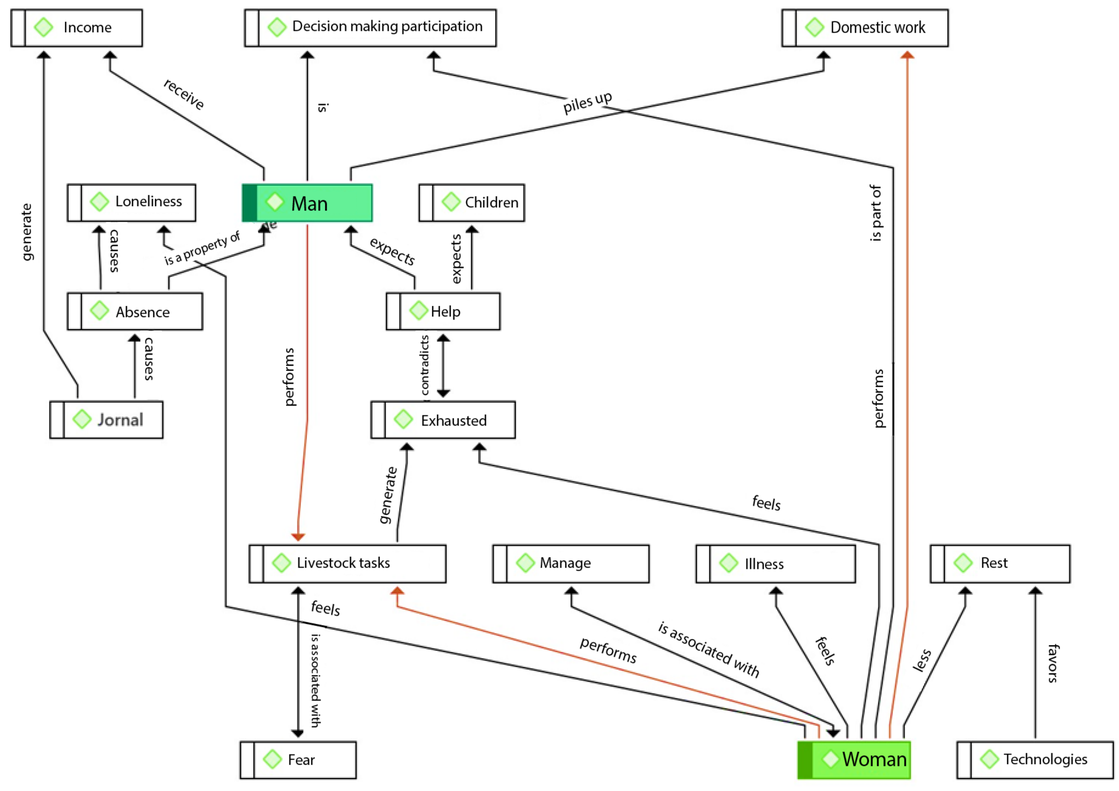

Figure 2. Perceptions of women and men regarding their participation in household tasks and in the dairy system.

Discussion and Conclusions

- Women are fundamental to dairy production but continue to carry a disproportionate productive, domestic, and caregiving workload.
- Sustainable livestock technologies have mixed gender impacts: water harvesting systems and paddock subdivision reduced labor and improved well-being, whereas mixed forage banks often increased women's workload.
- Technology adoption alone is insufficient to achieve gender equity; benefits depend on how innovations reshape labor allocation, time use, and decision-making. Technologies should be evaluated through a gender lens.
- Persistent gender norms continue to limit women's access to resources, training, and decision-making despite their central role in farm management.
- Livestock development programs should integrate gender-responsive technology design, strengthen women's decision-making power, and promote more equitable sharing of household and farm responsibilities.

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Related work

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