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Inhibiting factors and promotion strategies for increasing adoption levels of improved forages in cattle production

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Abstract

In Colombia, cattle farming is the economic activity of highest relevance in the rural environment, contributing to 53% of the agricultural GDP and 1.3% of the overall GDP. However, extensive management prevails, based on the use of native and/or naturalized pastures on soils of low to medium fertility, which limits the forage supply for prolonged dry periods, leading to low productivity and increased production costs due to the additional use of concentrates and supplements.

Considering this problem, researchers from the University of Cauca and the International Center for Tropical Agriculture (CIAT) have been working for > 10 years in the Colombian Cauca Department on investigating processes of adoption, diffusion and transfer of improved forage technologies among small and medium scale livestock producers. The investigated improved forages allow maintaining the feed supply in terms of quantity and quality throughout the whole year while contributing to the mitigation of greenhouse gas emissions and also promoting socio-economic and environmental sustainability of the livestock production system. The results of these studies demonstrate the acceptance of improved forages among livestock producers, though adoption levels are still low.

In order to identify strategies to promote adoption of improved forage technologies among small and medium scale livestock producers, a semi-quantitative study was conducted with 307 producers in the Colombian Cauca Department (Patía and Mercaderes Municipalities). Participatory rural appraisal workshops were organized to evaluate the perception of producers related to utilization of improved grasses and legumes. The hypothesis that the level of knowledge about management and establishment of improved forages, as well as the access to resources (positively or negatively) influence the adoption level were tested. Based on these results, factors that inhibit adoption were identified and recommendations for both producers and regional decision makers were formulated to support the design of strategies for a wider adoption of improved forages, contributing to sustainable intensification of livestock systems, productivity increase and climate change mitigation.

Keywords: Adoption, cattle, climate change, improved forages

Introduction

In Colombia, cattle farming is the economic activity of highest relevance in the rural environment, contributing to 53% of the agricultural GDP and 1.3% of the overall GDP (FEDEGAN, 2014). Furthermore, it is the activity with highest land use in the country, occupying over 30 million hectares (80% of the agricultural land), out of which 69.4% are related to forages (DANE, 2015) under mainly extensive cattle production systems. These systems are based on the use of native and/or naturalized pastures on soils of low to medium fertility, resulting in a limited forage supply especially during prolonged dry periods, and leading to low productivity. In addition, increased production costs might arise due to the use of concentrates and supplements. These factors result in high environmental impacts such as those related to land degradation due to overgrazing, greenhouse gas (GHG) emissions, deforestation, or water contamination (Steinfeld *et al.*, 2009).

The University of Cauca and the International Center for Tropical Agriculture (CIAT), with other collaborators have demonstrated the potential of improved forages for a sustainable intensification of livestock systems, reducing areas under extensive grazing, increasing productivity and competitiveness, and contributing to the adaptation and mitigation of climate change (Rao *et al.*, 2015).

Improved forages have shown to be accepted by livestock producers, however adoption levels are low, which leads to the assumption that productive inefficiency is also a result of limited technology adoption (Suárez *et al.* 2012). There are multiple factors that promote and limit the adoption of technologies for a particular region. It is necessary to identify these factors so that decision makers can be informed on how to develop adequate policies, incentives and strategies that lead to higher adoption levels and contribute to the transformation of traditional into sustainable production systems.

The aim of this study is to identify the relevant adoption factors (drivers and inhibitors) for improved forages among cattle producers in the Colombian Cauca Department and to propose strategies on how to increase adoption levels of improved forages.

Materials and methods

This study is part of the research program “*Development and implementation of forage resources for sustainable bovine production systems in the Cauca department, Colombia*” coordinated by the University of Cauca and the International Center for Tropical Agriculture (CIAT).

This study was conducted in the Colombian Cauca Department (Patía and Mercaderes municipalities) between October 2015 and July 2016. A semi-structured surveys was applied to 307 cattle producers of the region, randomly selected through producer associations of this area (Coagrousuarios and Asogamer) and by applying a snow-ball sampling method. In addition, personalized interviews with formal institutions along the cattle value chain (Banco Agrario, Secretaría de Desarrollo Agropecuario y Ambiental de Patía (SEDAM), Centro Provincial de Mercaderes) were conducted and through participatory rural appraisal workshops with cattle producers (adopters and non-adopters of improved forages) more in-depth qualitative information on adoption factors was obtained.

Information analysis included a qualitative, descriptive part to identify the main factors that facilitate or inhibit adoption processes and a second phase with correlation analyses and mean difference tests to evaluate the influence of sociodemographic variables (e.g., education, income, producer size), technical knowledge, access to information, membership in a producer association, and role within the association on the adoption level.

Results and Discussion

According to the survey results, 42.7% (N=307) of the interviewed cattle producers have adopted improved forage technologies. Currently, 1,082 out of 9,558 hectares of the area the interviewed producers dedicate to cattle production are being cultivated with improved forages – that corresponds to 11.32% of the study area. 4.8% of the producers show a 100% adoption rate, and 20.8% are increasing the use of improved forages showing adoption levels from 50 to 90%.

The statistical analysis (t-tests for mean difference) shows significantly higher adoption levels among producers with administrative/leading roles in producer associations. Significant correlations exist between adoption level and age (older producers tend to adopt less), distance of the producers' farm to input and output markets (the further away a producer lives from a market, the lower the adoption level). Although these correlations are significant, they show relatively small magnitudes (between -0.1 and -0.2). We found no significant relationships or differences between the adoption level and the variables gender, income, and education.

According to both the quantitative and the qualitative analyses, the following *drivers* for the adoption of improved forages could be identified:

- Biophysical characteristics of improved forages: higher productivity of improved forages (quality and quantity), tolerance to abiotic stress factors (e.g., drought)
- Availability of technical assistance
- Membership in associations
- An administrative/leading role of a producer within a producer association

Adopting producers never stated environmental benefits (e.g., less GHG emissions) to be a reason for adopting improved forages – all mentioned drivers are a result of the aim to achieve a higher economic performance.

As *inhibiting factors* could be identified:

- Lack of knowledge (e.g., about the existence of forage species relevant for the region, and about the implementation and management of improved forages)
- Limited access to productive resources (e.g., improved forage seeds, fertilizers)
- Limited economic resources resulting from inadequate credit schemes (e.g., repayment schemes)
- Distance to input and output markets
- Negative experiences made by other producers
- Lack of interest and initiative of the producers (risk aversion)

Conclusions and Outlook

According to the results of this study, technical knowledge has an important effect on the adoption of improved forages. Transferring the existing knowledge on the species relevant for the region, their establishment and management is recommended as one strategy for the promotion of improved forages. Methodologies for this purpose include Farmer Field Schools (FAO, 2005), training of trainers, demonstration plots, feedback loops between producers, technicians and researchers, and workshops.

The establishment of improved forages is a costly undertaking for cattle producers and credit, if available, is being provided under inappropriate conditions. It is necessary to promote the dialogue between producer associations and financial entities to develop appropriate credit schemes for cattle production.

In spite of the interest in implementing improved forages, productive inputs such as seeds can be hard to find. Therefore, it is recommendable to promote local seed multiplication programs (legumes) and to strengthen the formal seed sector (for forage hybrids).

Promoting public and/or private incentives (differentiated products, payment for eco-system services) may serve as a monetary incentive to producers for investing in the establishment of improved forages and in creating an awareness of their environmental benefits.

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