

# Silvopastoral Systems in Latin America: Mitigation Opportunities for Men and Women Livestock Producers

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*In order to strengthen the capacity of livestock producers to mitigate the impacts of climate change it is important to take into account the gender relations that influence the production system. Men and women participate critically but in different ways in dairy, beef, and dual production systems in Latin America, and consideration of their interests and priorities will be key for ensuring effective implementation of mitigation actions, like those related to silvopastoral systems. Furthermore, although both women and men are agents of change, women face certain limitations due to gaps in access to and control over productive resources. Nationally Appropriate Mitigation Actions (NAMAs) that address gender inequalities have better potential to harness producers' innovative capacities and create long-term positive mitigation effects.*

*In Latin America, the inclusion of gender perspectives in public policies is a relatively new phenomenon (FAO, 2013). Development and environmental policies have commonly failed to recognize women's role as producers in the national economy. As a result, interventions and strategies have characteristically not addressed the different resource constraints faced by Latin-American women, inhibiting the capacity of political strategies to achieve real integrated and equitable territorial development. Recognition of the significance and economic value of the non-remunerated labor that rural women do will be critical for the development of informed decision-making on mitigation options.*

## KEY MESSAGES

- Strong and effective planning for mitigation options in the cattle sector will take into account gender relations as they structure household production.
- It is important to make “visible” the contributions of both men and women to cattle production through accurate gender analysis that takes into account non-remunerated labor related to homecare and household consumption.
- Mitigation actions related to silvopastoral systems have the potential to impact gender relations in their capacity to: impose new labor demands on the household; and alter differentials in access to technical information and to monetary income.
- It will be key to take these gender dynamics into account when developing NAMAs for the cattle sector, in order to promote adoption and stimulate innovation.



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## SILVOPASTORAL SYSTEMS AND GENDER IN LATIN AMERICA

Livestock production is a critical economic activity for many small- and medium-holder producers in Latin American countries, and it can constitute an important opportunity for mitigation options depending on the production system implemented. Conventional cattle-ranching based on grass monocultures is a main driver of deforestation and soil erosion; furthermore the livestock sector produces 58-70% of the total greenhouse gas emissions from agriculture in Latin America (FAO, 2006; Montagnini, 2015). Silvopastoral systems are a viable strategy to help mitigate the detrimental environmental impacts resulting from livestock production.



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Silvopastoral systems (SPS) are a form of agroforestry that permits intensification of livestock production based on natural processes which contribute to sustainable land use. They involve the presence of trees and/or shrubs in and around meadows and croplands, which interact with existing forage resources and animals (Sanchez et al., 2009). By 2010 between 200 and 357 million hectares of agroforestry in Latin America were reported to be in use as SPS (Montagnini, 2015). These systems have brought major benefits to producers in countries such as Colombia and Costa Rica, particularly in areas where there have been significant soil changes. These include:

#### Productivity

- \* Provision of wood, NTFPs, and other organic matter for livestock feed
- \* Improved cattle productivity through improved feed
- \* Reduced caloric stress and increased milk and beef productivity through tree shade

#### Climate change

- \* Adaptation: Means of preventing reduced yield during drought and flood through use of tree species that are resistant to climate stress and of high nutritional value
- \* Mitigation
- \* Reduced soil erosion
- \* Recycling of carbon, nitrogen and phosphorous in soils
- \* Provision of carbon sinks
- \* Reduced methane emissions through improved nutritional quality of forages

Despite the multiple benefits of SPS, several barriers to adoption have been identified, such as: increased labor demands, high establishment costs, and low short-term return on labor (Calle et al., 2009). Overcoming these commonly requires access to credit, often not easily available for small-holder producers. Information and technical assistance can also be critical for adoption, due to the complexity of SPS and the consequent

production risks that producers might perceive. Traditional preferences for conventional ranching systems with open pastures and low administration levels can also inhibit adoption. Research on SPS implementation in Colombia suggests that payments for environmental services (PES) can help reduce these barriers (Calle et al., 2009).

Whilst recognizing the potential utility of silvopastoral systems as mitigation actions for the cattle sector in Latin American countries, it is critical to consider the varying interests and priorities of the different producers involved in the production system. While several Latin American countries have policies and strategies that address climate change for the agricultural and livestock sectors, the solutions they propose tend to focus on technical and market mechanisms that disregard social aspects, like gender; those that do address gender often do so only discursively (Gumucio and Tafur, 2015). Such gender-blind policies can have adverse effects on men and women producers and inhibit sustainable development outcomes. It is important that, in NAMA development, the potential trade-offs for more disadvantaged actors such as women producers are assessed. In Latin America the strong identification of cattle management with men hinders the visibility and value of women's labor, rights and status as cattle producers (Flores and Torres, 2012). The following are key gender considerations for cattle production in Latin America:

*Although cattle production is often associated strictly with men's work, in practice it depends on the contributions of household members at large, especially where it concerns small and medium-holder producers (Toruño Morales, 2012). Mitigation actions like those related to SPS will have to consider the household production system for effective adoption, in particular given the increased labor intensity that SPS implementation requires.*

- Several production activities are carried out by both men and women and can often involve the entire family,

including children. A study on SPS in Honduras found that those implemented by smallholder producers depended principally on family labor, representing 61% of their total production costs (Perez, 2006). The below figure on milk production value chains in Nicaragua furthermore demonstrates household members' inclusion in the various production activities (Holmann, Mtimet, Mora, & Van der Hoek, 2014).

Table 1: Gender roles in milk production activities in Nicaragua

Type of work	Men	Women	Family
Planting and pasture management	♂		♂, ♀, child
Cattle management (sanitary, reproductive)	♂		♂, ♀, child
Production management (feeding and pasture)	♂	♀	♂, ♀, child
Milking	♂	♀	
Product management (hygiene, cleaning and handling equipment)		♀	
Care of people and assets, as well as administrating family resources		♀	

Source: Holmann et al., 2014

- In Latin American countries, those cattle production activities that pertain particularly to women tend to be related to: milk processing, ensuring milk quality by keeping the milking area clean, and taking care of cattle; also, care and feeding of smaller animals, like pigs and chickens (Galie et al., 2015; Toruño Morales, 2012).
- Women's activities tend to take place near the home, where they spend most of their time due to gender norms, while men engage in those that require longer periods away from the household.
- Women spend a significant amount of time in activities related to food preparation for those who labor in agricultural and cattle production. This work constitutes an important guarantee for household production (Holmann et al., 2014; Toruño Morales, 2012).
- Women's work on cattle is often not recognized as "real" labor because it tends to be mixed with homecare and work around the house and is consequently viewed as an extension of their household chores (IICA, 1996; Perez and Farah, 1998).

*Successful adoption of complex mitigation measures like SPS depends on technical assistance; it will be important that extension services recognize the household as the production unit and correspondingly target both men and women household members. This will require addressing certain barriers to information access that women in particular confront.*

- Women may own cattle and land, and productive resources in some cases may be jointly or informally owned between men and women household members; however, men tend to own more of the principle resources necessary for cattle production and are more prone to have formal land rights (Galie et al., 2015).
- This and the presumption that men are the main cattle managers influence that, despite women's contributions to cattle production, extension services tend to disregard them (Flores and Torres, 2012).
- Women's childrearing activities and household obligations can limit their participation in cooperatives and farmer field schools, where trainings and technologies related to new cattle production practices are made available.

*In order to incentivize all household members to implement mitigation actions like SPS, it is important that financing mechanisms benefit men and women equally.*

- Men tend to predominate commercial cattle production activities and control the corresponding monetary income (Galie et al., 2015). Socio-cultural norms that consider men as primarily responsible for production and for provision of household income can influence that payments for adoption target men.
- Women commonly dedicate more time to work activities than men, including time spent in household care as well as livestock and agricultural activities (Toruño Morales, 2012; IICA, 1996). In order to meet the increased labor demands that SPS require, payment schemes that allow women to be paid separately from their husbands for their work may be key to increase the economic incentives for women to commit labor from their already demanding work schedules to SPS.

Additionally, agroforestry studies demonstrate that men and women often perceive and value forest and tree-related resources differently, and these preferences can have important implications for men's and women's adoption of mitigation actions related to silvopastoral systems. For instance, women might value non-monetary benefits from agroforestry systems more than men (Blare and Useche, 2015). In particular, research on fruit agroforestry in El Salvador suggests that women value that agroforestry systems provide access to food and to additional markets, as well as ecological services like better soil fertility (Kelly, 2009). Gender relations are an important aspect of cattle production systems and agroforestry technologies; consequently, it will be important that gender considerations be taken into account for effective implementation of mitigation actions related to SPS.





## CASE STUDIES: CATTLE SECTOR NAMAs AND GENDER CONSIDERATIONS IN COSTA RICA AND COLOMBIA

### Costa Rica

In Costa Rica, various efforts to reduce deforestation have focused on agroforestry systems like SPS as a means to promote sustainable agricultural and livestock production and contribute to the state's Climate Change and Carbon Neutral policy. Over the last 30 years forested areas on farms have increased to the extent that they represent 50% of the country's current forest cover. The Ministry of Agriculture and Livestock (MAG) has been working on developing a cattle livestock NAMA which prioritizes practices related to SPS among its principal technologies for reaching an eco-competitive livestock sector, although it does not specifically target silvopastoral systems as a key mitigation action. The NAMA under development is currently focusing on four main technologies for implementation with beef, dairy, and dual purpose cattle systems: improved fertilization plans, improved pasture-feeding, rotational pasturing, and living fences. Similarly to SPS, living fences are beneficial for their capacity to capture CO<sub>2</sub> and for their provision of food sources. Additionally, living fences reduce costs for farmers in that they do not need to be replaced frequently, like wood fences. The forms proposed for financing adoption of the new mitigation technologies include: direct payments, credit guarantees, and preferential interest rates. CCAFS is working together with MAG and the Tropical Agricultural Research and Higher Education Center (CATIE) through the LivestockPlus project to ensure that gender considerations are taken into account in the formulation of the cattle sector NAMA.

While data specific to Costa Rica is lacking, studies in other Central American countries demonstrate that women contribute to cattle production in the following ways:

- Women play significant roles in cattle production as land and cattle owners, as spouses or daughters of cattle producers, and as cooperative members (Flores and Torres, 2012).
- On-farm, women participate in specific production activities such as: worming, vaccinating, shutting up calves, watering the animals, chopping grass, in addition to milking and milk processing activities (Toruño Morales, 2012).
- Women are significant contributors to dairy value chains: they participate in 14 out of 24 identified activities in milk production value chains (Torres and Cordón, s.f.).

Gender norms can obscure and/or limit women's participation in cattle production, for example:

- Women often do not receive enough public or private support to increase and improve their production of artisanal cheese, because the activity tends to be considered as part of their domestic work.
- While joint decision-making between spouses occurs regarding various household assets and cattle associated activities, those that involve significant commercial transactions, like the selling and buying of animals and milk, are primarily decided by men due to gender norms that assign men the role of providers. Consequently, men tend to control and decide over the household's largest sources of income.
- Resource ownership may sometimes be joint and informal between men and women household members, but men tend to control primary cattle production resources. Their informal, or lack, of resource ownership limits women's decision making power to a great extent regarding shared household land and cattle (Galie et al., 2015).

Despite barriers to control productive resources, women act as innovators for climate change mitigation in Costa Rica, for instance:

- Women from the Quebrada Grande de Pital Women's Association in Costa Rica have been involved in reforesting land granted to them since 2000 by the Agrarian Development Institute, planting a total of 12,000 trees (Arguedas Ortiz, 2014). They have also coordinated environmental protection courses and engaged in organic agriculture and rural tourism activities through their organization.
- Another women's group in San Ramón de Turrialba enables the planting of 20,000 trees per year through seedlings produced from their greenhouse project.
- State support and targeted workshops and trainings have been key inputs to these women's initiatives to mitigate climate change in Costa Rica (Langford, 2014).

It is important to make visible women's productive role such that the cattle sector NAMA 1) is based on a complete, nuanced knowledge of how the cattle production system functions and 2) can take advantage of all actors' innovative capacities. Critically, the consideration of women's work in the NAMA can have positive effects by promoting the implementation of mitigation actions by all household members, thus enhancing the NAMA's impact. Furthermore, addressing how gender plays a defining role in household ownership systems can inform policies for effective adoption of mitigation technologies and practices.

## Colombia

In Colombia, livestock production accounts for 40% of land use, equivalent to more than 24 million cattle (Contexto Ganadero, 2013). This has contributed to deforestation and damage to more than 8 million hectares of land. As a strategy to address this, several SPS projects have been implemented, for example, the "Silvopastoral Approaches to Ecosystem Management" Project, led by the Center for Research on Sustainable Agricultural Production Systems (CIPAV). Projects like this have contributed to the country reporting more than 4,000 hectares of silvopastoral systems in 2013.

The Ministry of Agriculture and Rural Development (MADR) is working with CCAFS through the LivestockPlus project to develop its NAMA for the cattle sector, and a priority activity for reaching mitigation objectives is silvopastoral systems combined with improved pastures. It is important that the NAMA considers potential gender impacts.

Both men and women play significant roles in cattle production in Colombia although, congruent with trends elsewhere, women's contributions are often overlooked due to their overlap with household work and their non-remuneration. In some cases in Colombia where women's participation in all activities related to livestock production were taken into account, including those destined for household consumption, their participation exceeded that of men's, 67.8% vs. 32.2% (IICA, 1996). Women are particularly responsible for milking and milk processing activities. In general, both men and women contribute jointly to production activities, although women's contributions are particularly significant where the activity's purpose is auto-consumption, and men predominate comparatively where the activity concerns commercial production. Women also engage in a greater diversity of activities, including household care, in comparison to men. This contributes to their dedicating 14% more of their time to work during the day (USAID et al., 2015).

Consideration of men's and women's roles throughout the dairy and cattle production value chains, as well as their respective time and labor burdens, will be critical for successful implementation of the cattle sector NAMA and for effective adoption of mitigation actions like those related to SPS. For this reason, additional research on men's and women's roles, resource control and decision-making power as they relate to the cattle sector is important in order to provide complete information on the production system, necessary for the NAMA's development.

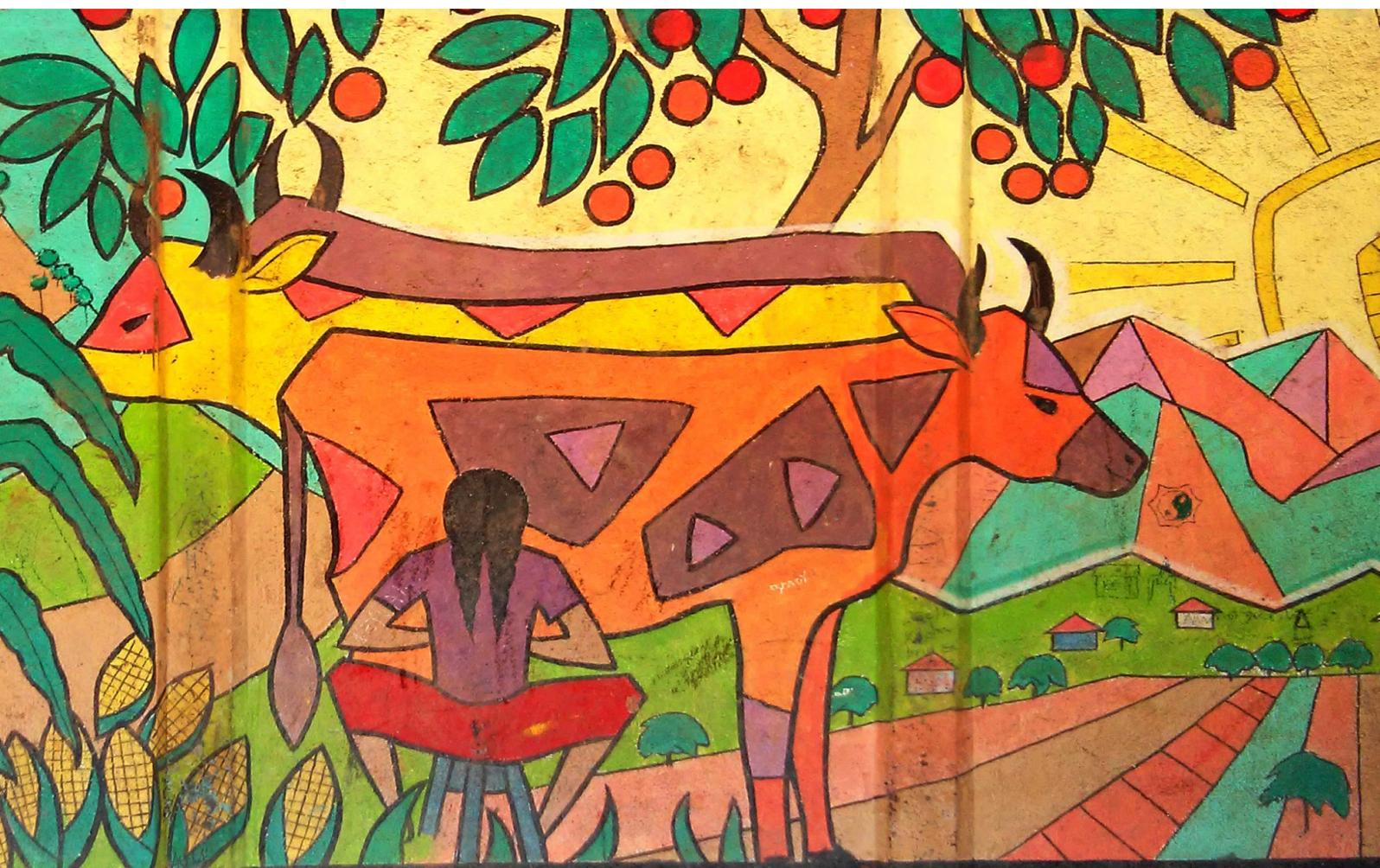


## CONCLUSIONS

- Livestock production systems in Latin America, especially those associated with small- and medium-holder production, depend significantly on the household unit. Comprehension of the gender relations at the crux of household production is key for the development of effective NAMAs for the cattle sector.
- Mitigation actions related to SPS have the potential to revalue and utilize the innovative capabilities of previously disregarded actors in the production system, in their capacity to recognize the time and labor that women contribute to cattle production and reduce resource differentials that disadvantage women producers.
- Although women's actual contributions to livestock production are significant, these are systematically disregarded due to their overlap with household care work. Historically state rural development policies in Latin American countries like Costa Rica and Colombia have not taken women into account under the presumption that they do not contribute substantially to priority sectors, such as cattle (Zumbado, 2003; Comisión Colombiana de Juristas, 2011).

## POLICY RECOMMENDATIONS

- SPS technologies need to be implemented with and adapted for local producers taking into consideration informal and often unequal ownership of productive resources associated with cattle production that disadvantage women.
- It will be important to take into account the time and labor that men and women dedicate to different livestock related activities, including those that occur in conjunction with homecare, when planning mitigation actions related to SPS, given the increased labor burden they may put on the household unit.
- Given the technical complexity of SPS, extension services and trainings on SPS should ensure that they include women, accounting for their time and mobility constraints in order to ensure that all household members receive the proper technical knowledge and promote successful SPS adoption.
- Additional analysis of gender roles and responsibilities related to cattle production in Costa Rica and Colombia, including collection and analysis of sex-disaggregated data at the household level, will be key in order to develop NAMAs that take into account gender aspects and promote effective implementation of mitigation actions in the cattle sector.



## REFERENCES

- Arguedas Ortiz, D. 2014. Rural Costa Rican women plant trees to fight climate change. Inter Press Service News Agency. 2 April. Available at: <http://www.ipsnews.net/2014/04/rural-costa-rican-women-plant-trees-fight-climate-change/> [Accessed 13 November 2015].
- Blare T, Useche P. 2015. Is there a choice?: choice experiment to determine the value men and women place on cacao agroforests in coastal Ecuador. *International Forestry Review* 17(S4): 46-60.
- Calle A, Montagnini F, Zuluaga AF. 2009. Farmer's perceptions of silvopastoral system promotion in Quindío, Colombia. *Bois et Forêts des Tropiques. Focus: Silvopastoral Systems* 300(2): 79-94.
- Comisión Colombiana de Juristas. 2011. La política agraria y los derechos de las mujeres en Colombia. Bogotá, Colombia.
- Contexto Ganadero, 2013. En 2019, Colombia tendría 50 mil hectáreas de sistemas silvopastoriles. Contexto Ganadero, 18 Febrero.
- FAO. 2006. Ganadería y deforestación. Políticas Pecuarias, 3(Organización de las Naciones Unidas para la Alimentación y la Agricultura).
- FAO. 2013. Construyendo una agenda de políticas públicas para las mujeres rurales. Santo Domingo: FAO.
- Flores S, Barrera J, Bastiaensen J, Castro A, Martínez SE, Polvorosa JC. 2011. Las cadenas de lácteos y su interacción con la dinámica de género: La experiencia en Matiguás y en Muy Muy, Nicaragua. *Cuaderno de investigación* 39. 136-153.
- Flores S, Torres S. 2012. Ganaderas en la producción de leche: una realidad oculta por el imaginario social en dos zonas de Nicaragua. *Encuentro-UCA*, 7-28.
- Galie A, Mulema A, Mora Benard MA, Onzere SN, and Colverson KE. 2015. Exploring gender perceptions of resource ownership and their implications for food security among rural livestock owners in Tanzania, Ethiopia, and Nicaragua. *Agriculture and Food Security* 4(2): 1-14.
- Gumucio T, Tafur Rueda M. 2015. Influencing Gender-Inclusive Climate Change Policies in Latin America. *Journal of Gender, Agriculture and Food Security* 1(2): 41-60.
- Holmann F, Mtimet N, Mora A, Van der Hoek, R. 2014. Dual-purpose milk and beef value chain development in Nicaragua: Past trends, current status and likely future directions. Managua: Livestock & Fish
- IICA. 1996. Las mujeres productoras de alimentos en Colombia: diagnóstico y políticas, preparado por Angel Gabriel Gaitán, convenio entre el IICA y BID, San José, Costa Rica.
- Kelly JJ. 2009. Reassessing Forest Transition Theory: Gender, Land Tenure Insecurity and Forest Cover Change in Rural El Salvador. Doctoral Dissertation. Rutgers, The State University of New Jersey, New Brunswick, NJ.
- Langford K. 2014. Costa Rica's women take action to reforest. World Agroforestry Center. 3 April. Available at: [http://worldagroforestry.org/newsroom/media\\_coverage/costa-rica%E2%80%99s-women-take-action-reforest](http://worldagroforestry.org/newsroom/media_coverage/costa-rica%E2%80%99s-women-take-action-reforest) [Accessed 13 November 2015].
- Montagnini F. 2015. Función de los sistemas agroforestales en la adaptación y mitigación del cambio climático. In: *Sistemas agroforestales. Funciones productivas, socioeconómicas y ambientales*. Cali: CIPAV, pp. 269-298.
- Murgueitio E, Xóchitl Flores M, Calle Z, Chará JD, Barahona R, Hernando Molina C, Uribe F. 2015. Productividad en sistemas silvopastoriles intensivos en América Latina. In: *Sistemas Agroforestales: Funciones productivas, socioeconómicas y ambientales*. Colombia: CIPAV, pp. 59-104.
- Pérez E. 2006. Caracterización de sistemas silvopastoriles y su contribución socioeconómica a productores ganaderos de Copán, Honduras. Tesis Mag. Sc. CATIE, Turrialba, CR.
- Pérez E, Farah M. 1998. Mujeres en el mercado laboral In: *Género, equidad y desarrollo*. Bogotá, CO. p. 263-303.
- Sánchez Matta L, Amado Saavedra GM, Criollo Campos PJ, Carvajal Salcedo T, Roa Triana J, Cuesta Peralta A, Conde Pulgarín A, Umaña Arboleda A, Bernal LM, Barreto de Escovar L. 2009. El Sauco (*sambucus nigra*) como alternativa silvopastoril en el manejo sostenible de praderas en el trópico alto colombiano. Colombia:CORPOICA.
- Torres S, Córdón G. (s.f). Cadenas de Valor con Enfoque de Género en el Occidente Ganadero de Nicaragua: Desarrollo más amplio, más profundo, más sostenible. Cuenta Reto del Milenio. Nicaragua.
- Toruño Morales I. 2012. Análisis financiero-económico de fincas con varias actividades productivas y el rol de la familia en la producción y toma de decisiones en el Centro Norte de Nicaragua. Tesis de Maestría. CATIE.
- USAID, Ministerio de Agricultura y Desarrollo Rural, Fedesarrollo. 2015. Barreras de acceso de la mujer rural a crédito, programas asociativos y a la formalización de la tierra en el norte del Cauca y el sur del Tolima, documento resumen.
- Zumbado C. 2003. Género y políticas de desarrollo: la brecha entre el decir y el hacer. Desarrollo rural y políticas agropecuarias en Costa Rica. Tesis de doctorado. Universitat Autònoma de Barcelona.

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