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Belize Cattle Farms: Potential to produce high value timber

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The natural regeneration of timber trees in livestock farms of Belize is a natural capital for conservation and timber production that can increase the income of producers.

The history of Belize is directly related to its forest resources. In fact, the Forest Department is one of the oldest institutions of the country, but its real weight within the government has been declining. Currently, the Forest Department has too few staff (34 professionals in 2011) to address the country's forestry, and forest policies and regulations do not allow the promotion of sustainable timber use in silvopastoral systems (SPS).

The timber production in silvopastoral systems in Belize has tremendous productive potential. Harvesting of timber in livestock farms is an attractive alternative source of income, and could be easily promoted by relatively simple administrative permits for harvesting and transportation of timber. However, there is a need to strengthen livestock producers' management strategies of regeneration of natural trees and/or to encourage farmers to plant timber trees on their farms, to assure long term sustainable timber production.

Context and Importance of the Problem

Livestock producers in Central America, as in the rest of the world, seek to meet a growing demand for meat and milk, which puts great pressure on the limited natural resources. According to FAOSTAT (2009), the area of grassland and permanent pasture in Central America moved from almost 9 to 13 million hectares in the last three decades, and the bovine inventory increased from 10 to 13 million heads over the same period.

In Belize, livestock production for meat and milk is concentrated mainly in the Cayo District in natural pastures of low production and quality. The capacity of these pastures is of one animal per hectare. Mismanagement of pastures has led to negative changes in their composition and quality, and has made the producers resort to forest land with trees in search of fodder for their animals. Soil fertility has declined due to water erosion and overgrazing in places with steep slopes. In the dry months, there is a severe shortage of food that causes weight loss of cattle (30–60 g / animal / day), low calving rates (<55%) and longer intervals between births (> 15 months); in extreme conditions, death occurs in 4–6% of adult animals (Alonzo et al. 2001).

To counter the fragmentation and degradation of the landscape caused by the increasing area in pastures, it is necessary to improve pasture productivity. In the silvopastoral systems (SPS), the perennial woody (trees and/or shrubs) interact with the traditional components (forage crops and animals) under a system of integrated management and can be an appropriate alternative to extensive livestock systems. In these cases, the timber component, in addition to generating shade for cattle, can provide firewood and timber with high commercial value, increase production and the nitrogen content of the grasses associated; provide environmental services such as the carbon sequestration, soil protection and conservation of biodiversity; facilitate the genetic flow between areas of the forest and the conservation of specific genotypes found in these forests, and maintain minimum viability of populations (Beer et al. 2003; Harvey et al. 2005).

The SPS not only encourage the sustainable management of natural resources, but also allow for the diversification of sources of income and employment, in particular in times of market instability of meat and milk, and the high cost of production of the conventional systems (Stoian and Current

2004). In general, small farmers have little access to new technologies and credits, making it necessary to create a culture of management of trees according to their livelihoods. In this sense, the commercial timber trees are a good option to improve the profitability of farms; it is possible to take advantage of simplified rules and procedures for managing and marketing of timber produced in SPS. The “petty permit” (small permit) Belizean law does not imply large transaction costs; in addition, with permission, farmers get consignment notes to sell their timber in the local or national market.

However, if this agile regulation is not complemented with technical guidance to promote the sustainable management of the farms, intensive exploitation could arise. Guidelines that are provided to producers should consider the management of the natural regeneration or other forms of replacement of the harvested timber resource. In addition, farmers should be offered guidance on commercialization of timber in order to improve the selling prices.

Potential for timber production on livestock farms

Two of the most common SPS in Belize are “live fences” and “scattered trees in pastures”. Live fences are installed at the farm for the purpose of demarcation of plots or the division of property and protection of different land uses. Scattered trees grow mainly by natural regeneration and in few cases are planted.

A study of the SPS conducted by Rosa Cruz (2010) in 35 representative farms in the Cayo District found scattered trees in all farms (26 individuals / ha), but only in ten farms, trees were found on lines, including living fences (minimum:



4 trees / ha; maximum: 106 trees / ha). The average volume in timber species of high commercial value was 8.5 m³ / ha, with a 20% tree cover. The most important timber species were cedar, teak, black poisonwood, dogwood, mahogany and oak (pink may flower); Cedar accounted for 66% of this volume. If this result is extrapolated to 50,000 hectares of pasture that FAOSTAT (2009) estimated for Belize, livestock farms in the country could produce 422 thousand m³ of round wood.

However, the current tree presence does not reach a greater productive potential by lack of management. The owners do not take into account the reproductive and regenerative capacity of priority species, nor use practices conducive to natural or artificial regeneration to ensure the presence and renewal of stocks in the medium and long term. The current form of management (chopping, burning, high density of animals) hurts the existing grasslands timber resource. In addition, lack of knowledge of the economic value of the timber species that grow in pastures and the need to increase the areas of crops adversely affect timber potential.

Financial benefits obtained with timber on livestock farms

There have been studies that show the financial benefits of trees in pastures in the Cayo District. Upon comparing the SPS with traditional livestock systems, values greater than 30 per cent for the internal rate of return were identified, 44 per cent for the actual net value and 6% for the benefit-cost relationship (with a real discount rate of 6 per cent). Sensitivity analyses to different scenarios showed that the sale of timber, with value added and placed in the local

market, allows producers of small and medium-sized farms to obtain higher incomes, compared to those obtained by the sale of timber on the farm. These results show the need to concentrate efforts to seek better markets (Alonzo et al. 2001 and Rosa Cruz 2010).

In addition to providing shade, forage and multiple services, the trees on livestock farms, can provide timber for sale.

Recommendations for the management of natural regeneration of timber trees of high commercial value on livestock farms

Silvopastoral systems with timber trees are a good option for small and medium livestock producers of Belize. The SPS help to decrease the pressure on primary forests, contribute to the generation of ecosystem services, diversify the sources of employment and income, facilitate the sustainability of the current performance of meat and/or milk and, at the same time, diversify production with high value timber.

Therefore, it is necessary to promote the sustainable management of tree resources on farms. Despite the limited human resources available to the Forest Department (34 professionals in 2011), farmers could take advantage of the technical visits that the forest officials should make during the approval process for small logging permits. It is suggested to develop user friendly guides that can be provided and discussed with farmers during said visits. Some of the elements that should be highlighted in these practical guides are:



- Identify the most promising tree species in pastures of the farm, to define which one (s) have better handling capabilities and are compatible with livestock management systems. Tree species selected must be good producers of seed to ensure regeneration.
- Avoid the use of herbicides and cutting young plants of commercial timber species at the time of mowing pastures.
- Abolish the burning of grasslands as a management practice.
- Implement thinning and pruning of mature trees and natural regeneration in pastures to ensure that they are the best examples of production.
- Keep at least one tree for each timber species for each paddock to maintain a seed source; train farmers in the management of natural regeneration.
- Handle the animal load appropriately to avoid damage by trampling and browsing, erosion and soil compaction. Heavy livestock must be placed in paddocks with already grown trees (upper-stem and adults).
- Mitigate negative impacts on natural resources in productive areas where harvesting or extraction of timber is carried out, for example, by pruning branches from standing trees damaged during timber harvesting, and by cutting and spreading of branches of trees harvested.
- If there are areas of much degraded soils on the farm, where it is unlikely to establish natural regeneration of trees, it should encourage reforestation and the necessary care to ensure the engraftment and growth of the trees in these sites.

An initiative of this nature may result in a “win - win” situation. Both the landowners and the country could obtain greater goods and environmental services, for, upon incorporating and managing more trees in the livestock farms, farmers can improve yields and productivity of timber resources. At the same time, Belize can improve livestock productivity, as well as the marketing of the products obtained, and contribute to the generation of ecosystem services.

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The authors viewpoints not necessarily match those of the organizations mentioned.

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