Cleberton Correia Santos
(Organizador)

Resultados Econômicos e de Sustentabilidade nos Sistemas nas Ciências Agrárias

Atena Editora
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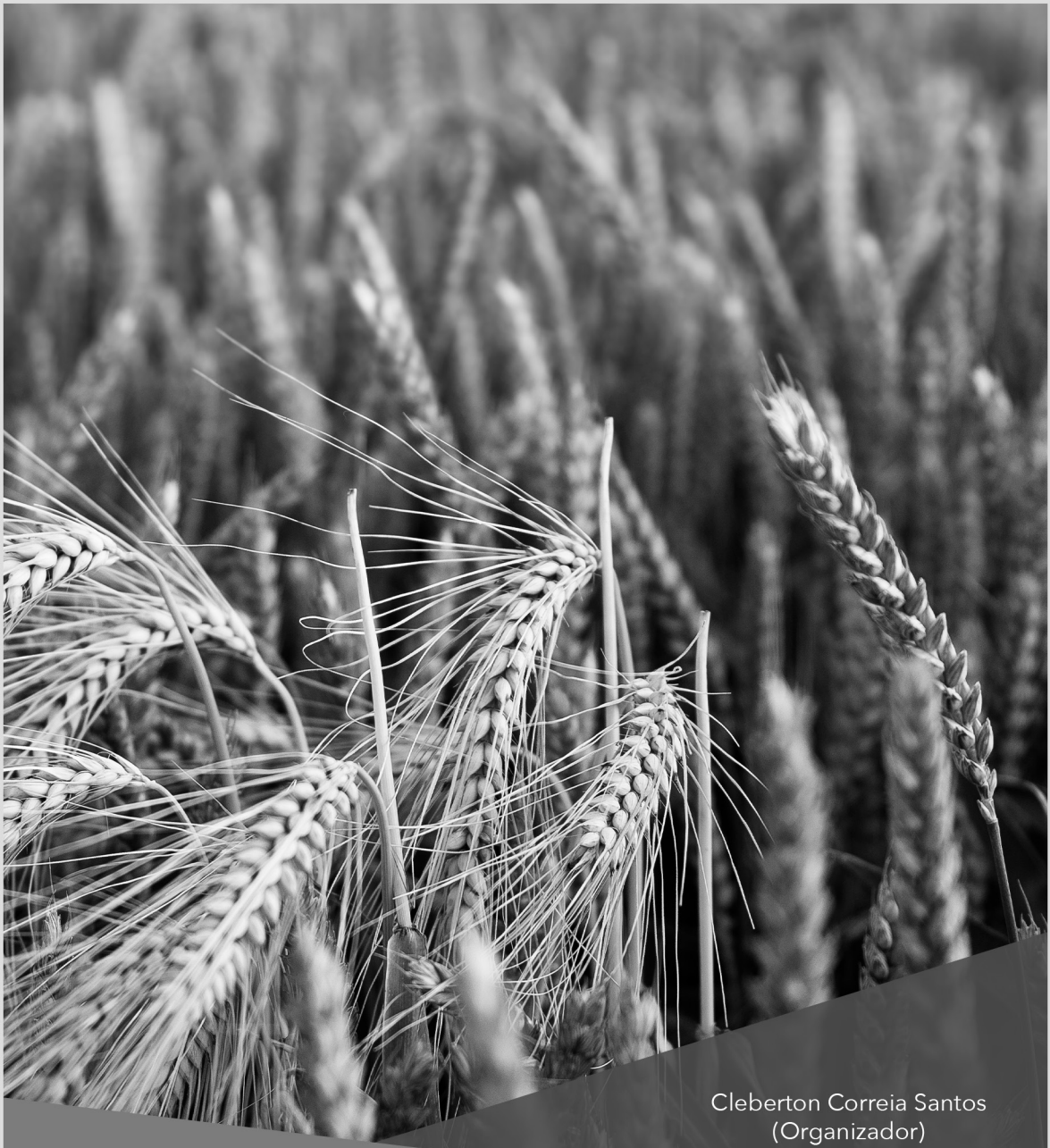

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Ciências Agrárias

APRESENTAÇÃO

O e-book "**Resultados Econômicos e de Sustentabilidade nos Sistemas nas Ciências Agrárias**" de publicação da Atena Editora, apresenta, em seus 25 capítulos, estudos almejando a reflexão dos impactos no cenário econômico baseando-se nos sistemas de produção e suas óticas nas sustentabilidade, objetivando-se o manejo dos recursos naturais renováveis e qualidade de vida da população mundial.

As ciências agrárias abrange diversas áreas de conhecimento, tais como a Agronomia, Zootecnia, Engenharia Agrícola, Engenharia Florestal, Agronegócio, Medicina Veterinária, Sociologia, Economia e Administração Rural, entre outras. Ao longo dos anos tem-se intensificado a busca por sistemas de produção vegetal e animal de base sustentável, isto é, articulando a preocupação com o meio ambiente e os alicerces econômicos. No entanto, ainda existem alguns aspectos que devem ser elucidados, almejando o emponderamento das comunidades rurais e sua inserção no Agronegócio. O e-book apresenta discussões e reflexões dos diferentes setores agropecuários e suas contribuições na economia mundial, além de descrever práticas que contribuam no manejo sustentável dos sistemas nas ciências agrárias, e para a sociedade.

Aos autores, os agradecimentos do Organizador e da Atena Editora pela dedicação e empenho na elucidação de trabalhos que irão contribuir no fortalecimento econômico e dimensões socioambientais. Esperamos contribuir no processo de ensino-aprendizagem e diálogos da necessidade da preocupação socioambiental e seus impactos positivos na cadeia do agronegócio, além de incentivar agentes de desenvolvimento, isto é, alunos de graduação, de pós-graduação e pesquisadores, instituições públicas e privadas de assistência e extensão rural na execução de práticas que promovam o desenvolvimento rural.

Uma ótima reflexão e leitura sobre os paradigmas da sustentabilidade econômica rural!

Cleberton Correia Santos

SUMÁRIO

CAPÍTULO 8

INCOME DIVERSIFICATION IN THE ASSOCIATION OF COFFEE PRODUCERS AGROPASUNCHA, CUNDINAMARCA, COLOMBIA

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ABSTRACT: Coffee activity in Colombia has great importance due to its direct relation with the economy and the population's welfare. Five hundred and sixty-three coffee families in Colombia depend on this agricultural activity. This paper shows the results of a viability evaluation of commercializing beekeeping products obtained from the implementation of Apis mellifera bees in the producers association Agropasuncha to generate an income diversification. The project created the diversification line as a new business alternative for the associate producers to improve their income with bee products. The viability plan was developed through the evaluation and projection of the economic aspect, with a rural economy methodology that evaluates monetary costs or explicit production and non-monetary or implicit production. Finally, an economic analysis was obtained in which the profitability was 1.95 of net profit obtained by each monetary unit of investment, family surplus of production for US$ 3.426 and a technical remuneration of domestic labor day for US$ 28,5. In addition, descriptive surveys were conducted to determine the potential market for apicultural products in health food stores in Pacho, Zipaquirá and Tocancipá, Colombia.

KEYWORDS: Apiculture, costs, diversification rural economy. incomes, market.

DIVERSIFICACIÓN DE INGRESOS EN LA ASOCIACIÓN DE PRODUCTORES DE CAFÉ AGROPASUNCHA, CUNDINAMARCA, COLOMBIA

RESUMEN: La actividad cafetera en Colombia es una actividad muy importante para la economía y en especial para el bienestar de las comunidades cafeteras. Cientos de familias en Colombia dependen de esta actividad agropecuaria, por tal razón la diversificación de ingresos es importante en el contexto de la producción cafetera. Este artículo muestra los resultados de una evaluación de viabilidad de la comercialización de productos apícolas obtenidos de la implementación de las abejas Apis mellifera en la asociación de

productores Agropasuncha para generar una diversificación de ingresos. El proyecto creó la línea de diversificación como una nueva alternativa de negocios para que los productores asociados mejoren sus ingresos con productos de abejas. El plan de viabilidad se desarrolló a través de la evaluación y proyección del aspecto económico, con una metodología de economía rural que evalúa los costos monetarios o la producción explícita y la producción no monetaria o implícita. Finalmente, se obtuvo un análisis económico en el cual la rentabilidad fue de 1.95 del beneficio neto obtenido por cada unidad monetaria de inversión, el excedente familiar de producción por US $ 3.426 y una remuneración técnica del día laboral doméstico por US $ 28,5. Además, se realizaron encuestas descriptivas para determinar el mercado potencial de productos apícolas en las tiendas naturistas de Pacho, Zipaquirá y Tocancipá, Colombia.
PALABRAS CLAVE: Apicultura, costos, economía rural, diversificación de ingresos, mercado.

1 I INTRODUCTION

Coffee activity in Colombia has great importance due to its direct relation with the economy and the population's welfare. Five hundred and sixty-three coffee families in Colombia depend on this agricultural activity (Federación Nacional de Cafeteros, 2010). However, profitability and productivity have shown low figures in recent years due to factors related to labor costs, low capital, deficit in the adoption of new technologies and low education. Small producers continue to maintain Coffee activity as their main source of income. Therefore, to strengthen this activity to take advantage of the existing potential is necessary (Cano, Vallejo, Caicedo, Amador y Tique, 2012). Hence, to look for alternatives that imply the mitigation of the risk effects of the dependence on a single product is important.

To continue, one of the strategies is the diversification of income, which is a mechanism to reduce poverty and thus improve the food security of peasant families related to the increase in the number of sources of income and their use (Zhao & Barry, 2013). The diversification effect depends mainly on the activity carried out; the determinants of this process are survival and accumulation (Mora y Cerón, 2015). In this case, beekeeping represents an option.

The term beekeeping or apiculture, which etymologically comes from the root Apis, 'bee', and cultura, 'culture' or 'breeding', is a concept determined as an applied science that studies the Melifera bee with which, through the application of technology, an economic benefit from its activity is obtained. It is an opportunity for competitive development in the market; for example, in Chile, in 2013, honey was the primary export product, reaching a value of USD 27.2 million for 8,195 tons exported.

Regarding pollination, the paid value for this service is estimated between USD 10 and 15 million. The economic impact of the activity is within a range of USD 225 to 450 million (Valdés, 2014). Due to the prominence of some of the products that are important in the market such as honey, royal jelly, propolis, pollen, wax, queen's cores or packages and others; the profitability is bound to the performance of the hives, to the sale price of the products and obviously to the production costs (Vásquez y Tello, 1995).

The beekeeping sector is linked to food security because of the role that bees

play in agricultural productivity with pollination. The apicultural production system has the capacity to provide more diversified productions than other products such as natural foods rich in vegetable protein, vitamins and minerals (Verde, 2014). There is certain connection between the quality of apicultural products and agricultural productivity since the practices in nearby crops can contaminate them with residues of agrochemical supplies.

1.1 Beekeeping in Colombia

The beekeeping activity in Colombia is getting stronger. It is one of the 37 productive chains and has predominated about 30 years ago as a rustic system. In 2011, 115,000 hives were reported in the livestock inventory (Flórez y Ward, 2013). In the 1970s the greatest development in pollen production was reached although they have always been characterized as small productive units. This size is probably related to the importance that this activity has in the economy since it is taken as a complementary process in the farm which limits the growth of the chain. This factor is also related to the fact that constant income is not generated but only in harvest seasons. There is a deficit in the demand for these products at a national level and in the ability to export or colonize international markets. Therefore, it is necessary to develop policies that strengthen the sector as well as combat the falsification issues and provide more information to the population. (Sánchez, Castañeda, Muñoz y Téllez, 2013).

According to Sánchez (2014), in three apicultural production systems of Boyacá most of the producers are small producers and the average number of beehives per producer is 16. The beekeeping activity has the potential to diversify products, but this advantage is not leveraged. Factors such as working capital, technical management and access to properties influence the development of this activity.

This study determined production costs and monetary benefits of $ 6,945 for honey / kg and $ 9,494 to $ 13,520 for pollen / kg, taking into account that the utility increases with the number of hives. Implementing good practices to guarantee the quality and safety of apicultural products is necessary. For small producers an approximate profitability of the 28 % is estimated (Hoyos, 2007).

The honey production of bees is variable according to the biogeographic zones, the efficiency can reach 40 kg / hive / year in Sucre, Atlántico, Magdalena, and Bolívar, while in high mountain areas, the annual average is 20 kg / hive / year (Laverde, Egea, Rodríguez and Peña, 2010).

1.2 Bee products

Climatic and / or environmental conditions directly affected beekeeping since plants are the ones that provide the raw material for bees to make the products (Martínez, 2011). Any change in temperature and strong rainfall can decrease the nectar and pollen demand, which affects the efficiency of apicultural products (Acosta, González-Martínez, & Vargas, 2017).

Vásquez and Tello (1995) classify bee products as follows:

- Secretion products: wax, royal jelly, apitoxin

- Products collected:
- No transformation: Pollen and propolis
- With transformation: Honey, frutimiel, honeydew
- Other products: queens, cores, packages, drone larva

1.3 Viability study

"A viability study consists on the collection, analysis and evaluation of different types of information with the purpose of determining whether or not to establish a company that implies economic risks" (Vega, 2006 p.1). The main objectives aim for demonstrating the viability of the business to investors, owners and financial institutions and to estimate the possible output or economic profit of a business initiative. This viability study is carried out by executing four phases: Conceptual, operational, market and economic (Vega, 2007). Adding to this concept you can see the viability at the legal or regulatory level, taking into account the necessary requirements for a project, in this case, an association that works properly.

In order to capture it, a feasibility plan is carried out, which is the document that will reflect the content of the business project that is going to be implemented, and that ranges from the definition of the idea to develop to the concrete form to carry it out (Manises, 2008).

1.4 Legal or regulation viability

In order for a business project to function properly, the rules and / or requirements that govern economic activity must be taken into account.

Legal framework for beekeeping: The legislation in Colombia on agricultural production, tries to normalize the adequate technical and technological progress of the productive activities. In Colombia, there is no law that governs beekeeping, but there is a regulatory framework, somehow related to beekeeping. This framework is grouped into two normative groups: a general legal framework, which is related to the environmental interest regulations, and a specific legal framework for the beekeeping activity (Silva, Arcos y Gómez, 2006).

These two legal frameworks are detailed as follows:

- General legal framework: In this frame, beekeeping is linked to environmental legislation, which regulates the development of productive activities and, in some way, may affect ecosystems due to their relationship and use of natural resources (Silva, Arcos y Gómez, 2006).
- Specific Legal Framework: "Beekeeping can be related as an agricultural activity or enterprise stated in the decree 2020 de 1971" (Silva, Arcos y Gómez, 2006) In the specific regulations are the technical, sanitary, agricultural, civil and tax.

1.5 Economic viability

The economic viability is determined from balance sheets, profit and loss (P & L) and

thus determine profitability for associations of agricultural producers. The analyses are in the field of rural economy, for this a valuation methodology proposed by Forero (2002) and adjusted by Acosta (2014) is applied, which is more appropriate for the current situation of agricultural producers pursuing an income improvement.

Specifically, in economic studies in beekeeping such as Magaña and Leyva (2011), variable costs represent 67.1% of total production costs, in which, labor is the most representative and fixed costs attributed to the depreciation of equipment in infrastructure. Another case is the study carried out by Rodi (2013), where analyzes of profitability for the production and marketing of honey with projections are carried out. The value of working capital represents 17.82%, in which the purchase of stamped wax sheets is the highest value in production supplies.

According to Sánchez (2014), the production costs (without monetizing labor) for the departments of Boyacá and Cundinamarca vary between $ 2,966 and $6,945. The fixed costs represent the greater part of the total cost for the production of honey. In addition, the higher number of hives, the greater the annual profits and the remuneration for family labor.

1.6 Rural economy and income diversification

At a global level, diversification in the rural economy allows social development, giving the possibility of reducing poverty and improving food security in peasant families. Family farming is a key sector for achieving change towards sustainable agricultural systems in Latin America, the Caribbean and the world. Small farmers are allies of food security and key players in the countries' efforts to achieve a future without hunger (OIT, 2015). In the Latin American region, 80% of farms belong to family agriculture, including more than 60 million people which makes it the main source of agricultural and rural employment that largely supplies the needs of all the population. Despite this, the peasant family has a higher poverty index. Taking this reality, the ideal is the existence of a diversification of income that allows producers to be sustainable, have more production alternatives and obtain more profits (Salcedo y Guzmán, 2014).

The diversification of rural income is a mechanism to reduce poverty and thus improve the food security of peasant families related to the increase in the number of sources of income and the use of these (Zhao & Barry, 2013). The diversification effect depends mainly on the activity carried out; the determinants of this process are survival and accumulation (Mora y Cerón, 2015).

2 | MATERIALS AND METHODS

The study was carried out in the Agropasucha Coffee Producers Association, located in Pasuncha, corregimiento of Pacho, Cundinamarca, in the province of Rionegro; in three farms with 20 hives, close to the coffee crop. In order to estimate costs the methodology proposed by Acosta (2014) is used. Acosta developed a pricing method for vegetables. The economic analysis is based on the methodology of Forero et al (2002). Bearing this in mind, the calculations are made as follows:

- Monetary costs (CM): Explicit costs, being those that the producer must pay in cash. Normally they are fixed and variable costs.
- Domestic costs (CD): Implicit costs, those in which money is not used for remuneration (taking family labor and the use of land where the apiaries are located).
- Total costs (TC): Sum between monetary costs (MC) and domestic costs. TC = MC + DC.
- Total Income (TI): Sum of the monetary income (MI), being these the sales of the products and the domestic (DI), being the self-consumption (A), which corresponds to the self-consumed quantities by the families calculating the amount consumed by the normal sale price. TI = V + A.
- Surplus or net benefits (EN): Correspond to the difference between total revenues and total costs. EN = IT - CT.
- Family production surpluses (VET): Express the capacity of the production system to generate income for the farmer. EFP = IT - CM - (CnM ≠ MO).

Where IT (total income), CM (monetary costs), CnM (non-monetary costs), MO (labor).

- Profitability (Rent): Denominated as a benefit / cost relationship, it is an indicator that reflects the net benefit obtained by each monetary unit of investment and is obtained with the ratio between the net benefits and the total costs generated by the activity: Rent = (V + A-CT) / CT.
- V (Sales), A (self-consumption), CT (total cost).
- Technical remuneration day of domestic work (RTDTD): Indicator that expresses the ability to generate income from a production system if income is not paid and is obtained with the relationship surplus family production between domestic daily wages. RTDTD = EFP / JD.

Taking the previous information into account, a general balance was made and P&L with production projections according to the agro-ecological conditions of the area, floral offer of the coffee crop, other plant species and the state of development of the hives. In the structure of costs and surpluses, the self-consumption of the association families was taken into account. These data were obtained through surveys to the three families and thus know the contribution of these products to improve their diet without the need of purchasing them at high prices.

The estimation of the potential market was carried out through 17 surveys to establishments that sell honey, pollen and other apicultural products or that are interested in them, in the municipalities of Pacho, Zipaquirá and Tocancipá, Cundinamarca. In addition, an average of the current market prices was taken to locate the price of the association's products in the optimum range, taking into account a fair trade. The surveys were descriptive with closed questions.

3 | RESULTS

The cost structure was made taking variable and fixed costs, monetary costs and domestic costs, which are generally not taken into account in the reality of the rural area. These are the land use cost in which the apiaries and family labor are located. It must be taken into account the US$ 4.735 investment. This value includes the necessary elements for 20 hives, such as rod bases for beehives, piquera lid, breeding chamber, half rise, honey boost, bee's core, roof, pollen trap, beekeeping overalls, lever stainless steel beekeeping, beekeeping brush, medium smoker in stainless steel and enclosed for four apiaries.

First, a sale price of US$ 3,05 for the presentation of 350 g and of US$ 1,81 for 175 g was determined with a profit of 50%. The cost per unit was found based on the monetary and domestic costs of apicultural production, which were defined taking into account variable costs (feeding with refined sugar, wax sheet changes, extraction and transport of commercialization) and fixed costs including depreciation and queens wear.

Later, to estimate the value of the annual income, a projection of the production equivalent to 20 kg / hive of honey was made, the self-consumption corresponds to 25.2 kg of honey and the total sales in relation to the 20 beehives of 374.8 kg of honey. In addition, due to the conditions of the area, pollen and wax production will be minimal, only covering self-consumption, not included in sales.

The table 1 shows the summary of the results of income costs and benefits, where the income projection was obtained for US$ 3.865,8, including sales and family consumption, a profitability of 1.95.

The technical remuneration of domestic work day it's important for the hi value in a sporadic work, approximately 1 day for month; If the apicultural activity would be a principal economic activity, the remuneration day weren't expensive price.

Annual Structure	
Income	$US
Sales	3.589
Self-consumption	276,6
Total	3.865,6
Cost	$US
Monetary	414,2
Domestic	893,8
Total	1308
Profit	$US
Production surplus	2.557,8
Family production surplus	3.426,7
Profitability	1,95
Technical remuneration day of domestic work	$ 28,5

Table 1. Income, cost and benefits

Source: Own elaboration

3.1 Potential market

The market was segmented, taking only the naturalist shops and some supermarkets that commercialize apicultural products. 100% of establishments sell honey, the presentations that are marketed are 750, 375, 250, 125 and 75 cc, which the majority sold honey is the presentation of 375 cc. In Zipaquirá, the sale of 750 cc honey (1,000 g approx.) predominates. There is little demand for honey since in the three municipalities they have sales of 1 to 10 units mostly.

The most commonly used packaging is glass, in addition, establishments purchase honey from intermediaries by 75% to 80%, while only 20% to 25% receive it directly from beekeepers.

According to Table 1 of prices consulted in the establishments, there is a great variability in presentations and prices, but the best-selling presentations are those with the lowest content such as 125 cc, which is equivalent to about 175 g taking the density of the honey of 1.4g / CC.

4 I DISCUSSION

The negative effect generated by transgenic crops and pesticides on bee health and honey quality is known, as reported by the Network for a Transgenic Free America (2016). However, because it is in a production system in which chemical synthetic agricultural inputs are not applied to control pests and diseases, honey is not affected in its organoleptic quality, and those who know where it comes from have paid up to 25% more compared to commercially available honey.

After the commercialization study to analyze the viability of the commercialization of bee products in the AGROPASUNCHA association, the honey production exercise was accompanied during two harvests with productions of 40 and 68 kg of honey, respectively. Honey could be marketed as agroecological honey under reliable labels with direct marketing between producers and consumers, generating a more significant profit margin for the producer and they are part of the group of small producers that can contribute to satisfying the demands of the domestic market (Saul da Rosa et al., 2014).

Additionally, it is necessary to consider the apicultural chain described by Razo, Jesús, Rebollar, Hernández, & Guzmán (2014), they have evidence that between the producer and the consumer there are retail gatherers and wholesale gatherers and these links in the chain generally remain with most of the profit with percentages of up to 18% in the first collection and an additional 15% in the second collection, before reaching the final consumer.

The difference in value acquired depends on the marketing channel to which they have access; in the case of direct marketing by the AGROPASUNCHA association, they receive 100% of what the consumer pays. In contrast, the intermediation channels can make the producer receive only 20% of the value paid by the final consumer for honey (Magaña, Moguel, Sanginés, & Leyva, 2012).

It is crucial to keep in mind that if the production of honey in this association continues to increase, not only is self-consumption satisfied and this contributes to the food sovereignty and autonomy of the beneficiary families (Altieri & Nicholls, 2020), but they could saturate the market and would require including in its marketing chain an intermediate link that deals with marketing (Rodi, 2013).

Finally, another benefit brought by the inclusion of bees for income diversification is the increase in productivity and quality in crops that results in an economic benefit from the ecosystem service provided by bees in pollination (Acosta, González-Martínez, & Vargas, 2017; Veldtman et al. 2018), which for the same association AGROPASUNCHA during the years 2015-2016 presented an increase of 15% in both quality and performance (Acosta, Rodríguez, González-Martínez, Cuervo, & Vargas, 2019).

5 | CONCLUSIONS

According to the review for the association Agropasuncha, to market honey is more viable since it has greater extraction and commercialization than other bee products. Additionally it has great market potential in the naturalist shops of the region. On the other hand, for the other apicultural products a minimum production projection obtained will only cover family self-consumption.

Thanks to the surveys, it was possible to obtain in which presentations it is feasible to offer. Intermediaries offer the largest amount of honey, in the case of selling the honey of the association is also concluded; the establishments will be supporting producers directly, promoting the development of the region and promoting fair trade. In addition, the price obtained for this study competes perfectly with the market.

Because of the economic study is possible to conclude that apiculture is profitable as an alternative for income diversification to coffee producers as well as the pollination of crops carried out by bees obtaining a cost / benefit of 1.9.

It is important to note that the economic study was made taking into account that the association in which the research was conducted is composed of peasants, which applies the rural economy model, closer to the reality of the Colombian countryside; therefore, peasant labor is quantified.

Small producers and their families will not need to invest money to buy apicultural products because they can access to this energy and nutritional sources as well as taking advantage of their medicinal properties for their consumption, which is a great benefit since it will contribute to the quality of life of these producers.

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