Jaqueline Fonseca Rodrigues
(Organizadora)

Inovação, Gestão e Sustentabilidade

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APRESENTAÇÃO

A edição do e book – **Inovação, Gestão e Sustentabilidade** trazem em sua essência o entendimento sobre o impacto gerado pela unificação destes.

Inovação, Gestão e Sustentabilidade aborda os desafios para as empresas e a sociedade em relação aos problemas ambientais que se inter-relacionam com a questão econômica. No contexto empresarial, a escassez de recursos naturais impõe a seguinte reflexão: Como inovar e ao mesmo tempo otimizar a sustentabilidade das cadeias de valor? Esta obra pretende contribuir para a compreensão desse contexto, apresentando alternativas analíticas e estratégias para as empresas nesse novo cenário socioeconômico, ambiental e inovador.

A preocupação com **Sustentabilidade** pode lançar as questões de **Inovação** e **Gestão** para um novo e diferenciado patamar, colocando-a, definitivamente, na ordem do diferencial competitivo.

Pode-se observar que tanto a **Inovação**, quanto a **Sustentabilidade** aliadas à processos de **Gestão** podem se tornarem fundamentais para a promoção da competitividade em contextos regionais e globais, bem como representarem a diferença na obtenção de resultados empresariais.

A busca por organizações "**Sustentáveis"** que sejam modelos de eficiência econômica e ambiental vêm sendo o maior desafio em um cenário globalizado e de constante mutação.

O principal destaque dos artigos é uma abordagem voltada para os temas destacados, através da apresentação de mudanças climáticas e as consequências ambientais no meio rural; a sustentabilidade e o desenvolvimento da suinocultura com a gestão de resíduos sólidos; o agronegócio da soja em mato grosso: explorando as fontes de inovação e/ou conhecimento; além da contribuição para que se interprete as relações inovadoras, sustentáveis e econômicas em várias outras pesquisas.a preferência pela escolha efetuada inclui as mais diversas regiões do país e aborda tanto questões de regionalidade quanto fatores de desigualdade promovidas pelo tema em destaque.

Necessita-se destacar que os locais escolhidos para as pesquisas exibidas, são os mais variados, o que promove uma ótica diferenciada da visão **sustentável**, da **gestão** e da **inovação**, ampliando os conhecimentos acerca dos assuntos apresentados.

A relevância ainda se estende na abordagem de proposições inerentes ao Desenvolvimento Regional e Territorial; Gestão da Produção e Inovação, envolvendo Agroecologia, apresentando questões relativas aos processos que buscam gerar diferencial competitivo.

Enfim, esta coletânea visa colaborar imensamente com os estudos referentes ao já destacado acima.

Não resta dúvidas que o leitor terá em mãos respeitáveis referenciais para pesquisas, estudos e identificação de cenários econômicos através de autores de

renome na área científica, que podem contribuir com o tema. Além disso, poderá identificar esses conceitos em situações cotidianas e num contexto profissional.

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DAIRY GOAT AGRIBUSINESS SYSTEM IN THE STATE OF MINAS GERAIS, BRAZIL: A MULTIPLE CASE STUDY

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ABSTRACT: This study aimed to characterize the dairy goat agribusiness system and map the goat product market in the State of Minas Gerais, Brazil. One breeder, one dairy plant and one retailer were selected to answer questionnaires. Data analysis focused on goat product and by-product types and flow, and their level of importance for each sector. A SWOT analysis for each actor was done. Flows of animals for reproduction and slaughter, milk and meat were identified. The limited number of dairy plants, lack of abattoirs, and consumer prejudice were pointed as the greatest threats to the system. However, all sectors involved had a favorable market, and fiscal and legal incentives adopted by the state government were reported as favorable for the activity. To overcome difficulties, measures such as investment on technical efficiency and vertical integration, strengthening of bonds with suppliers and diversification of products, as well as training of staff to guide clients on the selection of products were mentioned. Minas Gerais State tends to export primary products to other states and import higher added value processed products. In addition, there is waste due to the lack of by-product trade; nevertheless, the goat milk and meat market seems promising.

KEYWORDS: by-product, dairy product, marketing, slaughterhouse

1 I INTRODUCTION

The southeastern region of Brazil plays a major role in dairy goat agribusiness, both

because of its commercial production and its share in the milk and milk by-product market, in spite of the fact that it holds only a small share of the Brazilian goat population (Borges, 2003). In the State of Minas Gerais, dairy goat production has attained a relevant economic status. Producers have been favored by climate, availability of food and proximity to major consumer centers, such as São Paulo and Rio de Janeiro, which absorb their milk and dairy production (Boechat, 2002). On the other hand, this activity faces difficulties, such as poor agribusiness system organization.

The agribusiness system (ABS) concept refers to interdependence relations between input industries, agricultural production, the food industry and the distribution system as a whole. Its descriptive analysis includes as key elements the agents and relationships between them, sectors, support organizations and the institutional environment. ABS study has a wide application ranging from public policy design to organizational architecture and corporate strategy formulation (Zylberstajn, 2000). Through the identification of company and/or producer characteristics and the focus on aspects such as agricultural production, the study of local or regional markets, and the generation of jobs and income from agricultural activities, an activity profile can be outlined and public policies which allow the insertion and development of these companies and/or producers in a competitive market can be adopted. The environment of many of these chains is well-known and established, but this is not the case of dairy goat breeding.

Studies on goat agribusiness systems marketing trends in Brazil can be found in literature, as in Guimarães and Cordeiro (2003), Simplício et al. (2003), Campos and Carvalho (2005), Nogueira and Mello (2005) and Silva et al. (2012). However, such pieces of research usually address specific areas of the country. No research was found referring to the State of Minas Gerais, as the studies closest to the area in this state were goat and sheep production sector analyses, as those by Lana (2008) and SEBRAE (2004).

This study aimed to characterize the Minas Gerais State dairy goat agribusiness system and map the market for its products.

2 I MATERIAL AND METHODS

The present paper consists of a descriptive piece of research of both exploratory and qualitative approach, and has a multiple case study design. The research was divided into three stages. The first one consisted of field research identification (Gil, 2002) of goat milk production chain actors, on which occasion a producer, a processor, and a retailer were selected. In the second stage, questionnaires were drawn up and applied (Lakatos and Marconi, 1990) to these three actors so as to characterize the goat milk agribusiness system, the marketing of goat milk and its by-products, and the organizational environment in which the companies were inserted. Finally, the resulting data were analyzed and discussed.

Initially, a literature review on the milk goat agribusiness system and field surveys were carried out, and the *Associação de Criadores de Caprinos e Ovinos de Minas Gerais* - ACCOMIG (Goat and Sheep Breeders' Association of Minas Gerais State) as well as the *Instituto Mineiro de Agropecuária* - IMA (The Minas Gerais State Agribusiness Institute) were contacted. Thus, companies operating in various goat milk agribusiness system sectors in the State of Minas Gerais were identified as goat milk producers, dairy processing plants, and retailers selling goat dairy products.

After these companies had been identified, there was the selection of participating companies, namely a milk goat breeder, a dairy plant and a retailer. Company choice followed the non-probability sampling by trial design, in which researchers select the members of the population that are believed to be reliable sources of accurate information (Oliveira, 2001), considering the companies' interest in participating in the research.

For each company participating in the research, a semi-structured questionnaire was devised and applied (Lakatos and Marconi, 1990) which included predominantly closed questions. The questionnaires were divided into three parts, the first pf which focusing on the characterization of the respondent company, the second on the description of the products produced and/or marketed by the company as well as its market flows, and the third on guidelines for devising a SWOT analysis.

The term SWOT, according to Wright et al. (2000), stands for Strengths, Weaknesses, Opportunities and Threats. This is a tool which allows for specific analysis of resources comprising strengths and weaknesses of a particular company, as well as opportunities and threats offered by the environment in which it is set. In addition, participants classified additional aspects according to a scale of importance as "high", "average" or "low". The SWOT model was used to characterize the organizational environment of the dairy goat agribusiness system in the State of Minas Gerais, as well as internal environments of participating companies.

The questionnaires were sent to the respondents by electronic mail, except for the retail company, to which it was delivered personally. After being filled out, the questionnaires were sent back to the researchers.

After being collected, data were analyzed both interpretively and comparatively in order to allow cross-checking information on the goat breeding product and by-product flow, the level of importance of each for the different agribusiness system sectors, and the identification of the most relevant issues raised by the respondents regarding the productive chain and organizational environment characterization. As for the SWOT analysis, a matrix was devised for each actor.

3 I RESULTS AND DISCUSSION

The business representing the milk goat production sector in this study has a considerably large flock for the State of Minas Gerais which includes 260 animals, 150

of which are lactating goats. In addition to milk, the company also markets does and bucks for breeding, and is presently verticalizing its system for production processing. Its goat milk processing plant is in its final adequacy stages, and has already been licensed by SIF. Goat breeding is the sole activity of the farm and also the sole source of income for the farmer, who has been raising milk goats for fifteen years. The flock consists exclusively of Saanen breed registered animals of high production potential. The farm participates in genetic evaluation and improvement programs as well as official dairy control, which consists of a program for performing bi-monthly qualitative analysis and weighing of milk. The productive system is intensive and confined, with zootechnical coefficients showing good technical efficiency.

The dairy plant which participated in the research is one of the largest in the country operating in the goat ABS. It is located in the state of Rio de Janeiro, but was included in the study because it is probably the largest goat milk buyer in the State of Minas Gerais. It has been operating for twenty years, though in the first fourteen years, it processed goat milk only. The volume of milk processed by the company reaches 6,200 liters of goat milk per day. The company currently has 96 employees and does not have its own goat milk production.

The retail sector representative participating in this research has been in the market for 30 years and has 6,455 employees working in 41 different units, all located in the state of Minas Gerais. The retailer included in the study is headquartered in the city of Uberlândia, and sells milk, cheese and meats of goat origin. Data on the products marketed by the three agribusiness system representatives and the flow of trade of these goods are presented below.

The participating producer currently sells raw milk, does, bucks and animals for slaughter. The milk is sold to a plant in the city of Pindamonhangaba in the State of São Paulo, nearly 570 km away from the farm, which is located in the *Triângulo Mineiro* area. The does and bucks are sold to other breeders from all over Brazil, especially from the Northeastern region and São Paulo and Rio de Janeiro States. Goat kids are purchased by a municipal inspection slaughterhouse in the south of Minas Gerais and by eventual buyers. The producer does not sell pasteurized or frozen milk, dairy products, meat, goatskin or manure. However, when its own dairy plant starts operating, both pasteurized and frozen milk will also be marketed.

	Approximate volume per year	Financial share in sales		
		Low	Average	High
Raw Milk	150,000 L	X		
Does	250 animals			X
Bucks	10 animals			X
Goat kids for slaughter	200 animals		X	

Table 1 – Products marketed by the productive sector representative, and financial relevance attributed to each

According to the latest Brazilian Farming Census (IBGE, 2017), there were 1,016 agribusiness facilities producing goat milk in the State of Minas Gerais, which housed roughly 6,500 dairy goats. Although this means an average of 6 goats per property, most of the milk produced is aimed at commercialization. In the state, 78% of the production is sold, a proportion higher than the national average, which is 59%.

Some of the farmers have expanded their activities and facilities also for milk processing. This verticalization occurs due to the small number of industries processing goat milk in the State. According to data provided by ACCOMIG/CAPRILEITE (verbal information)[1], there are only three dairy plants that are able to process goat milk under the Federal Inspection Service (SIF) license in the State of Minas Gerais, all of which belong to farmers (vertical integration). The breeder who participated in the survey is one of them, although his processing facility was not operational at the time.

Another kind of establishment producing animal products are family agribusinesses, which were regulated by Ministerial Ordinance 1252 of October 10, 2012. These are small rural agro-based industries that have been allowed to continue producing until they could fully comply with health standards. Such operational license holds good for a period of up to two years, and is granted by the *Instituto Mineiro de Agropecuária* - IMA (Agribusiness Institute of Minas Gerais) for farmers to adjust their production towards obtaining their final sanitary qualification. Public food purchase programs have been developed for family farmers that prioritize the acquisition of products from small agro-industries, such as the School Meals Program and the Food Purchase Program. By the end of this study, there were only three small family agro-industries licensed to perform goat milk processing by the IMA.

It was found that there are no slaughterhouses in the State of Minas Gerais licensed by the Federal Inspection Service (SIF) for goat slaughtering (MAPA, 2015b). This fact is relevant to the milk goat agribusiness system because, although the major product in the activity is milk, goat kids are also raised for slaughter, and could be an important source of income for producers. The goat kid market is believed to be basically informal in the State of Minas Gerais.

One of the main reasons for the verticalization of dairy processing by farmers, is the distance to the other processing plants, an option which is supported by the volume of milk produced. Cordeiro (1998) states that milk and dairy product processing appear to be a necessity for many producers in Brazil due to the lack of an option to market these products *in natura* and the possibility of higher gross monthly sales by adding value to the milk produced.

As for the farmer participating in this study, the milk is transported to the State of São Paulo instead of being processed in Minas Gerais, wich is justified precisely by the distance between the farm and milk processing plants, since the other dairy plants are located in the Juiz de Fora area, the main goat milk producer in the state, which is even more distant than those in the state of São Paulo. The distance between the property and the dairy plant in the State of Rio de Janeiro state which participated in the research is about 740 km.

1 Information provided by telephone by *Caprileite* in October 2015.

As previously stated, this producer invests in genetics and owns a purebred registered flock. Thus, the sale of does and bucks has become most important in terms of revenue for the property. It can be concluded that investing in flock selection and improvement is an important way not only to improve technical indicators, and therefore breeding efficiency, but also to add value to products (does and bucks) whose marketing does not depend on the presence of processing plants in the region.

The fact that goat kids for slaughter are sold to slaughterhouses with no federal or state inspection is due to the absence of abattoirs with licensed inspection for the species in Minas Gerais state (MAPA, 2015b), as well as to the small slaughter scale that does not justify sending these animals to be slaughtered in other states. There are no reliable data on goat slaughtering at a state and municipal level, inasmuch as the agencies responsible for this information do not usually disclose them (Sorio and Rasi, 2010); for this reason, it was impossible to estimate the number of slaughterhouses under municipal inspection in the State of Minas Gerais.

Nevertheless, it is noteworthy that the financial importance of the sale of animals for slaughter was higher than that of milk for this producer, which shows that establishing a meat processing plant in the area would be interesting. According to the Brazilian Agricultural and Livestock Confederation (2007), the sheep and goat industry has few plants in the country and even fewer establishments under the Federal Inspection System (SIF) supervision. It is known that informality is present in the production, trade, slaughter and carcass processing, and one of the reasons for that to occur are the higher gains obtained by the producer when he himself slaughters the animals and sells their meat (Sorio and Rasi, 2010). The fact that kid goat slaughter can achieve higher prices in the informal market adds to the importance attributed to this category by the producer.

The lack of commercialization of animal skin is in agreement with a study by Cordeiro (1998), who states that this trade is commonplace in the northeast of Brazil rather than in other areas of the country. In this study, this situation may also be related to the informal slaughtering of animals, since under these conditions, slaughtering is dispersed making it difficult to group and scale up skin production for tannery processing. Another factor related to informal slaughtering which can restrict skin trade is the lack of care during slaughter, skinning and skin conservation (Simplício et al., 2003). In a general study of sheep and goat farming in the State of Minas Gerais, Lana (2008) pointed out that the sale of goat and sheep skin is restricted to the northeast of the country. Simplício et al. (2003) state that, despite the quality of goat skins, this raw material is scarce in the national market both in quantity and quality, and that the expansion of the leather and footwear industry has relied heavily on imported skins. The same authors report that this situation can be exemplified by northeast tanneries, which operate at about 50% of their existing capacity.

The participating processing plant markets its products to retail throughout the country, and cow milk concentrate is sold for industrial purposes. On the other hand, goat milk is purchased from producers located on average 320 km away from the plant in the States of Minas Gerais and Rio de Janeiro. This distance is much greater than

the average 150 km traveled to collect cow milk. The collections are carried out every three or four days, and the average price paid per liter of milk to suppliers is R$ 1.65/ liter without taking into account freight costs (according to the average exchange rate for the year 2018, R$ 1.00 equals US$ 0.27).

	Approximate volume per year	Financial share in Sales		
		Low	Averege	High
Dry goat milk	70,000 kg		X	
Dry cow Milk	1,250.000 kg			X
UHT goat Milk	465,000 L		X	
UHT cow Milk	6,500,000 L			X
Cow milk concentrate	4,650,000 L			X

Table 2 – Products marketed by the processing sector representative, and financial relevance attributed to each

The plant informed it processes about 1.5 million liters of goat milk per year. This is equivalent to about 40% of the total raw milk sold in the States of Rio de Janeiro and Minas Gerais as, according to IBGE (2017), the volume of goat milk sold in the State of Minas Gerais alone is 3,189,420 liters per year, while in Rio de Janeiro this amount reaches 558,770 liters per year. Cordeiro (2011) estimates that the two dairies processing goat milk in operation licensed by SIF in the State of Minas Gerais process approximately 40 thousand and 78 thousand liters of milk per year, respectively. Therefore, it is possible to state that the processing plant that participated in the study is the major goat milk buyer in Minas Gerais, although it is located in the State of Rio de Janeiro.

In this research, the dairy processing company pointed dry and UHT goat milks as representing average financial incomes and dry, UHT and concentrate cow milk as representing high financial share. Guimarães and Cordeiro (2003) point out that milk powder is an interesting alternative to regulate market supply, especially upon considering that goats are a seasonal polyestrous species and that milk production does not present yearly stability, which implies higher industrial operational costs. The participating dairy plant processed only goat milk for fourteen years, but it has also been processing cow milk in the last six years, due to its greater availability. As goat milk is more abundant, the greater distance traveled to collect it increases freight costs.

The participating retailer currently markets pasteurized milk, *dulce de leche*, cheese, yogurts, frozen meat and cold meat of goat origin, with UHT goat milk being the major marketed product in volume (Table 3). The company also sells fluid cow milk, and dairies from cow, buffalo, sheep and goat, as well as beef, pork, lamb and goat meat. The retailer does not sell viscera from any species or sausages of goat origin.

	Financial share in Sales		
	Low	Average	High
Pasteurized Milk		X	
Dulce de leche		X	
Cheese		X	
Yogurt			X
Frozen meat			X
Chilled meat			X

Table 3 – Goat origin products marketed by the retail sector representative, and financial relevance attributed to each

For the retailer, the level of importance of goat product sales by the company as compared to other products, has been ranked “average” for fluid milk, *dulce de leche* and cheese, and “high” for yogurt and meat.

Its goat milk suppliers are located in the States of São Paulo and Rio Grande do Sul, while goat dairy product suppliers are from São Paulo, Portugal and Spain. The goat meat supplier is a slaughterhouse from the State of Bahia, in the Northeastern region of the country. It is worthy to mention that none of the products of goat origin marketed by the participating retailer come from industries in the State of Minas Gerais. As for meat, one must consider that, in addition to the fact that there are no slaughterhouses with federal or state licenses in Minas Gerais, more than 90% of the national goat flock is in the northeastern region of the country (IBGE, 2017). Therefore, the Northeast has more licensed slaughterhouses and a larger goat slaughter scale in relation to other regions. The State of Bahia leads the number of goats slaughtered under federal inspection (MAPA, 2015a), having three goat slaughterhouses under SIF (MAPA, 2015b) supervision, as well as others under SIE, SISBI and SIM supervision. It is also worth mentioning that the participating retailer is part of a 41 store chain, so it needs major suppliers, and their goat meat supplier is one of the largest goat meat plants operating in the country.

As for goat milk, personal subsistence is the main purpose in the Brazilian Northeastern region, and its consumption occurs close to production areas, with a major involvement of state governments as social program buyers (Cordeiro, 2007). Thus, the retailer in question purchases dairy milk from other regions.

The retailer mentioned UHT milk as its main marketed product in volume; however, it included frozen and chilled meats as playing a major financial role in sales. It is worth mentioning that dairy products such as *dulce de leche* (milk sweet) and cheese were pointed out as representing a share similar to that of milk in sales, and that yogurt also plays a major role, similar to that of meat. Guimarães and Cordeiro (2003) and Cordeiro (2007) state that yogurt is a product which has great potential, since it has lower production costs as compared to cheese; in addition, yogurt does not demand

sophisticated equipment for its production and is easy to prepare. As a result, the product is cheaper and better accepted by the consumer.

The fact that meat has a greater sales relevance as compared to milk is surprising, inasmuch as milk is the major goat product in Brazil. Similarly, the milk processing industry is more organized and more developed than that of meat in the country, the latter being often considered incipient. This fact is reflected by the greater production of milk as contrasted to meat (FAOSTAT, 2017), the greater specialization of Brazilian flocks for dairy farming and the greater number of dairy breeds as compared to meat ones in Brazil. Goat breeding development in the country was aimed initially at cheese production (Fonseca and Bruschi, 2009). This suggests that there is an open market for meat, whose availability and marketing is restricted mainly due to the low availability of licensed slaughterhouses and the high informal slaughtering occurrence.

Based on the information obtained from the participants, the dairy goat ABS in the State of Minas Gerais can be represented as shown in Figure 1.

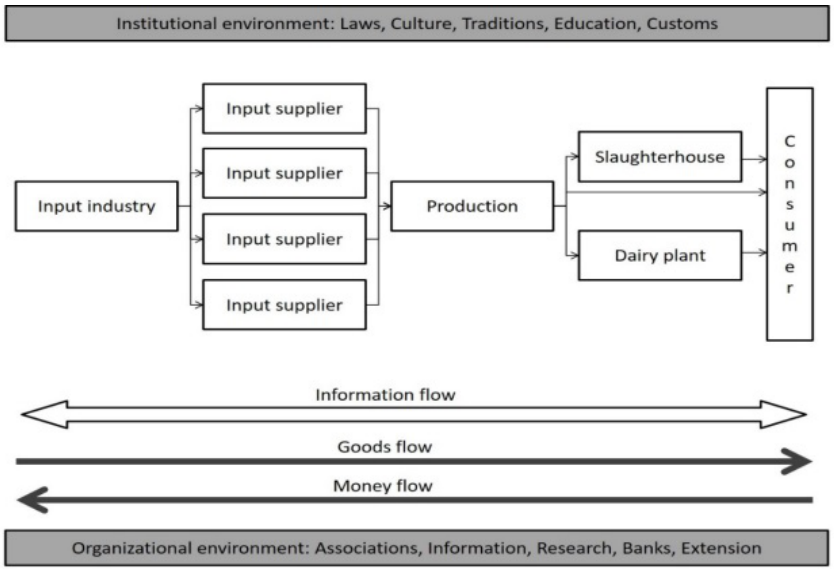

Figure 1 – Model for the dairy goat agribusiness system in the state of Minas Gerais.
Source: Adapted from Zylberstajn (1995) and Goulart et al. (2009).

In it the flow of products can be observed by separating the flow of dairy products from that of meat products, once goat milk production also implies the availability of animals for slaughter as by-products. The milk produced is processed before reaching the consumer, while meat can reach this final sector without going through the slaughtering industry after informal slaughter, given the difficulty of finding inspected slaughterhouses. As previously discussed, milk processing can be performed either by independent plants or farm-linked ones.

Institutions are the rules of the game in society, and are represented by the laws, traditions and customs that characterize different societies. Organizations such as companies, universities, cooperatives and producer associations, among others are

structures created to support the ABS operation (Zylberstajn, 2000). These are the factors that really make ABS work, and companies continually seek to attend to and influence these environments (Macedo and Bataglia, 2012).

Organizations can change quickly, but institutions change at a slower pace. Thus, company dynamics has to be adapted to the institutional environment, though this dynamics also seeks to modify it, exerting pressure on the legislative power in search of rules that can best address their interests. The understanding of organizations, and especially of institutions, is important for ABS efficiency, whether to establish private strategies or public policies (Zylberstajn, 2000).

According to Silva et al. (2014), environmental analysis is a monitoring process through which present and future risks and opportunities that may influence the ability of companies to achieve their goals are identified. This analysis addresses both internal and external factors that may affect company development, and serves the purpose of enabling companies to react and adapt to change. The global assessment of strengths, weaknesses, opportunities, and threats is called SWOT analysis, an acronym formed from the initials of the four terms (Wright et al., 2000), and is usually referred to as SWOT matrix.

SWOT matrices developed for the companies participating in this study are presented below, showing each company's perception of their strengths and weaknesses, as well as their insight into the opportunities and threats of the dairy goat ABS in the State of Minas Gerais.

The greater relevance of these forces to the company representing the goat milk production sector (Chart 1) is in agreement with its large share in the sale of does and bucks, as this depends on genetics investments, participation in breeding improvement programs and in the official dairy control carried out by ACCOMIG/CAPRILEITE, as well as good management.

Environment	Positive aspects	Negative aspects
Internal	×Good animal genetic level^{+++}; ×Good flock technical level^{+++}; ×Association to ACCOMIG^{+++}; ×Has own processing plant^{+++}; ×Closeness to processing plant^{+++}; ×Committed and well-trained workforce^{++}.	×Difficulties in operating own processing plant^{+++}; ×Lack of processing plant in the farm area^{+++}; ×Lack of slaughterhouse in the farm area^{+++}; ×Local market product placement difficulties $^{+++}$; ×Difficulties in selling value-added products^{+++}; ×Difficulties in selling goat meat^{+++}; ×Flock technical difficulties+; ×Poor workforce qualification+; ×Lack of technical assistance+.

External	×Good or promising market for genetics^{+++}; ×Good or promising market for meat^{+++}; ×Good or promising market for milk and by-products^{+++}; ×ICMS exemption in the state $^{+++}$; ×Establishment of specific goat milk processing legislation in the state $^{+++}$; ×Tanneries in the state $^{+++}$; ×Slaughterhouses in the state $^{+++}$; ×Dairy processing plants in the state $^{+++}$; ×"Healthy food" goat milk and meat appeal^{++}.	×Lack of qualification of available workforce^{+++}; ×Lack of qualification of available technicians^{+++}; ×Low technical advice availability^{+++}; ×Difficulties in selling dairy products^{+++}; ×Consumer lack of knowledge on products^{+++}; ×Low production efficiency of most flocks^{++}; ×Difficulties of communication between productive chain links^{++}; ×Consumer prejudice towards products^{++}; ×Difficulties in selling matrices and sires^{+}; ×Low availability of technology, products and equipment for the sector^{+}.

Chart 1 – SWOT matrix of the productive sector representative company, including relevance levels of positive and negative aspects

$^{+++}$ High relevance level; $^{++}$ Average relevance level; $^{+}$ Low relevance level.

It is also understandable that the producer considers having his own dairy processing plant a matter of great importance, given the distances up to the industry already mentioned; this plant was about to start operating at the time. One of the most relevant aspects of the organizational environment identified in the study was the ACCOMIG/CAPRILEITE performance. This Association was founded in 1974, and is a key player in the sector. Together with producers and in partnership with research institutions such as universities and Embrapa, it promotes the genealogical record and official milk production control of goats, genetic improvement programs and extension actions in the State. It has a highly respected technical staff and represents the sector and producers in the Goat and Sheep Technical Board of the Federation of Agriculture and Livestock of Minas Gerais State, as well as in Federal and State Sectoral Chambers of the Goat Production Chain. The weaknesses of the company result from the scarcity of industries to process different goat products.

As for the threats faced by the sector, the lack of workforce and technical training and little access to rural extension and assistance programs is well-known and have been extensively discussed in literature. Studies such as those of Lacki (1995), Gonçalves (1996), Bresslau et al. (1997), Jorge and Machado (1999), Campos (2003), Nogueira and Mello (2005), Falcão et al. (2006) and Lana (2008) have unanimously stated that the level of technology employed by the sector and the technical as well as the managerial knowledge of producers, employees and technicians is still low; furthermore, information access has been hampered by several factors, including flock spraying.

Customs, traditions and eating habits are part of the institutional environment, and also influence ABS, especially goat milk and meat consumption. This is clear when

the consumption of goat products in different regions of the country is considered. Lana (2008) states that the Northeast consumes up to 90% of all Brazilian goat meat, followed by the Southeastern and Southern regions. The average per capita goat meat consumption in Brazil was 220 g in 2006, whereas Northeasterners consumed an average of 640 grams per inhabitant. In the northeastern State of Piauí consumption reaches up to 1.77 kg per inhabitant per year and in the State of Bahia, 1.14 kg per inhabitant per year. Minas Gerais showed the highest consumption per capita in the southeast region, with about 30 g consumed. The same trend occurs in goat milk consumption, which is still low, and can therefore be further expanded, and is thought to be an opportunity by the producer, since to him the market for dairy products and goat meat, as well as for the genetic improvement of these animals, is promising.

Regarding ABS opportunities in the State of Minas Gerais, once again the industrial segment scarcity and institutional environment characteristics have proven to be of great importance, especially with respect to legislation. The need for the establishment of industrial plants, whether they are tanneries, dairy processing plants or slaughterhouses, is due to the already discussed scarcity of these sectors in the State. Regarding legislation, the State has taken several specific legal measures to encourage the activity, such as the legalization and regulation of goat and sheep milk production and sale, along with their by-products, and a temporary exemption from paying ICMS - Imposto sobre a Circulação de Mercadorias e Prestação de Serviços (State Excise Tax) on live goat and sheep marketing. The IMA - Instituto Mineiro de Agropecuária (Minas Gerais State Agribusiness Institute) Ordinance 1,059 of April 27, 2010, contains regulations to legalize the sale of goat milk in the State (Minas Gerais, 2010). This legal provision authorizes the slow pasteurization of prepackaged goat milk, provided it is self-produced and does not exceed a volume of 200 liters per day. Previously, goat and sheep farmers had been prevented from performing formal dairy product trade due to the lack of sanitary license regulation, and the small volume produced prevented them from complying with the legislation in force until then, which was based on the volumes of small cow milk plants.

Bill 19,583 (Minas Gerais, 2011), enacted in 2011 and later amended by Bill 21,429 of July 21, 2014 (Minas Gerais, 2014a), provided for small-scale goat and sheep milk handling and processing conditions, as well as those of their by-products. These bills aimed to allow access to the formal market for many small sheep and goat cheese producers, enabling products to be marketed with other states, and thus increasing the Minas Gerais producer competitiveness.

Another initiative aiming to support the sector expansion was the reactivation of the Goat and Sheep Technical Board of the Agriculture and Livestock Federation of the State of Minas Gerais, which took place in October 2014, for the purpose of representing the activities at a state level. This Board aims to eliminate taxes on all artisanal goat and sheep milk by-products for a 15 year period as well as expand professional training in the area through SENAR - Serviço Nacional de Aprendizagem

Rural (National Rural Apprenticeship Service). The Board's first achievement concerns ICMS - the State ExciseTax - on goat and sheep products trade (FAEMG, 2014). The exemption on ICMS for live animals and derivatives sale is a tax concession granted to stimulate the activity and attract abattoirs to the State, since the absence of licensed slaughterhouses by the Federal Inspection (SIF) or State Inspection (SIE) services forces a substantial number of goats and sheep from Minas Gerais to be slaughtered in the States of São Paulo and Rio de Janeiro. Milk is also commonly sold to industries in these States, given the small number of dairy plants with SIF license in Minas Gerais. Specifically for this producer, the benefit of ICMS exemption applies to both live animal and milk sales. The producers are free of the average 12% ICMS charge while the measure is in force – it started in November 2014 and was initially due in March 2016 (Minas Gerais, 2014b), but it was extended for undefined time (Minas Gerais, 2016).

It could be observed that the milk processing plant perception on positive and negative aspects of both internal and external origin is similar to that of the participating producer (Chart 2). No conflicting aspects were found, with both participants agreeing on many of the topics.

Again, low capacity was identified as a consequence of the company's difficulty in finding high-quality milk suppliers and the lack of technical assistance availability. Also, the lack of tradition in goat product consumption was once more pointed out, as well as problems in the sale of more expensive products, in addition to the scarcity of slaughterhouses and leather industries.

For authors such as Guimarães and Cordeiro (2003) and Wander and Martins (2004), marketing is one of the main bottlenecks in the sector, especially when dealing with higher added value products, as the activity depends on retail price acceptance, and more specifically on consumer purchasing power. As a consequence, according to Cordeiro and Cordeiro (2011) in Brazil, as opposed to developed countries, most goat milk is marketed in its fluid state rather than being processed into cheese. The ICMS tax exemption was once again relevant - in the case of this industry, this measure facilitated milk collection from Minas Gerais producers. They would probably be less likely to sell their product to the Rio dairy plant if they had to pay 12% tax on the value of the product. Such being the case, the company would probably have to offer higher values for milk or work on a smaller scale. Both representatives of the processing and productive sectors mentioned the ICMS exemption for goat products in the State of Minas Gerais was a great opportunity for the goat production chain.

Other positive aspects mentioned by the processing company were the goat milk appeal as a "healthy product" and the conviction that the goat product market is a growing one.

Environment	Positive aspects	Negative aspects

Internal	×Short distance from consumer market^{+++}; ×Regular supplier availability^{+++}; ×Committed and well-trained workforce^{++}; ×Sale of value-added products^{++}; ×Closeness to milk suppliers^{+}; ×Ease of sale of goat dairy products^{+}; ×Ease of product placement in local market^{+}; ×Ease of product placement in national market^{+}.	×Difficulties in product placement in the national market^{+++}; ×Difficulties in marketing high value-added products^{+++}; ×Difficulties in finding quality milk suppliers^{+++}; ×Difficulties in dealing with environmental policies^{++}; ×Local market product placement difficulties^{++}; ×Difficulties in finding regular milk suppliers^{++}; ×Competition with goat products from other companies^{++}; ×Technical difficulties in dairt plant operation^{+}; ×Competition with sheep and bovine products^{+}.
External	×Goat milk “healthy food” appeal^{+++}; ×ICMS exemption in MG^{+++}; ×Good or promising market for milk and by-products^{++}; ×Good or promising genetics market^{++}; ×Good or promising meat market^{++}; ×Dairy processing plants in the State^{++}; ×Good or promising skin market^{+}; ×Establishment of specific goat milk processing legislation in the state $^{+}$	×Low technical assistance availability for the sector^{+++}; ×Difficulties of communication between productive chain links^{+++}; ×Consumer lack ok knowledge on goat products^{+++}; ×Consumer prejudice toward goat products^{+++}; ×Difficulties in selling goat dairy products^{++}; ×Low technology, product and equipment availability for the sector^{++}; ×Goat slaughterhouse shortage in the state $^{++}$; ×Specific difficulties related to the state legislation^{+}; ×Specific difficulties related to Brazilian legislation^{+}; ×Difficulties in skin marketing^{+}.

Chart 2 – SWOT matrix of the processing plant sector representative, including relevance levels of positive and negative aspects

$^{+++}$ High relevance level; $^{++}$ Average relevance level; $^{+}$ Low relevance level.

As for the retail representative’s views (Chart 3), the goat milk healthy food appeal and the dairy and milk product market potential of the species were identified as ABS opportunities, whereas consumer ignorance and prejudice. In relation to these products and difficulties in finding regular quality product suppliers were identified as threats.

Environment	Positive aspects	Negative aspects
Internal	×Having a trained team to guide customers on goat dairy products^{+++}, ×Offering instructions on how to prepare products to clients^{++}; ×Offering a variety of goat products^{+}; ×Offering goat products of various price ranges^{+}; ×Good goat product demand^{+}	×Difficulties in finding goat meat suppliers^{+}; ×Difficulties in finding goat milk suppliers^{+}; ×Difficulties in finding goat dairy by-product suppliers^{+}; ×Difficulties in selling goat meat^{+}; ×Difficulties in selling goat milk^{+}; ×Difficulties in selling goat dairy by-products^{+}

External	×Goat meat “healthy food” appeal ++; ×Good or promising goat meat market++; ×Good or promising market for goat milk and by-products ++; ×Consumer looks for goat products+	×Difficulties in finding goat meat suppliers ++; ×The consumer does not like goat products++; ×Difficulties in finding goat milk suppliers +; ×Difficulties in finding regular product supply+; ×Consumer lack of knowledge of goat products+; ×Consumer has difficulty preparing goat products+; ×Consumer is prejudiced toward goat products+

Chart 3 – SWOT matrix of the retailer sector representative, including relevance levels of positive and negative aspects

+++ High relevance level; ++ Average relevance level; + Low relevance level

The retailer’s comments reinforce Guimarães and Cordeiro (2003)’s statement that goat milk consumption in Brazil is still associated with pediatric use by children who have cow milk allergy or individuals who need special milk.

Positive aspects pointed out by the processing plant sign the ways in which the establishment deals with threats, that is, the training of its staff to offer product information, and the availability of a variety of goods of varying types and price ranges, as previously discussed. On the whole, the retailer attributed low importance to goat product marketing opportunities, which makes sense because these goods are not the major ones marketed by the company. On the other hand, at the same time that the retailer finds it difficult to sell these products, he states that the market is good and promising, as the company has a well-trained team to guide the consumer by supporting clients and offering instructions. Couto Filho (2002) estimates that the goat milk demand in Brazil is repressed, with a deficit of around 22 thousand liters of milk per day, or 660 thousand liters per year, which is in agreement with the participants’ remarks when they stated that the goat product market is promising.

The option to keep a trained team to fight consumer ignorance and prejudice by offering product guidance is well-known in literature. In this study, all participants pointed out the lack of knowledge and the prejudice by Minas Gerais consumers in relation to goat products as sector challenges. According to Ribeiro and Ribeiro (2001) and Guimarães and Cordeiro (2003), goat products usually face restrictive consumption problems. Among these, one can mention the need for a marketing plan advertising the nutritional qualities and peculiarities of goat product composition, which is an extremely important piece of information for successful product and by-product development. Prejudice in relation to the majority of goat products, the lack of knowledge of most goat-based recipes by the public, and the difficulty in finding goat products and by-products on the market are also major problems. Selaive-Vilarroel (1995) points out

that there are restrictions on products in major consumer centers due to the poor quality of carcasses offered, together with the irregularity of supply.

The ABS is little developed and structured in a peculiar way, in that the few agents available strive to establish a coordination system that allows them to survive. Santos (2016) characterized the sheep milk ABS as a short chain system by bringing the producer and the consumer closer together; there is usually just one agent who is responsible for the different stages of the chain. However, most sheep milk produced is processed and marketed as by-products, which is not the case of goat milk. Since fluid milk is the major product of dairy goat breeding in Brazil, it is understandable that there is also a smaller number of industries, since the necessary investment is remunerated by a product of lower added value as compared to that of sheep milk. However, as observed in the present study and others, such as those of Cordeiro (2007), Martins et al. (2007) and Silva et al. (2018), milk by-products such as yogurts, candies and cheese have gained a greater market share. This may be an ongoing transformation in the agribusiness system, which may be turning into a short agrifood chain.

This is in agreement with Benyus (1997), who stated that some agribusiness enterprises may consider the production of goods on a smaller scale, once they offer high quality and are differentiated. The short food chain approach refers to ways of marketing agricultural production that seek closeness between producers and consumers, thus enabling a connection that allows greater interactivity in the mutual construction of trust bonds (Scarabelot and Schneider, 2012). These situations usually refer to high quality products, whose consumers are concerned with food origin.

4 I CONCLUSIONS

The dairy goat agribusiness system in Minas Gerais is underdeveloped and structured in a peculiar but promising way. The limited quantity of dairy plants and the lack of slaughterhouses, as well as consumer misinformation and prejudice against goat products make up the greatest threats. In contrast, the market seems favorable, and the fiscal and legal incentives adopted by the state government are beneficial. The strategies adopted by milk producers include investing in technical efficiency and verticalization; while processing seek closer relationships with milk suppliers and diversification. The retail sector invests in training sales team to guide customers. Much of the milk, goat kids, sires and dams are sold out of the State. Thus, Minas Gerais tends to export primary products and import higher added value processed products. No other marketing flows for by-products such as manure or skin have been identified, which is an evidence of the ABS waste and inefficiency.

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