# DAIRY ECOSYSTEM BARRIERS EXPOSED - A CASE STUDY IN A FAMILY PRODUCTION UNIT AT WESTERN SANTA CATARINA, BRAZIL

**ABSTRACT**

Dairy production is one of the main sources of income for Santa Catarina family farms, and has growth potential for the coming years. On the other hand, for the sector to grow and develop, some industry barriers need to be overcome. Based on the barriers exposed by Bonamigo; Ferenhof and Forcellini (2016) in their literature review article, we aim to empirically confirm this scenario in a case study with a dairy family farm. From the data collected in the case study, we performed a content analysis, which served as a basis for reflection and discussion of the barriers in the dairy sector. Fourteen context units were found, which empirically confirmed the presence of those barriers. We also identify some advantages that the studied dairy production unit obtained by overcoming these barriers, such as economic gains, quality improvement, and competitive advantages.

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## 1 INTROCTION

The Santa Catarina State is the fifth largest milk producer in the country, which represents 8% of milk production in Brazil and has a prospect potential growth (Winck; Neto, 2009; Mapa, 2011; Ibge, 2013). To maintain and /or maximize production rates, some sector barriers must be overcome.

According to Bonamigo; Ferenhof and Forcellini (2016), Santa Catarina's dairy sector barriers are linked to: 1) lack of cooperation between the business ecosystem actors, 2) milk quality deficiencies, 3) rural exodus and 4) productivity limitations. These barriers can be overcome through actors' interaction in the dairy business ecosystem that includes not only the milk value production chain, but also those with indirect roles in the ecosystem, such as companies from other industries that produce complementary products or equipment, outsourcing companies, regulatory agencies, financial institutions, research institutes, universities, media and even competitors.

The interaction between the actors in the dairy production system, only limits trade relations between the downstream and upstream production chain links, a factor which hinders the value co-creation between the actors, and prevents the sector development (Primo, 1999; Moore, 2006; Lamprinopoulou *et al.*, 2014; Dolinska; D'aquino, 2016; Kohtamäki; Partanen, 2016).

Based on the presented problem, we aimed to verify if the barriers exposed by Bonamigo; Ferenhof and Forcellini (2016), in their literature review article, can be empirically confirmed. For this, we interviewed a family dairy production unit located in western of Santa Catarina state, Brazil.

## 2 METHODOLOGY

The methodology used for the study comprises three stages. The first was conducted an exploratory search in the literature about value co-creation among multiple actors in the dairy ecosystem.

In the second stage, we seek to better understand the barriers' empirical existence in a case study. For this step was followed the recommendations proposed Yin (2013).

The case was limited to a reference production facility in the western region of Santa Catarina, Brazil, which is characterized in co-creating value with other dairy ecosystem actors. We checked with Agricultural Research and Rural Extension Company of Santa Catarina (EPAGRI), which property should be studied. The indicated one has more than eight years' experience in the dairy business and more than forty years in agricultural

production. Its average daily production is 600 liters per day and all the work comes from the producer family members.

Data collection consisted of an interview with the farm owner at his property, based on semi-structured interview and document analysis. In order to develop the interview instrument, we based the dairy sector barriers presented by Bonamigo; Ferenhof and Forcellini (2016). Prior to the interview was carried out a pilot test with experts in the field. Corrections were made in the research protocol. Later then, the interview was recorded and then transcribed to perform the content analysis.

The third stage the content analysis was conducted, which allowed the inference. For this, we followed the steps proposed by Bardin (2011), 1) Pre-analysis; 2) Exploration material or coding and; 3) treatment of results, inference and interpretation, detailed in item 4 of this article.

## 3 DAIRY FARMING IN SANTA CATARINA

Santa Catarina Milk production constitutes an important economic and social activity that allows a regular financial support to small producers, contributing to their maintenance in the field and reduce the rural exodus (Santos; Marcondes; Cordeiro, 2007; Winck, 2013).

More than 73% of the national milk production is concentrated in the South and Southeast of Brazil. The west geographic mesoregion of Santa Catarina is one of the most promising areas in terms of production and milk productivity. This region is characterized by the production structure base, consisting of agricultural and agro-industrial activities, especially the grain farming, swine farming, poultry farming, cutting cattle and, milk (Fischer *et al.*, 2011).

Regarding milk producing establishments, the concentration of properties with up to 100 hectares is 89.1% in the western Santa Catarina, against 87.3% in Santa Catarina state and 78% in Brazil. The dairy herd in western Santa Catarina is also concentrated in small farms. Establishments with up to 20 hectares account for 72.1% of milk production in the region, against 70.4% in Santa Catarina and 33.4% in the national average, which shows the importance of dairy farming for small properties at the region (Fischer *et al.*, 2011).

### 3.1 Barriers Limiting the Development of Dairy Activity in Santa Catarina

Bonamigo; Ferenhof and Forcellini (2016) expose barriers that limit the dairy sector in Santa Catarina, based on a literature review, which are represented in Figure 1.

The barrier linked to lack of cooperation between the dairy production actors makes clear the need for network innovation improvement (Smits; Monteny; Van Duinkerken, 2003; Dolinska; D'aquino, 2016). The lack of interaction between authors, like the producers, dairy cooperatives, retail is being shown disconnected, a factor that limits knowledge and innovation exchange in the sector (Eastwood; Chapman; Paine, 2012), which prevents the actors to co-create and innovate in the dairy production environment and overcome the activity adverse effects.

There is a lack of organized dairy production system, which should add value and support the entry into new markets. This lack is impacting on the dairy production development (Ferrari, 2003). A better interaction between the actors is needed, such as providing technical support for good production practices as well as financial support in order to include new production technologies and business expansion (Rodrigues; Alban, 2013; Winck, 2013; Dolinska; D'aquino, 2016).

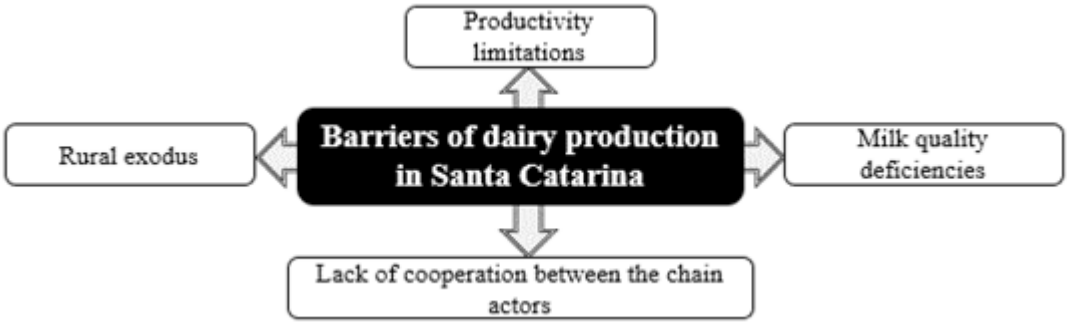


**FIGURE 1 –** Barriers limiting the development of dairy activity in Santa Catarina
Source: adapted from Bonamigo; Ferenhof and Forcellini (2016)

This management lack between the participants in the business ecosystem prevents the ecosystem as a whole to get economic rewards through the co-creation of value, for instance, innovation through cooperation among the actors in the dairy ecosystem (Moore, 1996).

According to Winck (2013), most of the dairy producers of the state are located in western Santa Catarina region, constituting of family farming, the region's model with properties of up to 30 hectares, and there is a predominance of women's work who are responsible for the activities related to milk. For the author, among these farmer's families, over 65% are not interested in continuing with the production or keep the property running. This is a problem that is getting worse over time, not just in the region or state but throughout Brazil (Stropasolas, 2011).

As in other agricultural sector activities, family dairy production is facing sustainability issues. The successors coming from family farms no longer demonstrate an interest in staying in the activity, therefore they leave the countryside, searching for new opportunities at urban centers (Bonamigo; Ferenhof; Forcellini, 2016).

The new technologies can help the manufacturer to use the same production area to produce more milk with the same amount of resources available (Ferrari, 2003; De Carvalho Figueiredo; Paulillo, 2011). With this new technologies increase, producers can boost milk productivity, reduce animal feed costs, incorporate new management techniques and improve herd management, which positively impacts the activity economic earnings (Novo *et al.*, 2013; Saenger *et al.*, 2013; Winck, 2013)

Regarding quality, milk is a highly perishable product and all production chain sectors influence the final product quality (Winck; Neto, 2009). Within the dairy chain, the producer appears as the most vulnerable link to meet the quality requirements and they are demanded to improve milk handling, comprising the collection and storage (Bonamigo; Ferenhof; Forcellini, 2016).

Some initiatives by dairy agribusinesses, such as payment policies that consider milk quality aspects have been proposed in order to improve the milk delivered quality by the producer. Regulations regarding milk quality are imposed by the Brazilian National Normative (IN 51 and IN 62) and by the rules of each importing country. Can be considered as an example of quality control, subclinical mastitis aspects, milk hygiene, and cooling (Costa et al., 2013; Winck, 2013).

## 4 BARRIERS VERIFICATION IN A PRACTICAL CASE

Based on the input data content analysis, four a priori units were selected, as proposed by Bonamigo; Ferenhof and Forcellini (2016). Based on the barriers called here record units we identified fourteen context units, as can be seen in Table 1.

The limited interaction between the dairy ecosystem actors, such as research institutes, universities, EPAGRI, SEBRAE, EMBRAPA, cooperatives, among other actors, prevents the ecosystem as a whole to get economic rewards through value co-creation, or innovate together (MOORE, 2006; MAZZAROL; LIMNIOS; REBOUD, 2013).

We could observe that the studied production unit sought knowledge with other actors in the dairy ecosystem as a way to restructure the farm. They feel that the milk production is an alternative to keep the family in the countryside because corn and swine' production are in crisis. Those statements are aligned with Fischer; Junior et al. (2011).

From the respondent perception, the cooperation between producers, the management and the co-creation among the actors in the dairy ecosystem has advantages for his property and also for the municipalities development. This argument lines up with Costa et al., (2009), where they state that the interaction between the actors contributes to the Brazilian agribusiness progress and can improve life quality, keeping people in the countryside for a sustainable regional development.

Cooperation in the studied production unit is shown as a way to motivate the family members to stay in the countryside and also to increase economic gains. On the other hand, the respondent noted that the limited expertise of some dairy ecosystem actors, such as technical assistance provided by the producers' cooperatives and suppliers of inputs, prevents the producer to cooperate with these actors. Therefore, it needs improvement.

Regarding rural exodus, the respondent points out that producers have resistance to change. For instance, an inclusion of new production techniques, and when the first difficulties appear, they tend to give up and choose to leave the countryside. For the respondent, milk has become an incentive to keep the farmer at the countryside, but it depends on the orientation of parents and the support that the property offers to the future successors. This respondent perception is in accordance with Mello and Schmidt (2003) and Ghosh and Maharjan (2004).

**TABLE 1 –** Barriers encountered at the family dairy production unit

| Record Unit | *Context Unit | Frequency |
|---|---|---|
| Lack of cooperation between the chain actors | "The lack of cooperation between producers in our region makes a difference for the producer and for the city. Furthermore, good producer cooperatives would help the business development" | 4 |
| | "Assistance by the city hall and supporting bodies for producers, the staff is low-skilled" | |
| | "Companies need more trained professionals (they are in the basics)" | |
| | "Our relationship with cooperatives does not have many advantages, and is limited to the purchase of medicines and some raw material" | |
| Rural exodus | "Dairy farming was an alternative that kept us in the field when there was a crisis in swine and corn farming. We often think about leaving agriculture" | 4 |
| | "People have resistance to change traditional production methods and give up at the first difficulty, leaving the field" | |
| | "Production cost increases considerably" | |
| | "Rural exodus: the milk is encouraging to hold the producer but depends heavily on parental guidance. If the business is structured, the young keep the continuity and does not leave the countryside" | |
| Milk quality deficiencies | "Quality should be more rigorous because it qualifies the manufacturer and thereby add more product values" | 3 |
| | "The future business is organic milk, and we are focusing on it, albeit slowly, because our region has no such demand and market, but it demands quality" | |
| | "Milk quality is important for recovery and, greater gains are possible by quality not by quantity" | |
| Productivity limitations | "Production cost has increased considerably" | 3 |
| | "The region producers have no interest in seeking knowledge" | |
| | "The producer puts too much effort on focusing in practice and ends up leaving aside the theory. The theory is what makes the producer better and makes you a rural entrepreneur" | |

Source: Authors *Translated from Portuguese

Since most members involved in dairy farming in Santa Catarina are elderly people, there are few young people working in the activity. This condition, according to Rodrigues and Alban (2013) indicates that in the future manpower shortage may occur at the countryside. Regarding milk quality shortcomings, in the respondent perception, the quality parameters should be more rigorous so the milk producer is awarded, obtaining then, a higher valuation. In this sense, the regulations imposed by the Brazilian National Normative (IN 51 and IN 62) and by the rules of importing countries are considered a quality factor that generates differential and a greater producers' appreciation (Winck, 2013).

Although there is an increase in milk production cost, some initiatives have been created by the producers to add value to their products, for instance, the organic milk production. According to Saucier; Parsons and Inwood (2016) the organic milk market provides opportunities for a new kind of relationship between the dairy system actors, given that the prices paid for milk are more stable, once it promotes a close business relationship with producers, processors and other dairy system stakeholders.

The production of organic milk has environmental benefits because it uses a small amount of pesticides and phosphorus (Thomassen et al., 2008). In this sense, the offer of products derived from milk with differentiated quality, as in the case of organic milk, allows the consumer to look for organic products, offering healthy products with improved nutritional aspects (Hill; Lynchehaun, 2002).

Regarding productivity limitations, the respondent points out that his property obtained benefits with the introduction of new production techniques, such as artificial insemination, and the handling of animals. Furthermore, the separation of animals by age, food quality and vaccines made it possible to increase production. These statements are aligned with Fischer; Junior et al. (2011).

The respondent indicated that the knowledge exchange with other dairy ecosystem actors, allowed all unit members to professionalize the activity through a

theoretical and scientific integration. From this progress, it is emphasized that the use of theoretical concepts makes the best producer, featuring it in a rural entrepreneur.

## 5 FINAL THOUGHTS

We aimed to verify if the barriers exposed by Bonamigo; Ferenhof and Forcellini (2016) are empirically confirmed. For this, we based our research on a case study with a family dairy production unit located in western Santa Catarina state, Brazil. As a result, we could confirm the presence of the barriers at the studied family production unit. In addition, we identified some benefits that the property obtained by overcoming these constraints.

We observed that cooperation between multiple dairy ecosystem actors has boosted economic gains, knowledge, and learning of the studied property. In this sense, we noted that the interaction between the various dairy sector actors creates competitive advantages through the introduction of new technologies and management techniques, which on the contrary, is limited if the producer acts individually.

Another point that we observed, related to cooperation between the actors, was that even with the little interaction that this property had, it assisted in the introduction of new technologies and innovation, a fact that motivated the producer interviewed to remain with rural activities and to develop and overcome the barrier linked to rural exodus.

Regarding the milk quality barrier, we observed that the studied property obtained gains because of the quality delivered. This was possible by the training and lectures coming from the interaction with government agencies that allowed the producer professionalization. Those lectures help them to meet customer requirements and also the Brazilian regulations (IN51 and IN62) that establish milk quality requirements. This compliance quality added more value to the product delivered to customers.

With respect to the productivity barrier, we observed that the production unit obtained benefits, such as lower production costs to implement management techniques and the management of animals.

We observed that the pursuit for overcoming the dairy sector barriers presented by Bonamigo; Ferenhof and Forcellini (2016) allowed the studied property to increase economic gains, increase professionalization, and motivated family members to stay in the countryside.

As an opportunity for future studies, we suggest replicating the present case study in different geographical regions with sizes of diversified production units. A second study could propose a value co-creation development platform as a reference model for the dairy production ecosystem.

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