

*Full Length Research Paper*

## Characterization of livestock farming in Jacaré dos Homens, Alagoas, Brazil

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Dairy farming is one of the most significant activities for Brazilian agribusiness, especially for its diversity and breadth. This study aimed to analyze the characterization of dairy farming activity developed in the Baixas community, in the city of Jacaré dos Homens-AL, Brazil, raising information about the production system adopted and considering the relevance of this activity to the locality. The research was conducted between September and October, 2011, through a questionnaire applied to 31 milk producers in the region. We used data tool software Microsoft Excel® 2010 and the results were analyzed in a descriptive statistical way, presented as absolute and relative frequency in charts. Conventional technique interviews were adopted. It can be concluded that despite the low level of school education, the majority of farmers are over 10 years in business and over half of them have incomes of less than 1 minimum wage. Despite the good production average 10 L/cow/day, the number of animals is small and for this reason, the income is low. Moreover, 45% of the producers do not have any type of economic and zootechnical control. However, barriers in the areas of management, nutrition, sanitation and genetics, combined with the implantation of technology and public policies focused on livestock, must be addressed so that this region can optimize its development.

**Key words:** Agribusiness, regional development, dairy farming.

### INTRODUCTION

In 2014, the European Union ranked first among the world's largest milk producers and had an estimated production of 38.2 billion gallons, followed by India with 37.3 billion gallons. The United States came in third place

with 24.6 billion gallons and China in fourth place with 10.2 billion gallons. Brazil is in the fifth position, with 8.8 billion gallons, an increase of 3.7% over the previous year (USDA, 2014).

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In this context, in 2014 the South region was in first place among the large Brazilian regions, holding 34.7% of the national production. However, Minas Gerais remained as the main producer state, with a production of 2.5 billion gallons, which corresponds to 77% of all the production in the Southeast region and 26.6% of the national production (Portal Brasil, 2015).

The milk production chain is among the most significant areas for Brazilian agribusiness, mainly due to its diversity and breadth. Brazil had a cattle herd of 212.3 million head in 2014, an increase of 569 thousand animals compared to 2013. The country still had the second largest herd in the world, being surpassed only by India, despite the several mishaps faced in the regional context, more specifically due to the strong drought and its consequences (IBGE, 2015).

The dairy sector is fundamental to the economic development of family-based farming in many regions of Brazil (Eurich et al., 2016). The breeding of dairy cattle developed at the semi-arid region of Northeastern Brazil is mostly composed of family establishments, with low level of technological innovation and seasonal production, due to the rainy and dry periods of the year (Guimarães Filho and Soares, 1999). The predominant breeding regimes are the extensive and the semi-intensive, in which the animals use the native vegetation of the Caatinga biome (exclusive to Brazil) for their maintenance and production (Alves et al., 2009). The Caatinga has the characteristics of a savannah, with xerophytic plants, and rare rainfall (around 12 to 31.5 inches per year), occupying 10% of the territory of Brazil.

In the extensive system, investments in facilities are reduced, having food support based on native pastures. When concentrated and mineral supplementation is available, they are not always adequate to the nutritional requirements of the herd. Another relevant aspect is the low reproductive and sanitary control, which leads to the limitation of milk yield per animal (LIMA, 2011).

The information from this study was generated through the program Alagoas Mais Leite, from the State Department of Agriculture of the State of Alagoas that hired Empresa Pecuária Intensiva de Consultoria, which with EMBRAPA is allowed to execute the methodology of the Projeto Balde Cheio. The project assisted 500 milk producers in several cities in Alagoas, organized in associations and productive groups. The program began in the second half of 2011 and ended in the second half of 2016.

The municipal HDI is adapted from the world famous version of HDI. It evaluates well-being from the geometric mean of three dimensions: income, health and education. Jacaré dos Homens is a city located in the State of Alagoas, Brazil. The country had 5507 municipalities in the 2000s. According to PNUD data, available in Wikipedia, out of the 101 municipalities of Alagoas at the time, Jacaré dos Homens ranked 56th in terms of municipal HDI in Alagoas (PNUD, 2010). This

corresponded to the 5098th position at the national level, holding a mHDI of 0.571. It is worth remembering that this indicator goes from 0 to 1. The closer to 1, the better the performance. In this context, it should be noted that Maceió, the capital of the state, is the city with the best ranking in Alagoas, with a mHDI of 0.739, occupying the 2180th position among the Brazilian municipalities.

When using PNUD official data for 2010, Maceió ranked 1266th. As the city is a capital of a Brazilian State, this position was still far below the expected, with an HDI of 0.721. The numbers fell, but the relative position of that city improved even with the increase in the number of municipalities during that period of time. Thus, in 2010, there would be 5565 Brazilian municipalities. At that same time, Jacaré dos Homens jumped to 4562th position, holding a HDI of 0.583. It is very interesting to note that it performs really well on the health dimension, well above its index aggregate value.

The HDI does not capture the income distribution aspect. This information is provided by the GINI index. The closer to 1 the value of the municipal GINI index, the worse the income distribution. In the case of Jacaré dos Homens, its GINI index was 0.505. Maceió, in the same period, had the value of 0.6378. That means a lot worse than Jacaré dos Homens. For comparative purposes only, the municipality of São Paulo, the largest in Brazil in population, had the GINI of 0.6453. Meanwhile, Chapecó, in the countryside of the State of Santa Catarina, had 0.4819. The capitals seem to present lower results when compared to countryside cities, since Florianópolis, capital of Santa Catarina, had the value of 0.5474. This situation is similar to Maceió. From everything that has been analyzed, it can be concluded that Jacaré dos Homens presents a relative adverse situation in social terms.

The objective of this study was to characterize the dairy cattle production system in the community known as Baixas, in the city of Jacaré dos Homens in Alagoas, based on social, economic and zootechnical aspects, aiming to contribute to the maintenance and improvement of the dairy production in the region, as it is the main economic activity of the municipality.

## MATERIALS AND METHODS

The present study was carried out in the municipality of Jacaré dos Homens, located in the southwestern region of the State of Alagoas, Brazil, a mesoregion of Sertão Alagoano, which is characterized by the presence of the caatinga biome, a savanna that only exists in Brazil. The city is located approximately 122 miles from the capital of the State of Alagoas, Maceió, at an altitude of approximately 443 feet and geographic coordinates 9°38' 08" S and 37°12' 17" W. The climate is semi-arid tropical, with dry season, with irregular rainfall and low relative humidity, and has an average annual rainfall of 17 inches (DB-City, 2016).

The research was carried out with the use of a structured questionnaire used for the initial diagnosis and characterization of properties used by the Balde Cheio program, from EMBRAPA Pecuária Sudeste. This public company stands out in Brazil for the

generation of new technologies in the agricultural sector. The objective of this study was to collect information about the social aspects of producers, obtainment of rural financing, types of economic activities practiced on rural properties, herd management practices (food, productive, reproductive, genetic and sanitary) and property rentals, besides the factors considered more important for the producers regarding the development of rural activities.

Interviews were done with families of milk producers, at their properties' headquarters. In some cases, more than one member participated. 31 questionnaires were elaborated with structured questions, where 10 relevant aspects were selected among the questions in the standard questionnaires by the Balde Cheio program. It is important to mention that the 31 interviews represent the total statistical population of the city. The software Microsoft Excel® 2010 was used, and the results were analyzed in a descriptive statistical way and presented as absolute and relative frequency in charts.

The research is descriptive and exploratory. For the first case, it is description of the studied phenomenon and its characterization and for second case, to show information about the production system at the Caatinga biome for a public that may not know it.

For convenience, this is the case of a non-probabilistic sample, which selected the accessible producers that were part of the project mentioned above. The research is descriptive and exploratory. In the first case, it describes the phenomena studied and their characterization and in the second case, it opens some information about the production system in the Caatinga biome to an audience that would probably ignore it.

The formula used to calculate the productivity would be: the standard daily milk production in liters / number of dairy cows) \*365 days = milk production in liters/cow/year. This formula led to the results analyzed below.

## RESULTS AND DISCUSSION

In this study, when the socioeconomic profile of the interviewees was analyzed, it was found that these individuals are, on average, 45 years old and have a property with about 8 hectares.

It can be observed that the educational level can only be considered "good", since although the activity does not require producers with a high level of education, they are favored if they have a higher level of education, as it brings a greater easiness for the absorption of new technologies for increasing the productivity. More than half of the producers show minimal knowledge at reading, writing, calculations and routine note taking, among other tasks (Chart 1), similar data were found in a study titled Characterization of Dairy Cattle in the Municipality of Diamantina-MG). In this study, it was observed that 42% of the interviewees have elementary education (8 years of formal study); 17.1% went to high school (11 years of formal study); 15.5% do not have schooling; 14.8% have incomplete primary education; 7.9% have university degree (15 years of formal studies) and 2.6% have not finished their university course yet (Almeida, 2013).

The income results showed that 52% of the households earn less than the minimum wage with the activity (minimum wage in Brazil 2011 ~ R\$ 545.00 during the research, where in September/2011, US\$1 = R\$ 1.75 and US\$1 = R\$ 1.77, in October/2011). According to the data,

45% earn more than the minimum wage at the time and 3% earned the equivalent of a minimum wage (Chart 2). These indices show that the income uniformity is due to the fact that, the families take their livelihood only from the milk activity. This means the absence of pluriactivity (Schneider, 2003). This perception is perhaps linked to the low level of education of the participants. This is then a barrier in terms of low degree of human capital and local cultural vision, the accommodation to an existing situation, not looking for other sources of income. A priori, in the vision of the producer, the daily milk activity does not cause the perception of such need. Moreover, the low degree of centrality, within Christaller's vision, favors the open options with the plurality, in this adverse situation. Another factor that can correlate these indices is the activity time, since 94% of the producers have already been engaged in the activity for more than 10 years and are more stabilized, despite the low financial gains (Chart 3).

This information gives a relative view, but when the GDP per capita is analyzed, the reality becomes different. For this, some comparative data are observed. The largest Brazilian municipality in terms of population, São Paulo, would have GDP per capita of R\$ 37,105.08. Florianópolis, in Santa Catarina, would have GDP per capita of R\$ 31,998.89. Chapecó, in Santa Catarina, presents R\$ 26,121.03 for this indicator, and Maceió, in Alagoas, R\$ 14,836.26. Finally, Jacaré dos Homens presents GDP per capita of R\$ 7,286.06 (IBGE, 2017), considering the value of the currency for the year 2012. This is considered as the Real currency with current price for the year 2012. The cities in Alagoas have a very low indicator, being worse for Jacaré dos Homens. The milk cattle activity, thus, has not yet been able to bring to the city a greater income vitality or better distribution of the income generated, despite presenting a better performance than Maceió in terms of income distribution, according to the Gini index. This may reflect the need to further increase the milk and dairy production chain in the region, so as to bring greater aggregation of local value and improvement in per capita income.

Considering the analyzed properties, from the total cattle herd destined to milk production, the predominant breed was Girolando, a result of crossbreeding between the GIR and Holstein breeds. As shown in Chart 4, 35% of the cows are lactating, 12% are dry cows, about 25% are calves and 13% are heifers. Through Chart 5, it can be analyzed that the milk production of the Baixas community in Jacaré dos Homens is characterized by small producers, who have an average daily production under 40 L. Out of the total of cows in the lactation period, the average daily production is 31.4 L/day and the average production per cow reaches 10.6 L/day, which is equivalent to 3872 liters/cow/year.

According to IBGE (2014), the average productivity of milk production in Brazil was 1,525 liters/cow/year in 2014, corresponding to a growth of 2.2% in relation to

### Level of Education

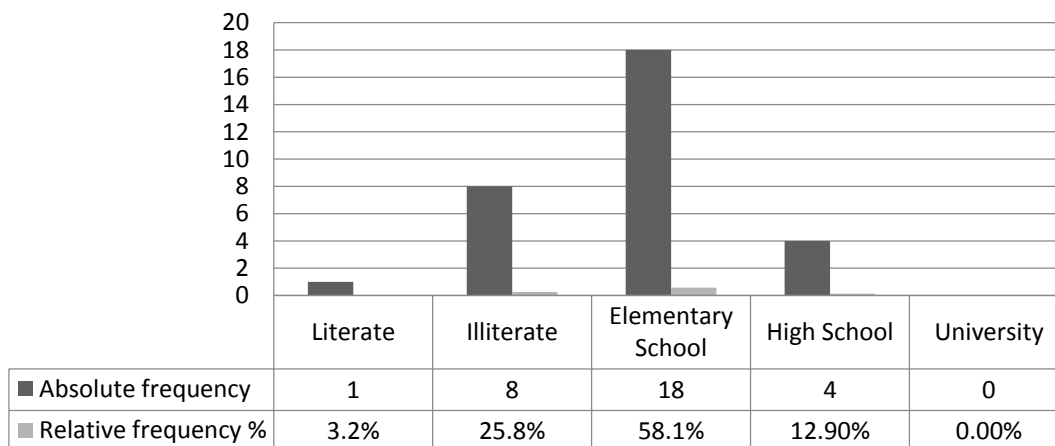


Chart 1. Level of education, Source: Based on the survey data.

### Economic condition of the producers

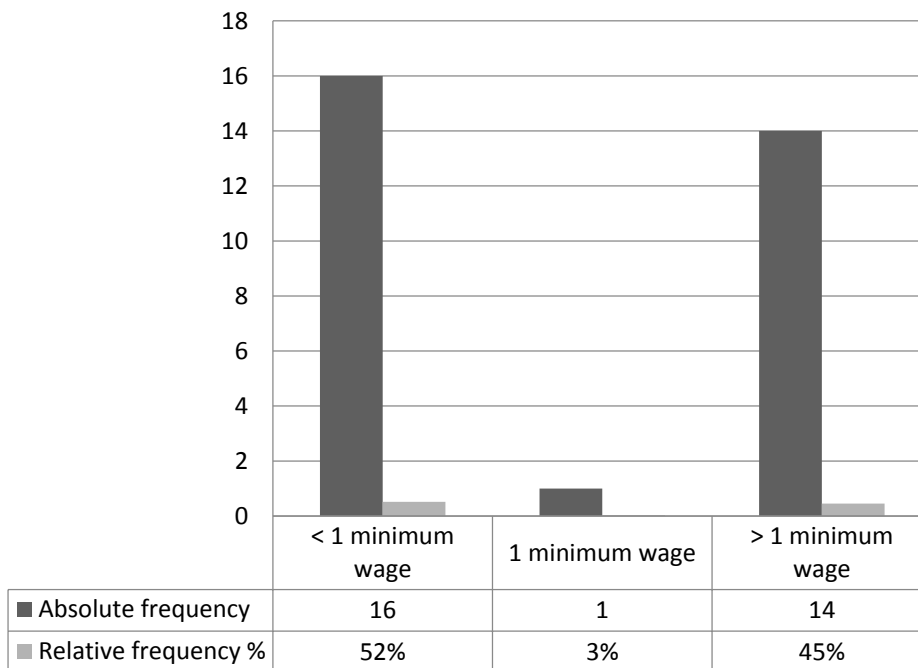
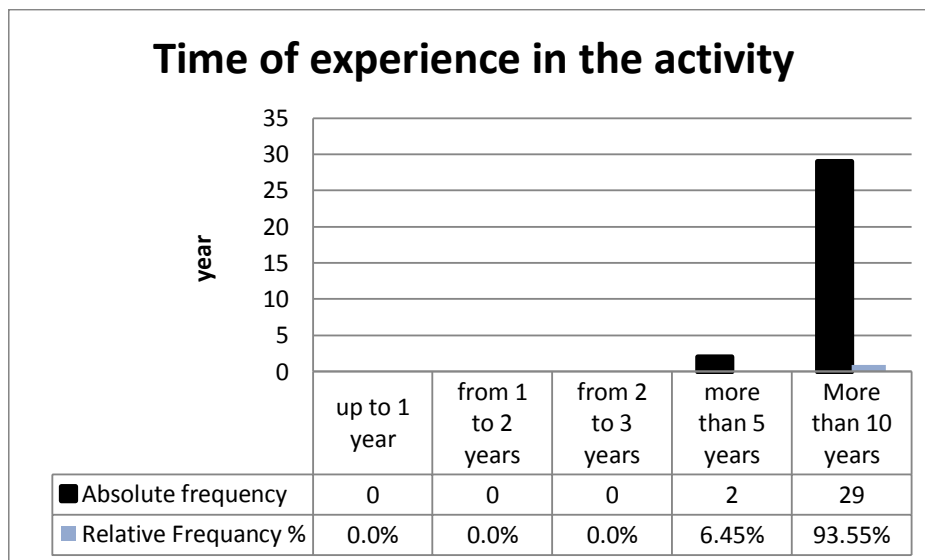


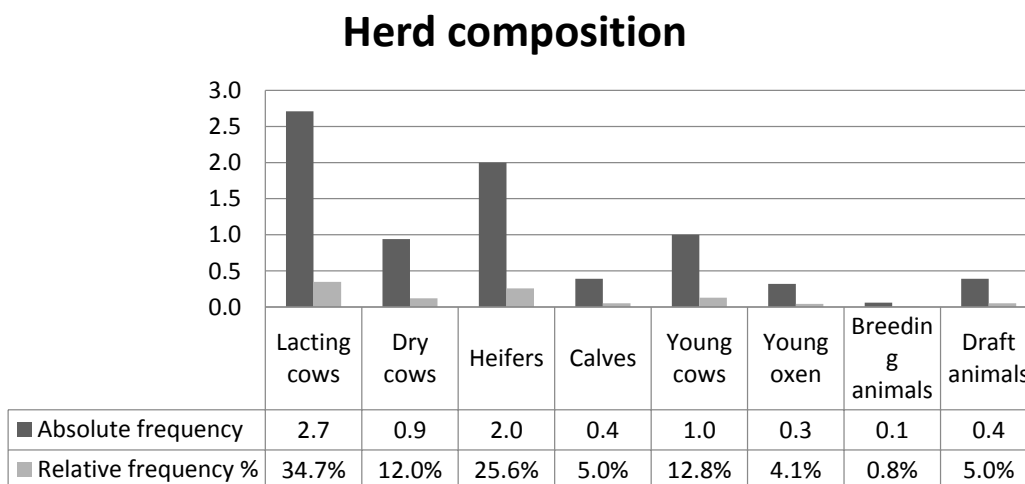
Chart 2. Economic situation of producers, Source: Based on the survey data.

2013 (1,492 L/cow/year). The South Region showed the highest national productivity, 2 789 liters/cow/year, an increase of 4.3% in 2014, compared to the previous year. The highest productivities occurred in the South of the country, in terms of aggregated data by State; The State of Rio Grande do Sul has the highest national productivity (3,034 L/cow/year), followed by the States of Santa

Catarina (2,694 L/cow/year) and Paraná (2,629 L/cow/year). The lowest productivity was found in the State of Roraima (345 L/cow/year), in the northern region of Brazil. In terms of cities, despite the leadership of Araras (11,364 L/cow/year), in the State of São Paulo (SP), southeast region, more than 50 cities are among the largest producers, and all of them are in the southern



**Chart 3.** Time of experience in the activity, Source: Based on the survey data.



**Chart 4.** Herd composition, Source: Based on the survey data.

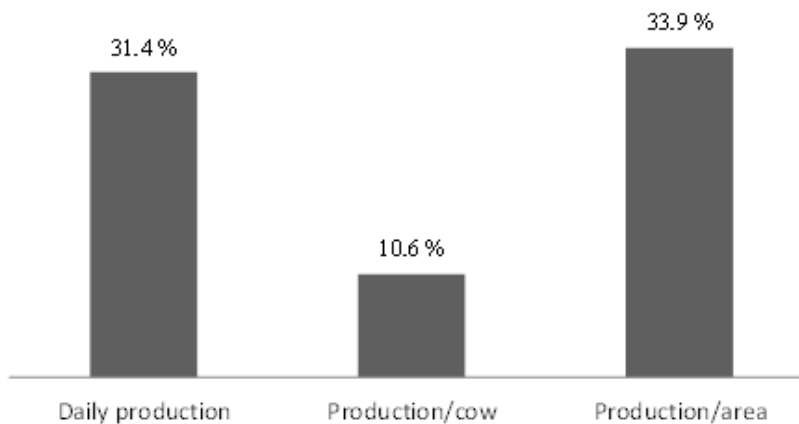
region of Brazil. Castro, in the State of Rio Grande do Sul, Castro (7469 L/cow/year) and Carlos Barbosa (6827L/cow/year), in the State of Paraná, are the second and third place in this productivity ranking, respectively. Therefore, the average productivity of the producers surveyed is twice the national average. The result comes from a sample (not probabilistic), for convenience, composed by who is the part of the program in that city. For comparative purposes, the IBGE data estimated for 2014 showed a production of 2336 L/cow/year. Of course, slightly lower than the mean of the selected sample, even with 2014 data.

Regarding the management of agricultural practices, in addition to seeking to maximize the dairy productivity of the herds, both the feeding, and the economic and

zootechnical data also have repercussions on the quality of the milk. However, in order to obtain a better yield, it is necessary to make use of a set of sanitary, herd management and pasture practices. However, none of the producers do soil analysis and only 3% use mechanized traction to work the soil of the property.

Zootechnical control is a management technique that has been widely used in dairy farms. With this technique, the producer has the possibility to make notes on the productive life (milk control), reproductive (reproductive control) and sanitary (sanitation control) of each animal of the property. These indicators of zootechnical performance are fundamental for the decision making of the milk producer, aiming at the efficiency and productivity of the milk activity. In the region studied,

## Productive indices



**Chart 5.** Production indices, Source: Based on the survey data.

amounts of 45% of producers claim not to make any kind of control within their property. On the other hand, 42% of them do zootechnical and economic control. This percentage corresponds to almost half of the interviewees and is considered as a source of production growth within the municipality. It is estimated that this number will increase in the coming years (Chart 6).

An example of the advantage of adoption of zootechnical control is the knowledge of the production profile of the animals in the farm, allowing them to be separated by batches, so the balance of the diet can be specific for each group. It is also possible to observe the period of droughts and rainfall of the region in function of the feeding management of the animals, since during the rainy season the animals feed mainly on native pasture, and during the dry season the food supplementation is based on the use of silage and palm, according to Charts 7 and 8. The importance of the combination of pasture, batch separation, zootechnical control and food supplementation is evidenced when evaluating its contribution to the productivity of the herd. Therefore, planning is essential to ensure the balance between forage production and demand, in order to ensure high efficiency of pasture utilization and maintenance of conditions favorable to productivity and animal performance. In the dry period, the main food is spineless cactus (*Nopalea cochenillifera*), corn silage (*Zea mays* L) and pasture grasses, mainly Buffel (*Cenchrus ciliaris*). In the rainy season, pastures of native plants abound, with herbs and shrubs favoring the feeding of animals. In addition to green Buffel, there are other grasses such as Milhã (*Digitaria horizontalis* Willd) and Quince (*Cydonia oblongata*).

Regarding reproductive management, 55% of the interviewees opt for uncontrolled mating and 45% use the artificial insemination method (Chart 9). The first type of management is advantageous due to the low cost of

specific labor. However, the second excels because insemination ensures a greater chance of fertilization and calving as well as providing the improvement of the herd and allowing the choice of features that will remain in the calves. In a study in the southern region of the country, higher percentages were found. It was found that 81% of interviewees use artificial insemination as the main method of reproduction, which shows the use of technology performing on the activity. The remainder, approximately 19%, uses mating by natural mating in the breeding system (Caixeta, 2009).

Through a good health management - conducting clinical examinations and vaccinations - the farmer is able to prevent, control and even eradicate some diseases. It is important to note that, in addition to the foot-and-mouth disease, other diseases such as brucellosis, clostridiosis, carbuncle, mastitis and parasitic diseases should be monitored and treated. It was observed that almost all producers carry out vaccination against foot-and-mouth disease and parasite control, and have a 100% non-vaccinated herd against anthrax, clostridiosis and brucellosis (Chart 10). In the same study mentioned above, it was observed that in vaccination against foot-and-mouth disease, 100% of the respondents said that it was done during the established periods. As for mastitis and other diseases caused by the lack of adequate health management, it was verified that all the interviewees consider low the index that affects the herd, therefore they do not see the necessity of vaccination of the animals (Caixeta, 2009). The control agencies of the State Government (Agency of Defense and Agricultural Inspection of Alagoas - ADEAL) and Federal control (Ministry of Livestock and Supply) monitor the control of vaccinations to maintain the control of zoonosis and infectious diseases in the State of Alagoas and Brazil.

In 97% of the properties, two daily milks were performed, considering the 12 h milking interval (Zoccal,

2004). During the interview, all producers stated that the milking is done manually and do not perform the sanitary practices of pre and post dipping. This information is a negative indicator for both the prevention of health of the herd, and for the quality of milk, as these tools are essential for reducing contamination by the skin of the teats before milking and eliminating most bacteria that are on their skin after milking, reducing the colonization of the skin of the teats, which is the main way of transmission of contagious mastitis without leaving residues in milk (Simões, 2012).

## Conclusions

After the research, it is concluded that despite the low level of education of the producers, most of them are more than 10 years in the activity and more than half of them have income less than a minimum wage. Despite having a good average production (10 L/cow/day), the number of animals is low, justifying the income less than 1 minimum wage. About 45% of the producers do not have any type of economic or zootechnical control.

According to data from the Brazilian Institute of Geography and Statistics (IBGE, 2014), considering the municipal productivity (liters/cow/year) according to the traditional calculation method, Jacaré dos Homens has an HDI well below the cities of Araranguá (SC) and Anahy (PR). In spite of this, these mentioned municipalities present the same productivity of milk.

In this case, we can conclude four distinct and complementary situations. The first is that there is no pluriactivity, that is, farmers do not have alternative sources of income. Second, there is a lack of chain densification also with the purpose of aggregating value and indirectly to provide a better distribution of income along the chain. Third, Balde Cheio program is fundamental to increase the diffusion of technologies that allow greater gains through greater productivity, and even the expansion of the herd. There is room for this, clearly.

Finally, this article aimed to characterize a production system based on an exploratory research, which makes it very important to reduce the asymmetry of existing information. In addition, to this, the research agenda is allow to expand, as it can encourage interesting international comparisons which is a specific biome with edaphoclimatic conditions that impose restrictions for the activity.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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