

SOCIOECONOMIC DIFFERENTIATION OF MILK PRODUCERS FROM THE MATIDA SETTLEMENT - NORTH REGION, PARANÁ STATE

Wellington Felipe Caetano

Universidade Estadual de Londrina

Londrina – Paraná

<http://lattes.cnpq.br/7384734419734468>

Serinei Cesar Grigolo

Universidade Tecnológica Federal do Paraná

Dois vizinhos – Paraná

<http://lattes.cnpq.br/1900546696859464>

Almir Antônio Gnoatto

Universidade Tecnológica Federal do Paraná

Dois vizinhos – Paraná

<http://lattes.cnpq.br/4413175281305033>

Jenifer Goes Predolin

Universidade Tecnológica Federal do Paraná

Dois vizinhos – Paraná

<http://lattes.cnpq.br/6689839705277690>

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Abstract: The strategies for obtaining income adopted by the farmers are reflections of the rural development process in a region, as well as having an impact on the development itself when they gain the attention of the Technical Assistance and Rural Extension teams. The present work had as general objective to analyze the elements that influence the differentiation of milk producers from the Matida settlement, in the municipality of Jundiá do Sul, in the pioneer north region of Paraná. The study used elements of the methodology of Diagnostic Analysis of Agrarian Systems in order to typify and characterize milk producers according to work productivity, that is, by the relationship between Agricultural Income and Man Work Unit (RA/UTH). A questionnaire was applied to 15 (fifteen) milk producers in the settlement. The data obtained were transferred to a programmed electronic spreadsheet that provided results such as: Total Surface (ST), Useful Agricultural Surface (SAU), Available Labor (UTH), Gross Product (BP), Intermediate Consumption (CI), Depreciation (DEP), Value Added Division (DVA), Agricultural Income (RA), Non-Agricultural Income (RNA), External Income (RE) and Total Income (RT). It was observed with the work that, in the properties of the Matida settlement, the RA/UTH is more related to the use of technologies such as soil care, use of silage and milking equipment than to other factors such as land and labor.

Keywords: Family Agriculture, Dairy Farming, Agricultural Income, Agrarian Systems.

INTRODUCTION

Brazil is one of the main milk producers in the world (VILELA, 2017), this activity is increasingly competitive and constantly changing to serve the market. With

increasingly demanding consumers, a higher quality product is needed (PESSOA, 2018).

Milk production is an activity developed in all Brazilian states. Milk has great economic importance, because its consumption can be either *in natura* or in derivatives, facilitating its commercialization. For the most part, milk production is performed by family farming with small and medium-sized properties, being the main source of income for these families, providing a short-term return in small areas (SILVA, 2016).

The dairy activity is an alternative for the development of small properties, but there are still difficulties, and the settlements are more vulnerable to the progress of agriculture. These adversities occur due to the lack of information and access to cutting-edge technologies, which are more demanding in terms of capital. The settlement consists of family farming, for which it is extremely important to diversify sources of income. However, different strategies can be perceived among families, which differ in the remuneration of work and who adopt strategies of diversification or specialization of income sources (DEPONTI, 2014).

Milk production is one of the biggest sources of income for farmers in the Matida settlement, as it is an activity that adapts to the relief of the properties and generates monthly income for producers. However, even if the land area in the settlement is similar between the families, the remuneration for work presents significant differences, giving rise to the development or decline of the dairy activity in the family units.

The aim of this work was to understand what are the factors that lead to the socioeconomic differentiation of milk producers in the Matida settlement and how they influence income strategies for rural development.

MATERIAL AND METHODS

The work was carried out in the Matida settlement, in the municipality of Jundiá do Sul, located in the pioneer north region of the state of Paraná. First, a structured questionnaire was applied to fifteen milk producers for an analysis of data related to the 2018/2019 crop year. The questionnaire followed as a reference the model used by Perondi in his doctoral thesis (Diversification of livelihoods and mechanization of family farming) in 2007. With the application of the questionnaire, socioeconomic data of properties and production systems were obtained. in dairy farming. The locations were chosen because they are part of the settlement's milk producers' association, ACPMA, which brings together the majority of milk producers.

The Matida settlement has 84 families, 30 of which are milk producers and 20 are associated with ACPMA. The 10 non-associated milk-producing properties are properties that produce milk on a secondary basis, their income being higher from social transfer or with part of the properties leased to third parties. Of the 20 associated properties, it was only possible to interview fifteen, as three refused to answer the questionnaire, another had no milk production in the year and one that the producer was not found on the days of the interviews.

For the analysis of the data obtained and for better organization and structuring of the information, a programmed electronic spreadsheet was used, obtaining the processing of information and the classification of establishments according to RA/UTH and for descriptive statistics.

Economic information was obtained considering the property as a whole and analyzes were performed as described by Wagner; et al, 2010, with description in Annex I, are: Total Area (ST), Useful Agricultural

Area (SAU), Man Work Unit (Available Labor) (UTH), Gross Product (CP), Intermediate Consumption (CI), Depreciation (DEP), Value Added Division (DVA), Agricultural Income (RA), Non-Agricultural Income (RNA), External Income (RE) Income with Social Transfer (RTS), Agricultural Income per Hectare of Useful Agricultural Surface (RA/SAU), Agricultural Income per Man Work Unit (RA/UTH) and Total Income (RT).

With the economic data obtained, descriptive statistical analysis of correlation and median were performed for better interpretation of the data. Correlation has the function of measuring the degree of relationship between two variables, in which it varies between the numbers -1 to 1, in which 1 would have a high correlation, which could be positive or negative, and close to zero has no correlation. Correlations were made between RA/UTH with age; with the SAU; with the BP and with the CI. Subsequently, interpretive correlations were performed without instruments, that is, the correlation between RA/UTH with the use of correctives and fertilizers in pastures; with the use of silage and feed; with the use of insemination; with the use of milking and cooling tanks. The median is the value where half of the properties with higher RA/UTH values and half of the properties with lower RA/UTH values are found.

The properties were classified into four groups, one of which must be below the Simple Reproduction Level.

Simple Reproduction Level (NRS) is the minimum income needed to reproduce the unit's means of production and remunerate family work over time. The indicator used for the NRS is the opportunity cost of work, measured through the minimum wage per Man Work Unit (UTH). The basic procedure consists of relating the global economic performance of the production unit with the expected level of reproduction. The measure of the economic result that evaluates

the performance of the system is the Agricultural Income, and the NRS indicator is the equivalent of the value of a monthly minimum wage per worker (Mínimo/UTH), during the year (PERONDI, 2007).

The minimum wage as the basis for classification was BRL 998.00, as it is the minimum wage stipulated by the federal government in the 2018/2019 crop year, with the annual NRS value being BRL 12,974.00. The text above addresses the NRS on total income, but in this work it was used to separate agricultural income from properties.

The 15 properties interviewed were classified into groups: A, B, C and D; in which the classification was given by Agricultural Income per Man Work Unit (RA/UTH) for the 2018/2019 crop year and divided by 12 months. The choice of classification of properties by RA/UTH was due to the fact that it allows evaluating the remuneration of work by the agricultural income obtained. This indicator makes it possible to evaluate the work remuneration of the properties and in this text it is also referred to as labor productivity (BIELSCHOWSKY et al., 2013).

In group A, properties that have RA/UTH higher than 3 minimum wages remained; in group B, those with RA/UTH above 2 and less than 3 minimum wages; in group C were those who have RA/UTH above 1 and less than 2 minimum wages; and those in group D are those with RA/UTH up to 1 minimum wage. The median of RA/UTH is also used to determine the central value of RA/UTH as a further reference for analysis.

RESULT AND DISCUSSION

The present study found that the group that obtains the highest remuneration for work is precisely the one that uses higher technological levels. In addition, what has been able to accompany the increase in the level of investment in the dairy activity is the

gradual transformation of diversified family farming into specialized family farming and dependent on significant capital contributions. This fact can pose risks as it is done by market pressure without the proper mediation of technical assistance. Soil correction, pasture and supplementation seem to be the main differentiating technological elements.

CLASSIFICATION OF PRODUCTION UNITS BY RA/UTH

According to Table 1, the annual RA/UTH of group A is R\$ 52,174.56. Dividing monthly the value would be above 3 minimum wages per unit of agricultural work man. For group B, the value is R\$ 26,205.39, which would be an average of 2 to 3 minimum wages per month. Group C received R\$16,133.64, with an average above 1 and less than 2 times the minimum wage. Group D received R\$10,716.05, which is up to one minimum wage per month.

The average human work unit (UTH) of the groups has no significant difference, with group A being 1.7 UTH, group B having 1.2 UTH, group C having 1.4 UTH and group D having 1.3 UTH in its properties.

Of the total of 15 properties interviewed, 20% were classified in group A, that is, they have an RA/UTH greater than 3 minimum wages; 20% were in group B and have RA/UTH above 2 and less than 3 minimum wages. In group C, 33% had RA/UTH above 1 and less than 2 minimum wages and those in group D had RA/UTH up to 1 minimum wage, corresponding to 27% of the sample properties (Figure 1).

The median was BRL 17,051.45, which corresponds to 1.3 minimum wages/UTH. This shows that 53% of the settlement properties are above the level of simple reproduction, indicating good conditions to increase the production and productivity of the dairy activity. And the other 47% of

the properties are very close to the Simple Reproduction Level, including the entire D group, that is, 27% of the properties and a part of the C group, estimated at 20% of the establishments. On the other hand, groups A and B are distinguished by obtaining enough RA/UTH to reinvest in the activity and well above the median. A few properties, around 13% of the C group, are also above the median. This way, we identified at least two very distinct groups, that is, groups A and B are distinguished by the median of groups C and D.

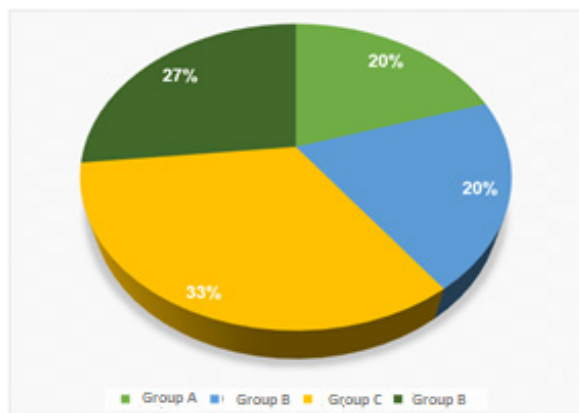


Figure 1 - Classification by RA/UTH of milk producers in the Matida settlement.

Source: Study data.

RA/UTH AND AGE GROUP

The dominant age group of the heads of families in the Matida settlement was 46 to 55 years old, with 40% of the producers, followed by 27% of the producers aged between 36 and 45 years, 20% are over 55 years old and only 13% of the producers aged up to 35 years (figure 2). Parre et al. (2011), in their work, shows the socioeconomic profile of milk producers in the southwest region of Paraná, in which there was a greater predominance of milk producers aged between 36 and 50 years, which characterized as young producers. Among the properties interviewed, 33.33% had women as the head of the family. The average age of group A is 50 years old, group

B is 40 years old, group C is 43 years old and group D is 55 years old. Thus, age is possibly not a factor that is related to the productivity of dairy farming in the settlement, since its correlation is -0.0647 , showing to be low and the group with the highest productivity does not have the lowest average age. Group D is the group with the lowest RA/UTH ratio and has the highest average age of the heads of households, which can infer that these heads of households may be failing to invest heavily in dairy activities or agricultural activities due to age and are getting close to having income from social transfers.

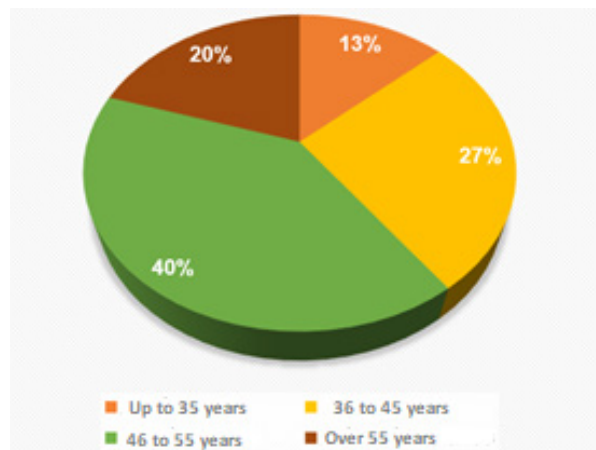


Figure 2 - Age group of heads of family in the Matida settlement.

Source: Study data.

CORRELATIONS BETWEEN RA/UTH WITH OTHER INDICATORS

The information obtained through the questionnaire applied to the producers and transferred to an electronic spreadsheet resulted in some clarifications of an economic nature of the properties, since after the classification, an average of the values was made for each group and which are described below (Table 1).

The Useful Agricultural Surface (SAU) corresponds to the areas (in hectare) that are effectively used for agricultural work on the

property, discounting reserves, leased areas and unproductive areas. The average of the Useful Agricultural Surface of the producers of the settlement in group A is 15.31 ha, group B is 13.50 ha, group C with 16.98 ha and group D with 15.21 ha. It can be seen that, in the settlement's producers, the Useful Agricultural Surface does not interfere with the value of agricultural income, with group D having a value of Useful Agricultural Surface similar to group A, but having the lowest agricultural income. The correlation of Agricultural Income (AR) with Useful Agricultural Area obtained the value of 0.122478, this result shows that the correlation between agricultural income and useful agricultural area is low as it is close to 0. In large part this data makes sense since the area of production units is very similar, therefore, for this question, the sample is homogeneous for the area of land because it is a settlement.

The Gross Product (GP) is given by the value of production on a property during the year. The values that make up the gross product are: 1) production sold, consumed and stored by families; 2) livestock variation; 3) remuneration for services provided to third parties; and 4) production intended for payment of services to third parties.

In this settlement we can see a big difference in the gross product between the groups. Group A has a gross product R\$188,714.23 higher than group D. The gross product is related to production volume and influences the remuneration of labor as we can see in the correlation between RA/UTH and gross product, being high with a value of 0.924.

Intermediate consumption (IC) is the indicative in reais of inputs and services aimed at production, among them are seeds, energy, animal feed, correctives and fertilizers. The percentage of the gross product that is committed to intermediate consumption in group A was the highest

among the groups. This means that group A spends 44.75% of the gross product on intermediate consumption. Group B has a lower percentage of intermediate consumption, being 32.90% of the gross product. The intermediate consumption value of group C is 42.75% and that of group D is 36.98%. The correlation between gross product and intermediate consumption is 0.964, showing a high correlation between the variables. Intermediate consumption also has a correlation with RA/UTH being 0.812. Although in an exploratory way, it can be hypothesized that a large intermediate consumption affects higher productivity, which reflects in higher gross product, which in turn reflects in higher agricultural income and, consequently, in higher remuneration for work (RA/ UTH).

The Agricultural Income is the added value that is left with the producer for the remuneration of work and investment in patrimony. It constitutes the main criterion for evaluating the reproduction capacity of the family production unit over time (VILLWOCK, 2017). The value of agricultural income in group A is higher compared to group B, C and D, therefore with greater economic efficiency. Different from group D, which has low economic efficiency, indicating subsistence-oriented activities. Agricultural income has a significant correlation with intermediate consumption of 0.831 being significant and shows that high agricultural income also comes from high intermediate consumption, which is usually associated with intensive use of technology.

With the observation of the economic data provided by table 1, it can be observed that there is a significant difference between groups A and D. With this, it is important to analyze the way that the producers of each group work in relation to food, reproductive and technological properties.

| Properties | Group A | Group B | Group C | Group D |
|----------------------------------|------------|-----------|-----------|-----------|
| Useful Agricultural Surface (Ha) | 15,31 | 13,50 | 16,98 | 15,21 |
| Man work unit (UTH) | 1,7 | 1,2 | 1,4 | 1,3 |
| Gross Product (R\$) | 213.013,92 | 51.654,17 | 45.373,25 | 24.299,69 |
| Intermediate Consumption (R\$) | 95.332,20 | 16.994,66 | 19.398,15 | 8.987,14 |
| Agricultural Income (R\$) | 106.775,04 | 33.412,93 | 23.810,60 | 13.961,06 |
| RA/UTHagr | 52.174,56 | 26.205,39 | 16.133,64 | 10.716,05 |

Table 1 – Average of the economic values of properties classified by group.

Source: Study data.

RELATIONSHIP BETWEEN RA/UTH AND SILAGE USE

In Figure 3, among the producers in groups A and B, 100% use silage and concentrate to supplement their herds throughout the year or at some time. On the other hand, groups C and D are equal to or more than 60% of producers do not use silage and concentrate in the animals' diet. According to Mendes (2016), animals fed only with pasture reduce the cost of production, but in times of little forage or low nutritional value, milk production tends to decrease. Supplementation with silage makes it possible to maintain production per animal while the concentrate increases animal productivity, which may be the reason that producers in groups A and B supplement animals. Thus, there may be an increase, which will maintain your production. As a result, it generates higher agricultural income, compared to producers in groups C and D.

RELATIONSHIP BETWEEN RA/UTH AND FERTILIZATION OR SOIL CORRECTION

It was observed, in Figure 4, that all producers in group A use fertilization or soil correction, while producers in groups B and D 100% do not use it and 20% of group C use it. Fertilization and soil correction are sets of agricultural practices to obtain maximum production per cultivated area, thus obtaining greater economic income. Therefore, the data

bring an important question to the Rural Extension, as they reveal that the group that obtains the highest remuneration from the work, manages on fertilized and corrected soils.

RELATIONSHIP BETWEEN RA/UTH AND ARTIFICIAL INSEMINATION (AI)

With Figure 5, we can see that 100% of properties in group A use the reproductive biotechnology of Artificial Insemination (AI). In properties in group B, only 33% use AI; 20% in group C; in group D, 100% use Monta Natural (MN).

According to Aragão (2011), in his work, reproductive management of AI has a high cost compared to MN, but AI produces an added value through genetic gain, while natural breeding does not produce added value. With the improvement of productivity indexes, the producer has an increase in income, adds value to his assets and makes the infrastructure of the properties viable. This may justify the results in which group A, which uses AI, increases work productivity.

RELATIONSHIP BETWEEN RA/UTH AND USE OF MECHANICAL MILKING

Milk extraction is done through milking, which can be mechanical or manual. In figure 6, the properties of groups A and B

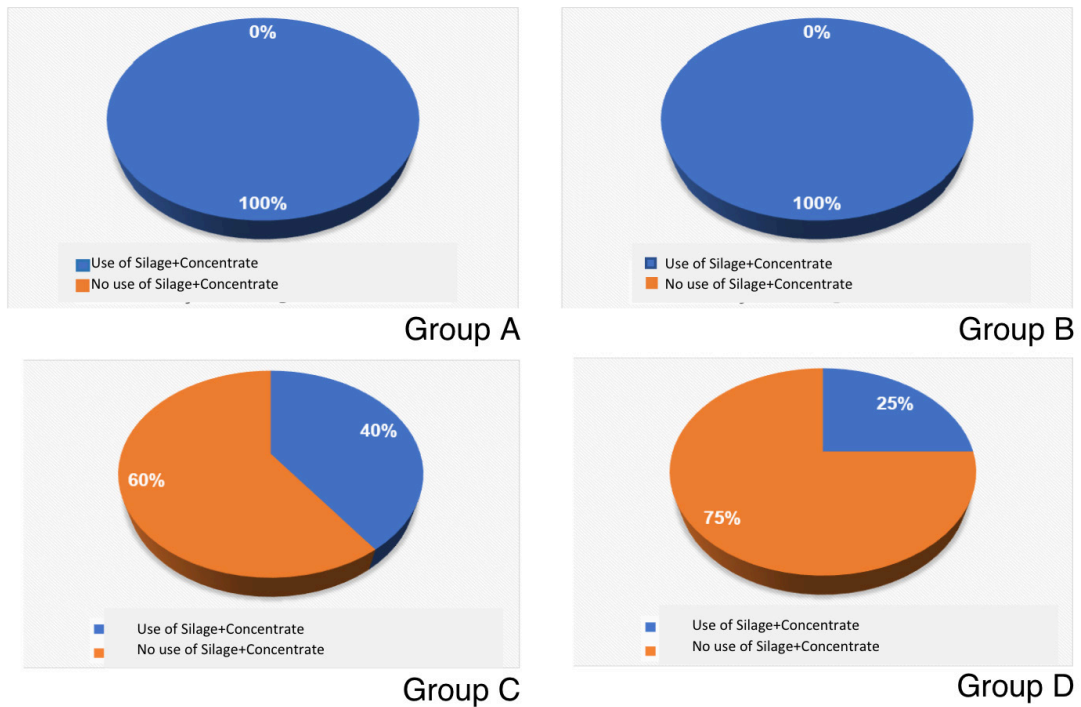


Figure 3 - Use of corn silage and concentrate supplementation at some period of the year in the feeding management of animals in the properties of the Matida settlement.

Source: Study data.

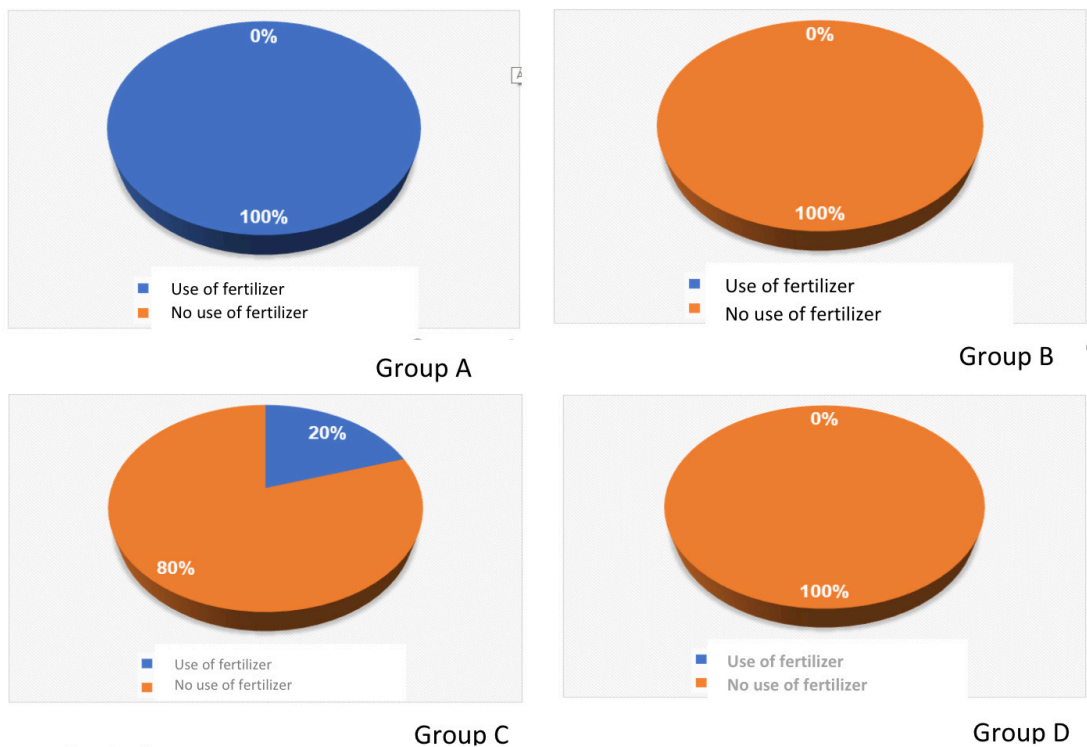


Figure 4 - Fertilization management (soil, pasture) or soil correction of the properties of the Matida settlement.

Source: Study data.

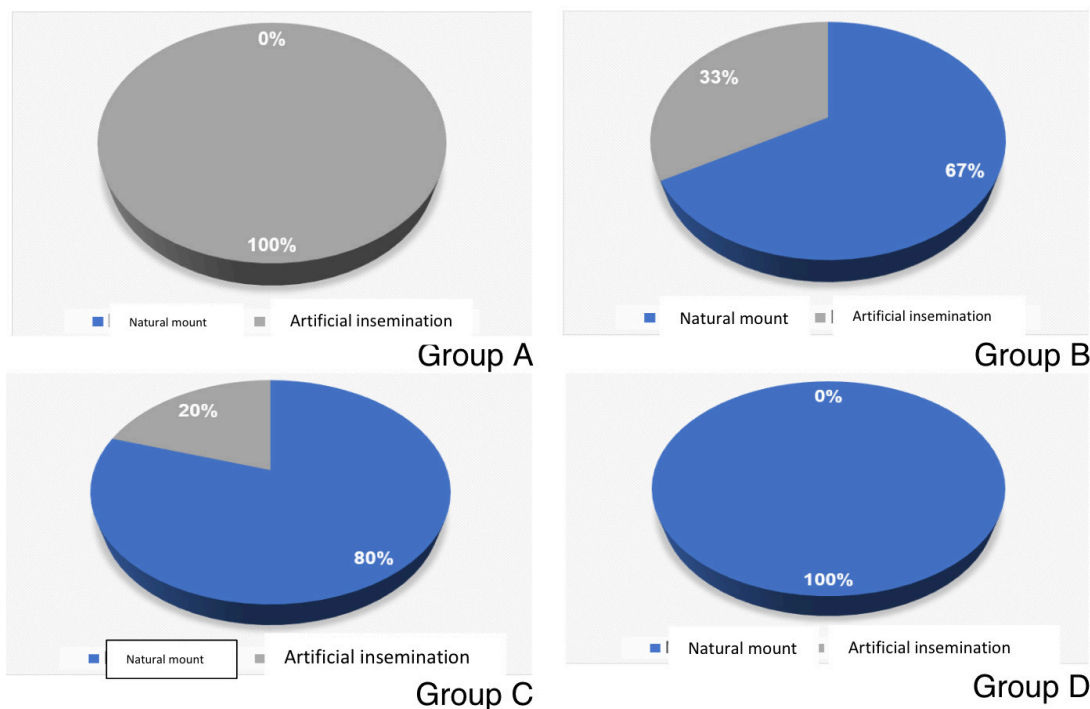


Figure 5 - Reproductive management used by the properties of the Matida settlement.

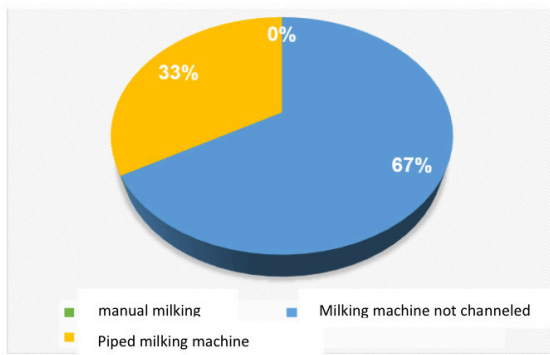
Source: Study data.

use 100% mechanical milking. Group A has 33% channeled mechanical milking, in which the milk leaves the udder and goes straight to the cooling tank, and 67% non-channeled mechanical milking, when the milk is transferred first to the can and then to the cooling tank. In group B, 100% of the production units have non-channeled mechanical milking. In the properties of group C, 60% have non-channeled mechanical milking and 40% manual milking. The properties of group D are the ones that most have manual milking, 75%, but 25% use non-channeled mechanical milking.

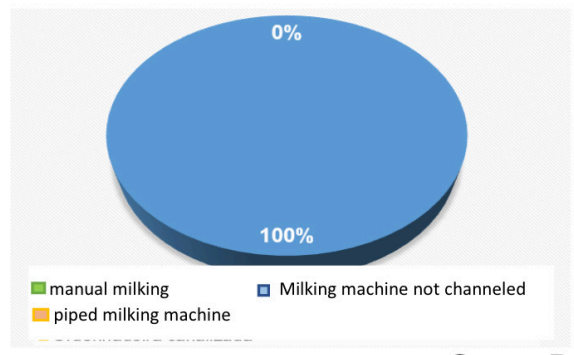
According to Rosa et al. (2009), the use of manual milking can be justified because it is a cheap way of extracting milk and because of the low cost in the structure for milking, being suitable for small herds. Non-channeled mechanical milking is cheaper compared to channeled mechanical milking, and can be implemented both in simple sheds and in structures with a ditch.

Channeled mechanical milking is recommended for large herds, as it requires high implementation costs and requires a planned structure. According to a study carried out by Taffarel et al. (2013), as it does not have contact with the external environment and is immediately refrigerated, this system presents the possibility of producing better quality milk.

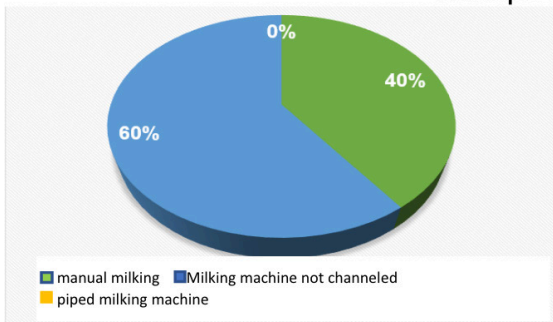
In the present study, it can be seen that the group with the highest productivity has mechanized milking and the one with the lowest labor productivity prevails manual milking. Although it seems obvious, this result raises the hypothesis that the differentiation between producers may be due to technical factors and, consequently, requires investment capacity in the activity. This data is especially important because it is a settlement, where all the families started from similar amounts of land area and over time they were technically differentiated and conferring higher remuneration for the work to the family members.



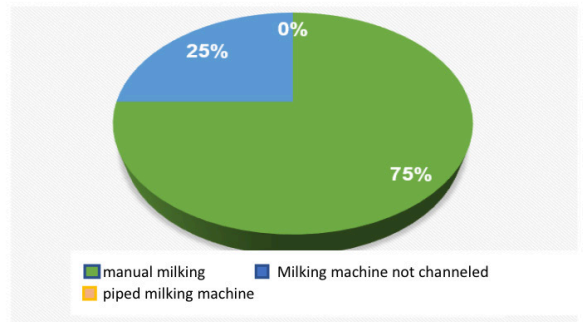
Group A



Group B



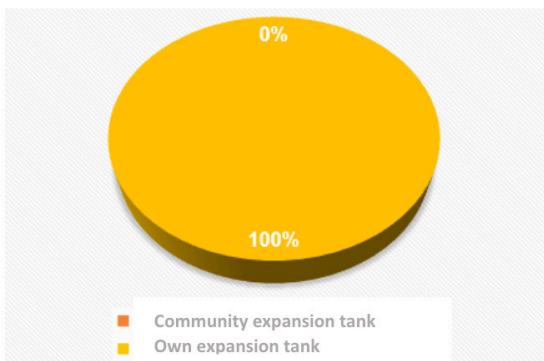
Group C



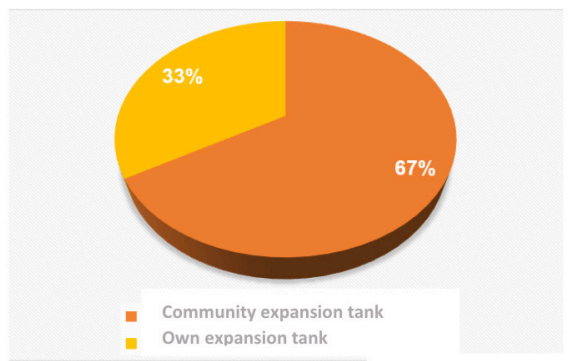
Group D

Figure 6 - Types of milking in the properties of the Matida settlement.

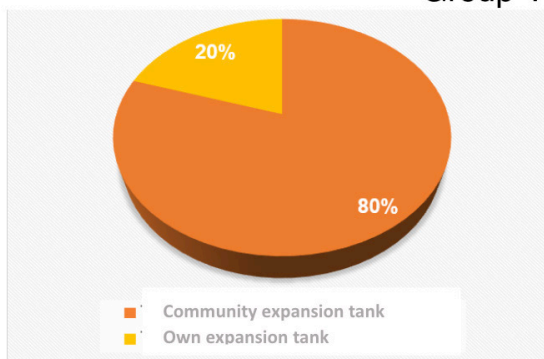
Source: Study data.



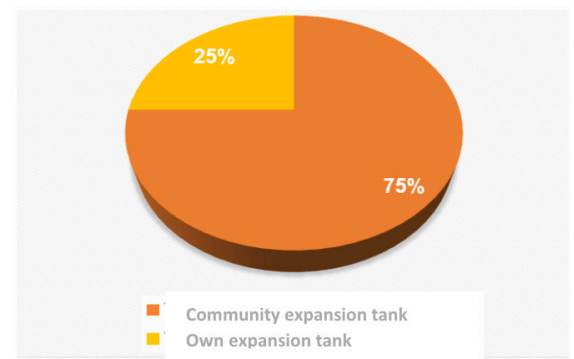
Group A



Group B



Group C



Group D

Figure 7 - Ways of cooling raw milk in the properties of the Matida settlement.

Source: Study data.

RELATIONSHIP BETWEEN RA/UTH AND MILK COOLING SYSTEM

The conservation of milk through cooling is of great importance for the processing of milk. It was observed in the properties of group A that 100% have their own expansion tanks. On the other hand, properties in groups B, C and D have a high percentage of sites that use community expansion tanks, with group B having 67%; group C 80%; and D 75%. The reason why most groups use community expansion tanks is due to an association action that makes such a structure available. However, farmers with lower incomes use it. The expansion tank itself is used by those with higher incomes.

The data indicate that the group that obtains greater productivity from work is already different from the others as it no longer uses the community expansion tank.

CONCLUSION

It is concluded with the present work that the properties of the Matida settlement with higher RA/UTH differ from the others in the use of key technologies for milk production. Correlation data already indicated that the differentiation of labor productivity could not be attributed to the useful agricultural area, nor to the age of the family members, but to the gross product and the use of high-yield inputs.

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