revista online de extensão e cultura
REALIZ AÇÃO

# Milk quality evaluation of dairy farmers in the Alto São Francisco Region

*Vital Leite: avaliação da qualidade do leite e da gestão agrícola dos produtores da Região de Bambuí e entorno*

DOI
10.30612/re-ufgd.v6i12.10623

Florence Dalila Peres
Daniela Paulino Parreira
Jean Kaique Valentim
Karynne Luana Chaves de Paula
Sônia de Oliveira Duque Paciulli
Dayane Aparecida Lima Silva

Recebido em: 02/11/2019 Aceito em: 07/12/2019

**Abstract:** Among family farmers, milk production is one of the main activities developed. The aim of this work was to evaluate the milk quality in the some properties and to monitor or manage the properties for observation of deficient points. The project was conducted on rural properties in the Bambuí / MG city and which works with bovine milk production, saves between 50 and 600 liters per day. The work started on March 2015 and ended on February 2016 and was developed through a partnership with Laticínio Total União Ltda. Three steps were performed, namely: data collection, milk quality analysis and work results obtained through meetings and lectures with producers and publication of booklet. The project's target farms was 12 rural properties with an average production of up to 600 liters of milk per day, without qualifying as small and medium producers, selected after the first phase. The milk quality analyzes were performed without 30 days interval for 4 months and the monitoring of the productive management performed throughout the project. It can be seen that the producers analyzed largely did not have the herd specialized in milk production and did not receive professional technical assistance.

**Keywords:** Rural extension, Milk production, Milk quality, Rural producer.

**RESUMO:** Entre os agricultores familiares, a pecuária de leite é uma das principais atividades desenvolvidas. Os objetivos do presente trabalho foram avaliar a qualidade do leite nas propriedades-alvo, acompanhar o manejo e gestão das propriedades para observação de pontos deficientes. O projeto foi conduzido nas propriedades rurais do município de Bambuí/MG e entorno, que trabalham com produção de leite bovino, estando entre 50 e 600 litros diários. O trabalho iniciou-se em março de 2015 com término em fevereiro de 2016, e foi desenvolvido através de parceria com o Laticínio União Total Ltda. Para isso, três etapas foram executadas, sendo elas: levantamento de dados, análise da qualidade do leite e o trabalho dos resultados obtidos por meio de reuniões e palestras com os produtores e publicação de cartilha. O público alvo do projeto foram 12 propriedades rurais com produção média de até 600 litros de leite por dia, no qual se caracterizam como os pequenos e médios produtores, selecionados após a primeira fase. As análises da qualidade do leite foram realizadas no intervalo de 30 dias durante 4 meses e o acompanhamento da gestão produtiva realizado durante todo o projeto. Pode-se constatar que os produtores analisados em grande maioria não possuíam rebanho especializado na produção de leite e nem recebiam assistência técnica profissionalizada.

Este obra está licenciada com uma Licença:
Creative Commons Atribuição-NãoComercial-Compartilhalgual 3.0 Brasil.

**Palavras-chave:** Boas práticas; extensão rural; gestão da qualidade; produção de leite.

**Introduction**

Family farming is characterized by job creation and food production. It is especially focused on self-consumption focusing on social rather than economic functions. It also has a lower productivity and technological incorporation.

Family production also stands out as a source of financial resources for low-income families, in addition to reducing rural exodus. This system also contributes to wealth generation by considering the national economy beyond the agricultural sector.

Milk production for these small farmers is an activity that can be exercised as a way of improving household incomes. Through the regular sale of milk produced, it can also enable them to shift from a subsistence approach to a profitable market (HEMME et al., 2004).

According to Zoccal & Gomes (2005) dairy production is among the main activities, making up about 36% of the establishments. This livestock activity also accounts for approximately 52% of gross production value.

Family-owned dairy farms in the South and Midwest Regions are the ones that most use the activity as a source of income, about 61% of the establishments. In the southeastern region are approximately 44% of the properties with dairy farming. And in the North and Northeast Regions this proportion is lower, about 24% (GUANZIROLI et al., 2000).

Within dairy activity the high microbial count and the occurrence of pathogens can affect the quality and safety of fresh milk as well as its derivatives. Hygiene on the dairy farm directly influences production. In addition to affecting the economic results and prospects for human health safety. Therefore, it is important to ensure the high quality of fresh milk production through healthy animals, as well as good hygiene conditions (MUBARACK et al., 2010).

The various microbiological analyzes of milk can identify negative variations in milk composition that alter its quality. The main influencing factors are related to the type of animal management used in pre and post milking. Other factors occur from the breeding system, breed, health, among other zootechnical factors. Thus, working with agricultural management methods in simplified and impacted languages can positively affect the management of production in small and medium properties.

The objective of this work was to evaluate the quality of milk in some farms. Followed the management and control of the properties for observe deficient points. Being able to



Este obra está licenciada com uma Licença:
Creative Commons Atribuição-NãoComercial-CompartilhaIgual 3.0 Brasil.

Volume 6 | N° 12
ISSN: 2358-3401

assist them in the applicability of management routines aimed at preventing microbial contamination. Thus, it was possible to provide producers with an understanding of the best use of their available resources, as well as a better understanding of rural business management.

**Material and Methods**

The extension project was conducted on rural properties in and around Bambuí municipality. These production units worked with bovine milk production, being between 50 and 600 liters per day. The work began in March 2015 and ended in February 2016. It was developed through partnership with Laticínio União Total LTDA. to provide maps and milk routes in the region.

In phase one of the project, visits were made to 20 properties to apply a social questionnaire. This questionnaire aimed to study the profile of the property and the producer to characterize which properties met the basic requirements for project participation. From this filtering, only 12 properties were selected. Afterwards, a plan was developed for each family unit to coordinate and execute improvement activities.

The pre-elaborated data collection instrument was based on the questionnaire produced by Aquino (2011). This process included multiple choice questions, with the possibility of obtaining more than one answer in some questions.

In these questions, the producer was able to choose between a closed alternative or, where verifiable, an open answer. This procedure allowed the obtaining of greater volume of information increasing the reliability of the data. In the identification diagnosis of the socio-productive profile of each producer there was information about the rural property, dairy herd and technical knowledge to obtain quality milk and cheese, as well as issues such as family succession.

In the second stage, monthly visits were made to collect milk samples. The period of the visits covered the months from May to August. The samples were identified with the property number and placed in a thermal box and were sent to the Milk Quality Analysis Laboratory at the Department of Technology and Inspection of Animal Products of the Veterinary School / UFMG. Then analyzes were performed, such as somatic cell count (SCC) and physicochemical compositions of milk. The results of the analysis were received 30 days after each sample was sent. Then the data was inventoried separately for each property.

Given the objectives and the nature of the object of this study, it aviou-descriptive and exploratory search (GIL, 1999). Such methodological use envisioned the description of



Este obra está licenciada com uma Licença:
Creative Commons Atribuição-NãoComercial-Compartilhalgual 3.0 Brasil.

Volume 6 | N° 12
ISSN: 2358-3401

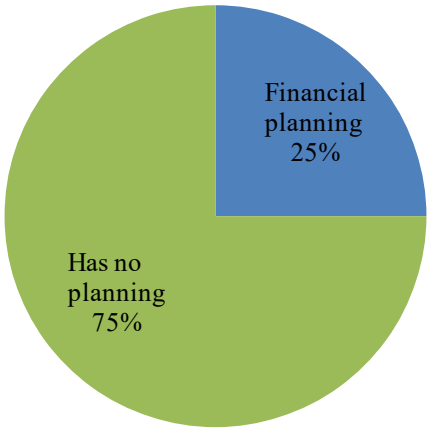
characteristics of certain populations or phenomena, besides establishing the type of certain relationships between variables. These variables were quali-quantitative in nature, due to their intrinsic interdependence in the demands imposed in this study, given the complexity of the social reality of our target audience. Descriptive research, according to Mattar (1999), is used to describe group characteristics, to estimate the proportion of elements in a specific population and to discover or verify the existence of relationship between variables.

Semi-open questionnaires were applied to dairy farmers in the region and the census nature was chosen for the survey according to the limited number of producers on site. The answers were spontaneous, and their availability to answer the questionnaire was considered.

Data analysis was performed using spreadsheets, using Microsoft Office Excel® 2007. Data from the questionnaires were tabulated and transformed into percentage values. From these were drawn graphs aiming to facilitate the interpretation of the results, thus combining a descriptive statistic of these data obtained.

**Results and Discussion**

Family farming is a form of production in which the core of decision making, management, labor and capital is controlled by the family. In the survey presented, 75% of producers did not have a planned management system, 25% had only financial planning and none of the producers claimed to perform administrative planning (Graph 1).




*Graph 1. Family management system*

Such a scenario can be one of the triggering problems in production. This finding



Este obra está licenciada com uma Licença:
Creative Commons Atribuição-NãoComercial-Compartilhalgual 3.0 Brasil.

Volume 6 | N° 12
ISSN: 2358-3401

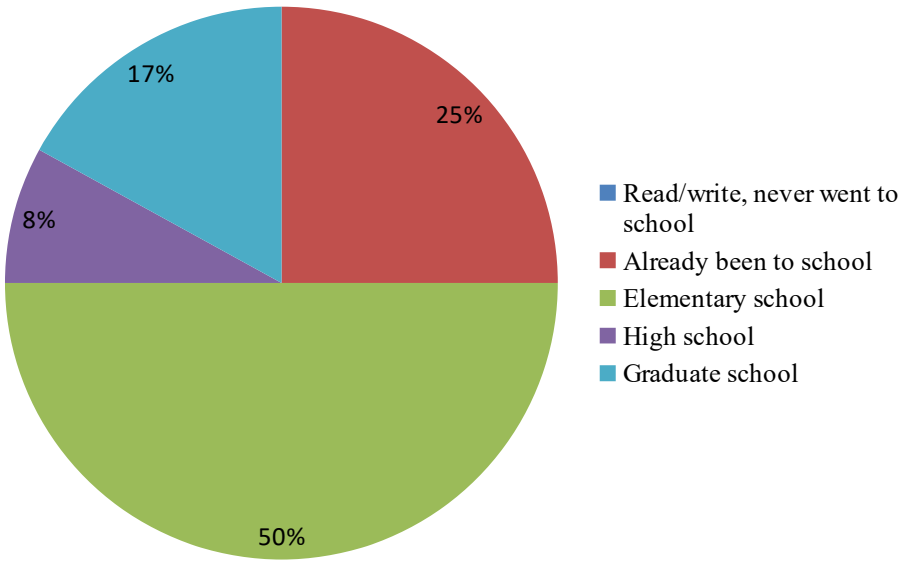
corroborates with Junior et al. (2009) that when analyzing cheese properties in the Araxá and Serro region, they found that more than 90% of the properties did not perform economic control.

The use of management tools is considered an effective tool for business diagnosis. Being used for a better understanding of the interactions between components and management of production systems, such as planning, setting goals, delineating actions and controlling the production system. The production cost, on the other hand, allows the enterprise management, besides understanding the financial impact of certain processes and / or technologies on the whole system, specifying them in the final cost of the product (OAIGEN et al., 2008).

Producers had a low level of education, where 50% had only elementary school (Graph 2). This factor may be linked to poor financial and administrative planning of properties, where producers experience intellectual difficulties in performing certain mathematical and logical operations.

These initial data corroborate the results obtained by Santos & Azevedo (2009) who, studying the school profile of the rancher of the Brazilian state of Paraíba, found that 72.7% of them attended only the first grades of elementary school.

Zeni (2001) assessing the characterization of the beef cattle production chain in the state of Santa Catarina observed that 26.7% of respondents had a college degree, followed by 14.8% who completed high school and 1.7% respondents said they are illiterate and another 14.5% reported that they only studied until the 4th grade of primary school.



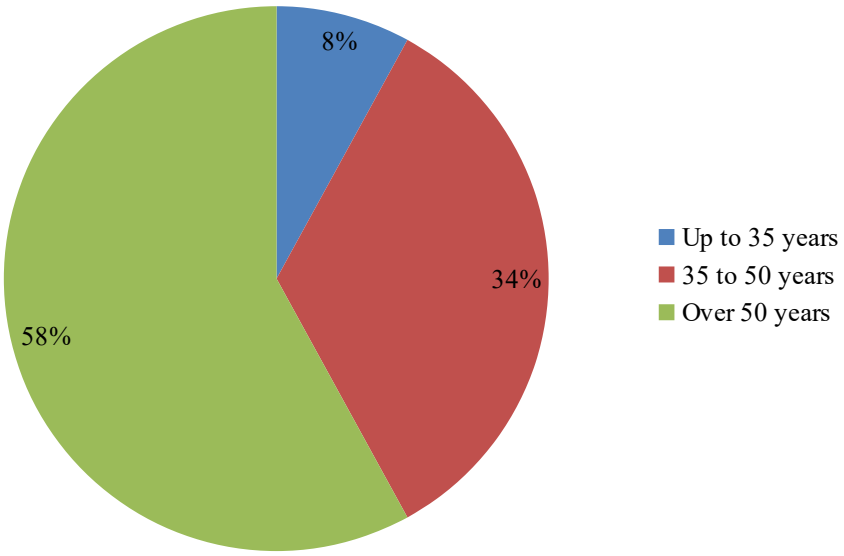

*Graph 2. Level of education of the head of the household*



Este obra está licenciada com uma Licença:
Creative Commons Atribuição-NãoComercial-Compartilhalgual 3.0 Brasil.

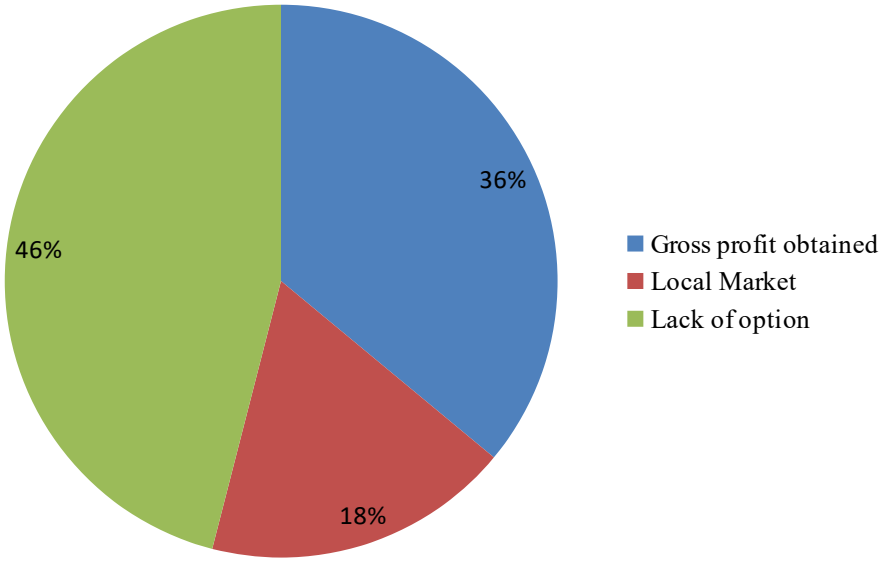
Volume 6 | N° 12
ISSN: 2358-3401

Regarding the age group analyzed in the present research, 58% of respondents were over 50 years old (Graphs 3). This proves to be an empirically savvy audience in this segment. This consequently increases the difficulty in using new technologies implemented in agriculture. This result contradicts the study by Santos (2009) who, when analyzing 11 cattle owners in Paraíba, observed that most of the breeders were between 30 and 60 years old.




*Graph 3. Age of the rural producer*

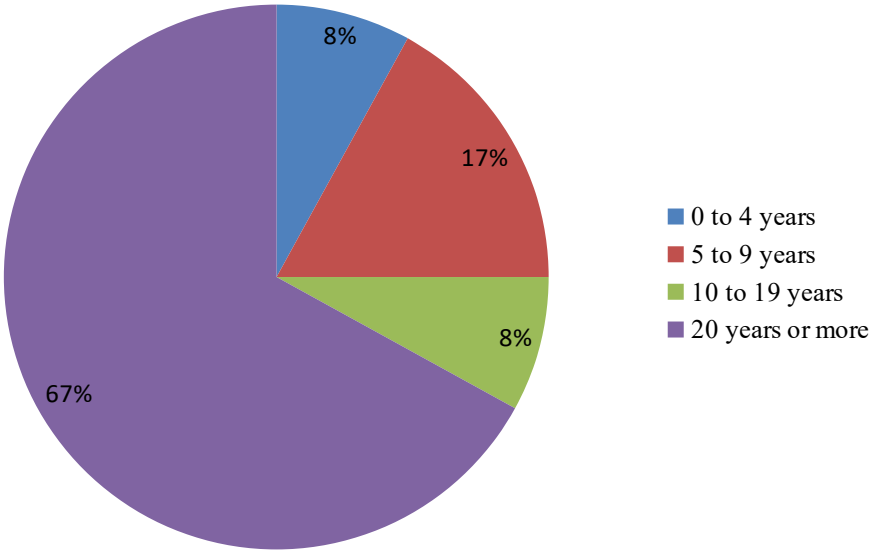
The reason for remaining in the dairy industry, as reported by 46% of producers, is due to the lack of choice of these people, besides the family tradition that makes them have no other job, being milk the only source of income generated. This reflects the difficulty of entering the conventional labor market (outside the rural environment) (Graph 4).




Este obra está licenciada com uma Licença:
Creative Commons Atribuição-NãoComercial-Compartilhalgual 3.0 Brasil.

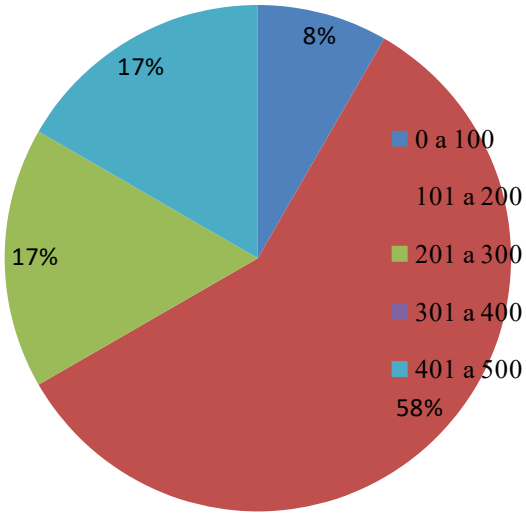
*Graph 4. Main reason for action*

By ascertaining the time spent by the interviewees in the activity, it was observed that most producers are more than 20 years in the activity (Graph 5). This may be related to the older age observed in the present research.




*Graph 5. Life time in the activity*

Regarding daily milk production (Graph 6) 58% of respondents produce about 100 - 200 liters, fitting in small producers.



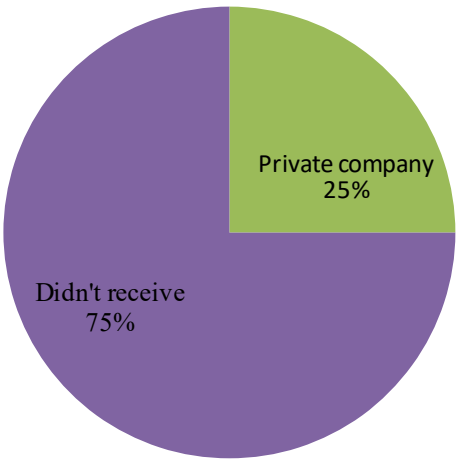

*Grafh 6. Daily milk production (liters)*

Borges (2010) identified 715 dairy farms distributed in the municipalities of Bambuí, Bom Despacho, Dantas Stream, Dores do Indaiá, Estrela do Indaiá, Lagoa da Prata, Luz, Martinho

Este obra está licenciada com uma Licença:
Creative Commons Atribuição-NãoComercial-Compartilhalgual 3.0 Brasil.

Campos, Moema and Serra da Saudade. The region had an average daily production of 348,835 liters of milk in the mapped region. The author also diagnosed that of this total of producing properties, 629 (six hundred and twenty-nine) provide 339,405 (three hundred and thirty-nine thousand, four hundred and five) liters of milk / day to the main dairy companies in the region.

As for the producers of the research in question, as highlighted by Graph 7, 75% of them did not have adequate technical assistance.




*Graph 7. Level of technical assistance obtained*

According to Werncke et al. (2016), regarding the incentives that make the rancher to adopt new production technologies, the economic factor is the most cited by them. Higher yields, better quality and better price guarantees are fundamental to lead the farmer to seek this technological increase. Such factors may improve the image of the rancher before the market, being emphasized with the actions of the technical assistance professionals.

The composition and properties of milk vary depending on genetic, environmental, health and nutritional factors, in addition to the stage of lactation, age, interval between milkings (FOX, 2003; WALSTRA et al., 1999; LAWRENCE, 1991). Overall, among all these components, which vary the most, according to Walstra et al. (1999), is the fat content, followed by the protein content.

The solid elements (protein, minerals and vitamins) correspond to 12 to 13% of milk. These parameters, turning to the bromatological quality of milk, are used as an acceptance criterion by the industry, following the legal premises of each country or region. However, apart from official regulation, some industries use such criteria for milk bonus (LIMA et al 2006).

Este obra está licenciada com uma Licença:
Creative Commons Atribuição-NãoComercial-CompartilhaIgual 3.0 Brasil.

Volume 6 | N° 12
ISSN: 2358-3401

Figure 1 corresponds to the solid milk components that remain in equilibrium, so that the relationship between them is very stable. The test was aimed at pointing out the occurrence of problems that would alter the composition of milk. It is verified that the use of qualified technical assistance, besides improving the total solids content in milk, it brought a constancy in these values.




*Figure 1. Comparison between total solids averages*

The degreased dry extract comprises the percentage of protein, mineral salts and lactose, excluding the measurement of water and milk fats. Figure 2 presents the results of the comparison between the mean of the degreased dry extract (DDE) analysis, based on the minimum value of 8.4g / 100g. All producers remained above the minimum value (8.4g / 100g) before and after the technical assistance program.

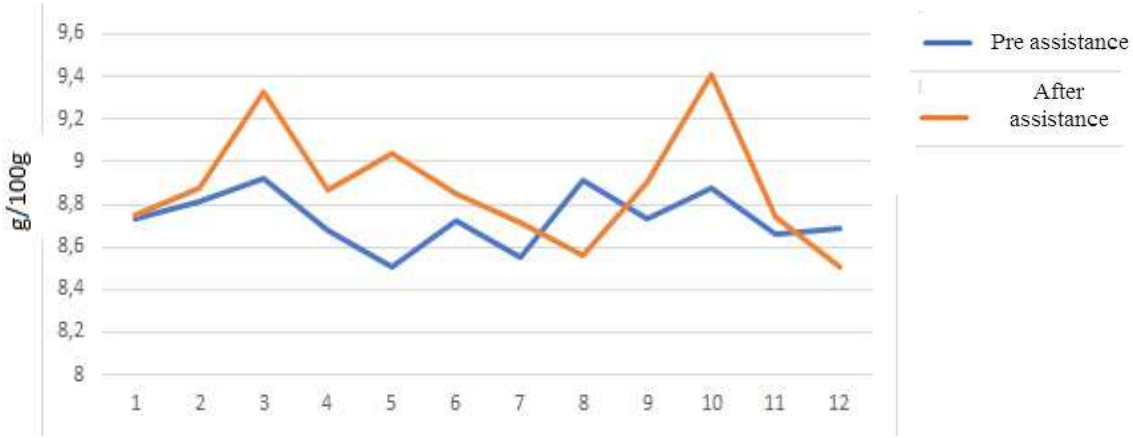



*Figure 2. Mean comparison of DDE*

Este obra está licenciada com uma Licença:
Creative Commons Atribuição-NãoComercial-Compartilhalgual 3.0 Brasil.



Volume 6 | N° 12
ISSN: 2358-3401

Fat analyzes followed the parameter imposed by Normative Instruction IN 62, minimum of 3g / 100g (Figure 3). Fat had a minimum pre-care content of 2.4% while post-care the minimum was 2.7%, reaching a maximum of 4.5 in the care phase (Figure 3). Overall, it was noted that producers were able to stay within the limits required by IN 62.




*Figure 3. Comparison between means of fat percentage*

According to Roma & Luiz (2008) milk protein has the most prominence, explained by the direct relationship between protein content and industrial yield. This factor is relevant mainly in cheese making, which is one of the main products in the region of Bambuí / MG.

The Figure 4 represents the comparison between the averages of the total protein values of the analyzed milk samples. The legislation requires a minimum of 2.9g / 100g (2.9%). It is known that there are three possible ways to influence milk fat and protein content, namely genetic selection, identification and manipulation of genes that control milk composition and nutrition. It was observed that there were no differences between the periods with and without technical assistance for protein contents and that they remained constant.

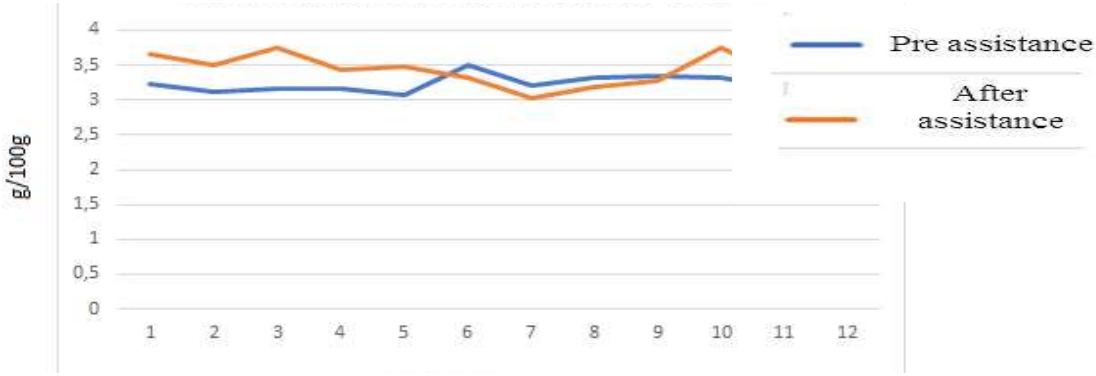



*Figure 4. Comparison between means of protein percentage*

The results shown when compared to IN 62, which establishes a maximum of 600X1000 CS / mL for SCC, it is noted that the values before care had very high results for SCC,



Este obra está licenciada com uma Licença:
Creative Commons Atribuição-NãoComercial-Compartilhalgual 3.0 Brasil.

Volume 6 | N° 12
ISSN: 2358-3401

resulting from the lack of hygiene resulting from the lack of good practice information ( Figure 5). Roma & Luiz (2008) point out that the benefits of increasing some components of milk for industry are significant, especially in the case of proteins. However, these nutrients are directly affected by microbiological factors such as high Somatic Cell Count (SCC) and Total Bacterial Count (TBC). Such measures, when out of accepted standards, can cause losses to both producers and industry.

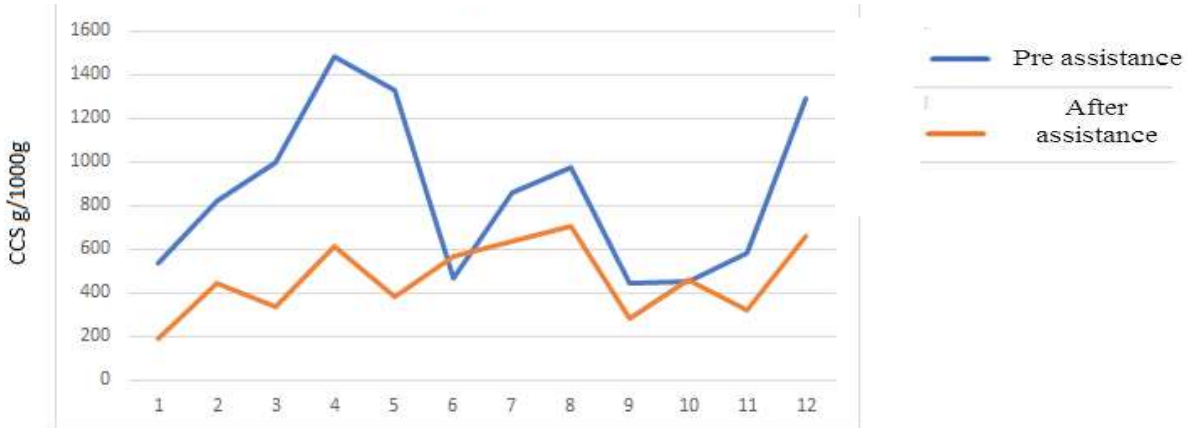



*Figure 5. Comparison between SCC*

High CCS in milk adversely affects the industry, such as the production of milk powder, butter and UHT milk, reducing shelf life and producing undesirable tastes for consumers.

**Conclusions**

Milk production conditions on small farms in the Bambuí / MS region still need to be improved. Producers in the region still lack knowledge and technification, reflecting directly on product quality. The contents of the chemical composition of milk varied from the information and monitoring of the technical assistance program. It can be concluded that milk produced according to environmental and socio-economic conditions has become a quality product that meets the requirements.

Health and management care that favors increased milk production and quality is unknown to many of the evaluated producers. Such producers were unaware of such methods of preventing sanitary and qualitative problems in the raw material. So much so that they neglected to guarantee food safety for consumers. In addition, the producers approached are characterized as having low education, which makes it difficult to seek information and understand it.

**Referências Bibliográficas**

Este obra está licenciada com uma Licença:
Creative Commons Atribuição-NãoComercial-Compartilhalgual 3.0 Brasil.



Volume 6 | N° 12
ISSN: 2358-3401

AQUINO, A. A. **Requeijão do Sertão fabricado na microrregião de Guanambi, Bahia: Características físico-químicas, microbiológicas e de produção**. 2011. 183p. Tese (Doutorado em Ciência e Tecnologia de Alimentos). Universidade Federal de Viçosa, 2011.

BORGES, L. R. **Diagnóstico de captação e perfil de qualidade do leite produzido em Bambuí, Córrego Dantas e na microrregião de Bom Despacho, mesorregião Central Mineira**. 2010. Dissertação (Mestrado) Escola de Veterinária, Universidade Federal de Minas Gerais, Belo Horizonte- MG, 2010. 60p.

DURR, JOÃO W. Prevenção da mastite. 2006. **Artigos técnicos do Conselho Brasileiro de Qualidade do Leite.** Disponível em: http://www.terraviva.com.br/IICBQL/p026.pdf. Acesso em 20 mar. De 2016.

FONSECA, LUÍS FERNANDO LARANJA DA; SANTOS, MARCOS VEIGA DOS. **Qualidade do leite e controle de mastite.** 2001.

FOX, P.F. The major constituents of milk.In:SMITH, G. (Ed.) **Diary Processing: Improving Quality,** CRC Press: Boca Raton, Boston, New York, Washington, cap. 2. 2003.
FOX, P.F., McSWEENEY, P.L.H. Diary Chemistry and Biochemistry, **Blackie Academic Professional:** London 1998.

GIL, A. C. **Métodos e técnicas de pesquisa social**. 5. ed. São Paulo: Atlas, 1999. 206 p.

GIMENES, RAQUEL M.; PONCHIO, LEANDRO A. **Elaboração de sistema de pagamento de leite pela qualidade para fornecedores da empresa A. In: Congresso Brasileiro de Qualidade do Leite**, 2, Goiânia – Anais.2006.

GUANZIROLI, C.E; CARDIM, S.E de C. S. **Novo retrato da agricultura familiar – O Brasil redescoberto**. Projeto Cooperação Técnica. INCRA/FAO, Brasília, Incra, fevereiro 2000, 75p.

HEMME, T.; GARCIA, O.; KHAN, A. R. A review of Milk Production in Bangladesh with Particular Emphasison Small-Scale Producers, **Pro-Poor Livestock Policy Initiative**, 2004.

JUNIOR, L. C. G. C., COSTA, R. G. B., MAGALHÃES, F. A. R., VARGAS, P. I. R., FERNANDES, A. J. M., & PEREIRA, A. S.Variações na composição de queijo Minas artesanal da Serra da Canastra nas quatro estações do ano. **Revista do Instituto de Laticínios Cândido Tostes**, v. 64, n. 371, p. 13-20, 2009.

LAWRENCE, R.C. Cheese yield potential of Milk. In: MANN, A.R. (Ed.) International Daiary Federation Special Issue no. 9301: **Factors affecting the yield of cheese, International Daiary Federation**: Brussels, cap 10.1991b.

LIMA, M. C. G., SENA, M. J., MOTA, R. A., MENDES, E. S., ALMEIDA, C. C., & SILVA, R. P. P. E. **Contagem de células somáticas e análises físico-químicas e microbiológicas do leite cru tipo c produzido na região agreste do estado de Pernambuco**. Arquivos do Instituto Biológico, v. 73, n. 1, p. 89-95, 2006.

Este obra está licenciada com uma Licença:
Creative Commons Atribuição-NãoComercial-Compartilhalgual 3.0 Brasil.



Volume 6 | N° 12
ISSN: 2358-3401

MATTAR, F. N. **Pesquisa de marketing:** metodologia e planejamento. 5. ed. São Paulo: Atlas, v.1. 97p. 1999.
MUBARACK, H.M.; DOSS, A.; DHANABALAN, R.; BALACHANDER, S. Microbial quality of raw milk samples collected from different villages of Coimbatore District, **Tamilnadu, South India//Indian Journal of Science and Technology** Vol. 3 No. 1, 2010.

OAIGEN, R. P.; BARCELLOS, J. O. J.; CHRISTOFARI, L. F. Melhoria organizacional na produção de bezerros de corte a partir dos centros de custos**. Revista Brasileira de Zootecnia,** v.37, n.3, p.580-587, 2008.

RIBAS, RODRIGO JUSTO; MASSUQUETTI, ANGÉLICA. A PECUÁRIA DE CORTE GAÚCHA: **UMA ANÁLISE DOS PRINCIPAIS SISTEMAS DE PRODUÇÃO**. 2016.

ROMA J., LUIZ C. **Características quantitativas e qualitativas da proteína do leite produzido na região Sudeste**. 2008. 148 f. Tese (Doutorado em Agronomia) – Escola Superior de Agricultura "Luiz de Queiroz", Universidade de São Paulo, 2008.

SANTOS, P. L. S.; AZEVEDO, E. O. Perfil sócio-econômico de produtores de leite do estado da Paraíba, Brasil. **Revista Caatinga** , Mossoró, v.22, n.4,p.260-267, 2009.

WALSTRA, P., GEURTS, T.J., NOOMEN, A., JELLEMA, A., VAN BOEKEL, M.A.J.S. Daiary Technology: **Principles of Milk Properties and Processes**, Marcel Dekker: New York, 1999.

WERNCKE, D., GABBI, A. M., ABREU, A. S., FELIPUS, N. C., MACHADO, N. L., CARDOSO, L. L., ... & NETO, A. T. (2016). Qualidade do leite e perfil das propriedades leiteiras no sul de Santa Catarina; abordagem multivariada. **Arquivo Brasileiro de Medicina Veterinária e Zootecnia,** 68(2), 506-516.

ZENI, ELTON. **Caracterização da cadeia produtiva da pecuária bovina de corte no estado de Santa Catarina**; Dissertação, Universidade Federal de Santa Catarina, Programa de Pós-Graduação em Engenharia de Produção. Florianópolis – SC, 2001.

ZOCCAL, R., SOUZA, A. D., & GOMES, A. T. (2005). Produção de leite na agricultura familiar. Juiz de Fora: Embrapa Gado de Leite.

Este obra está licenciada com uma Licença:
Creative Commons Atribuição-NãoComercial-CompartilhaIgual 3.0 Brasil.