RELEVANT ASPECTS OF DAIRY CATTLE IN THE MUNICIPALITY OF RONDINHA-RS AND ITS EFFECTS ON MILK QUALITY

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ABSTRACT - The objective of this work was to evaluate the milk quality of dairy farms in the city of Rondinha, Rio Grande do Sul, through somatic cell count (SCC), standard plate count (SPC) and protein and fat indexes, comparing with the standards required by Normative Instruction 62 (BRAZIL, 2011), evaluating the main aspects of the production chain that influence the final quality of the product. The target municipality of this study was Rondinha were the 64 producers evaluated during four months in the city of Rondinha in the state of Rio Grande do Sul, largely do not meet the requirements of Normative Instruction 62, when standard plate count and somatic cell counts were evaluated, since only 35% of producers are in accordance with the appropriate standards. There is a need for greater care regarding the hygiene and management of these dairy herds and the accompaniment of qualified technicians to give support to the producers.
Keywords: farming, agricultural sciences, animal husbandry, veterinary medicine.

ASPECTOS RELEVANTES A BOVINOCULTURA LEITEIRA NO MUNICÍPIO DE RONDINHA-RS E SEUS EFEITOS NA QUALIDADE DO LEITE

RESUMO - O objetivo deste trabalho foi avaliar a qualidade do leite de propriedades leiteiras do município de Rondinha, Rio Grande do Sul, através da contagem de células somáticas (CCS), contagem padrão em placas (CPP) e índices de proteína e gordura comparando com os padrões exigidos pela Instrução Normativa 62 (BRASIL, 2011), avaliando os principais aspectos da cadeia produtiva que influenciam na qualidade final do produto. O município alvo deste estudo foi Rondinha, onde os 64 produtores avaliados durante quatro meses na cidade de Rondinha no estado do Rio Grande do Sul, em grande parte não atendem as exigências da Instrução Normativa 62, quando avaliado os teores de contagem padrão em placas e contagem de células somáticas, pois somente 35% dos

produtores estão de acordo com os padrões adequados. Há necessidade de maiores cuidados em relação à higiene e manejo desses rebanhos leiteiros e acompanhamento de técnicos qualificados para dar o devido suporte aos produtores.

INTRODUCTION

The milk production chain has enormous social and economic importance. The activity is practiced throughout Brazil with more than one million rural properties, generating more than three million jobs only in primary production (VILELA et al., 2002), with milk being considered one of the most noble of foods, with a rich composition of proteins, fats, carbohydrates, minerals and vitamins, providing nutrients and immunological protection (MÜLLER, 2002).

In this scenario, the states of the South region in the period between 2002 and 2012 showed an increase of 88.4%, generating an increment in production of 4.9 billion liters (RESENDE & STOCK, 2014). Rio Grande do Sul is the second state with the largest milk production, behind Minas Gerais, which accounts for 26.8% of production (CONAB, 2016). The majority of dairy production in the state of Rio Grande do Sul is concentrated in the northern region of the state, in the dairy basin of the northwest region, where the city of Rondinha-RS is located (EMATER / ASCAR, 2015). In the face of the constant increase and development of milk production, many challenges are encountered by producers, related to product quality, modernization of the sector and financial return, among them the quality that is determined by the set of actions in all links of the productive chair, and is seen as one of the main factors that compromise the consolidation of this sector (OLIVEIRA et al., 1999).

The constant hygiene in the handling of milk when it is obtained is fundamental to guarantee quality and avoid contamination by pathogenic and deteriorating micro-organisms. In addition, physicochemical alterations and those that are caused by microorganisms can occur from the handling of the milking to the processing of the raw material, compromising the quality of the milk (ECKSTEIN et al., 2014; SILVA et al., 2010). Changes can be influenced by factors such as the health of the cattle herd (which mainly influences the amount of somatic cells found in the milk), hygiene at milking, equipment and utensils other than those involved in

storage, ie, cooling tanks as well as the time and temperature of storage and transport and storage conditions in the industries, mainly causing an increase in the load of microorganisms present (SILVA et al., 2010).

Damage caused by poor milk quality can be estimated by determining the amount of Somatic Cells (SC mL^{-1}) and the Standard Plate Count (CFU mL^{-1}), as well as the fat and protein contents and the presence of antibiotics that are determinants for the acceptance of milk in the industry (FIGUEREDO, 2012). Assessing the various problems of milk production in Brazil in the last decades, the Ministry of Agriculture, Livestock and Food Supply (MAPA) has published regulations to improve and guarantee milk quality. In 2002, Normative Instruction 51 - IN 51 - (BRASIL, 2002) was published, in which it regulated the production, transport and quality of milk. In 2011, some parameters of IN 51 were modified, and Normative Instruction 62 (BRASIL, 2011), which is currently in force, changed the regulation of milk production and marketing, as well as quality parameters.

Based on this scenario, the objective of this work was to evaluate the milk quality of dairy farms in the city of Rondinha, Rio Grande do Sul, through somatic cell count (SCC), standard plate count (SPC) and protein and fat indexes, comparing with the standards required by Normative Instruction 62 (BRAZIL, 2011), evaluating the main aspects of the production chain that influence the final quality of the product.

MATERIAL AND METHODS

The target municipality of this study was Rondinha, located in latitude 27º 49 '41 "S, longitude 52º 54' 35" W with an altitude of 440 m, region of the average plateau of the State of Rio Grande do Sul. The municipality has 640 milk producers, from which data were obtained from 64 rural properties, a questionnaire was applied to each farm with questions related to herd characteristics, hygiene procedures, sanitary and reproductive issues, milking management and milk storage. The parameters evaluated were somatic cell counts (SCC), standard plate counts (SPC) and protein and fat content, obtained with the producers through the analyzes performed by the milk receiving company during the months of September, October, November and December.

Figure 1: Location of the municipality of Rondinha, in the state of Rio Grande do Sul, Brazil.

The data collected were tabulated and then, a descriptive analysis was carried out in relation to milk quality. The parameters of SCC, SPC, protein and fat were analyzed separately and the properties for each factor were analyzed and for each period evaluated considering the period of four months.

For the milk quality parameter and standard plate count, there was performed a division into four groups considering the intervals: I) lower or = 300,000 (CFU mL^{-1}); II) from 300,000 to 500,000 (CFU mL^{-1}); III) between 500,000 to 1,000,000 (CFU mL^{-1}) and IV) greater than 1,000,000 (CFU mL^{-1}).

The somatic cell counting parameter was separated into three groups considering intervals, interval I) ≤500,000 SC mL^{-1}; II) from 500,000 to 1000,000 SC mL^{-1} and III> 1000,000 SC mL^{-1}. The protein content was divided into three groups, I) 2.9%; II) <2.9% and III> 2.9%. The quality parameter fat content was separated into three groups, I) 3%; II) <3% and III> 3%. The values were analyzed and compared to the standards established by Normative Instruction 62 (BRAZIL, 2011).

RESULTS AND DISCUSSION

The quality of the milk is determined by several factors that act in all links of the productive chain, being necessary an evaluation of all the activities developed until the arrival of the product to the consumer, in this way, was evaluated during four months the milk production of 64 properties of the municipality of Rondinha-RS, including reproductive management, adopted hygiene techniques and frequency, herd characterization, storage support system, adopted milk transport and final product quality evaluation.

Among the factors that influence the quality of milk, animal genetics highlights, with a large difference in milk composition among breeds and also among individuals of the same breed, this difference is justified mainly due to the variations in milk fat content, of lactose and minerals content (SILVA and VELOSO, 2011).

In a study carried out by Lopes & Carvalho (2000) comparing the quality and constitution of milk in Holstein and Jersey breeds, it was verified a variation of the fat content, where the Jersey breed shows superiority to the Holstein in the fat content, however lower levels of protein . In relation to the breeds used in the dairy properties of the municipality, it is predominantly Holstein, used in 35.94% properties, followed by the Jersey breed in 6.25% properties. The joint use of the breeds, such as Holstein and Jersey, is highlighted in the municipality, with joint use being identified in 48.43%. In addition, in 3.12% of the properties there are used of Holstein, Jersey and Girolando, 4.69% Jersey and half-breed and 1.57% Holstein, Jersey and half-breed.

In the study conducted by Suñé, Juchem and Damboriarena (2010) the use of the Holstein and Jersey breeds together accounted for 84.6% of the properties. Breed choice involves the assessment of local climate, type, fertility, soil topography, farmer preference, livestock value, milk yield, available value for investments, available technologies, the ability of the farmer to manage, among others (MIRANDA; FREITAS, 2009).

Regarding the reproductive management of the evaluated herds, it was verified that the use of artificial insemination occurs in 56.25% of the properties. It is believed that proper management of reproduction, when used in accordance with appropriate milking practices and hygiene of the process, can contribute to improvements in milk quality.

When monitoring the management of milking, it was verified that in all the properties visited there was a milking order, with animals with mastitis being milked last. However, it was verified that in 14.06% the milking order was started with primiparous cows without mastitis, then healthy cows, and finally cows with mastitis, emphasizing the milk discard of animals with mastitis. It is observed the concern on the part of the rural producers of Rondinha, RS, regarding the contamination of the milk, the equipment and the environment of milking, when segregating the sick animals. Similar concern was also reported by Zanela and colleagues (2006), who described the correct procedures to be adopted at milking, emphasizing the importance of separating cows with clinical or subclinical mastitis to be milked later on to healthy cows to avoid contamination.

The hygiene of the hands and forearms by the producers is adopted in 95.31% of the properties, index higher than that found by Nero, Viçosa and Pereira (2009) in the region of Viçosa, MG (SILVA et al., 2011). In addition, in 9.37% of the properties there is the disposal of the first three reported that 86.66% of the milkers do the hygiene before milking. It is worth noting that the index of hygiene of hands and arms in Rondinha, RS, is high, which also denotes knowledge and concern of the milkers for good hygiene habits. The discharge of the first three jets is performed daily in 59.37% properties, an index considered low, given the importance of the tool to control milk contamination, because in these jets are contained different groups of microorganisms jets in "some occasions", in 20 properties the first jets are not discarded.

The hygiene of the teats is carried out in all the properties studied. In 78.12% of the properties studied, the teats are washed with water. In only 8.81% of the properties it is made using a pre-dipping solution, and 14.06% properties use both methodologies. The researchers Nero, Viçosa and Pereira (2009) report that in a study conducted in the region of Viçosa, Minas Gerais, data similar to the present study were obtained in relation to the use of the pre-dipping solution, with 10% of the properties using the specific hygiene solution. Superior index was reported in the municipality of Luz, Minas Gerais, where Figueredo et al. (2012) described that this practice is done in 20% of the evaluated properties. The disinfection of teats before milking is a practice recommended by Figueredo et al. (2012), who assert that teats

with dirt have a high potential to contaminate milk with large amounts of microorganisms, which may lead to deterioration of milk and influence on its quality. The pre-dipping practice is an important ally to reduce the contamination of the skin of the teats, since the possible contamination of the milk is notorious when this practice is not adopted (MIGUEL et al., 2012).

It was examined that the use of paper towels for drying the teats is done in 26.56% of the properties daily, in 7.81% of the properties it is done "from time to time" and in 57.82% the drying of the teats after washing is not performed. When analyzing the use of the cloth in other municipalities, there is a high percentage in the municipalities of Miranda do Norte, Itapecurú-Mirim and Santa Rita in Maranhão, reaching 60% of the properties (LACERDA; MOTA; SENA, 2010). In the city of Luz, MG, a survey conducted by Araújo et al. (2009) found that 72.7% of the properties used a paper towel, 18.2% used cloth and in about 9.1% the teats were dried naturally, that is, they were not dry. In the study by Figueredo et al. (2012), the percentage of cloth use was very significant, 60% of the properties, and higher than that of this study, disposable paper towel 20% and did not dry the teats in 20% of the properties.

The practice of post-dipping was adopted in 53.12% of properties in the municipality of Rondinha, RS. In Paraná, the study carried out by Eckstein and collaborators (2014) allowed to demonstrate this practice in all the properties visited, while in the state of Minas Gerais, the research by Figueredo and collaborators (2012) demonstrated the use of this practice daily in 10%, and in 5% of the properties from time to time. Disinfection of teats should also be performed after milking to avoid further contamination, as recommended by Zanela et al. (2006). Medeiros and collaborators (2009) emphasize the importance of the correct choice of products used for the disinfection of the teats in pre and post-dipping, as the disinfectants contribute to the control and reduce the possibility of new infections in the mammary gland. The best disinfection of the teats and the use of untreated water are the main failures to obtain quality milk. Therefore, improvements in hygienic-sanitary management to obtain quality milk are suggested (FIGUEREDO et al., 2012).

It was verified that the daily removal of manure from the milking parlor was performed in 93.75% of the properties daily, sometimes in 4.68% of the properties

and at only 1.56% of the properties this procedure is not adopted. In relation to the cleaning of the room, in 73.43% of properties it is performed daily. Compared to other works, the frequency of cleaning and disinfection of facilities was 13.43% higher than that reported by Lacerda, Mota and Sena (2010), 60% in properties in the municipalities of Miranda do Norte, Itapecurú-Mirim and Santa Rita in Maranhão. At the facilities where the milking is carried out, it is necessary to present good hygiene conditions to reduce possible new infections (DEMEU, 2011), and should present more hygiene to maintain milk quality (PATÊS et al., 2012). In addition to the equipment, it was observed that 100% of the properties visited, the hygienizing of the milking equipment and utensils is carried out daily, which avoids the proliferation of microorganisms and guarantees greater safety in relation to milk quality (VALLIN et al. 2009).

Regarding the daily number of milking, 100% of the properties studied perform two milking operations, one in the morning (between 6am and 8am) and the other at dusk (between 5pm and 7pm), this pattern is seen in other field surveys, such as in the microregion of Campina in Pernambuco, where 60% of the properties adopt this system, and in the municipality of Boa Vista, where 100% of the producers realize two milking operations daily (MELO, 2014). The use of manual milking is still adopted in 3.12% properties in the municipality of Rondinha, RS. In the study conducted by Nero, Viçosa and Pereira (2009) this percentage is 95.0% of the producers. A study conducted by Netto et al. (2009) manual milking determined a somatic cell level higher than mechanical milking.

The hygiene procedures adopted by the producers are still flawed for most of the aspects analyzed in this research. The producer must adopt good hygiene practices, especially during the management of milking, to guarantee productive efficiency, to avoid the entry of disease-causing pathogens, and to cause significant economic losses, especially production reduction, thus guaranteeing milk quality (PATÊS et al. 2012). Because a quality product generates more value to the producer, and despite the quality milk subsidy being adopted by the companies that collect milk in Rondinha, RS, many producers do not comply with all hygiene procedures and end up interfering negatively in quality with economic losses.

Mastitis is the major disease that occurs in cattle worldwide, occurring due to an inflammatory process of the mammary gland, clinical or subclinical, and may occur due to incorrect handling of milking (LOPES; LACERDA; RONDA, 2013). When analyzed the health management of the 64 properties, it was verified that the incidence of mastitis reported by the producers is considered low in 84.37% properties, mean occurrence in 9.37% and high in 3.13%, and in 3.13, cases of mastitis never occurred. This can be attributed to the adoption of adequate hygiene measures to avoid inflammation of the mammary gland. Mastitis can be diagnosed by performing pre-milking tests after sanitizing teats using the California Mastitis Test (CMT), method to diagnose subclinical mastitis and the mug of black background method for diagnosing clinical mastitis, which is indicated daily (OLIVEIRA; MELO; AZEVEDO, 2009). It was verified that the black background mug is used in 20.31% properties as the method of determining mastitis, of which 1.92% use it daily, 7.81% weekly, 1.92% every 15 days and 8.66% use it monthly.

The use of the California Mastitis Test (CMT) for the diagnosis of mastitis in the rural properties of Rondinha, RS, is performed in 62.5% of the properties, 9.37% of the properties make weekly use of this tool, 3.12% every 15 days, 21.87% monthly, and in 28.14%, its use is carried out when the cows present symptoms of mastitis. In the survey conducted by Nero, Viçosa and Pereira (2009) in Viçosa, MG, it is reported that only 66% of the properties use the CMT test, being a practice of fundamental importance to maintain milk quality (NERO, VIÇOSA; PEREIRA, 2009). Eckstein and collaborators (2014), in a study carried out in Paraná, show that this test is not used in only 9.37% of the properties, and among the 90.63% that use this test, the same is done in 56.25% weekly, 15.62% fortnightly and 18.75% of the properties, monthly.

One of the tools to control mastitis after it has infected the bovine herd is the use of dry cow therapy, that is, when the animal is not producing milk, in which the antibiotic treatment is carried out, known as a dry cow tube, being this practice used by 71.87% of the producers. The animal that has untreated mastitis presents losses in the production, and it is possible to occur losses of the teats or even the (premature) discard of the animal (FIGUEREDO et al., 2012). In addition to the health of the mammary gland, the hygiene of milking, the environment in which the

cow is housed and the cleaning procedures of the milking equipment, the storage adopted by the producer is determinant for the milk quality, in which the temperature and the storage period are directly linked to the multiplication of microorganisms in milk, directly influencing the total bacterial count (FONSECA, 1998).

It was verified in relation to the milk cooling system that 1.64% is stored in a freezer, 1.64% in refrigerator, 78.12% of the properties in expansion tank and 18.75% of the properties use immersion tanks. In a study carried out in the Municipality of Pinheiro Machado, RS, it is verified that the expansion system is used in 19.2%, immersion 61.5% and in refrigerator 19.2%. According to Fagundes et al. (2006) it is recommended that refrigeration should be done soon after milking, to avoid the multiplication of bacteria that acidify milk, and the storage temperature of the milk should be maintained at 4ºC, according to Resolution 62/2011 (BRAZIL, 2011). Before storing the milk in the rural property, it is necessary to filter it to remove some coarse particles that may still be present in milk, a practice evidenced in 78.12% of the properties. A nylon, stainless steel or plastic container is recommended for this purpose, which facilitates correct sanitization (PEDRICO et al., 2009).

The quality of milk is recommended in Normative Instruction 62 (BRAZIL, 2011), where it is possible to visualize the minimum acceptable parameters for milk. The standard plate count (SPC), somatic cell count (SCC), and protein and fat content were evaluated in this study. SPC levels should be below 300,000 CFU mL^{-1}), SCC content below 500,000 SC mL^{-1}, protein content above or equal to 2.9% and fat at or above 3% (BRAZIL, 2011). The standard plante counts (CFU mL^{-1}) and somatic cell counts expressed in SC mL^{-1} observed in the properties of Rondinha, RS, during the four months are presented in table 1.

Table 1: Standard Count in Milk plates expressed in CFU mL^{-1} and Somatic Cell Count expressed in SC mL^{-1} of 64 properties in the municipality of Rondinha / RS.

Months	Standard Plate Count (CFU mL^{-1})	Number of samples %	Somatic Cell Count (SCmL^{-1})	Number of samples %
September	≤ 300.000*	8 (25%)	≤ 500.000*	13(40,6%)
	300.000 - 500.000	4 (12,5%)	500.000 - 1.000.0000	11 (34,4%)
	500.000 - 1.000.0000	5 (15,6%)	> 1000.000	8 (25%)
	> 1.000.000	15 (46,9%)	--	
October	≤ 300.000	13 (40,6%)	≤ 500.000	11(34,4%)
	300.000 - 500.000	4 (12,5%)	500.000 - 1.000.0000	14 (43,7%)
	500.000 - 1.000.0000	7 (21,9%)	> 1000.000	7 (21,9%)
	> 1.000.000	8 (25%)	--	
November	≤ 300.000	12 (37,5%)	≤ 500.000	7 (21,9%)
	300.000 - 500.000	5 (15,6%)	500.000 - 1.000.0000	21 (65,6%)
	500.000 - 1.000.0000	3(9,4%)	> 1000.000	4 (12.5%)
	> 1.000.000	12 (37,5%)	--	
December	≤ 300.000	13 (40,6%)	≤ 500.000	14 (43,7%)
	300.000 - 500.000	5 (15,6%)	500.000 - 1.000.0000	15 (46,9%)
	500.000 - 1.000.0000	1 (3,2%)	> 1000.000	3 (9.4%)
	> 1.000.000	13 40,6%)	--	

* Standards required by Normative Instruction 62 (BRAZIL, 2011)

Among the evaluated producers, 35% have SPC less than or equal to 300,000 CFU mL-1, which is the parameter required by Normative Instruction 62 (BRAZIL, 2011). also, a significant number of producers (37.5%) reveal a number higher than 1,000,000 CFU mL-1, which represents problems in milk quality, with September being the month that represented the most problems. The high values above the tolerable limits of SPC indicate problems with the cleaning and hygiene of milking equipment, teats, cows with mastitis (mainly subclinical) and deficiency in the milk cooling system (TAFFAREL et al., 2013), also, lack of hygiene of the producer and the milking parlor are factors that aggravate the problem.

From the results it is possible to observe that within the time interval that has been evaluated (four months) it is possible to affirm that few producers are adequate to Normative Instruction 62 (BRAZIL, 2011), since the percentage of milk whose somatic cell count is lower or equal to 500,000 SC mL-1, about 35% of respondents, but those who are above 1,000,000 SC mL-1 are about 17.2% of the producers. The mastitis problem in the bovine herd causes an increase in SCC, which is used as a factor in the evaluation of milk, since it is related to the reduction in milk of the concentrations of its components, in addition, it causes alterations in the dairy derivatives in the sensorial characteristics (SILVA et al., 2010).

Table 2: Fat and protein content present in milk in the municipality of Rondinha / RS, during four months.

Months	Fat contente in milk	Number of samples	Protein contente in milk	Number of samples
	3%*	0	2.9%*	4 (12.5%)
September	< 3%	1 (3.2%)	< 2.9%	0
	> 3%	31 (96.8%)	> 2.9%	28 (87.5%)
	3%	0	2.9%	3 (9.3%)
October	< 3%	4 (12,5%)	< 2.9%	1 (3.2%)
	> 3%	28 (87,5%)	> 2.9%	28 (87.5%)
	3%	0	2.9%	5 (15.6%)
November	< 3%	0	< 2.9%	3 (9.4%)
	> 3%	32 (100%)	> 2.9%	24 (75%)
	3%	0	2.9%	6 (18,7%)
December	< 3%	2 (6,3%)	< 2.9%	7 (21,9%)
	> 3%	30 (93,7%)	> 2.9%	19 (59,4%)

* Standards required by Normative Instruction 62 (BRAZIL, 2011)

When evaluated the content of fat and proteins present in the milk of the dairy herd of the municipality of Rondinha (Table 2) during the four months, most producers are suitable to Normative Instruction 62 (BRAZIL, 2011).

Regarding the fat content, the percentage of producers with this value below 3% is about 5.5% of the interviewees, and the producers with levels above 3% fat are about 94.5%. This fact can be explained to the use of pasture for feeding of the herds, in which 98.44% of properties, pasture is used. In 90.62% of the properties, it is fed to animals all year round, 6.25% only in winter and 1,57% property only in spring. Regarding the protein content, with a minimum limit value of 2.9%, in which

14% of the milk samples are in these levels, and below that figure there are only 8.6% producers.

In relation to the use of concentrate, this is used in 95.31% properties, being this influence in milk protein content. The quality of the milk is influenced by several external factors such as climatic variables such as maximum and minimum temperature, rainfall and relative humidity, directly interfering positively or negatively in milk quality in the contents of SCC, SPC, fats, protein, total solids and lactose (Nakamura et al., 2012). The researchers Noro and collaborators (2006) emphasize the importance of considering some factors that interfere in milk quality and chemical composition as factors beyond the environmental cited above, the months of the year and of the animal as the age at calving and the lactation stage of the cow.

A study was carried out to verify the quality of milk in the region of the Córrego da Velha Luz (MG) with 20 properties, to verify the percentage of producers that would fit to the new legislation, since the period of the research was the transition between the NI 51 (MAPA, 2002) and NI 62 (MAPA, 2011), with a significant part of the properties, about 40% were in disagreement with Normative Instruction 62 (MAPA, 2011) for SPC levels. About 50% of the properties were out of the standard for SCC, 30% of the samples analyzed for protein and 15% for fat (FIGUEREDO et al., 2012), being the SCC and SPC contents in disagreement with the NI 62 (MAPA, 2011). For the fat and protein contents the values found in the municipality are higher, as evidenced in the research done by Noro and collaborators (2006) carried out with cooperatives, obtained the average fat content of 3.54%, protein of 3.12% , similar to that of the present study, which are above 3% and the mean somatic cell value of 390,000 cells mL^{-1}, a content considered within the legislation, and of better quality when compared to the present study, since only 35% of the properties have the SCC value below 50000 SC mL^{-1}.

In a study conducted by Roma Júnior et al. (2009) in the states of Minas Gerais, Rio de Janeiro and São Paulo, the mean values of protein 3.15%, fat 3.52% SCC 553,000 (SC ml^{-1}) and SPC 103 000 (CFU ml^{-1}), showing that the protein and fat contents are significant values and that add value to milk, while the levels of SCC and SPC reduce the milk subsidy, being the results according to the current

legislation, the protein and fat contents are similar, already in relation to the contents of SCC and SPC the researchers are better, representing a better milk quality.

In the state of Rio Grande do Norte, a study developed by Andrade and collaborators (2014) evaluating the effect of the four seasons on milk quality, showed that this did not influence the levels of protein, fat, SCC and SPC. They obtained averages of 3.53% for fat, 3.30% for protein. Borges et al. (2009) carried out a study in the Vale do Taquari Region, RS, from August 2006 to August 2007, in which they evaluated the milk quality of the properties, through analysis of SCC, SPC and fat and protein content. The mean values of these parameters were 3.34% fat, 3.09% crude protein, SCC 6.0×10^5 SC mL-1 and SPC 1.07×10^6 CFU mL-1, with fat and protein contents similar to those found in this study, because they are above 3% and for factors that negatively interfere with milk quality, although the SCC is a little high, this parameter is a better index than the present study, and the SPC content is high as in the study introduced. According to the authors, SPC is a limiting factor in the study, and it is necessary for the professionals in the area to do more work to improve hygienic-sanitary conditions. Some hygiene procedures should be adopted, such as proper milking, cleaning of equipment and utensils used for milking and cooling, refrigeration should be done correctly to contribute to the reduction of TBC.

In the state of Paraná, in order to adapt dairy properties to current legislation regarding milk quality. The mean SPC values were 1.36×10^6 CFU mL-1 and the mean SCC was 1.87×10^6 SC mL-1 before orientation to the producers. After orienting the producers to changes in the management of the milking, treatment of the animals and maintenance of the equipment used in milking, a great improvement was observed, with a mean reduction of 74.3% for SCC and 93.4% for SPC, with the average content of SCC 450.8×10^3 SC mL^{-1} achieved and SPC of 47.4×10^3 CFU mL^{-1}, it is shown that it is possible to improve the milk quality, and the values of the researchers are good for good milk quality when compared to this research. The authors point out that a significant reduction in SCC values may have occurred due to the use of antibiotics at the time of cows drying and SPC values decreased due to good milking practices and changes in management. Another point that the authors emphasize is that the influence that the payment for milk quality generates, as it results in more income to the producer (BOZO et al., 2013).

Some hygiene procedures adopted are inefficient to guarantee the quality of the milk, so, it is necessary programs for the orientation of the producers on the importance of the appropriate management. Another point is that some procedures must be adopted to frame producers in Normative Instruction 62, and many producers have not yet reached the quality standards required by the legislation, mainly regarding the Somatic Cell Count and Standard Plate Count standards.

CONCLUSION

The 64 producers evaluated during four months in the city of Rondinha in the state of Rio Grande do Sul, largely do not meet the requirements of Normative Instruction 62, when standard plate count and somatic cell counts were evaluated, since only 35% of producers are in accordance with the appropriate standards.

There is a need for greater care regarding the hygiene and management of these dairy herds and the accompaniment of qualified technicians to give support to the producers.

REFERENCES

ANDRADE, K. D. de; RANGEL, A. H. N.; ARAUJO, V. M.; MEDEIROS, H. R.; BEZERRA, K. C.; BEZERRIL, R. F. LIMA JUNIOR, D. M.. **Qualidade do leite bovino nas diferentes estações do ano no estado do Rio Grande do Norte**. Revista brasileira de Ciência Veterinária, v. 21, n. 3, p. 213-216, 2014.

ARAÚJO, M. M. P.; ALVES P. D. D.; BARBOSA, F. H. F.; ROSA, C. A. **Qualidade higiênico-sanitária do leite e da água de algumas propriedades da bacia leiteira do município de Luz – MG.** Revista de biologia e ciências da terra, v. 9, n. 2, 2009.

BORGES, K. A.; REICHERT, S.; ZANELA, M. B.; FISCHER, V. **Avaliação da qualidade do leite de propriedades da região do Vale do Taquari no estado do Rio Grande do Sul.** Acta ScientiaeVeterinariae, v. 37, n.1, p. 39-44, 2009.

BOZO, G. A. ALEGRO, L. C. A.; SILVA, L. C.; SANTANA, E. H. W.; OKANO, W.; SILVA, L. C. C. **Adequação da contagem de células somáticas e da contagem bacteriana total em leite cru refrigerado aos parâmetros da legislação.** Arquivo Brasileiro de Medicina Veterinária e Zootecnia, v.65, n.2, p.589-594, 2013.

BRASIL. Ministério da Agricultura, Pecuária e Abastecimento**. Instrução Normativa nº 51 de 18 de setembro de 2002. Aprova os Regulamentos Técnicos de Produção, Identidade e Qualidade do Leite tipo A, do Leite tipo B, do Leite tipo C, do Leite Pasteurizado e do Leite Cru Refrigerado e o Regulamento Técnico da Coleta de Leite Cru Refrigerado e seu Transporte a Granel**. Brasília, 2002.

BRASIL. Ministério da Agricultura, Pecuária e Abastecimento. **Instrução Normativa nº 62, de 29 de dezembro de 2011. Aprova os Regulamentos Técnicos de Produção, Identidade e Qualidade do Leite tipo A, do Leite tipo B, do Leite tipo C, do Leite Pasteurizado e do Leite Cru Refrigerado e o Regulamento Técnico da Coleta de Leite Cru Refrigerado e seu Transporte a Granel.** Diário Oficial da União, Brasília, December 30th, 2011.

BRITO, J. R. F.; PINTO, S. M.; SOUZA, G. N. ARCURI, E. F.; BRITO, M. A. V. P.; SILVA, M. R. **Adoção de boas práticas agropecuárias em propriedades leiteiras da Região Sudeste do Brasil como um passo para a produção de leite seguro**. Acta ScientiaeVeterinariae, v. 32, n .2,p.125-131, 2004.

Campanha Nacional de Abastecimento (CONAB) – **Perspectivas Agropecuárias 2015/16 – Produtos.** Versão 127 ISSN 2318-3241- Perspec. Agropec. Brasília, v.3, p. 1-130,2016.

DEMEU, F. A. LOPES, M. A;; COSTA, G. M.; ROCHA, C. M. B. M.; SANTOS, G. NETO, A. F. **Influência do descarte involuntário de matrizes no impacto econômico da mastite em rebanhos leiteiros**. Revista Ciência e agrotecnologia, Lavras, v. 35, n. 1, p. 195-202. 2011.

ECKSTEIN, I. I. POZZA, M. S. S.; ZAMBOM, M. A.; RAMOS, C. E. C. O.; TSUTSUMI, C. Y.; FERNANDES, T.; ECKSTEIN, E. I.; BUSANELLO, M. **Qualidade do leite e sua correlação com técnicas de manejo de ordenha.** Scientia Agraria Paranaensis, Marechal Candido Rondon, v.13, n.2, p.143-151, 2014.

FAGUNDES, C. M.; FISCHER, V.; SILVA, W. P. CARBONERA, N. ARAUJO, M. R.; **Presença de *Pseudomonas*spp em função de diferentes etapas da ordenha com distintos manejos higiênicos e no leite refrigerado.** Ciência Rural, Santa Maria, v.36, n.2, p.568-572, Mar/Apr. 2006.

FIGUEIREDO, A. P. G.; ARAUJO, M. M. P.; CUNHA, A. F.; ALVES, J. R. CERQUEIRA, M. M. O. P. **Qualidade do Leite de Propriedades da Área de Proteção Ambiental da Bacia do Córrego da Velha no Município de Luz (MG).** Ciência Equatorial, v.2, n. 2, p. 34-53, 2012.

IBGE – Instituto Brasileiro de Geografia e Estatística. **Censo Agropecuário 2006: Brasil, Grandes Regiões e Unidades da Federação.** Rio de janeiro, p. 1-777, 2006.

IbGE – Instituto Brasileiro de Geografia e Estatística.**Produção da Pecuária Municipal 2013**.Rio de Janeiro, v. 41, p.1-108, 2013.

LACERDA, L.M; MOTA, R. A.; SENA, M.J de. **Contagem de Células Somáticas, composição e Contagem Bacteriana total do leite de propriedades leiteiras nos municípios de Miranda do Norte, Itapecurú-Mirim e Santa Rita, Maranhão**. Arquivo do Instituto Biológico, São Paulo, v.77, n.2, p.209-215, 2010.

LOPES, L. O.; LACERDA, M. S. de ; RONDA J. B. **Eficiência de desinfetantes em manejo de ordenha em vacas leiteiras na prevenção de mastites.** Revista cientifica eletrônica de medicina veterinária, Garça, n.21, 2013.

MEDEIROS, E. S. SANTOS, M. V.; JUNIOE, J. W. P. FARIA, E. B.; WANDERLEY, G. G. TELES, J. A. A.; MOTA, R. A. **Avaliação in vitro da eficácia de desinfetantes comerciais utilizados no pré e pós-dipping frente amostras de Staphylococcus spp. isoladas de mastite bovina.** Pesquisa Veterinária Brasileira, v. 29, n. 1, p. 71-75, 2009.

MELO, W. J. L.; NASCIMENTO, J. W. B. FURTADO, D. A.; SALES, A. T. **Perfil da atividade leiteira na microrregião de Campina Grande-PB.** Revista Tecnologia e Ciência Agropecuária, João Pessoa, v. 8, n. 3, p. 45-50,. 2014.

MIGUEL, P. R. R.; POZZA, M. S. S.; CARON, L. F. ZAMBOM, M. A. POZZA, P. C. **Incidência de contaminação no processo de obtenção do leite e suscetibilidade a agentes antimicrobianos.** Semina: Ciências Agrárias, Londrina, v. 33, n. 1, p. 403-416, 2012.

MiRANDA, J. E. C. de; FREITAS, A. F. de. **Raças e tipos de cruzamentos para produção de leite.** Circular Técnica 98. EMBRAPA, Juiz de Fora, 2009.

MÜLLER, E. E.. **Qualidade do leite, células somáticas e prevenção da mastite.** Simpósio sobre Sustentabilidade da Pecuária Leiteira na Região Sul do Brasil, v. 2, n. 2002, p. 206-217, 2002.

NAKAMURA, A. Y.; ALBERTON, L. R.; OTUTUMI, L. K. DONADEL, D. TURCI, R.; AGOSTINIS, R. O.; CAETANO, I. C. S.; **Correlação entre as variáveis climáticas e a qualidade do leite de amostras obtidas em três regiões do estado do Paraná.** Arquivos de Ciências Veterinárias e Zoologia. UNIPAR, Umuarama, v. 15, n. 2, p. 103-108, Jul./Dec. 2012.

NERO, L. A.;VIÇOSA, G. N.; PEREIRA, F. E. V. **Qualidade microbiológica do leite determinada por características de produção.** Revista Ciência e Tecnologia de Alimentos, Campinas, v. 29, n. 2,p.386-390, 2009.

NETTO, A. S.; FERNANDES, R. H. R.; AZZI, R. LIMA, Y. V. R. **Estudo comparativo da qualidade do leite em ordenha manual e mecânica.** Revista do Instituto de Ciências da Saúde, v. 27, n. 4, p.345-9, 2009.

NORO, G. **Fatores ambientais que afetam a produção e a composição do leite em rebanhos assistidos por cooperativas no Rio Grande do Sul**. Revista Brasileira de Zootecnia, v.35, n.3, p.1129-1135, 2006.

OLIVEIRA, A. A. DE; MELO, DE C. B.; AZEVEDO, H. C. **Diagnóstico e determinação microbiológica da mastite em rebanhos bovinos leiteiros nos tabuleiros costeiros de Sergipe.** Ciência Animal Brasileira, v. 10, n. 1, p. 226-230, Jan./Mar. 2009.

OLIVEIRA, C. A. F.; FONSECA, L. F. L.; GERMANO, P. M. L. **Aspectos relacionados à produção, que influenciam a qualidade do leite. Higiene Alimentar**, v.13, n.62, p.10-13, 1999.

PATÊS, N. M. S.; FIGUEIREDO, M. P. PIRES, A. J. V.; CARVALHO, G. G. P.; SILVA, F. F.; FRIES, D. D.; BONOMO, P.; ROSA, R. C. C. **Aspectos produtivos e sanitários do rebanho leiteiro nas propriedades do sudoeste da Bahia.** Revista Brasileira de Saúde e Produção Animal, Salvador, v.13, n.3, p.825-837. 2012.

PEDRICO, A.; CASTRO, J. G. D.; SILVA, J. E. C.; MACHADO, L. A. R. **Aspectos higiênico-sanitários na obtenção do leite no assentamento Alegre, município de Araguaína, TO**. Ciência Animal Brasileira, v. 10, n. 2, p. 610-617, 2009.

RESENDE, J. C.; STOCK, L. A. **Crescimento e mudanças geográficas da produção de leite no Brasil entre 2002 e 2012.** Boletim CBLeite, nº 20. Embrapa Gado de Leite. Juiz de Fora: 2014. (no prelo).

RIBEIRO JÚNIOR , J. C.; BELOTI, V. SILVA, L. C. C.; TAMANINI, R. **Avaliação da qualidade microbiológica e físicoquímica do leite cru refrigerado produzido na região de Ivaiporã, Paraná.** Revista do Instituto de Laticínios Cândido Tostes, Juiz de Fora, v. 68, n. 392, p. 5-11, May/Jun. 2013.

ROMA JÚNIOR, L. C.; MONTOYA, J. F. G.; MARTINS, T. T.; CASSOLI, L. D.; MACHADO, P. F. **Sazonalidade do teor de proteína e outros componentes do leite e sua relação com programa de pagamento por qualidade.** Arquivo Brasileiro de Medicina Veterinária e Zootecnia, v.61, n.6, p.1411-1418, 2009.

SILVA, L. C. C.; BELOTI, V. TAMANINI; OVIDIO, L.; MATTOS, M. R.; ARRUDA, A. M. C. T.; PIRES, E. M. F. **Rastreamento de fontes da contaminação microbiológica do leite cru durante a ordenha em propriedades leiteiras do Agreste Pernambucano.** Semina: Ciências Agrárias, Londrina, v. 32, n. 1, p. 267-276, 2011.

SILVA, M. A. P.; SANTOS, P. A.; LEAO, K. M. NEVES, R. B. S.; GUIMARAES, K. C.; NICOLAU, E. S. **Qualidade do leite na indústria de laticínios**. Revista do Instituto Adolfo Lutz. São Paulo,v.69, n.1, p.23-28, 2010.

SUÑÉ, R. W.; JUCHEM, S. DE O.; DAMBORIARENA, E. **Diagnóstico Preliminar da Bacia Leiteira de Pinheiro Machado**. Documentos 109. Bagé: Embrapa Pecuária Sul, 2010.

TAFFAREL, L. E.; COSTA, P. B.; OLIVEIRA, N. T. E.; BRAGA, G. C.; ZONIN, W.J. **Contagem bacteriana total do leite em diferentes sistemas de ordenha e de resfriamento.** Arquivos do Instituto Biológico, São Paulo, v.80, n.1, p.7-11, 2013.

TEIXEIRA, N. M.da S. LANA, R. P.; FERNANDES, L. O.; OLIVEIRA, A. S.; QUEIROZ, A. C.; PIMENTEL, J. J. O. **Desempenho produtivo de vacas da raça Gir leiteira em confinamento alimentadas com níveis de concentrado e proteína bruta nas dietas.** Revista Brasileira de Zootecnia, v.39, n.11, p.2527-2534, 2010.

VALLIN, V. M. BELOTI, V.; BATTAGLINI, A. P. P.; TAMANINI, R.; FAGNANI, R.; ANGELA, H. L.; SILVA, L. C. C. **Melhoria da qualidade do leite a partir da implantação de boas práticas de higiene na ordenha em 19 municípios da região central do Paraná.** Semina: Ciências Agrárias, Londrina, v. 30, n. 1, p. 181-188, . 2009.

VILELA, D.; LEITE, J. L. B.; RESENDE, J. C. **Políticas para o leite no Brasil: passado presente e futuro**. In: Santos, G. T.; Jobim, C. C.; Damasceno, J. C. SulLeite Simpósio sobre Sustentabilidade da Pecuária Leiteira na Região Sul do Brasil, 2002, Maringá. Anais... Maringá: UEM/CCA/DZO-NUPEL, 2002.

ZANELA, M. B.; FISCHER, V. RIBEIRO, M. E. R.; STUMPF JUNIOR, W.; ZANELA, C.; MARQUES, L. T.; MARTINS, P. R. G. **Qualidade do leite em sistemas de produção na região Sul do Rio Grande do Sul.** Revista Pesquisa Agropecuária Brasileira, Brasília, v.41, n.1, p.153-159,Jan. 2006.