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Physical and microbiological quality of raw milk affected by subclinic mastitis

Abstract

This thesis work was carried out in a livestock production unit in northern Veracruz. The California Test (CMT) was performed to 38 Cows Swiss breed x Cebu, with a free grazingfeed. Of which 18 samples were taken control of raw milk, 21 samples with grade 1 subclinical mastitis, 18 samples with grade 2 subclinical mastitis and 18 samples with grade 3 subclinical mastitis, all samples were collected directly from the affected room. The samples were evaluated in the ultrasonic milk analyzer (Lactoscan LA, Milkotronic Ltd, Bulgaria). The results were compared to NOM-155-SCFI2012. The statistical analysis was performed in the IBM SPSS Statistics version 21 program. In the results obtained, no difference in fat concentration was found according to the mastitis levels observed (P-0.363), the observed average was 3.03x0.17%. Difference in protein concentration was found according to observed mastitis levels (0.006). It is concluded that the physicochemical characteristics of raw milk are affected by the presence of subclinical Mastitis, especially by mishandling during mechanical milking.

Keywords: orange valence, by-products, weight gain, indubrasil, semi-stable

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Cabrera Nunez Amalia, Lammoglia-Villagomez Miguel, Rojas-Ronquillo Rebeca
Faculty of Biological and Agricultural Sciences, Universidad Veracruzana, Tuxpan, Mexico

Correspondence: Cabrera Nunez Amalia, Faculty of Biological and Agricultural Sciences of the Universidad Veracruzana, Colonia Universitaria, Tuxpan, Veracruz, Mexico, Email amacabrera@uv.mx

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Introduccion

It is important to note that worldwide, many countries consider milk production and supply as a national priority, which is why some policies for the dairy sector are in place. It is estimated that the world's population consumes about 500 million tons of milk equivalentannually in various presentations for human food. 85% corresponds to cow's milk and the rest to other species (buffalo 11%, goat 2% and others 2%). The United States and the European Union are considered the most developed countries in milk production, so their surplusesend up selling the monthe international market with large subsidies, strongly affecting the prices of the product in the global markets.[1]

In relation to milk production, measures are put in place to reduce the risks of contamination considering the feeding, management and health of livestock.[2] High quality milk should have a percentage of protein>3.2%, fat>3.5, total solids>12.2 a low number of mesophylls<50,000 UfC/mL and somaticcells<100,000 CS/mL,[3] free of inhibitors and must be ensuredtheir safety (MinProtection, Decree 616). Among the physical properties is the specific gravity ordensity, which expresses the weight of one liter of milk in kilograms; milk density in Mexico has been established to be 1,029 g/mL at 15oC.[4] Very low values, it may be due to the addition of water and very high to the lack of protein and energy.[5]

The term mastitis is used to refer to inflammation of the mammary gland regardless of the cause and is characterized by physical, chemical and usually bacteriological changes in milk, as well as pathological changes in glandular tissues.[6] The decrease in milk-per-cow production combined with the prevalence of clinical and subclinical mastitis are the main causes of economic losses.[7] Because of this disease another of the effects is the reduction in milk production, cost of treatment, disposal of infected animals, prematured eath in the longevity of animals, negative effects on body weight and penalties for the highcount of Somaticcells (CCS).[8] In tank milk, milk disposal during and after treatment and Money invested in the treatment of mastitis. In addition, it has been reported that mastitis has a detrimental effect on the reproductive development of cows specialized in milk production0[3].

The most common pathogens of mastitis are Staphylococcusaureus and Streptococcusagalactiae.[9] The source of contagionis the same gland of other cows in the stable, however, the hands of milkers can act as a source of infection of S. aureus and S. galactiae have been isolated from milk from animals with cases of subclinical mastitis.[10] The main route of transmissionis cow-to-cow when the same instruments are used to wash the glands of animals, as well as nipples and poorlydis infected milking equipment.[2] Mycoplasmabovisisless common as a cause of contagious mastitis, this causes outbreaks of clinical mastitis that do notrespond to therapy and are difficult to control.[11]

Materials and methods

It was carried out in a live stock production unit located north of Veracruz in the period from March to June 2019. The test was performed of California mastitis to 38 cows Swiss breed x Cebu, with a free grazing feed, complementing with orange silo and concentrate. Of which 18 samples were taken control of raw milk, 21 samples with grade 1 subclinical mastitis, 18 samples with grade 2 subclinical mastitis and 18 samples with grade 3 subclinical mastitis, all samples were collected directly from the affected quarter of the cow'smammary gland, which were refrigerated and transported for processing in the Laboratory. Las muestras fueron analizadas en el analizador de leche ultrasónico (Lactoscan LA, Milkotronic Ltd, Bulgaria), en el cual se determinaron los parámetros de: grasa, densidad, proteína, sólidos no grasos, pH, punto criogénico, sales y lactosa. El análisis estadístico se realizó en el programa IBM SPSS Statistics versión 21. Para comparar el grupo control con los grados 1, 2 y 3 de mastitis subclínica se calcularon las medidas descriptivas, y se realizaron las siguientes

pruebas estadísticas: se probó normalidad usando la Kolmogorov-Smirnov, las variables normales se analizaron por medio de ANOVA de un factor y las pruebas post hoc.

Results and discussion

The results obtained (Table 1) from the different grades (1, 2 and 3) of milk with subclinical mastitis and milk with out subclinical mastitis (control group) are shown below in the specifications analyzed which are: Fat, Milk-own proteins, Lactose, Solids are not (SNG), Density, pH and Salts. Fat results for milk without subclinical mastitis and milk with subclinical mastitis grade 1, 2 and 3 are shown in Chart 1. No difference in fat concentration was found according to the levels of mastitis observed (P-0.363), the observed average was 3.03 x 0.17%. For this study the average percentage of milk fat with varying degrees of mastitis was 2.7% for milk without mastitis, 3.1% formilkwith grade 1 mastitis, 3.5% for mastitis grades 2 and 2.7% for milk with mastitis grade 3 (Table 1), 2 of the values obtained are not are within the NOM155-SCFI-2012 (DOF, 2012), as the minimum fat percentage is 3%. Higher values were obtained by Romero et al.[9]

Table 1 Averages of physicomic characteristics of milk with and without mastitis

	Grado de mastitis			
	0	1	2	3
Fat	2.7	3.1	3.5	2.7
Protein	3.0	3.0	2.9	2.7
Lactose	4.5	4.4	4.3	4.1
SNG	8.2	8.1	7.9	7.4
Density	1.045	1.028	1.037	1.026
PH	6.4	6.4	6.5	6.6
Salts	0.7	0.7	0.6	0.6

Fuente: propia/2019 The average percentage of protein was 3.0% for milk without mastitis, 3.0% for milk with grade 1 mastitis, 2.9% for milk with grade 2 mastitis and 2.7% for milk with grade 3 mastitis (Table 1), values for grade 2 and 3 mastitis are below the NOM- 155-SCFI-2012. These results are below those found by Romero et al.[9] in Sucre, Colombia, which were 3.10% and 3.29% in subregion 1 and 3, but subregion 2 found a value of 2.96% similar to those in this study. Higher protein results were reported by Rodriguez et al.[8] 3.02% and 3.01 in two collecting companies, while in one company it reported 2.91%. The average density of milk with and without subclinical mastitis in different grades; milk without mastitis: 1045.8 Kg/m3, grade 1:1028.8 Kg7m^3, grade 2:1027.9 KG/m^3 and grade 3:1026.7 Kg/m^3. Of which only the result of milk without mastitis is greatertan that established by NOM-155-SCFI-2012 (DOF, 2012). While a study conducted by Romero et al.[9] in milks in 3 subregions of Colombia found higher values 1,030 g/mL. Calderón et al.[12] in milk with mastitis found an average of 1,029x0.001 in cows of different lactations and in milk without mastitis found an average of 1,032x0.001. The average pH found in this study for milk without subclinical mastitis and milk with subclinical mastitis grade 1, 2 and 3 were (6.4, 6.4, 6.5 and 6.6),[13–15] mention that the pH must be neutral (6.6), and tends to acidify by the effect of temperatures and if proper cooling is not carried out.

Conclusion

The physico chemical characteristics of raw milk are affected by te presence of subclinical Mastitis developed in the quarters of cattle, this is mainly due to inadequate handling of milkers, also the parameters may be affected by the time of year, the type of feeding that issupplied to livestock, the breed found in the Livestock Production Unit (UPP) and the lactation of the animal. The presence of subclinical mastitis significantly affects some physicochemical parameters of rawmilk, e.g. milk with grade 3 mastitis affects: fat, protein, lactose, SNG and density. They are not within the established by the Official Mexican Standard, also the subclinical Mastitis grade 2 affect slessserious tan the a forementioned, being present only in: protein, SNG, density and Ph.

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Conflits of interest

The author declares there is no conflcit of interest.

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