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Changes of buffalo milk physico-chemical parameters in a population from Cluj County

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Abstract. Given to the peculiarities of the lactating buffaloes behavior and for influencing the chemical composition and technological quality of the final products made from buffalo milk, we thought it advisable to study the main physico-chemical parameters (fat, protein, lactose and solids) from the herd of buffaloes GDG Cluj county formed from 72 buffaloes in I-VIII lactations.
Key Words: Buffalo, physico-chemical parameters, milk.

Introduction. In our country but also in some Asian countries, buffaloes are not solely breed for milk and meat production but they are also used for transport especially in households. In the context of the current issues that concern specific conditions that produce buffalo milk and is recovered by manufacturers, research objectives are oriented toward setting out the main characteristics of buffalo milk, raw material for obtaining various products (Coroian et al 2013, 2012b, 2011b). Buffalos have the ability to adapt to various difficult environmental conditions and also the rare ability to use almost all available forage resources. Buffaloes are a species with high underused potential for milk production. In order to achieve quantitative and qualitative improvement of milk production of buffaloes in Romania, several issues are demanded: improving livestock and genetic input of existing population, ensuring adequate material and technical base, improvement of breeding technology, maintenance, feeding and increase economic efficiency by operational measurements and compliance with hygiene. Lactation and milk production depend on genetic and environmental factors. The genetics are given by species, breed and individuals. Race is a factor that influences not only the quality and quantity of milk production but other important traits such as precocity, longevity and ability to convert forage. Race also affects fat and protein content (Chindriş 1998). Milking frequency affects total milk production and the amount of fat. Based on research conducted by (Velea 1990, 1992) on the morphological characteristics of the buffalo udder, he concluded a good development and growth dynamics of the udder in close correlation with milk production level/lactation obtained in control process. The quantity of milk obtained in a normal lactation has a positive correlation with some udder characteristics that illustrates the degree of its development. Milk composition is influenced by factors acting both before and after milking. If changes occur within the mammary gland, we almost certainly talking about a treatment based on antibiotic or other medication, or it is about a disease which automatically increases the milk total germ content and/or somatic cells amount (Coroian et al 2012a, 2009). Forages can also alter the normal composition of milk, but these changes are occurring less frequently (Coroian et al 2011a). The season can affect milk composition due to differences in diet in certain periods of the year (Chindriş 1998). Similar studies have been carried out by Cerón-Muñoz et al (2002) which studied factors influencing milk production and milk composition in buffaloes. Sarfraz et al (2008) studied the chemical composition of buffalo

and cow milk and observed higher values for buffalo milk and differences during acidification. Patel & Mistry (1997) studied the structural and physicochemical properties of ultra filtrate buffalo milk.

Material and Method. The biological material is constituted of buffaloes farm GDG Dej in number of 72 individuals in different lactations and raised in similar conditions of feeding. In this study we determined the amount of physical and chemical parameters of buffalo milk, fat, protein, lactose and total solids. Study of the chemical composition of buffalo milk requires scientific and technological considerations. These compounds are critical in the larger context of raw milk characteristics needed in milk industry. Physical and chemical examination has been analyzed with a Lactoscan device. Number of buffaloes under study is as follows, depending on lactation: lactation I, n=15; lactation II, n=12; lactation III, n=9; lactation IV, n=7; lactation V, n=8; lactation VI=8; lactation VII=8; lactation VIII=5.

Results and Discussion. Quality of buffalo milk is considered appropriate if the proportion of large components is within normal limits with no substitutions or additions of other substances. The composition of buffalo milk includes all necessary nutrients for human and animal organism. The compositional quality of milk is reflected by its economic, social and medical characteristics and requires careful monitoring of both, its composition and the factors of influence. Although lactating buffaloes are demanded to have a higher body resistance when compared with other females, the possibilities of intra-vital contamination of milk could be higher due to aggression of environmental factors and specific behavior of the animals on pasture and frequent well-known bathing in various unsanitary places. Buffalo milk fat varies with lactation: 7.28 % in lactation I, 7.54 % in lactation II, 7.65 % in third lactation, 7.73 % in lactation IV, 8.15 % in lactation V, 8.29 % in lactation VI, 8.54 % in lactation VII and 8.83 % in lactation VIII.

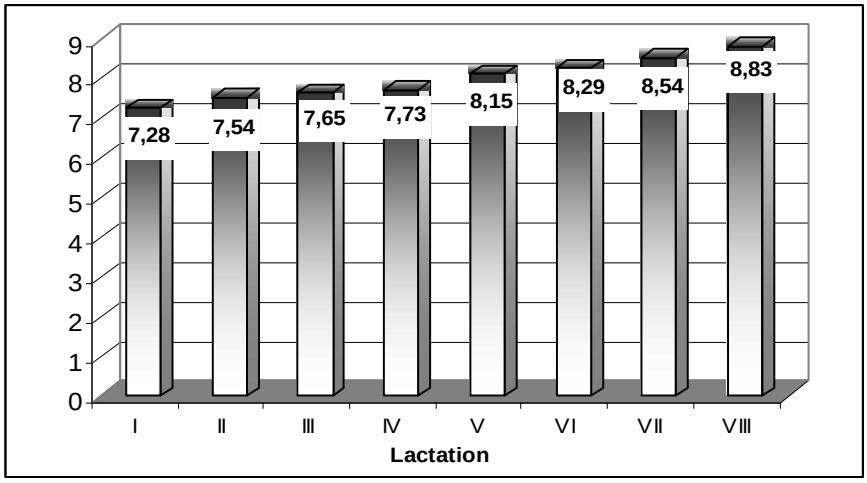

Figure 1. Average fat content according to lactations for buffaloes from GDG Dej farm.

Mean values of milk fat in buffaloes under study are higher than those reported by Cerón-Muñoz (2002). Imtiaz et al (2012) observed a higher amount of fat, protein and calcium in buffalo milk compared to cow. Casein micelles are important in dairy milk products and have an important influence on structural properties of the products. Bei-Zhong et al (2007) studied the physico-chemical characteristics of several breeds of buffaloes: Murrah breed fat (%) was 6.57 ± 1.21, 4.27 ± 0.43 for protein, 5.07 ± 0.13 for lactose, 6.53 for pH, in Nili-Ravi breed the fat value was 6.53 ± 1.28, 4.16 ± 0.20 for protein, 4.56 ± 0.10 for lactose, and 6.39 for pH.

The protein content is highest in lactation V with an average of 4.9 %. Buffalo milk protein according to lactation is shown in Figure 2. Georgescu (2000) studied Romanian buffaloes and found that the average percentage of protein in milk was 4.0 %. If we

compare these data with those obtained in Italian buffaloes (Nardone & Gibon (2000) - 4.65 % protein content) we observe a lower value for Romanian milk.

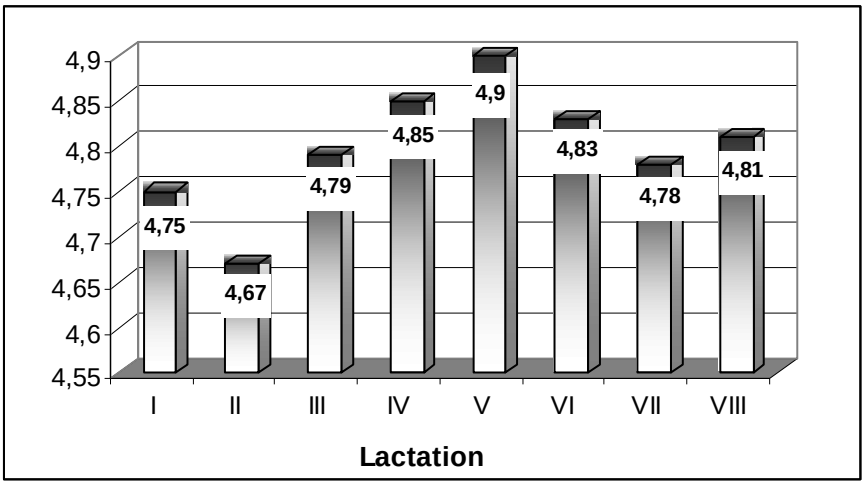

Figure 2. Average proteins content according to lactation for buffaloes from GDG Dej farm.

Aleksiev & Zahariev (1986) in a research conducted over four buffalo breed has obtained values for fat as follow: Bulgarian buffalos: 7.50 %, Bulgarian Murrah: 7.55 %, Caucasian x Bulgarian Murrah: 8.02 %. Pucheanu (2000) has established an average for fat percentage by 6.94 % and Romanian buffaloes exploited in SCPCB Sercaia achieved a percentage of <7 % fat.

Figure 3 plotted the 8 lactations studied in respect with the lactose content. The lowest values are present in lactation I with an average of 4.76 % and the highest values in lactation VIII with an average of 4.94 %.

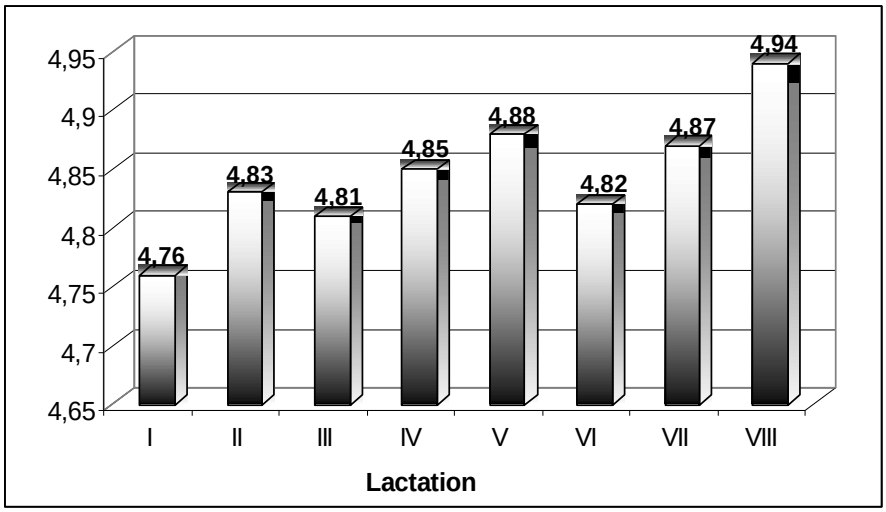

Figure 3. Average lactose content according to lactation for buffaloes from GDG Dej farm.

Total dry matter content of buffalo milk varies as follows: in first lactation is 18.02 and then slightly decreases in lactation II and further increases from lactation III to lactation VIII (Figure 4).

The average chemical composition of buffalo milk by lactations after (Velea 2006) is as follows: lactation, I: fat 7.39 %, 4.23 % protein, lactose 4.68 %, ash 0.89 %, acidity 8.28, energetic value 1110 cal/kg, average density 1032, TDM (total dry matter) 17.39 %; lactation II: fat 7.49 %, 4.62 % protein, lactose 4.65 %, ash 0.91 %, acidity

8.42, energetic value 1150 cal/kg, average density 1032, TDM 17.67 %; in lactation III: 7.81 % fat, protein 4.79 %, 4.68 % lactose, ash 0.94 %, acidity 8.46, energetic value 1180 cal/kg, average density 1033, TDM 18.22 %.

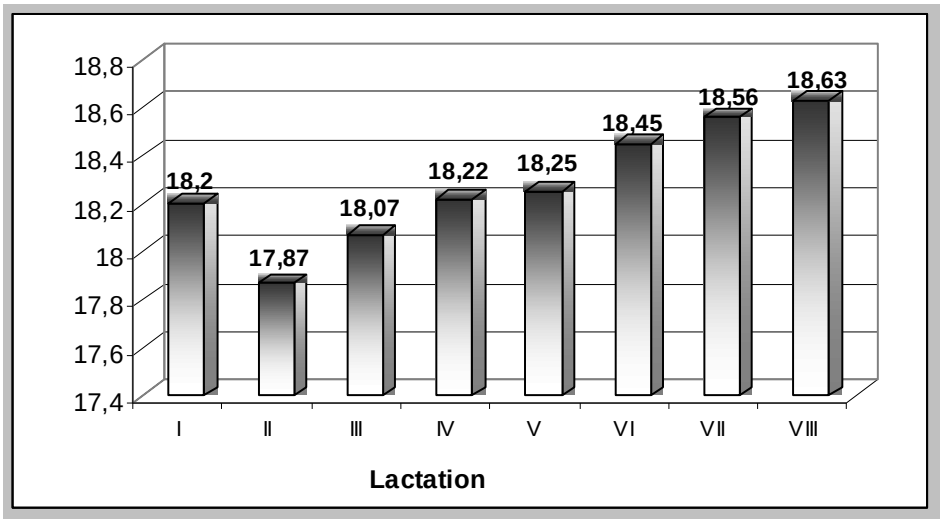

Figure 4. Average of TDM content according to lactation for buffalo milk from GDG Dej farm.

Fat percentage varies depending on the stage of lactation and milk production volume. A study of Nili-Ravi breed in Pakistan shows that the percentage of fat increased steadily from 5.5 % in the first month of lactation to 7.5 % in 10th month of lactation. The fat percentage function of the level of lactation tends to decrease from lactation I to lactation IV and then tends to increase until it reaches in VIII lactation the maximum value of 7.73 %, followed by a slight decrease with a minimum of 7.41 %. Nardone & Gibon (2000) has follow a nearly complex research study of buffalos milk made from different areas, he achieved the following average values for fat: for buffalos in Bulgaria: 5.70 %, in Italian buffalos: 8.10 %, Romanian buffalos: 7.10 %, buffalos from Egypt: 6.80 %, buffalos from Turkey: 8.70 %.

Conclusions. Buffalos from GDG farm present favorable traits for milk production. There have been initiated actions to improve the genetic performances of populations through artificial insemination with semen from bulls of Murrah breed. The livestock was found as a heterogeneous population, but there are efforts requested in technology optimization in order to achieve quantitative and qualitative milk production. The fat content has the lowest value in lactation I, namely 7.28 % after reaching the highest increase in lactation VIII at 8.83 %. The average content of protein has presented a maximum value in lactation V with an average of 4.9 % and a minimum in lactation II with an average of 4.67 %. The average content of lactose has the minimum value in lactation I of 4.7 6% and maximum in lactation VIII of 4.94 %. Total solids presented the highest values in the last three lactations, V-VIII.

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