

INVESTIGATION ON ARABIAN AND BARBE MARE'S COLOSTRUM AND MILK VARIATION

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ABSTRACT

The aim of this study was to investigate the difference between two horses (*Equus caballus*) breeds (Arabian and Barb) colostrum and milk. Both breeds are raised in the west region of Algeria in the same management conditions. A total of eight mares (3 Barbe and 5 Arabian) were used from the national Haras of Chaouchaoua of Tiaret at the west of Algeria. They were of varying ages, sizes, and with foaling dates ranging from mid February to early April. Immediately after foaling, and then weekly thereafter, milk samples were collected. Ca, Na, K, P, Triglycerides, Protein and Cholesterol were measured both in colostrums and milk. Data were analyzed statistically. In our work the levels of triglycerides in Arabian and Barbe mare's colostrums were slightly lower than in the same mare's milk. In this work, no significant differences were observed between the two breeds milk in the levels of the minerals measured.

Keywords: Mares; Arabian; Barb; milk; colostrum; minerals.

INTRODUCTION

Lactation is an important function in all mammals. It provides nutrients to the new born. Mare's milk represents the essential source of nourishment of foals during the first months of life (Potočnik et al. 2011). The richness in whey protein content of mare's milk makes it more favorable to human nutrition than cow's, sheep's and goat's milk, because of the relatively higher amount of essential amino acids (Hambraeus, 1993).

Mare's milk is characterized by high water content and low calorie content. The concentration of mare's milk components varies throughout lactation. Over the first 25 days of lactation, the serum levels of solids and protein decreases, after which the composition stabilizes. At the end of lactation the amount of protein slightly diminishes, whereas the amount of solids and fat may increase or stay the same (Pecka et al. 2012; Pagliarini et al. 1993).

The fat content of mare's milk is significantly lower in comparison with human and cow's milk. This fat contains fewer triglycerides, but it is richer in free fatty acids and phospholipids. Mare's milk consists mainly of medium chain fatty acids, human milk has high concentration of long chain fatty acids whereas cow's milk is richer in short chain fatty acids (Sheng and Fang, 2009; Markiewicz-Kęszycka et al. 2011).

As it is similar to human milk, mare's milk can be used in feeding infants. The ratio of caseins and whey proteins similar to that of human milk influences its better digestibility. Because it remains in the stomach for a shorter period of time than cow's milk, mare's milk is a much better human milk substitute in baby feeding. It is also a valuable infant food due to its lower content of mineral salts in comparison with cow's milk (Sheng and Fang, 2009; Malacarne et al. 2002).

The results of research conducted by Businco et al. (2000), showed that 96% of children observed with confirmed cow's milk allergy tolerated mare's milk. In this work we investigated the composition of some constituents in mare's colostrums and milk of Arabian and Barbe breeds raised in the west of Algeria.

MATERIALS AND METHODS

A total of eight mares (*Equus caballus*) (3 Barbe and 5 Arabian) were used from the national Haras of Chaouchaoua of Tiaret at the west of Algeria. They were of varying ages, sizes, and with foaling dates ranging from mid February to early April. Immediately after foaling, and then weekly thereafter, milk samples were collected from each udder half into sterile DHI plastic snap top vials. Samples were sent immediately to the laboratory to be analyzed for Calcium,

Sodium, Potassium, inorganic Phosphorus, Triglycerides, Protein and Cholesterol.

A halter and a lead rope were used to restrain the mares while collecting milk samples. One person was in charge of holding the mare in her stall while the other collected the milk samples. If any complications arose, the mares were placed in stocks while they were collected to ensure the safety of all parties involved.

The analysis of variance and LSD test were used to estimate the probability of the significance of statistical differences in means for milk parameters at $P < 0.05$ and $P < 0.01$ (Statistica V 5.0 PL).

RESULTS AND DISCUSSION

Table 1 presents the concentrations of minerals, triglycerides, and cholesterol and total proteins in mare's colostrums and the Table 2 presents the values of the same parameters in milk. The cholesterol and the total proteins concentrations in colostrums was significantly lower in Arabian mare's than in Barbe mare's $p < 0.05$. Those findings are in contradiction with many studies reporting that breed does not affect milk composition (Pikul and Wójtowski, 2008; Salamon et al. 2009).

In our work the levels of triglycerides in Arabian and Barbe mare's colostrum were respectively 11.95 ± 0.26 g/l and 13.72 ± 3.23 slightly lower than in the same mare's milk 14.19 ± 6.08 g/l and 14.94 ± 1.46 g/l. In this work, no significant differences were observed between the two breed's milk in the levels of the minerals measured. However the levels of all minerals were slightly higher in Barb mare's than in Arabian ones.

Mare's milk is characterized by a low content of cholesterol and high content of

unsaturated fatty acids (Malacarne et al. 2002). The mean of colostrums total protein for the two breeds, in this study, was about 57.13±33.85 g/l higher than 20.38±7.55 g/l in the mare's milk. The values of the mare's milk total proteins were average of the values reported by authors (Malacarne et al. 2002; Schryver et al. 1986).

Table 1. Concentrations of some minerals, triglycerides, cholesterol and total proteins in mare's colostrums

Component	Arabian mare's	Barbe mare's	All
Ca mg/l	567.60±34.40	582.82±102.41	573.31±61.11
Na mmol/l	22.32±12.51	33.70±13.06	26.59±13.15
K mmol/l	26.93±6.10	31.26±3.09	28.55±5.39
P mg/l	246.00±112.85	206.67±69.26	231.25±95.19
Triglycerides g/l	11.95±0.26	13.72±3.23	12.62±1.96
Cholesterol g/l	0.16±0.06*	0.42±0.18	0.26±0.17
Total Proteins g/l	36.6±18.24*	91.33±23.18	57.13±33.85

* Significant difference $P < 0.05$

Table 2. Concentration of some minerals triglycerides, cholesterol and proteins in mare's milk

Component	Arabian mare's	Barbe mare's	All
Ca mg/l	585.67±123.75	604.00±84.27	592.54±108.97
Na mmol/l	13.02±3.90	13.20±2.99	13.09±3.52
K mmol/l	18.96±3.84	19.82±2.52	19.28±3.37
P mg/l	308.33±68.18	399.33±155.19	342.46±115.03
Triglycerides g/l	14.19±6.08	14.94±1.46	14.47±4.84
Cholesterol g/l	0.04±0.04	0.02±0.02	0.03±0.04
Total Proteins g/l	19.60±6.19	21.67±9.68	20.38±7.55

* Significant difference $P < 0.05$

Ullrey et al. (1996) studied Arabian and Quarter Horse mare's milk composition and reported that protein and fat contents decrease their levels during lactation. Studies using other horse breeds demonstrated similar change patterns on milk's composition during lactation (Doreau and Boulot, 1989; Smolders et al. 1990; Solaroli et al. 1993).

Milk is generally a good source of calcium and phosphorus which are necessary for the process of bone growth and development, and also magnesium, which is needed for mineralisation of bones (Sheng and Fang, 2009). Mineral content is highest in the first week of lactation and then decreases. Due to the fact that the proportion of minerals is constantly changing in mare's milk, it is difficult to determine precisely their average concentration.

It is necessary to point out that a single sample is not representative of the whole lactation, but rather of a specific lactation stage (Schryver et al. 1986). These authors also observed a change in Ca:P ratio from 1.45:1 in the first week of lactation to 1.3:1 in the 15th –17th weeks, which is close to the optimal ratio of these elements in humans (between 1:1 and 1.3:1). In the same period Ca:Mg ratio changed from 11:1 to 16:1. The differentiation of mineral content as far as the mare's breed is concerned. The highest content of calcium can be observed in the milk of Bardigiano mares and Italian Saddle bred mares. The lowest values of magnesium and zinc were reported for Arabian mares (Pieszka and Łuszczynski 2013; Sheng and Fang, 2009). It is important to emphasize that all mares were submitted to the same nutritional plan, and it is necessary to identify variables, which may

have influenced the colostrum composition between the two groups.

CONCLUSION

In this work, the Barb mare's colostrums contained higher levels of cholesterol and total proteins than Arabian mare's and also the Barb mare's milk contained higher levels of Ca, K, P and total proteins than Arabian mare's. So we concluded that Barb mare's colostrums and milk are better than Arabian mare as a nutriment substitute.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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