

## INFLUENCE OF LACTATION ON COMPOSITION OF MARE'S MILK

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### Abstract

*Mare's milk is valuable because of its nutritional properties. It is used in human food and tartamente for various diseases. Mare milk changes its composition depending on the lactation. It has the lowest values in first and second lactation in lactating 3, the highest values. The fat content varies between 1.88 g/100 g (lactation 1) and 2.17 g/100 g (lactation 3). Milk protein varies between 1.74 g/100g (lactation 1) and 1.92 g/100 g (lactation 3). For colostrum, affecting all day postpartum physico-chemical parameters. The highest values for these parameters are within 3 days postpartum. On day 5, the low values are observed. The fat content of the colostrum varies between 2.85 g/100 g, on day 1, and 2.13 g/100 g, on day 5.*

**Key words:** mare milk, colostrum, fat, protein, lactose.

### INTRODUCTION

Mare's milk is used in food, cosmetics and medical. It is used for various diseases (tuberculosis, liver disease, gastritis, allergies) (Doreau et al., 1989; Salhanov et al., 1979; Malacarne et al., 2002). Mare's milk composition (high content of protein and globulin, essential amino acids, fatty acids) it is advisable to cancer patients, people with low immunity, heart problems, those suffering from atherosclerosis (Kharitonova et al., 1978, Mao et al., 2009; Chen et al., 2010; Jirillo et al., 2010). Studies on the milk and colostrum from the mare are: the influence of lactation on the chemical composition of mare's milk; influence on nutrient colostrum postpartum day; mare's milk benefits; caseins in milk distribution; mare's milk protein (Wells et al., 2012; Salamon et al., 2009; Mateja et al., 2014; Solaroli et al., 1993; Malacarne et al., 2000; Klemen et al., 2011). Quality, composition and production of mare milk are influenced by: feed, race, maintenance conditions, the process of milking, milk preservation and thermal

processes applied (Doreau et al., 1989; Uniacke-Lowe et al., 2010; Orlandi et al., 2003; Markiewicz-Keszycka et al., 2015; Cosentino et al., 2015; Caroprese et al., 2007). Aim of the study was to evaluate the influence of lactation and postpartum day on milk and colostrum from the mare.

### MATERIALS AND METHODS

**Sampling.** Milk was collected from a total of 5 copies per lactation. And samples were collected according to the postpartum period (day 1, 3, 5). Were studied animals breed Semigreu Românesc. It was chosen race, Semigreu Românesc because heavy breeds have a higher milk production. Sampling was performed manually in sterile containers and stored in the cold until analysis.

**Physico-chemical analysis.** Analysis of physico-chemical parameters of milk and colostrum from the mare were analyzed with the device Lactoscan S (Figures 1 and 2).

Physico-chemical parameters are analyzed milk: fat, protein, lactose, and pH. Colostrum we have examined: fat, protein, lactose, dry matter and pH.

## RESULTS AND DISCUSSIONS

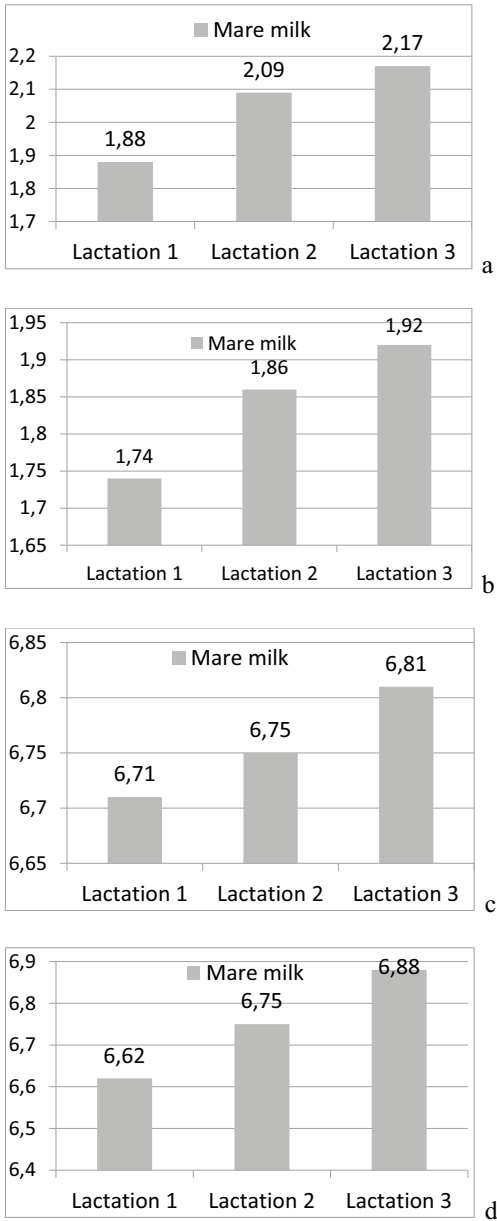


Figure 1 (a-d). Physico-chemical composition of the mare milk on three lactations: a- fat; b-protein; c-lactose; d-ph

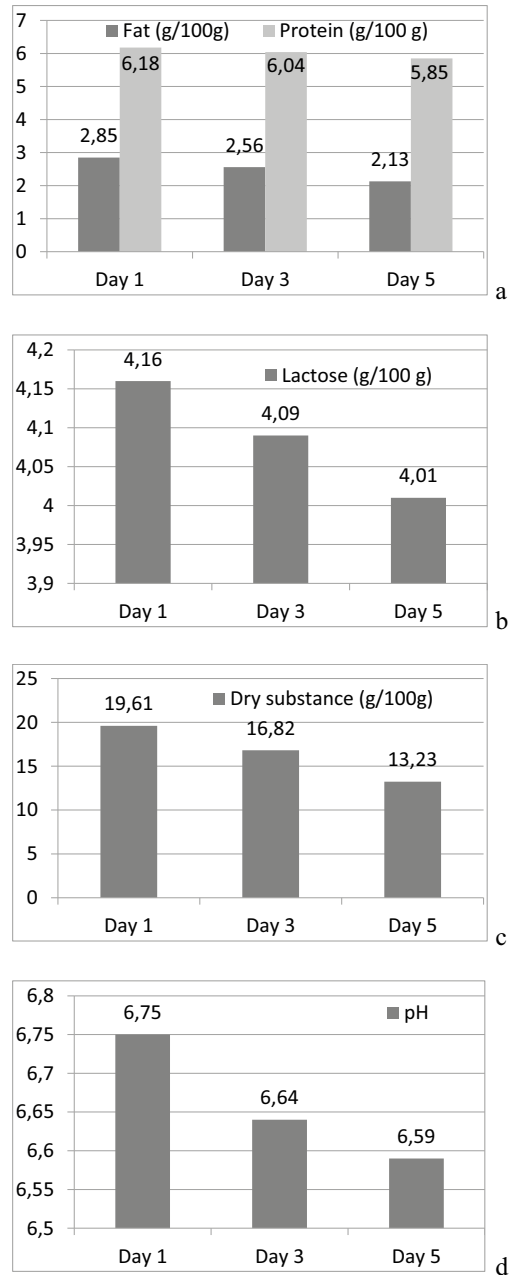


Figure 2 (a-d). Physico-chemical parameters of colostrum

Figure 2 (a-d) are given values for physico-chemical parameters of influence colostrum postpartum day (day 1, 3 and 5).

## Mare's milk

The amount of fat varies depending on the lactation stage of lactation and in increasing quantities in colostrum (Gibbs et al., 1982). The amount of the higher fat is 2.17 g/100 g, in 3 lactation. Diet influences the composition of the milk, a diet rich in fiber such oil and causes a higher fat content (Hoffman et al., 1998). The amount of protein is influenced by the properties of the month lactation and changes from one month to another (Gibbs et al., 1982). Similar values are reported for the protein of (Gibbs et al., 1982). Aspects of physicochemical parameters change depending on the time period of lactation and colostrum are reported (Ciesla et al., 2009; Oftedal et al., 1983; Pagliarini et al., 1993). Similar values for physico-chemical composition of mare's milk are reported Leaflet et al., 2012. Lactose in mare's milk varies between 6.71 g/100 g, (lactation 1) and 6.81 g/100g (lactation 3) (Figure 1, c).

## Colostrum

The fat content is influenced by the postpartum day (Figure 2a). The fat content of the colostrum is higher than milk. Similar appearance was also reported (Pikul et al., 2008). Salamon et al., 2009 reports the influence of the race on the chemical composition of colostrum according to the postpartum day. Values similar to those obtained for the colostrum are also reported by Salamon et al. (2009). The colostrum phase significantly influences the protein content in the early postpartum days (Ullrey et al., 1996). Lactose shows higher values in the early postpartum days and decreases towards the end of the colostrum (4.16 g/100g day 1 and 4.01 g/100g day 5). The dry substance in colostrum is 19.61 (g/100 g) on day 1, postpartum and 13.23 (g/100 g), 5th day postpartum.

## CONCLUSIONS

The physico-chemical parameters of colostrum show the highest values in the early postpartum days, and decrease towards the end of the colostrum. The physicochemical parameters of milk change its properties according to lactation.

## REFERENCES

- Caroprese, M., Albenzio, M., Marino, R., Muscio, A., Zezza, T., Sevi, A. (2007). Behavior, milk yield, and milk composition of machine and hand-milked Murgesse mares. *Journal of Dairy Science*, 90, 2773–2777.
- Chen, Y., Wang, Z., Chen, X., Liu, Y., Zhang, H., Sun, T. (2010). Identification of angiotensin I-converting enzyme inhibitory peptides from koumiss, a traditional fermented mare's milk. *Journal of Dairy Science*, 93, 884–892.
- Ciesla, A., Palacz, R., Janiszewska, J., Skorka, D. (2009). Total protein, selected protein fractions and chemical elements in the colostrum and milk of mares. *Archiv für Tierzucht*, 52, 1–6.
- Cosentino, C., Labella, C., Musto, M., Paolino, R., Naturali, S., Freschi, P. (2015). Effect of different physical treatments on antioxidant activity of jenny milk. *International Journal of Agricultural Sciences*, 5, 874–877.
- Doreau, M., Boulot, S. (1989). Recent Knowledge on mare milk production: A review. *Livestock Production Science*, 22, 213–235.
- Gibbs, P. G., Potter, G. D., Blake, R. W., McMullan, W. C. (1982). Milk production of quarter horse mares during 150 days of lactation. *J Anim Sci.*, 54(3), 496–9.
- Gobesso, A. O., Gonzaga, I. V. F., Taran, F. M. P., Francoso, R., Centini, T. N., Moreira, C. G., Ferreira J. R., Rodrigues, F. P., Baldi F. (2012). Influence of fat supplementation on mare's milk composition. *Forages and grazing in horse nutrition*, 132, 347–350.
- Hoffman, R. M., Kronfeld, D. S., Herbein, J. H., Swecker W. S., Cooper, W. L., Harris, P. A. (1998). Dietary carbohydrates and fat influence milk composition and fatty acid profile of mare's milk. *Journal of nutrition*, 128, 27088–27118.
- Jirillo, E., D'Alessandro, A. G., Amati, L., Jirillo, F., Pugliese, V., Martemucci, G. (2010). Modulation of human aged immune response by donkey milk intake. *Annual Meeting of Animal Production*, Heraklion, Crete Island, Greece.
- Kharitonova, I. (1978). Fatty acids and phospholipids in mare's milk. *Konevodstvo Konnyi Sport*, 12, 24.
- Klemen, P., Gantner, V., Kuterovac, K., Cividini, A. (2011). Mare's milk: composition and protein fraction in comparison with different milk species. *Mljekarstvo*, 61(2), 107–113.
- Malacarne, M., Martuzzi, F., Summer, A., Mariani, P. (2002). Protein and fat Composition of mare's milk: some nutritional remarks with reference to human and cow's milk. *International Dairy Journal*, 12, 869–877.
- Malacarne, M., Summer, A., Formaggioni, P., Mariani, P. (2000). Observations on percentage distribution of the main mare milk caseins separated by reversed-phase HPLC. *Annali Facolta di Medicina Veterinaria*, Università di Parma, 20, 143–152.
- Mao, X., Gu, J., Xu, Y. S. S., Zhang, X., Yang, H., Ren, F. (2009). Antiproliferative and anti-tumor effect of

- active components in equine milk. *International Dairy Journal*, 19, 703–708.
- Markiewicz-Keszycka, M., Czyzak-Runowska, G., Wojtowski, J., Jozwik, A., Pankiewicz, R., Leska, B., Krzyzewski, J., Strzalkowska, N., Marchewka, J., Bagnicka, E. (2015). Influence of stage of lactation and year season on composition of mares' colostrum and milk and method and time of storage on vitamin C content in mares' milk. *Journal of the Science of Food and Agriculture*, 95, 2279–2286.
- Mateja, Č., Brezovečki, A., Mikulec, N., Antunac, N. (2014). Composition and properties of mare's milk of Croatian Cold blood horse breed. *Mljekarstvo*, 64(1): 3–11.
- Ofteidal, O. T., Hintz, H. F., Schryver, H. F. (1983). Lactation in the horse: milk composition and intake by foals. *Journal of Nutrition*, 113, 2096–2106.
- Orlandi, M., Goracci, J., Curadi, M. (2003). Fat composition of mare's milk with reference to human nutrition. *Annali della Facoltà di Medicina veterinaria*, 56, 97–105.
- Pagliarini, E., Solaroli, G., Peri, C. (1993). Chemical and physical characteristic of mare milk. *Italian Journal of Food Science*, 4, 323–332.
- Pikul, J., Wójtowski, J. (2008). Fat and cholesterol content and fatty acid composition of mares' colostrums and milk during five lactation months. *Livestock Science*, 113, 285–290.
- Salamon, R. V., Salamon, S., Csapo-Kiss, Z., Csapo, J. (2009). Composition of mare's colostrum and milk I. Fat content, fatty acid composition and vitamin Contents. *Acta Univ. Sapientiae, Alimentaria*, 2(1): 119–131.
- Salhanov, B. A., Sharmanov, T. S. (1979). Treatment of patients with gastric ulcer and duodenal ulcer with the inclusion in the diet of whole camel and mare's milk. *Dissertation of the candidate of medical sciences*, Bishkek.
- Solaroli, G., Pagliarini, E., Peri, C. (1993). Composition and nutritional quality of mare's milk. *Italian Journal of Food Science*, 5, 3–10.
- Ullrey, D. E., Struthers, R. D., Hendricks, D. G., Brent, B. E. (1966). Composition of mare's milk. *Journal of Animal Science*, 25, 217–222.
- Uniacke-Lowe, T., Huppertz, T., Fox, P. F. (2010). Equine milk proteins: chemistry, structure and nutritional significance. *International Dairy Journal*, 20, 609–629.
- Wells, S., Ferwerda, N., Timms, L. (2012). Evaluation of Mare Milk Composition-Quality during Lactation. *Animal Industry Report*: AS 658, ASL R2719.