

# CHARACTERISTICS OF THE COLOSTRUM COMPOSITION OF HONAMLI GOATS

O. Elmaz<sup>1\*</sup>, F. Taşçı<sup>2</sup>, A.A. Akbaş<sup>1</sup>, M. Saater<sup>3</sup>

<sup>1</sup>Burdur Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Department of Animal Science, Burdur, Turkey

<sup>2</sup>Burdur Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Department of Food Hygiene and Technology, Burdur, Turkey

<sup>3</sup>Muğla Sıtkı Koçman University, Fethiye Agriculture Faculty, Department of Animal Science, Muğla, Turkey

## Abstract

*Honamlı goat, which is new officially registered goat breed of Turkey, has been studied for its various production and reproduction traits. In this study colostrum composition of Honamlı goat, which was the first study related on this subject. It has been investigated according to changes in the first 4 days after parturition. Samples were collected from Honamlı goats in second lactation. Composition of colostrum were evaluated in terms of fat, protein, lactose and total solids content according to successive days. Mean values of fat, protein, lactose and total solids in the first and the last days were determined as 8.39%, 10.52%, 3.74%, 22.41% and 3.27%, 6.80%, 4.93%, 15.99% respectively. While fat, protein and total solid were showing a significant decrease from the first day to the last day, lactose demonstrated a significant decrease in same period ( $P < 0.05$ ).*

**Key words:** Colostrum composition, Honamlı goat

## INTRODUCTION

Colostrum is known as an important source of nutrition in neonate ruminants secreted for approximately first 5–7 days after parturition. Even though goat colostrum is richer in fat, protein, dry matter, minerals, somatic cell count, lactic acid, and immunity molecules, it contains less lactose than goat mature milk [13, 23]. Colostrum has a main biological function in goats. It provides protection for newborn from lots of infections via immunoglobulin transfer from the dam to the newborn [15]. So, the relation between colostrum and liveability traits of newborn ruminant has been investigated [1, 6, 7]. Colostrum intake and the absorption of colostrum proteins play an essential role on newborn survival rates [24, 8].

Several factors such as the breed, health status of the mammal, time after parturition, number of lactation and litter size affect the quality and composition of goat colostrum [4, 5, 11]. Additionally, the

management towards the end of pregnancy is so important, because of colostrum secretion [7]. Various studies have been conducted about changes in the composition for different goat breed milk during lactation [10, 14, 16, 25]. But studies related to colostrum composition are not sufficient.

Until very recently, Honamlı goat is not considered as one of a native goat breed different from Turkish Hair goat. However, it has been detected as multipurpose with its different morphological and yield characteristics than Turkish Hair goat [3, 9, 10, 11, 15, 16, 22]. They are officially registered as an original goat breed in the year of 2015 [20].

The study was conducted to investigate colostrum composition (fat, protein, lactose, total solid) of Honamlı goat in Turkey. It is thought that the findings of the current study are important to characterizing the Honamlı goat.

## MATERIAL AND METHODS

### The Study Area, Animals, and Data Collection

This study was carried out in the Research and Training Farm of the Faculty of

\*Corresponding author: elmaz@mehmetakif.edu.tr  
The manuscript was received: 28.09.2021  
Accepted for publication: 15.12.2021

Veterinary Medicine in Burdur Mehmet Akif Ersoy University in Turkey. The Honamlı goats were reared under the extensive conditions. The goats were allowed for grazing and browsing for 3-4 hours in the morning and afternoon during spring and summer. They were concentrate feeding in addition to grazing and browsing during winter time. No sign of clinical mastitis was determined throughout the study.

Colostrum samples were collected from 54 Honamlı goats (the second lactation) in the first four days after parturition. The samples were placed in an icebox and immediately sent to the laboratory. All samples were analyzed by using a Bentley Combi 150 at the Central Laboratory of Burdur Mehmet Akif Ersoy University in order to determine the colostrum compositions.

Project has been approved by Burdur Mehmet Akif Ersoy University Local Ethical

Committee on Animal Experiments (7.9.2012, meeting number: 1, resolution number: 6).

### Statistical Analysis

All statistical analysis were carried out using Minitab 16.1 statistical package [18]. Variance Analysis (One-way ANOVA) was applied to data according to determine the effect of different lactation stages on colostrum composition (fat, protein, lactose and total solids). Tukey analysis was used to control the significance of differences between subgroups.

## RESULTS

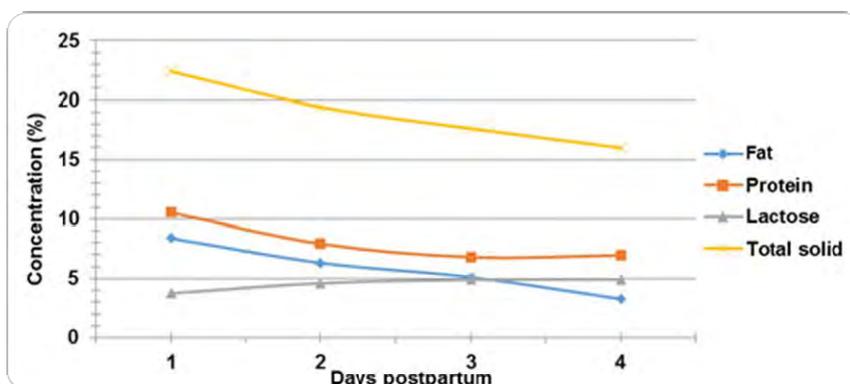
The colostrum composition (fat, protein, lactose, total solid) of Honamlı goat breed were presented in Table 1. Changes of chemical composition in Honamlı colostrum up to from postpartum to first four days are summarized in Fig 1.

**Table 1.** Colostrum composition of Honamlı goat in different days (postpartum 1<sup>st</sup> - 4<sup>th</sup> days) ( $\bar{X} \pm S_{\bar{X}}$ )

Days	(n)	Fat (%)	Protein (%)	Lactose (%)	Total solid (%)
1	17	8.39 <sup>a</sup> ± 0.80	10.52 <sup>a</sup> ± 0.1	3.74 <sup>b</sup> ± 0.28	22.41 <sup>a</sup> ± 0.86
2	15	6.31 <sup>b</sup> ± 0.49	7.92 <sup>b</sup> ± 0.74	4.61 <sup>ab</sup> ± 0.11	19.42 <sup>b</sup> ± 0.61
3	15	5.11 <sup>b</sup> ± 0.49	6.95 <sup>b</sup> ± 0.42	4.89 <sup>a</sup> ± 0.08	17.62 <sup>c</sup> ± 0.51
4	7	3.27 <sup>c</sup> ± 0.43	6.80 <sup>c</sup> ± 0.80	4.93 <sup>a</sup> ± 0.07	15.99 <sup>d</sup> ± 0.48
P		0.003**	0.006**	0.044*	0.001**
Mean	54	5.77 ± 0.55	8.05 ± 0.72	4.54 ± 0.13	18.86 ± 0.61

a,b,c: Values in the same column with different superscripts are statistically different (P < 0.05).

ns: nonsignificant (P > 0.05). \*: P < 0.05, \*\*: P < 0.01



**Fig. 1** Changes of chemical composition in Honamlı colostrum up to from postpartum to first four days

In the present study, changes were gradually observed in each component. All contents of colostrum decreased rapidly on the first day; whereas, its lactose content increased from first day to fourth day after parturition. Total solid concentration showed reduction in 4<sup>th</sup> day (15.99%) compared to its initial value (22.41%). The protein level in the colostrum was obtained as 10.52% at the 1<sup>st</sup> day, 7.92% at the 2<sup>nd</sup> day, 6.95% at the 3<sup>rd</sup> day, and 6.80% at the 4<sup>th</sup> day. The fat percentages of the colostrum on the day of 1-4 were determined as 8.39%, 6.31%, 5.11%, and 3.27%, respectively. Lactose content increased from first day (3.74%) to fourth day (4.93%) after parturition. All components of colostrum in Honamli goat were statistical significant ( $P < 0.05$ ) until 4<sup>th</sup> days post partum.

## DISCUSSION

This study provided first information about colostrum composition of Honamli goat. All contents of colostrum decreased rapidly on the first day; whereas, its lactose content increased from first day to fourth day after parturition. The findings of present study are similar with other studies [2, 19, 23].

Hadjipanayiotou [12] and Kracmar et al. [17] reported that the colostrum contained high amounts of total solid and other components in the first hours after parturition. Most of the colostrum components significantly had low levels within 24 h after parturition. These were compatible with the present study in terms of colostrum contents. Romero et al. [21] reported that the protein concentration of goat colostrum was 29.53% at 0<sup>th</sup> h, and 16.5% at 156<sup>th</sup> h after parturition. Hodulova et al. [13] explained that dry matter content of colostrum was 10 times greater in the first hours than the value reported at 132<sup>nd</sup> h. The dry matter content of colostrum was reported as 24.73% at 1<sup>st</sup> h and 14.11% at 132<sup>nd</sup> h in the same research. Sanchez-Macias et al. [23] reported higher fat and protein content and lower lactose in Majorera goats during the first days after parturition.

In the present study, the fat percentage of the colostrum decreased from the first day to fourth day. Romero et al. [21] stated that the concentration of fat was 9.53% at 0<sup>th</sup> h and 6.59% at 156<sup>th</sup> h after parturition. Hodulova

et al [13] stated that the concentration of fat was 8.88% at 1<sup>st</sup> h and 4.83% at 132<sup>nd</sup> h after parturition. On contrary, Arguello et al. [2] reported an increase for the colostrum fat proportion at postpartum 24<sup>th</sup> h, which can be explained by the fact that all the cisternal milk was removed on the first day.

Some researchers [2, 12] have indicated a high protein concentration of colostrum after birth and then a rapid decline in its concentration following initial lactation. Romero et al. [21] reported that the concentration of protein was 13.64% at 0<sup>th</sup> h and 4.33% 156<sup>th</sup> h after parturition. Hodulova et al. [13] stated that the concentration of protein was 13.46% at 1<sup>st</sup> h and 5.02% 132<sup>nd</sup> h after parturition. It was reported that the most variable component was protein concentration in goat colostrum.

In this study, lactose continued to increase until the fourth day. Several authors have also described a similar increase in lactose concentration [2, 13, 19, 21] which complies with the present study. Hodulova et al. [13] observed that the concentration of lactose in the white short-haired goats colostrum at 1<sup>st</sup> h, and 132<sup>nd</sup> h after parturition was 3.7%, and 4.63% respectively.

## CONCLUSION

This study provided first information about colostrum composition of Honamli goats. All constituents of colostrum decreased rapidly on the first day; whereas, lactose content increased from first day to fourth day after parturition. Analysed results showed that kids must have colostrum as soon as possible after birth to get the best quality of ingredients. Moreover, It is required to determine biological process of colostrum trough healthy of newborn ruminants particularly in less studied domestic ruminants such as native goat breeds.

## CONFLICTS OF INTEREST

The authors declare no conflicts of interest with respect to the publication of this manuscript.

## ACKNOWLEDGMENTS

This study was supported by the Scientific and Technological Research Council of Turkey (TÜBİTAK), Project No: 112R031.

## REFERENCES

- [1] Argüello A, Castro N, Capote J, Tyler JW, Holloway NM. (2004). Effect of colostrum administration practices on serum IgG in goat kids, *Livest Prod Sci* 90, pp. 235-239.
- [2] Arguello A, Castro N, Alvarez S, Capote J. (2006). Effects of the number of lactations and litter size on chemical composition and physical characteristics of goat colostrum, *Small Rumin Res*, 64, pp. 53-59.
- [3] Alizadehasl M, Ünal N. (2011). Some morphological traits of Kilis, Norduz and Honamlı indigenous goats breeds, *Lalahan Hay Arařt Enst Derg* 51(2), pp. 81-92.
- [4] Ahmadi M, Boldura O, Milovanov C, Dronca D, Mircu C, Hutu I, et al. (2016). Colostrum from different animal species – a product for health status enhancement, *Bulletin UASVM Animal Science and Biotechnologies* 73(1), pp. 1-7.
- [5] Bernabucci U, Basirico L, Morera P. (2013). Impact of hot environment on colostrum and milk composition, *Cell Mol Biol* 59(1), pp. 67-83.
- [6] Castro N, Capote J, Alvarez S, Arguello A. (2005). Effects of lyophilized colostrum and different colostrum feeding regimens on passive transfer of immunoglobulin G in Majorero goat kids, *J Dairy Sci* 88(10), pp. 3650-3654.
- [7] Castro N, Capote J, Bruckmaier RM, Arguello A. (2011). Management effects on colostrumogenesis in small ruminants: a review, *J Appl Anim Res* 39(2), pp. 85-93.
- [8] Danielsen M, Pedersen LJ, Bendixen E. (2011). An in vivo characterization of colostrum protein uptake in porcine gut during early lactation, *J Proteomics* 4(1), pp. 101-109.
- [9] Elmaz Ö, Saatçı M, Mamak N, Dağ B, Aktaş AH, Saatçı M. (2012). The determination of some morphological characteristics of Honamlı goat and kids, defined as a new indigenous goat breed of Turkey, *Kafkas Univ Vet Fak Derg* 18(3), pp. 481-485.
- [10] Güzeler N, Say D, Kaçar A. (2010).
- [11] Hernández-Castellano LE, Almeida AM, Castro N, Argüello A. (2014). The colostrum proteome, ruminant nutrition and immunity: A review, *Curr Protein Pept Sc* 15, pp. 64-74
- [12] Hadjipanayiotou M. (1995). Composition of ewe, goat and cow milk and of colostrum of ewes and goats, *Small Rumin Res* 18, pp. 255-262.
- [13] Hodulova L, Vorlova L, Kostrohounova R. (2014). Dynamical changes of basic chemical indicators and significant lipophilic vitamins in caprine colostrum, *Acta Vet Brno* 83, pp. 15-19.
- [14] Keskin M, Afşar YK, Biçer OB, Güler MB. (2004). A comparative study on the milk yield and milk composition of two different goat genotypes under the climate of the Eastern Mediterranean, *Turk J Vet Anim Sci* 28, pp. 531-536.
- [15] Kramer MS, Chalmers B, Hodnett ED, Sevkovskaya Z, Dzickovich I, Shapiro S. et al., (2001). Promotion of breast feeding intervention trial (PROBIT) - A randomized trial in the Republic of Belarus, *JAMA J Am Med Assoc* 285(4), pp. 413-420.
- [16] Koşum N, Taşkın T, Kınık Ö, Kandemir Ç, Akan E. (2018). A study on the change in postpartum immunoglobulins of goats and kids, *J Anim Prod* 59(1), pp. 1-8.
- [17] Kracmar S, Kuchtik J, Baran M, Váradyová Z, Kráčmarová E, Gajdůšek S, et al. (2005). Dynamics of changes in contents of organic and inorganic substances in sheep colostrum within the first 72 h after parturition, *Small Rumin Res* 56, pp. 183-188. Compositional changes of Saanen x Kilis Goats' milk during lactation, *Gıda* 35(5), pp. 325-330.
- [18] Minitab. (2011). 16.1.1 for Windows, Minitab Inc State College, PA, USA
- [19] Moreno-Indias I, Sanchez-Macias D, Castro N, Morales-delaNuez A, Hernández-Castellano LE, Capote J, et al. (2012). Chemical composition and immune status of dairy goat colostrum fractions during the first 10 h after partum, *Small Rumin Res* 103, pp. 220-224.
- [20] Official Gazette of Turkish Republic. (2015). Communiqué on the registration of national animal breeds and lines, Turkey: National Official Gazette No: 2015/43, No: 29535, <http://www.resmigazete.gov.tr/eskiler/2015/11/20151117-13.htm>, Accession date; 15.12.2018
- [21] Romero T, Beltran MC, Rodriguez M, Marti De Olives A, Molina MP. (2013). Short communication: Goat colostrum quality: Litter size and lactation number effects, *J Dairy Sci* 96, pp. 7526-7531.
- [22] Saatçı M, Elmaz Ö. (2017). Honamlı, newly registered special goat breed of Turkey, In: Simões J, Gutiérrez C, editor(s), *Sustainable Goat Production in Adverse Environments: Volume II, Local Goat Breeds*, Cham: Springer pp. 131-146.
- [23] Sanchez-Macias D, Moreno-Indias I, Castro N, Morales-Delanuez A, Argüello A. (2014). From goat colostrum to milk: Physical, chemical, and immune evolution from partum to 90 days post partum, *J Dairy Sci* 97, pp. 10-16.
- [24] Stelwagen K, Carpenter E, Haigh B, Hodgkinson A, Wheeler TT. (2009). Immunocomponents of bovine colostrum and milk, *J Anim Sci* 87(13 Suppl), pp. 3-9.
- [25] Yakan A, Özkan H, Şakar AE, Ateş CT, Ünal N, Koçak Ö, et al., (2019). Milk yield and quality traits in different lactation stages of Damascus goats: Concentrate and pasture based feeding systems, *Ankara Üniv Vet Fak Derg* 66, pp. 117-129.