

The Milk Biochemical Parameters and Sucking Behaviour of Lambs until 35 d of Age

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The object of the experiment was to investigate the effect of lactation weeks on sucking behaviour and milk biochemistry until 35 d of age and find the correlations between sucking parameters and biochemical milk components. Ten Karayaka male lambs were used in the present studies. Sucking parameters of each lamb were observed at 7, 14, 21, 28 and 35 d of age. It was found the significant differences in fat levels of milk between first and last three periods of experiment. Urea-N and protein levels of milk were stable throughout the study. Milk intake of lambs declined ($p < 0.05$) significantly as the lamb age increased from 7 to 14 d. There were significant differences between first and last three periods in median duration of sucking bouts of lambs ($p < 0.05$). Total duration of sucking bouts of lambs decreased ($p < 0.05$) significantly as the lambs increased from 7 to 14 d. The number of sucking bouts gradually declined from 7 to 35 d and the differences between 7 and all other d are significant ($p < 0.05$). Median duration of sucking bouts was significantly correlated with milk intake ($r = 0.33$, $p < 0.05$) and milk fat ($r = 0.29$, $p < 0.05$). There was a significant correlation ($r = 0.29$, $p < 0.05$) between total duration of sucking bouts and milk intake. The urea-N and protein in milk have no significant effect on lamb sucking behaviour.

Key Words: Milk, Biochemical parameters, Sucking behaviour, Lamb.

INTRODUCTION

As lambs depend on maternal milk during the first weeks after birth, the knowledge of factors affecting milk intake is important. Sucking behaviour and effective factors on these behaviour parameters are important in the acquisition of milk by offspring. One poorly understood factor for milk yield and components is the sucking behaviour¹. For a successful rearing, it is necessary to understand the sucking behaviour and many studies have been done on sucking behaviour of domestic animals²⁻⁴. Understanding the relationships between milk biochemical components and sucking behaviour is a major importance to the sheep industry because the milk and components of it influence the rearing of offspring.

This study was aimed to investigate the effect of lactation weeks on sucking behaviour and milk biochemical components until 35 d of age. It was also tested the relationship between sucking behaviour and milk parameters.

EXPERIMENTAL

Ten Karayaka male lambs were used in this study. The lambs were maintained with mothers during experimental period. The lambs were removed from their dams and housed in a separate pen for 12 h period before observation days and between morning and afternoon observations. Observation on sucking behaviour of each lamb was conducted at 7, 14, 21, 28 and 35 d of age after the birth of the lamb. On observation days, the observer walked slowly past the front of each pen from a distance of 4 m and recorded lamb number and sucking behaviour of it. Sucking parameters of lambs were recorded twice daily at 08:00-10:00 and 16:00-18:00 h. The behaviour of each lamb was observed for a period of 15 min in both morning and afternoon observations⁵ for normal lambs suck milk from mother in *ca.* 15 min.

The sucking parameters in Table-1 represent the mean of the morning and afternoon observations. The data recorded during 15 min observation session were as follows:

Sucking bout: The sucking bouts are considered successful sucking movements and were timed to the nearest second for the duration of time during which lambs pull at or are in contact with the udder. A sucking bout was considered successful when the lambs' nose was in contact with a female udder⁶ for at least 5 s.

Total duration of sucking bouts: Cumulative duration of sucking bouts throughout the 15 min observation time. This may include one or several sucking bouts.

Number of sucking bouts (Frequency of sucking): A sucking bout consisted of lamb sucking one or more teats at the udder of the dam.

The difference between pre- and post-sucking weights was defined as milk intake. To determine milk composition, samples were obtained on the 7, 14, 21, 28 and 35 d of lamb age by hand-milking before allowing the lambs to nurse. Milk samples were composites of milk collected at consecutive morning and afternoon. The samples were collected into plastic vials preserved with micro tabs, stored at 4°C until analyzed for determination of urea nitrogen (Urea-N), total protein and fat. An enzymatic (urease and glutamate dehydrogenase) colorimetric method (Boehringer-Mannheim) was used to determine of Urea-N. The total protein of the milk was determined by Kjeldahl method ($N \times 6.38$). The milk fat was determined by Roese-Gottlieb Method⁷.

Comparisons were done by using Duncan test with help of the SPSS. Correlations between all traits were obtained using Person correlation coefficients⁸.

RESULTS AND DISCUSSION

Weekly intake, fat, urea-N and protein in milk were presented in Table-1. There was a decline of milk intake from 379 g/d for first week to 334 g/d at 28 d and thereafter a gradual increase to 349 g/d at 35 d of study. It was found the significant differences in fat levels of milk between first and last three periods of experiment. The milk fat was secreted at its highest rate at the start of lactation and then declined until last of experiment. This conclusion is in agreement with the observation in same breed that the fat content of sheep milk reaches peak level at the start of lactation then decline⁹ until 3rd weeks. The highest level of milk fat is usually observed in ruminants at the beginning of the lactation¹⁰. During the days of observation, urea-N and protein levels of milk remained essentially unchanged (Table-1). Milk components of Karayaka sheep in this study are consistent with normal values for sheep observed by Koneko and Cornelius¹¹.

TABLE-1
SUCKING BEHAVIOURS AND MILK COMPONENTS DURING STUDY

| | Periods (d) | | | | |
|--------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | 7 | 14 | 21 | 28 | 35 |
| Median duration of sucking bouts, S* | 41.7 ± 3 ^a | 35.1 ± 4 ^{ab} | 30.7 ± 3 ^b | 30.4 ± 3 ^b | 31.4 ± 3 ^b |
| Total duration of sucking bouts, S* | 317.6 ± 32 ^a | 226.4 ± 34 ^b | 187.6 ± 32 ^b | 178.9 ± 22 ^b | 184.2 ± 23 ^b |
| Number of sucking bouts | 7.5 ± 0.3 ^a | 6.3 ± 0.5 ^b | 5.9 ± 0.3 ^b | 5.9 ± 0.4 ^b | 5.8 ± 0.3 ^b |
| Fat (%) | 6.5 ± 0.2 ^a | 5.9 ± 0.3 ^{ab} | 5.6 ± 0.3 ^b | 5.5 ± 0.2 ^b | 5.4 ± 0.2 ^b |
| Protein (%) | 5.6 ± 0.1 | 5.4 ± 0.9 | 5.5 ± 0.9 | 5.3 ± 0.1 | 5.3 ± 0.2 |
| Urea-N (mg/dL) | 10.2 ± 1.2 | 8.5 ± 0.6 | 9.2 ± 0.5 | 9.0 ± 0.5 | 9.1 ± 0.6 |
| Milk intake (g/d) | 379 ± 5.2 ^a | 343 ± 10 ^b | 339 ± 7.7 ^b | 334 ± 17 ^b | 349 ± 13 ^{ab} |

*S: Second. Means followed by different letters differ significantly at $p < 0.05$.

Median duration of sucking bouts decreased as the age of lamb increased from 7 to 28 d (Table-1) with significant differences between first and last three periods ($p < 0.05$). Total duration of sucking bouts of lambs decreased ($p < 0.05$) significantly as the lambs increased from 7 to 14 d of age. The number of sucking bouts gradually declined from 7 to 35 d of age (Table-1) and the differences between 1st week and all other weeks of age are significant ($p < 0.05$). The number of sucking bout (frequency) and the duration of sucking decreased with the age of the lambs¹². The result on differences in sucking behaviour between days of study has been

reported in a similar study on goats³. In this study, milk intake and milk fat changes were parallel with sucking behaviour changes during days of research. The parallel shifts of all sucking behaviour as a function of changes in milk yield and fat were observed during the periods. Milk intake of lambs declined ($p < 0.05$) significantly as the lamb age increased from 7 to 14 d. Milk intake depends on frequency and duration of sucking and rate of milk withdrawal at each sucking period¹³. Frequency and duration of sucking bout decrease with declining milk intake¹⁴.

In present studies, a general pattern of sucking activity was found, showing that total duration and number of sucking bouts decrease with age. This is in agreement with the findings of Day *et al.*¹⁵ for cows. In present studies, it was shown that sucking behaviour of lambs varied with milk intake at various weeks of study.

TABLE-2
CORRELATION COEFFICIENTS BETWEEN EXPERIMENTAL DATA

| | Milk | | | |
|----------------------------------|--------|-------|---------|--------|
| | Intake | Fat | Protein | Urea-N |
| Median duration of sucking bouts | 0.33* | 0.29* | NS | NS |
| Total duration of sucking bouts | 0.29* | NS | NS | NS |
| Number of sucking bouts | NS | NS | NS | NS |

* $p < 0.05$, NS: Not Significant.

Median duration of sucking bouts was significantly correlated with milk intake ($r = 0.33$, $p < 0.05$) and milk fat ($r = 0.29$, $p < 0.05$). There was a significant positive correlation between total duration of sucking bouts and milk intake ($r = 0.29$, $p < 0.05$). Overall, there was a positive correlation between sucking behaviour and milk intake¹⁶. The milk fat has an obvious effect on sucking duration of infant because of high energy of it¹⁷. Milk fat constitute approximately 60 % of total energy content of milk¹⁸ and it is one of the major nutrients in milk and is a key source of body adipose and energy to the sucking young animal¹⁹. Some researchers reported that there is a positive correlation between energy intake and growth rate of young animals^{20,21}. Therefore, it is an expected result that sucking parameters are affected by growth rate of animal²².

Although milk fat has a major effect on median duration of sucking bouts, other biochemical parameters in milk have no significant effect on sucking parameters of lambs. The milk fat as a function of its own high energy density may be effective factor on median duration of sucking bouts. In general, it is apparent that the effects of milk fat and milk intake on total duration of sucking are similar to those that have been examined in babies²³.

Further studies during early lactation will help to clarify the relationships between lamb sucking behaviour and milk parameters. In addition, this study demonstrated that the sucking behaviour of lambs may represent an effective alternative model to know the alterations of some biochemical parameters such as fat in milk during sucking period.

ACKNOWLEDGEMENTS

This study was funded by DIMES Ltd. The author would like to thank Mr. Ali Riza Diren and Mr. Koray Suner for technical and financial help in conducting the experiment.

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