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Endocrines in Sheep by Machine Milked and Nursed in Early Lactation

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Abstract: Plasma concentrations of prolactin and cortisol were compared in twelve Native Karayaka sheep milked by machine versus nursed in early lactation. Sheep were divided into two groups. One group was machine milked; the other group was nursed without milked. The experiment was carried out first 30 day of lactation. Blood samples were taken at the end of the study and were assayed for hormones. Similar prolactin and cortisol were released in groups. There were no significant differences the plasma prolactin, cortisol and milk yields between groups. In early lactation period of Karayaka sheep there were no significant correlations among body weight, milk yield plasma prolactin and cortisol. Present data show that machine milking and nursing in sheep results stabled release of prolactin and cortisol in early lactation.

Key words: Machine milking, nursing, sheep, endocrines

INTRODUCTION

A hormone is a chemical produced in the body that interacts with a receptor in a target tissue to cause a change in the function of that tissue. There are various types of hormones in the body and include the endocrine hormones. Hormones control a number of essential functions in the body, including growth, development and milk synthesis. In all cases endocrine hormones function as signaling molecules in a manner parallel to the nervous system. Whereas the nervous system functions to communicate quickly, the endocrine system employs hormones to tell cells and tissues throughout the body how to behave over more prolonged periods of time. Prolactin stimulates the development of the mammary glands and the production of milk. It is also involved in the metabolism of fats and carbohydrates. Cortisol (a glucocorticoid) raises the level of glucose in the blood by stimulating the liver to produce glucose from stored non-carbo hydrate sources such as proteins and lipids and to release it into the blood. Glucocorticoids are produced in response to stress [1-3]

Machine milking of lactating cows results in the release of prolactin and cortisol[4-6]. The physiological significance of the milking induced secretion or release of prolactin and cortisol in ruminants is not known. Reducing the circulating concentrations of prolactin does not interfere adversely with an established lactation in cattle[7,8]. However, the quantity of prolactin released at milking is positively correlated with milk production[9].

The type of stimulation during milking seems to be related to milk fat production[10] whether the endocrine response induced by milking is influenced by the type of stimulation is not known. The purpose of the present study was to determine whether there was a difference in the hormonal release patterns of prolactin and cortisol when comparing machine milking to nursing in sheep in early lactation period.

MATERIALS AND METHODS

In this study, 2 years old 12 long-thin tail Karayaka ewes selected from a raiser flock were used. At the beginning of the study the sheep were numbered with ear tags and equally (six sheep per group) distributed into Machine Milking (MM) and Nursing (N) groups having similar live weights (56.55 vs 55.44 kg). During the study, sheep in two groups were offered either the mixed ration in a single feed bunk. Nutrient contents of feed materials in ration were given in Table 1. Sheep were fed a diet containing 135.1 g kg^{-1} crude protein and 2.31 ME kcal kg^{-1}. The composition of the ration for sheep was based on the nutritional requirements for lactating sheep[11]. Crude protein (CP) (Kjeldahl-Nx6.25) of feed sources was determined by AOAC procedures. Metabolizable energy (ME, Mcal/kg), Ca and P of feeds calculated from feed composition tables[11].

The N group lambs suckled twice daily in their mother's pen and during the experiment period. The experiment continued 30 days after parturition. All lambs single males and housed separated rooms without their mothers. Milk consumed by the lambs of N group was

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Table 1: Composition of the feed materials

Ingredients	Percentage	ME Mcal kg^{-1}	CP(%)	Ca(%)	P(%)
Barley	53.00	2.60	10.87	0.07	0.42
Wheat bran	20.50	2.30	14.69	0.15	0.32
Sun flower meal	14.00	2.01	28.77	0.40	1.25
Lentil straw	10.00	1.80	7.05	1.20	0.20
Marble powder	1.5	-	-	37.00	-
NaHCO	1.00	-	-	-	-
Total	100	2.31	135.1	0.80	0.48

measured twice daily by weighing the lambs before and after suckling. Milk yield was measured twice daily for both of group. Time of milking and nursing was between 0830 and 0930 and between 1600 and 1700. The MM ewes were milked with portable machine which has two milking unit (Alfa Laval). Pulsation rate was 120 min^{-1}, with a milking to massage phase ratio of 60:40 and a vacuum level of 45 kPa[12]

The blood samples were collected from each animal by disposable syringe through vein and were placed in heparin zed tube. Then the samples were centrifuged at 3500 rpm for 5 min. The plasma obtained in each tube was separated and immediately frozen to –40°C until it was analysed. The following techniques were used to determine the biochemical parameters: plasma levels of cortisol were determined using kits (Diagnostic products Corp., LA, CA), and prolactin was assayed by the method of Butler *et al.*[13]

The data concerning milk yield, live weight, plasma cortisol and prolactin were assessed by Analysis Of Variance (ANOVA) and were compared by Independent Samples *t*-test with the help of the SPSS *et al* [14] .

RESULTS AND DISCUSSION

Table 2 shows insignificant differences between MM and N sheep with respect to live weights, milk yields, plasma prolactin and cortisol levels of groups. Plasma prolactin and cortisol levels of MM and N sheep were found 45, 46 ng mL^{-1} and 59, 58 ng mL^{-1}. Live weights and milk yields of MM and N sheep were 58.57, 56.01 kg and 526.43 and 545.63 g d^{-1}, respectively.

Plasma prolactin and cortisol levels did not differ between two groups. Lupoli[15] reported that significant increases in prolactin and decrease in cortisol were found during suckling and different hormonal patterns were triggered in the cows by suckling and milking. But, according to report from Marnet and Negrao[16] , in ewes plasma prolactin and cortisol were similar during suckling and milking. This expression supported our findings that there were no significant differences in plasma prolactin and cortisol in sheep.

No difference was found in milk yields between groups. Nevertheless, non-significant ($p>0.26$) trend was found for high yield in the N group. Abu ishmais *et al.*[17]

Table 2: Prolactin and cortisol in plasma and live weights and milk yields of groups

	Groups		
Parameters	MM	N	P
Prolactin ng mL^{-1}	45±0.5	46±0.4	0.37
Cortisol ng mL^{-1}	59±1 0	58±6	0.92
Live weight (kg)	58.57±1.34	56.01±0.68	0.120
Milk yield g/d^{-1}	526.43±8.50	545.63±13.	610.260

Table 3: The correlations among experimental data

	Prolactin	Cortisol	Milk yield	Live weight
Prolactin	-	0.66^{NS}	0.54^{NS}	0.86^{NS}
Cortisol	0.66^{NS}	-	0.20^{NS}	0.21^{NS}
Milk yield	0.54^{NS}	0.20^{NS}	-	0.42^{NS}
Live weight	0.86^{NS}	0.21^{NS}	0.42^{NS}	-

NS:Not Significant

reported that nursed ewes had greater milk production compared with milked ewes (non-nursed). But in our study suckling lambs were not housed with their mothers during experiment unlike other researches[18,19] and they could be nursed by their mom only twice daily. The reason of similarity in milk yields of groups might be diversity of suckling method (twice daily without milking) when compared with before nursing studies. A study by Costa[20] found no evidence that calf suckling increased milk yields.

Nevertheless, he reported that suckling may still be recommended for the cows that have an aggressive behaviour during milking. According to reports from Holand *et al.*[21] , machine milking did not significantly alter milk yield when compared with nursing. But some breeds of sheep machine milked have a disproportion decline in milk yield[22] . Partington *et al.*[19] reported that ewes were suckled had higher milk yield than ewes by machine milked. Milk yields of Karayaka sheep in the study, were found higher than before studies. It was reported that Karayaka sheep produced 350-400 g d^{-1} milk during 120-130 day of lactation in conventional farming[23-25]. During the early lactation after lambing the non restricted intake of feed materials can be increased to milk production of Karayaka sheep in this study. Sheep offered feed materials ad libitum is based on attening high milk production during the indoor feeding period. However, the results in this study showed early lactation performance (after parturition), but the results of others appertained to lactation period then weaning. There were not found studies on milk yields in early lactation of Karayaka sheep. Therefore, we could not compare our results with others.

As shown the Table 3, no significant correlation was found among experimental data.

Lupoli *et al.* [15], showed that there were no correlation between plasma prolactin and cortisol. In other study, no correlation was found between the average concentration of prolactin released during early lactation and the

average milk yield of the goats[26]. In contrast Lacasse *et al.*[27] , in the study it was not found a positive correlation between prolactin and live weight. De Braganca *et al.*[28] announced that the concentrations of cortisol were positively correlated with body weight during lactation. But we could not find any correlation between plasma cortisol and body weight. Because in our study, body weights of all ewes were similar. In early lactation stages of cows there were no significant correlation between plasma cortisol and milk yield[29] . This report was consistent with Present findings on correlation between plasma cortisol and milk yield.

CONCLUSIONS

In this study, we were not found significant differences the plasma prolactin, cortisol and milk yields between groups. In early lactation period of Karayaka ewes there were no significant correlation between experimental data.

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