

Lactation Performance and Suckling Lamb Growth of Kermani Fat-Tailed Ewe

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Abstract: Lactation performance of 3, 5 and 6-year-old ewes from 55 Kermani fat-tailed sheep (a native breed in Iran); giving birth to single lamb and their suckling lamb growth was studied. Milk production during the suckling period (14 weeks) was determined by a combined lamb-suckling and hand milking and daily milking from weaning to end of lactation. Average lactation length was 15 weeks (103±1 days). Daily milk yield and total milk yield during the suckling and post-weaning periods averaged 610 g and 62 kg, respectively. Udder dimensions were measured at 2 weeks parturition. The effect of ewe age, birth weight of lamb, sex, udder depth and width was significant on milk yield ($p < 0.01$). Udder depth ($r = 0.38$) and udder circumference ($r = 0.38$) at 2 weeks postpartum had the highest correlation ($p < 0.01$) with lactation yield. Effect of ewe age and sex of lamb also was significant on daily gain and weaning weight. The lambs of 6-year-old ewes have the highest growth but the lambs of 3 year old ewes had the lowest growth. It was concluded that milk yield and lamb growth in this breed are somehow the same as the other Iranian breeds, that can be because of genetically and natural conditions.

Key words: Lactation performance, udder dimensions, suckling lambs growth, Kermani sheep

INTRODUCTION

Sheep are used commercially for milk and meat production in several countries. Milk of sheep is widely used in the Asia and Europe for making hard and soft cheese, yoghurt and other dairy products. Milk composition is very important because it affected the quality and determines ratio processed products milk. Sheep milk production is mainly confined to Near East countries and southern and central Europe. Asia and Europe together produce 90% of total milk from sheep (Ploumi *et al.*, 1998).

Sheep milk is used for lamb feeding and for human consumption as fresh milk or processed dairy products. Milking is generally practiced after a reasonably long period of lamb suckling and plays an important role in the dietary balance of the population (Gatenby, 1986).

Sheep are multipurpose animals in Iran and are reared for meat, wool and milk production. Although, sheep population in Iran is amongst the largest in the world (Izadifard and Zamiri, 1998). Zare Shahneh *et al.* (2005) reported milk production of 2 Iranian breed of Shall and Zandi. Safari (1993) measured milk production of the Makui breed by oxytocin and hand milking methods. Milk production of Mehraban and Ghezal (Izadifard and Zamiri, 1998) Varamini (Zare Shahneh and Nehzati, 2001) and Sangsari (Monem *et al.*, 1991) sheep has also been studied.

Milk production is in peak on second until 4th week and gradually decreases. Milk production decreases immediately after weaning.

The main objectives of the present investigation were, to study lactation performance of Kermani sheep during the lactation period, to determine correlations of milk yield with udder measurements (circumference, length, width and depth) at 2 weeks postpartum and estimating production potential in this fat-tailed Iranian breed.

MATERIALS AND METHODS

This experiment was carried out at the Sheep Research Station in Shahrabak. Lactation performance was investigated in 3 ($n = 19$), 5 ($n = 18$) and 6 year old ewes ($n = 18$) of the Kermani sheep. Ewes were randomly selected from those which had given birth to single lambs.

The general managerial procedure is that the flocks are shepherded to the nearby grazing areas. Supplementary feeding was provided in the form of alfalfa hay, straw and 300 g barley grains for each ewe, during the last trimester of gestation but during the first 2 months of lactation each ewe received 500 g.

During the suckling period, milk production was measured weekly for 15 weeks starting on day 3 postpartum. Daily milk production was estimated over a 3 continuous 8 h periods within a particular day, employing

a combined lamb suckling-hand milking technique (Izadifard and Zamiri, 1998). Lambs and ewes were separated at 8 am. At 2 pm, each ewe was milked by hand, in the presence of her lamb. The lamb was allowed to suck the dam after hand-milking. The actual recording started 8 h later at 10 pm. The ewe was hand milked, near the lamb, for about 3 min and the hand milk was weighed (± 1 g) (hand milk). The lambs was allowed to suck the ewe for 15 min after which it was reweighed (± 10 g) for calculation of the amount of milk consumed by the lamb (suckled milk). The sum of milk obtained by hand and that suckled by the lamb was taken as the milk yield for the first 8 h period. Ewe and lamb were then separated for 8 h and the above procedure was repeated at 6 am, the following day, to measure the milk yield for the second 8 h. Lamb and ewe were again separated for another 8 h and the third 8 h milk recording was started at 2 pm. The sum of milk yield for the three 8 h periods was taken as total milk yield for each test day. Lambs were carefully observed between weightings. On occasions when a lamb urinated (and) or defecated, the amount of urine was estimated and faeces were collected and weighed for calculation of the suckled milk. After weaning, the ewes were hand-milked daily but their milk production was measured every other day, until production dropped to 100 mL or less per day.

Udder circumference and length, depth and width of the udder were measured at 2 weeks postpartum. Circumference and length of each teat was also determined.

Statistical analysis of milk yield, lactation length, milk composition lamb weight gain, udder measurements was performed by using liner model of the GLM procedure of SAS (1986) in a model which included ewe age (3, 5 and 6 years), lamb sex and various interactions, lamb weight-gain and lamb weight-weaning as covariate. Correlation coefficients were calculated and regression equations of total milk yield (calculated for whole lactation) on udder measurements were determined using the Forward method.

RESULTS AND DISCUSSION

Milk production peaked around the third week of lactation and decreased thereafter. Milk production was decreased immediately after weaning. The sharp decrease in milk production after weaning was due to removal of suckling stimulus (Labussiere, 1988). The shape of the lactation curve (Fig. 1) was quite similar to that for most breeds, (Shahneh *et al.*, 2005; Shahneh and Nehzati, 2001). Table 1 shows parameters of lactation performance in sheep. Mean lactation length was 103 days. Mean lactation yield was 62.00 kg and daily yield was 610 g.

Table 1: Lactation performance of kermani fat-tailed ewe (X \pm SEM)

Age of ewe and sex of lambs	Lactation performance daily yield (g)	Total yield (kg)
3 year old	580 \pm 20	59.47 \pm 1.93
5 year old	624 \pm 23	65.47 \pm 2.34
6 year old	610 \pm 18	62.17 \pm 1.85
Nursing ram lamb	623 \pm 21	63.42 \pm 1.98
Nursing ewe lamb	594 \pm 22	60.73 \pm 1.60

Table 2: Udder measurements (cm), at 2 week postpartum in kermani fat-tailed ewe (X \pm SEM)

Measurements taken	Centimeter
Udder circumference	37.66 \pm 0.420
Udder length	11.97 \pm 0.142
Udder depth	10.53 \pm 0.160
Udder width	6.02 \pm 0.062
Teat circumference	5.26 \pm 0.056
Teat length	2.64 \pm 0.620

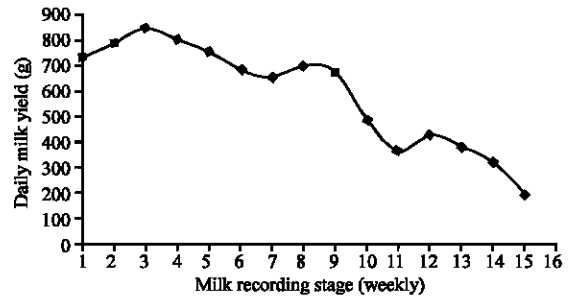


Fig. 1: Lactation curve of kermani ewes

Means for daily milk production during the suckling and post-weaning periods were 628 and 157 g, respectively. Shahneh and Nehzati (2001) reported that total milk production in 77 day trial (lambing to weaning) in Varamini breed was 26.56 kg. In similar study lactation length was 177 days for Mehraban, 173 days for Ghezel ewes. Means milk yield per day in Mehraban and Ghezel ewes were 813.0 and 879.6 g, respectively (Izadifard and Zamiri, 1998) that produced more milk compared with Makui (70.76 kg; Safari, 1993). Daily milk production of various sheep breeds in the tropics and subtropics ranged from 0.06-2.0 kg (Gatenby, 1986) and milk production during a 12 week period for various breeds suckling single lambs varied between 78 and 181 kg (Peart *et al.*, 1972).

Factors such as breed nutrition, method of measuring milk yield, ewe age, parity, stage of lactation and the number of suckling lambs are responsible for such variations (Labussiere, 1988). Effect of ewe age was significant on milk yield ($p < 0.01$) and to be greatest for ewes 5 years old and was lowest in 3 years old ewes. Milk production was not different between 4 and 5-year-old of Mehraban and Ghezel ewes (Izadifard and Zamiri, 1998). Milk production in the present experiment was different between ewes nursing male and female lambs (Table 1). For the amount of milk harvested by hand during the suckling period, being 30% greater for Ghezel ewes suckling ram lambs than those suckling ewe lambs

Table 3: Lamb growth in Kermani fat-tailed breed during the suckling period (X±SEM)

	Mean	Age of ewe			Ram lamb	Ewe lamb
		3	5	6		
Daily gain (g)	171±0.10	165.7±15.50	176.3±12	172.1±10	174.0±12	167.7±11.5
Weaning weight (kg)	19.46±0.35	018.9±0.130	019.9±0.130	019.5±0.13	019.7±0.120	019.01±0.10
Birth weight	3.21±0.29	3.09±0.44	3.26±0.24	3.28±0.46	3.28±0.35	3.12±0.38

(Izadifard and Zamiri, 1998). Shahneh *et al.* (2005) and Shahneh and Nehzati (2001) reported that lamb sex did influence milk yield and milk yield of ewes suckling ram lambs to be greater compared with those nursing ewe lambs. However, Torres-Hernandez and Hohenboken (1980) reported that sex of lamb did not influence on milk production in crossbred sheep.

Ewe weight at parturition was not significantly effect on the milk yield, but correlation coefficient of ewe weight at lambing with milk yield (0.31) was significant ($p < 0.05$). Izadifard and Zamiri (1998) reported that correlation coefficient of ewe weight at lambing with milk yield was 0.52 for Mehraban ($p < 0.05$) and 0.24 for Ghezel ewes. Bencini and Purvis (1990) found that the Merino ewes which gave birth to heavier lambs produced more milk.

In present study, at 2 weeks postpartum, significant correlations were found between the udder depth and length ($r = 0.42$; $p < 0.01$) and udder width and length ($r = 0.23$; $p < 0.05$). Udder circumference was correlated with udder depth ($r = 0.63$; $p < 0.01$), udder width ($r = 0.32$; $p < 0.05$) and udder length ($r = 0.58$; $p < 0.01$). Teat circumference had significant correlations with the udder circumference ($r = 0.26$; $p < 0.05$) and udder length ($r = 0.45$; $p < 0.01$). The correlation coefficient of teat length and teat circumference, was ($r = 0.51$; $p < 0.01$). This study shown in Kermani breed at 2 week post parturition udder circumference, length, depth, width, teat length and teat circumference (Table 2) was litter compared with Mehraban and Ghezel (Izadifard and Zamiri, 1998).

The correlation of milk yield with udder circumference ($r = 0.38$) and udder width was significant, ($r = 0.38$) ($p < 0.01$). In same studies udder width in Suffolk sheep (Snoder and Glimp, 1991) and udder circumference in Mehraban sheep (Izadifard and Zamiri, 1998) has greatest correlation with milk yield. Udder volume and milk yield in the first nine weeks of lactations were significantly correlated ($r = 0.71$) in the Australian Merinos (Bencini and Purvis, 1990).

Lamb daily gain and weaning weight (Table 3) was affected by lamb sex. It was greater ($p < 0.01$) for ram lambs as compared with ewe lambs (174.08 versus 167.74 g and 19.77 versus 19.01 kg). Lamb sex affected on lamb daily gain in other fat-tailed Iranian breeds (Shahneh and Nehzati, 2001; Shahneh *et al.*, 2005). Shahneh and Nehzati (2001) have indicated it was 220 g for ram lamb and 172 g for ewe lamb.

Correlation coefficient of lamb daily weight gain ($r = 0.73$) and weaning weight ($r = 0.65$) during the suckling period with the milk yield was significant ($p < 0.05$). Correlation coefficient of weaning weight with lamb birth-weight was 0.67 in Karaman ewes. The correlation coefficient of lamb daily gain with milk yield during the first 28 days of suckling was 0.83 and 0.67 for single and twin lambs, respectively. The correlations of daily gain with milk yield during the whole suckling period was 0.39 and 0.27 for single and twin lambs, respectively (Benyouceff and Ayachi, 1991). Correlation coefficient of weaning weight with lamb birth-weight was 0.64 for the Mehraban ($p < 0.01$) and 0.62 for the Ghezel ewes ($p < 0.05$), (Izadifard and Zamiri, 1998). In this study effect of ewe age on lamb daily gain and weaning weigh was significant, ($p < 0.01$). Lamb of 3-year-old had litter and lamb of 5 year old had greater daily gain and weaning weigh. Probability, is due to significant different of milk yield between ewes.

Snoder and Glimp (1991) found that as lactation progressed, the correlation between estimated daily milk yield and lamb growth rate from birth to time of milk yield estimation steadily decreased in Ramboillet, Polypay Columbia and Suffolk ewes.

Results of the present experiment showed that milk yield and lamb growth in this breed are somehow the same as the other Iranian breeds. Milk potential of mature Kermani fat-tailed ewes can be estimated with reasonable accuracy by measuring udder depth, udder circumference around peak of lactation.

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