



Short Communication

Evaluating Varying Calf Milk Replacers for Optimum Growth Performance in Salt Range Lambs

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ABSTRACT

The objective of study was to evaluate through feeding calf milk replacer to lambs for optimum growth performance and survivability. For this purpose, Salt Range neonatal lambs (n = 24, age = 01 week) were selected and divided equally into three groups having 08 lambs each. The experimental lambs were fed ewe milk, calf milk replacer-1 (Telilac) and calf milk replacer-2 (Creamo) through nipple feeding for optimum performance in lambs after mandatory colostrum feeding. Results depicted that average daily gain (ADG) and the body measurements were not different ($P > 0.05$) among lambs fed ewe milk and calf milk replacer-1 but higher ($P < 0.05$) than of calf milk replacer-2. Ewe milk and milk replacer-1 were equally efficient diets and better ($P < 0.05$) than replacer-2 in terms of FCR. The survival rate in lambs fed ewe milk and replacer-1 remained 100% as compared to 75% in case of lambs fed milk replacer-2. The calf milk replacers were cheaper in terms of milk cost per kg gain than natural ewe milk. It was concluded that high quality calf milk replacer can be used as an efficient substitute of ewe milk for optimum growth performance in neonatal Salt Range lambs after mandatory colostrum feeding.

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Authors' Contributions

MF, KM, MM designed the experiments, collected the data and partly wrote the article. MAC, MukA, Muhammad A and TA provided research material. Nasrullah performed statistical analysis. MF, MAC and Mukhtar A helped in writing of manuscript.

Key words

Salt Range lambs, Calf milk replacer, Growth, Survivability and milk cost.

Sheep is raised primarily for mutton production in the country and secondarily for carpet type wool production. The major Sheep breeds in province of Punjab are thin tailed like Buchi, Cholistani, Kajli, Lohi and Sipli. However, Salt Range is the only fat tailed breed available in Punjab and particularly in Pothohar region.

Salt Range performance is badly affected during scarcity period when feed resources are minimized as region is totally rain fed. Consequently, it is quite difficult for ewes to nourish their newly born lambs especially during lambing season. The suboptimal nutrition in ewes might affect growth of mammary secretory tissue (Jenkinson, 2003; Karabacak *et al.*, 2016; Knight and Sorensen, 2001) during pregnancy which leads to reduced milk yield and ultimately lambs survival (Binns *et al.*, 2002). Unfortunately enormous numbers of newly born

lambs die annually (Iqbal *et al.*, 1993) and more than 66 percent of lamb died before, during and shortly after birth (Berger, 1997). The mortality in lambs at early age in Punjab was due to starvation, chilling, dystocia and mis-mothering (Mustafa *et al.*, 2014).

The early lamb mortality eventually reduces the mutton production in country and accounts greater loss to the meat industry. As an attempt to reduce early lamb mortality, newly born lambs can be reared successfully on alternative source of mother milk that is milk replacer (Emsen *et al.*, 2004). Literature regarding use of milk replacer is limited and milk replacers for lambs are not available in market. However, lambs can be reared satisfactorily on artificial calf milk replacer having adequate nutrients like protein and energy (Mc Kusick *et al.*, 2001; Sevi *et al.*, 2001). Previously, Ocak and Cankaya (2013) reported that calf milk replacer might be used for successful rearing of lambs even at lower cost than ewe milk. Keeping in view the crucial importance of early lamb mortality the present study was designed with aim to

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feed newly born Salt Range lambs with calf milk replacers for optimum growth performance and survivability.

Materials and methods

The research site Barani Livestock Production Research Institute (BLPRI) Kherimurat is situated in Fateh Jang, Attock, Punjab, Pakistan. This institute is included in home tract of Salt Range sheep. Its geographical coordinates are 33° 33' 57" North, 72° 38' 57" East. The institute is located at a distance of 50 km from Islamabad-capital of Pakistan. The range of ambient temperature during year of 2015 was 10 to 20° C, whereas average precipitation was 7.8 mm ([World Weather Online, 2015](#)).

Twenty four newly born lambs having similar body weight and size were selected from the flock of Salt Range sheep maintained at BLPRI Kherimurat. The selected lambs were initially fed with Colostrum for 07 days and later-on were allocated randomly to 03 treatment groups having 08 lambs each.

The lambs in treatment group-1 were given natural ewe milk (Control) and in group-2 were fed alternative source of mother milk i.e. calf milk replacer-1 (Telilac), whereas lambs in treatment group 3 were fed another calf milk replacer-2 (Creamo). The Telilac was constituted of protein 24.5% and fat 21%, whereas Creamo had protein 20.5% and Fat 21%. This dietary treatment was continued for 45 days including adjustment period of 07 days.

The feeding of milk replacer was given individually @ 10% of body weight twice morning and evening daily. The 100 g milk powder was added in 600 ml hot water for making liquid diet. The water was heated up to 50° C before mixing and then added powder was thoroughly mixed with continuous stirring. The liquid milk replacer was fed to lambs at 40° C through nipple feeding. All utensils needed and nipples were thoroughly cleaned with detergent powder and then boiled water. The washed

nipples and utensils were then air dried before used. Hand gloves were used while touching and handling of nipples and utensils. All experimental lambs were also offered *ad lib* Lamb starter ration having CP 18.5% and TDN 80%. The composition of starter solid diet is soybean meal, 26%; maize grain broken, 40%; rice broken, 20%; wheat bran, 08%; molasses, 05% and minerals mixture, 01% (CP, 18.58%; TDN, 80.54%). The fresh oat fodder (CP, 9.6%) was also offered at the choice of young lambs in all three groups.

The performance of lambs was determined by average daily gain (ADG), feed conversion ratio (FCR), survival rate, body measurements (gain in body height, length and heart girth) and cost of milk per kg live weight gain. The milk or milk replacer intake was recorded daily, whereas weight gain was recorded weekly along with body measurements. Number of mortality was noted daily, whereas feed conversion ratio and milk cost per kg weight gain were calculated. The collected data were analyzed using ANOVA techniques ([Steel et al., 1997](#)) under completely randomized design (CRD). The difference among treatments mean was tested through Duncan Multiple Range Test ([Duncan, 1955](#)). The statistical model used was as under:

$$Y_{ij} = \mu + \tau_i + \varepsilon_{ij}$$

Where, Y_{ij} is observation on i^{th} treatment due to j^{th} animal, μ is overall mean, τ_i is effect of i^{th} treatment ($\sum \tau_i = 0$ and $i = 1, 2, 3$) and ε_{ij} is random error associated with i^{th} treatment with the restriction that variance and σ^2 and mean zero.

Results and discussion

The performance of Salt Range lambs kept under different treatment groups at Barani Livestock Production Research Institute is shown in [Table I](#).

Table I.- Effect of feeding natural ewe milk and calf milk replacers on average daily gain, feed efficiency and milk cost per kg gain survivability, body height, length and girth gains in Salt Range lambs.

Parameters	Control: (Ewe milk)	Calf milk replacer-I (Telilac)	Calf milk replacer-2 (Creamo)
Average daily gain (g/day)	149±07 ^a	125±13 ^a	73±12 ^b
Feed conversion ratio	4.4±0.25 ^b	5.7±0.82 ^b	10±1.85 ^a
Milk cost per kg gain (Rs.)**	396±22 ^a	276±39 ^b	279±50 ^b
Survivability of lambs (%)	100	100	75
Body height gain (inches)	4.25±0.76 ^a	4.41±0.22 ^a	3.0±0.22 ^b
Body length gain (inches)	8.25±0.76 ^a	7.5±0.22 ^a	4.0±0.22 ^b
Heart girth gain (inches)	6.5±0.22	5.5±0.22	4.0±0.22

All values are in Mean±SEM; *, variables having different superscripts in a row are different ($P<0.05$); **, milk cost per kg gain was calculated by dividing cost of milk consumed over weight gain in Kg.

ADG in Salt Range lambs fed natural ewe milk was higher ($P < 0.05$) than those fed calf milk replacer-2 Creamo, though not different ($P > 0.05$) from lambs fed calf milk replacer-1 Telilac (Table I). The FCR of natural ewe milk is also not different ($P > 0.05$) with calf milk replacer-1 Telilac but lower ($P < 0.05$) than calf milk replacer-2 Creamo (Table I).

The findings of this study are supported by those of Ocak and Cankaya (2013). Similarly, Emsen *et al.* (2004) reported successful rearing of Awassi lambs on calf milk replacer, and other workers (Galina *et al.*, 1995; Delgado-Pertinez *et al.*, 2009) observed similar findings even in goat kids fed milk replacer. Previously, Xi-Chun *et al.* (2010) reported no differences of body length, height and chest measurement ($P > 0.05$) among lambs fed ewe milk and milk replacers. No difference in improvement of body measurements might be due to factor that milk replacer diet had adequate protein and energy. Whereas less improvement in body measurements of lambs fed calf milk replacer-2 might be due to lower concentration of protein in the replacer. However, Rodrigues *et al.* (2008) reported differently that lambs belonging to Assaf breed fed natural ewe milk gained greater than of those fed artificial milk. The possible reason for this divergence might be different breed of lambs (Assaf Lambs) in that study.

In present study, poor performance of lambs fed milk replacer-2 (Creamo) might be due to the factor that it had lower dietary protein (CP 20.5%) concentration as compared to that (CP 24.5%) of calf milk replacer-1 (Telilac). The reduced dietary protein level significantly affect growth performance of lambs (NRC, 1985). Provision of dense dietary protein might be a better strategy for optimum growth (Arthington and Kalmbacher, 2003). It was inferred that high quality calf milk replacer can be used in Salt Range lambs as substitute of ewe milk. The survival rate was 100% in lambs fed ewe milk and calf milk replacer-1 (Telilac), whereas it was 75% in group of lambs fed calf milk replacer-2 (creamo).

Findings of present study regarding zero mortality in lambs fed calf milk replacer-1 were strengthened by report of Delgado-Pertinez *et al.* (2009) who also reported no mortality. Similarly, Ocak and Cankaya (2013) also affirmed that lambs can be successfully raised with calf milk replacer even with better survival rate (91.7%) as compared to 55% in ewe reared lambs. The comparative better survivability in calf milk replacer-1 than calf milk replacer-2 might be attributed to higher concentration of protein in Telilac. The dietary protein was needed for optimized growth and feed efficiency which can also generally increase immunocompetence (Latshaw, 1991) and ultimately improved survivability of lambs.

Besides that gain in the body height and length of

lambs fed ewe milk and calf milk replacer-1 (Telilac) were not different ($P > 0.05$), though it was higher in animals fed on calf milk replacer-2 (Creamo). The gain in heart girth was however, found highest in ewe milk followed by calf milk replacer-1 and calf milk replacer-2. Table I also shows the cost of milk calf fed on milk replacer-1 and calf milk replacer-2 which was almost the same but lower than ewe milk.

Findings regarding cost in this study were also endorsed by few workers previously (Galina *et al.*, 1995; Emsen *et al.*, 2004; Ocak and Cankaya, 2013; Delgado-Pertinez *et al.*, 2009). They reported that lambs could be reared successfully on artificial milk replacers on lower cost. It was inferred that optimum survivability in Salt Range lambs fed high quality calf milk replacer can be achieved with low milk cost. The comparative lower cost of calf milk replacer might be due to cheaper synthetic constituents used in preparation of milk replacer powder.

Conclusion

It was concluded from findings of present study that high quality calf milk replacer can be used as an efficient substitute of ewe milk for optimum growth performance in neonatal Salt Range lambs after mandatory colostrum feeding.

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Statement of conflict of interest

Authors have declared no conflict of interest.

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