

Rearing of Kachhi lambs by using milk replacer

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Abstract

The experiment was conducted to observe the effect of milk replacer on the growth and body conformation of Kachhi lambs at Livestock Experimental Station, Sindh Agriculture University Tandojam. 12 lambs were randomly allocated into two groups; group A (fed milk replacer) and group B (fed with Ewe milk) @ 10% of their live body weight, for a period of 60 days. Average final body weight and weight gain of group A and group B was 9.4kg, 5.8kg and 10.5kg, 6.8kg, respectively. There was statistically significant ($P<0.05$) difference between the body weight of groups. Like wise average final body length (cm) and increase in length of group A was (42.9, 10.9) and group B (44.9, 13.0), the body length of group B was significantly higher ($P<0.05$) than group A. Similarly average final body girth (cm) and increase in body girth of group A and group B was 48.8, 13 and 51.5, 15, respectively, there was significant ($P<0.05$) difference between the groups. In respect of average final body height (cm) and increase in body height of lambs of group B (49.4, 15.4) was significantly ($P<0.05$) higher than group A (47.6, 13.3), respectively. It was therefore, concluded that whole milk resulted in better growth of lambs as compared to lambs fed with milk replacer. The generated income of group A was Rs. 16500 and group B was Rs. 17400, with a net profit of group A and group B as Rs. 1175 and Rs. 128, respectively. Net profit/lamb was Rs. 196 and Rs. 22 for group A and for group B, respectively. These figures showed that the lambs of group A, fed milk replacer had remarkably higher net profit as compared to group B, fed Ewe milk/ whole milk.

Key words: Lambs; Milk Replacer; Rearing; Ewe Milk

Introduction

The sheep population of the Pakistan during 2014 was 29.1 million heads, which produced 38 million tons of milk and have considerable share in producing total mutton production of 657 thousand tons. In case of other by-products the wool production of sheep was 44.1 thousand tons, 11,001 million sheep skin and 3,268 million lamb skin (Jawad, 2014). In Sindh province more than a dozen breeds of sheep are reared and breeds preference is climate dependent. The Kachhi breed is a thin tailed, mutton and wool type of sheep. It is found in the Ran of Kachhi, Tharparkar district and adjoining desert area of Sindh province of Pakistan. Lamb is a prime source of high-quality protein, vitamins and minerals. As with other red meats, its protein is nutritionally complete with all essential amino acids in the proper ratios. Compared to other meats, lamb contains very little marbling (fat in muscles). Since lamb fat is on the edges of the meat, it is easily trimmed off (Abd-el-Rahiem, 1990). The lamb growth and health depend on the management and nutrition. Various liquid feed sources nourish the lamb after feeding first colostrum and transition milk. Milk replacers are very good source of liquid feed for lambs. They are often very economical and also, in many situations more easily adapted to the labour and facility needs of lamb-raising operations than whole or waste milk (Sarwar *et al.* 2009). Suitable and sufficient supply of nutrients for young one through liquid feed (whole milk or milk replacer) is essential for performance and welfare. Conventionally, dairy lambs are separated from dams within few hours of their birth and receive a restricted amount (typically 10% of body weight) of mother milk or milk replacer through a nipple or bucket (Lee, *et al.* 2009). Mother milk is substituted with milk replacer to feed dairy young ones. Commercially available milk replacer usually contains 20% crude protein and 10 to 15% fat (Lee, *et al.* 2009). The present study thus, has been conducted to investigate the effect of milk replacer on body weight, body conformation and economics of milk replacer and whole milk use for rearing the Kachhi lambs.

Materials and Methods

Study Design

12 Kachhi lambs aging (3 days old) were procured from the markets. The navel cords were disinfected before being transported from markets to the Livestock Experimental Station, Sindh Agriculture University, Tandojam. Lambs were housed under hygienic conditions with clean straw bedding for 56 days. The lambs were randomly divided into two groups; group A and B. Group-A lambs were fed with milk replacer (MR), while group-B lambs were fed with mother milk (WM), the milk was provided @ 10% of their live body weight. During experiment body weight weekly (kg), Body conformation weekly (cm), Body length, Heart girth, Body height, Feed consumption (kg), Economics (Rs) were recorded.

Materials

Milk Replacer: (Telilac™ ICI Pakistan Limited) was purchased from local market of Hyderabad and used to feed the lambs of group A.

Mother milk: Mother milk was received from sheep to feed the lambs.

Weighing balance: Manual weighing balance was used to record weight of experimental animals.

Measuring tape: To measure the body conformation of lambs (height, girth, length) measuring tape was used.

Rubber nipple: Rubber nipple was used to feed the lambs.

Thermometer: Thermometer was used to check milk temperature prior to lambs feeding.

Bowl drinker: Lambs were provided free access to water from a bowl drinker in each treatment groups.

Steel bucket: Diluted milk replacer was prepared in steel buckets by mixing in a concentration of 170g/ litre of milk replacer in warm water ($50 \pm 2^\circ\text{C}$).

Methods

Feeding The lambs were randomly divided into two treatment groups. Treatment A group was fed with sheep milk (MR) and milk replacer (WM) @ 10% of their live body weight. 60% of MR or WM were fed to lambs early in the morning and remaining 40% in the afternoon using nipple feeder throughout the pre-weaning period. Required diluted milk replacer was prepared in a ratio of 170g/ltr of warm water ($50 \pm 2^\circ\text{C}$). The diluted MR was then cooled to $40 \pm 1^\circ\text{C}$. After each feeding the bottles were washed with iodine detergent and after rinsing and drying, these were stored in the inverted position.

Economics For the purpose of economic evaluation, milk feeding cost (milk replacer and whole milk), cost of animal, medication cost, labour charges and miscellaneous costs were recorded. The net profit was also calculated by using following formula.

Sale out amount – total cost = net profit

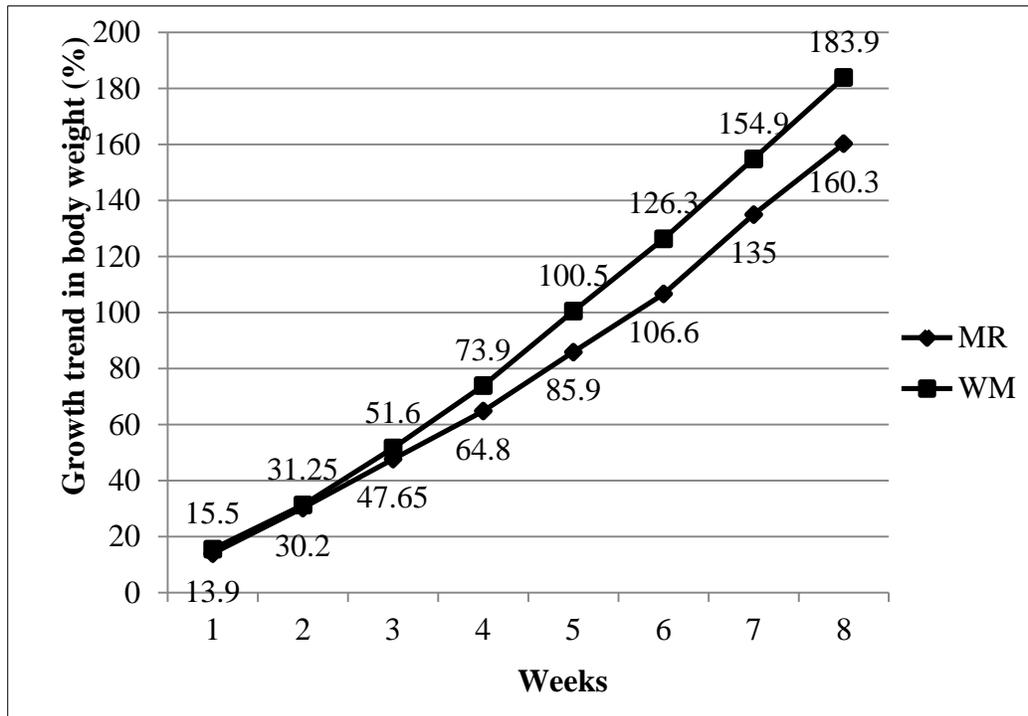
Statistical Analysis The obtained data was subjected to statistical tool, analysis of variance ANOVA at $\alpha = 0.05$ (level of significant) and 95% confidence level. Furthermore, significant difference noticed among the means, the

post-hoc test i.e Least Significant Difference (L.S.D) was computed. The statistical procedures analysis was performed through M.STAT computerized package.

Results

Body weight (kg) of Kachhi lambs

As Shown in fig. 1 at the start of experiment the average body weight of group A and group B was recorded as 3.62 kg and 3.68 kg respectively while at the end of experimental trial the average body weight was observed as 9.4 kg and 10.5 kg respectively. The average wait gain at the end of experiment was 5.8 (group A) and 6.8 kg (group B). The coefficient of variance for final body weight was analyzed as 0.95% for group A and 1.31% for group B. The analysis of variance was applied on data for body weight of lambs the results showed significant ($P<0.05$) difference between group A and group B. Growth trend of body weight (%) of both groups showed difference. The first week body weight recorded as 13.9% and 15.5% and final body weight was reached at 160.3% and 183.9% of group A and group B, respectively. The growth trend showed that the weekly body weight gain of group B was higher as compared to group A.

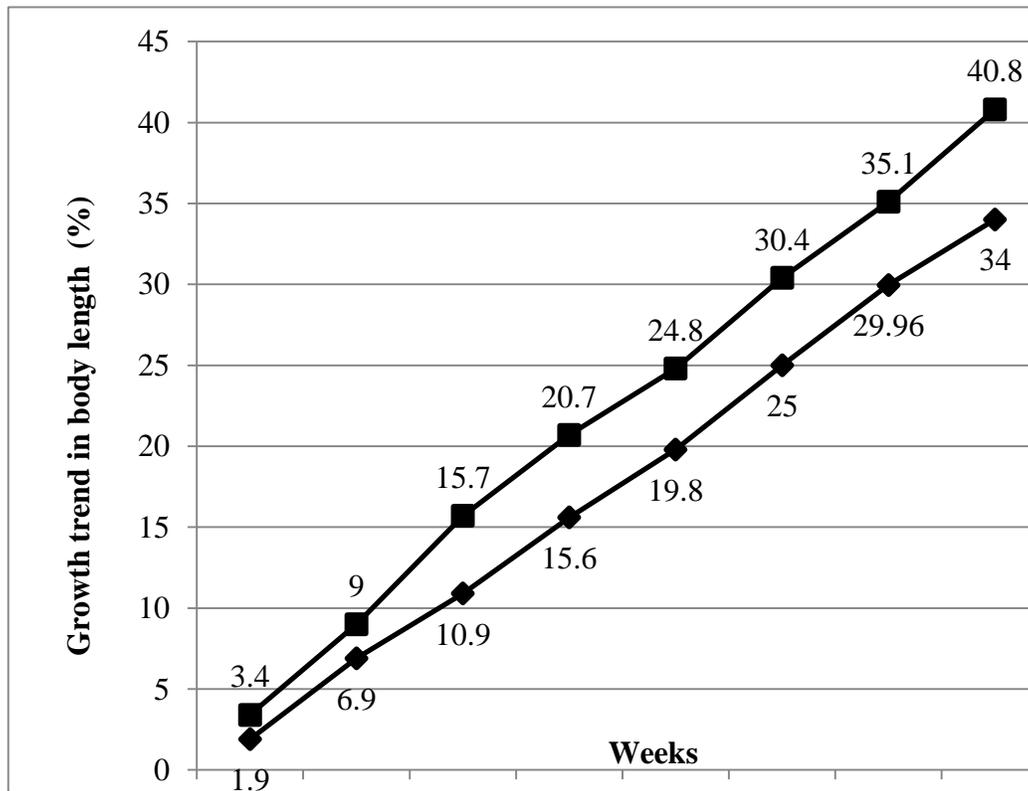


Group A (milk replacer Average initial body weight (kg) = 3.62), Group B (milk replacer Average initial body weight (kg) = 3.68)

Fig 1- Weekly growth trend in body weight (%) lambs fed milk replacer and whole milk.

Body length (cm) of Kachhi lambs

As shown in fig. 2 at the start of research work the average initial body length of group A and group B was recorded as 32.00 cm and 31.91 cm, respectively. While the average final body length at the end of experimental trial was observed as 42.9 cm and 44.9 cm, respectively. The average length increased at the end of experiment was 10.9 (group A) and 13.0 cm (group B). Moreover, the coefficient of variance for final length was analyzed as 1.36% for group A and 0.45% for group B. The analysis of variance was applied on data for body length of lambs results shown the significant ($P<0.05$) difference between group A and group B. Increasing trend in body length (%) of group A and group B shown that the first week length was 1.9 % and 3.4 % and final length was reached at 34% and 40.8 % of group A and group B, respectively which indicates that the animals of group B attained more length on weekly basis as compared to lambs of group A.



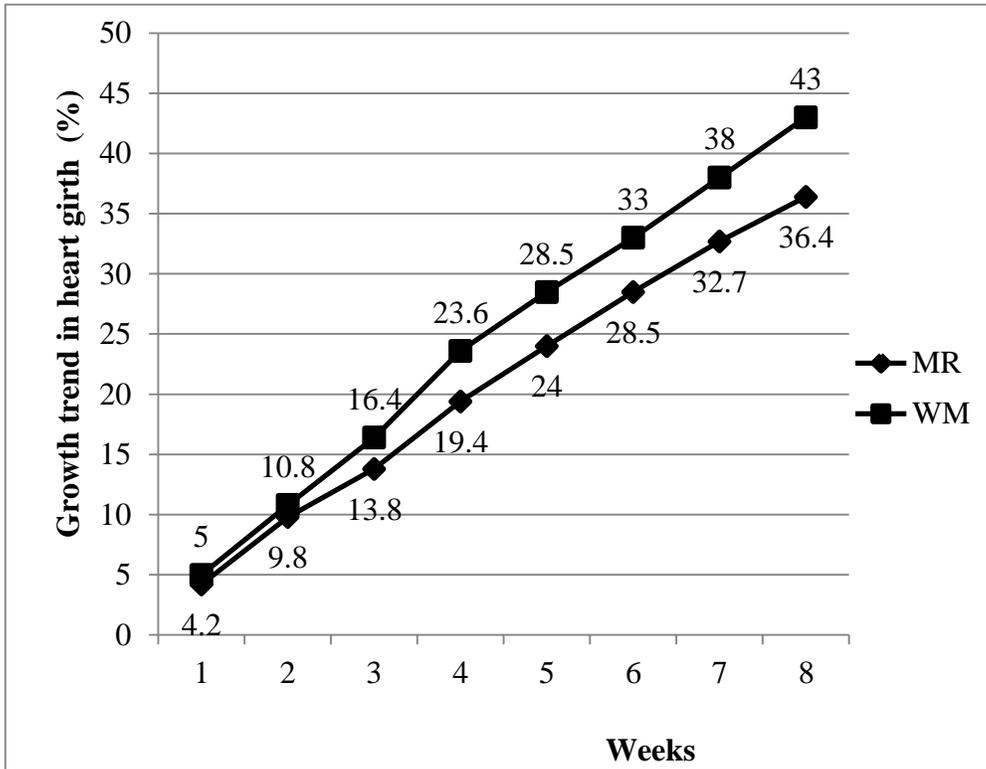
Group A (milk replacer, Average initial body length (cm) = 32.0), Group B (whole milk, Average initial body length (cm) = 31.9)
Fig 2- Weekly growth trend in body length (%) lambs fed milk replacer and whole milk.

Heart girth (cm) of Kachhi lambs

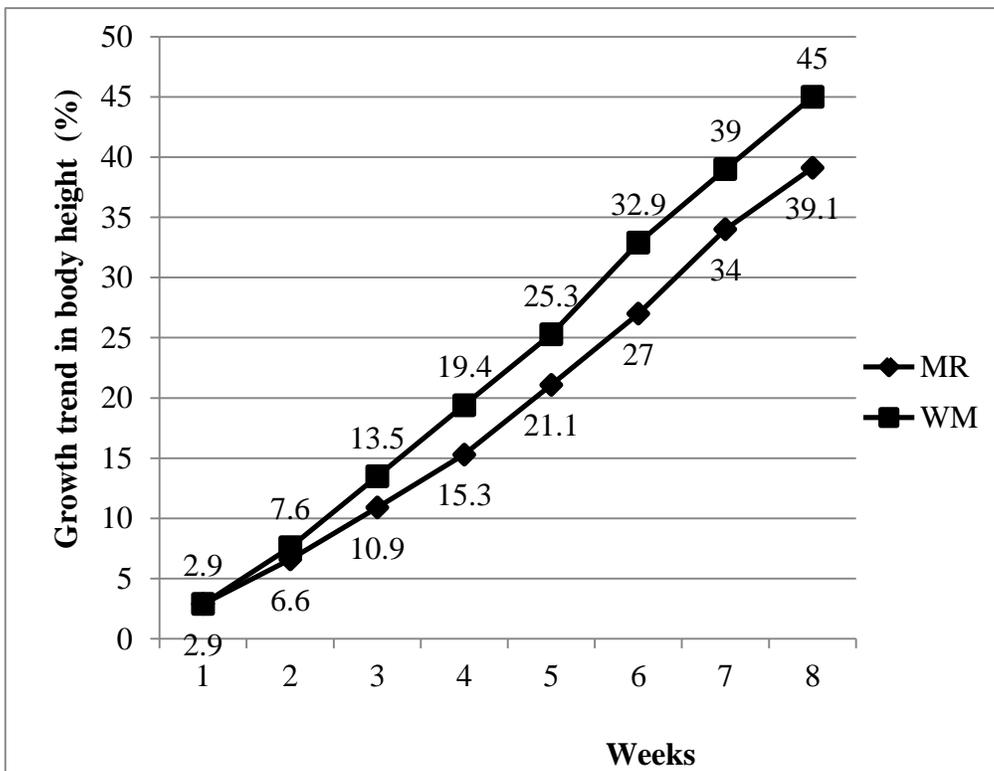
As shown in fig. 3 the average initial heart girth of group A was 35.83 cm and group B was 36.41 cm, while the average final heart girth was observed as 48.8 cm and 51.5 cm, respectively. The average increase in heart girth increase at the end of experiment was 13 cm (group A) and 15 cm (group B). Moreover, the coefficient of variance for final heart girth was analyzed as 0.83% for group A and 1.37% for group B. Application of ANOVA on recorded data for heart girth of lambs the results shown the significant ($P < 0.05$) difference between group A and group B. The trend in hearth girth (%) of group A and group B showed that there was the difference between heart girths of the groups. According to growth trend (%) the first week girth was 4.2 % and 5 % and final girth was reached at 36.4 % and 43 % of group A and group B, respectively. The trend showed that the weekly heart girth of group B was higher compared to group A.

Body height (cm) of Kachhi lambs

As shown in fig. 4 the average initial body height of group A and group B was recorded as 34.25 cm and 34.08, respectively while the final body height at the was observed as 47.6 and 49.4 cm, respectively. The average increase of body height at the end of experiment was 13.3 cm (group A) and 15.4 cm (group B). The analysis of coefficient of variance for final boby height was analyzed as 1.08% for group A and 1.74% for group B. The analysis of variance was applied on data for body length of lambs the results showed the significant ($P < 0.05$) difference between group A and group B. Weekly trend of body height (%) of group A and group B shown significant difference between the groups. The body height in first week was recorded as 2.9 % and 2.9 % and final body height was reached at 39.1 % and 45.3 % of group A and group B, respectively. The growth trend showed that the weekly body height attainment of group B was higher as compared to group A.



Group A (milk replacer, Average initial heart girth (cm) = 35.8), Group B (whole milk, Average initial heart girth (cm) = 36.0)
Fig 3 Weekly growth trend in body girth (%) lambs fed milk replacer and whole milk.



Group A (milk replacer, Average initial body height (cm) = 34.35) Group B (whole milk, Average initial body height (cm) = 34.00)
Fig. 4: Weekly growth trend in body height (%) lambs fed milk replacer and whole milk.

Economic of Kachhi lambs during study period

As shown in table 1 the total milk consumption through the experimental trial was 219.1 liters (170g/litre) in group A and 237.7 liters in group B, with the rates Rs 42.1/litre and Rs 47/ litre respectively. The total cost of milk fed in group a was calculated as Rs. 9225 and Rs. 11172 for group B, and after accumulation of other costs i.e, medication, labor, miscellaneous and including purchasing costs of group A and group B were Rs. 15325 and 17272, respectively. The total generated income of group A was Rs.16500 and group B was Rs. 17400, with a net profit of Rs. 1175 and Rs. 128, for group A and B respectively. These figures showed that the calves in group A fed on milk replacer had higher net profit (1175) compared to group B.

Table 1: Economic of Kachhi lambs during study period.

Particulars	Groups	
	A	B
Total milk (litter) fed	219.1	237.7
Rates of milk (Rs/litter)	42.1	47
Total cost of milk (Rs)	9225	11172
Cost of medication (Rs)	0	0
Labour cost (Rs)	0	0
Miscellaneous cost of lambs (Rs)	100	100
Purchasing costs of lambs (Rs)	6000	6000
Total cost (Rs)	15325	17272
Initial average body weight (kg)	3.61	3.68
Final body weight (kg)	9.4	10.4
Weight gain through experimental trial (kg)	5.8	6.8
Sale cost (Rs)	16500	17400
Net profit (Rs)	1175	128

Discussion

In present study milk replacer was used to rear the lambs with the aim to reduce the cost of rearing lambs so that the sheep farmers could think about rearing the lambs on milk replacer successfully. The experiment showed body weight of the lambs fed whole milk (10.5 kg) was higher as compared to lambs fed with the milk replacer (9.4 kg). These findings are in agreement with (Sezen and Cankaya 2012) they showed that the weaning weights in the artificially reared (AR) and ewe reared (ER) groups were 12.64 and 14.15 kg, respectively. Results showed an average daily weight gain of 180 and 230 g for artificially reared (AR) and ewe reared (ER), respectively. They confirmed that the average body weight of lambs fed with whole milk was higher than lambs fed with milk replacer. The body growth was affected by composition of milk, the milk replacer is formulated with a higher crude protein content (22 to 25%) to meet the needs of the rapidly growing muscle, but there may be problem with digestibility. Similarly, (Bodnar and Kispal 2006) demonstrated that crude protein intake of growing lambs fed had a little difference on body weight, body size, daily weight gain and crude protein intake in sheep lambs, and also crude protein in ration had significant effect on daily gain and performance of the lambs. The results showed that lambs fed high-fat milk replacers would have lower digestibility, and average daily gain.

The growth and health performance of lambs fed milk replacer containing non milk or vegetable proteins has generally been less than lambs fed diets consisting of all whole milk proteins. However, reduced growth performance and premature adaptations of intestinal function and immune responsiveness of lambs fed milk replacer (Cruywagen *et al.* 2009). Likewise, (Gorrill 2011) demonstrated changes in the morphology of the intestine especially in villus height when milk replacer offered in pre-weaning period and had observed decreases in protein synthetic capacity of the gut, reduced mucosal enzyme activity and reduced transport capacity by the gut. Similarly, (Kumar *et al.* 2014) observed the composition of milk replacer affects on growth performance during pre-weaning and early post-weaning periods. Restricted milk replacer feeding to lambs generally depressed their growth, health and behavior and delayed the initiation of ruminal fermentation and development, because of poor nutrients supply due to poor absorption in intestine.

Natural rearing of lambs showed greater body weight gain than artificially reared lambs (Rodriguez *et al.* 2008). Similarly they reported that, total body weight gain of group A (Ewe milk) and B (Milk replacer) were 14.2 and 13.8 Kg, respectively (Masum *et al.* 2009). Body weight gain efficiency during pre-weaning and overall was improved in WM fed than those fed with MR. Even though gross composition of the MR and WM was similar;

growth was greater in lambs fed WM. (Lee *et al.* 2009) reported that the average daily gain and live body weight at 6 weeks intervals were measured, ewe reared (ER) lambs were heavier than artificially reared (AR) lambs at 4 weeks of age (Emsen *et al.* 2005) reported that feeding milk replacer at early age limited the growth as compared with the lambs reared on whole milk .

Results shown that milk replacer fed animals had significantly lower final live weight compared to whole milk fed. (Aquino *et al.* 2008). ADG (g/day) and total weight gain (kg) were in mother milk fed lambs and lambs offered milk replacer (175, 14.5 and 118, 10.4 respectively, (Musharraf *et al.* 2014). Similar to this study the effect of milk replacer on weight gain was reported by (Gorrill 2011) and reported that increased nutrients intake and absorption, whole milk can increase the growth rate and feed cost.

The growth conformation of lamb fed with whole milk was significantly higher higher as compared to lambs fed with milk replacer. This indicated that whole milk gave better results than milk replacer. Similarly results were obtained by (Masum *et al.* 2009) they demonstrated that the lambs of group A were reared by Ewe milk, group B reared by Milk replacer there was no significant difference between the groups of lambs. Non-significant differences were also seen for wither height (56 and 54.5 cm, respectively), length (48.5 and 47 cm, respectively) and heart-girth (59.44 and 57cm, respectively) of lambs, my findings were in accordance with the study of (Kumar *et al.* 2014) resulted that the intake of milk replacer had a significant effect on body measurement. (Cruywagen *et al.* 2009) also reported that the gain in body measurements were obtained higher in lambs fed whole milk than milk replacer and he observed significant change in body length, wither height and heart girth in lambs fed milk replacers containing different amounts of protein.

The body conformation of the lambs growth were high with naturally than artificially rearing likewise (Rodriguez *et al.* 2008) they demonstrated that the average growth and conformation of lambs fed with whole milk was higher than lambs fed with milk replacer. The effect of milk replacer and whole milk on economics of lamb rearing was observed that the feeding of milk replacer is much less costly to feed the lambs than whole milk. In agreement with (Aquino *et al.* 2008) stated that rearing of lambs on milk replacer as a substitute to raw milk resulted to lower feed cost. It can be concluded that milk replacer could be used successfully for raising lambs (Masum *et al.* 2009). Likewise (Emsen *et al.* 2005) they reported that the lambs can be successfully reared on calf milk replacer at a lower cost than with ewe rearing, thus offers a potential increase in economic returns for sheep producers. In accordance (Peiman *et al.* 2013) they demonstrated that calf milk replacers were cheaper than whole milk.

Conclusion

From the results of present study, it could be concluded that the growth parameters (body weight, length, height and heart girth) of lambs fed with whole milk were higher than the lambs fed with milk replacer.

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