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Effect of Milk Replacer on Performance Parameters of Different Bovine Breeds

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Abstract: The experiment was conducted in Livestock Research and Development Station Surezai Peshawar. Total 112 numbers of calves including 28 Nilli Ravi and 10 Azikheli buffalo, while cattle calves contained 31 achai and 41 crossed bred (HF and Sahiwal cross). Commercially available milk replacer was used for calves feeding in this experiment. After preparation milk replacer was offer for calves feeding according to the daily requirements. The birth weight was recorded soon after birth, weakly growth rate was recorded of all calves upto weaning weight. Effect of milk replacer on birth and weaning weight of different bovine breeds was significant (P<0.05). Average birth weight of Achai, Azikheli, Cross and Nili Ravi breed were 15.23±0.49, 28.70±1.00, 21.92±0.70 and 31.90±1.10 kg, respectively. Total mortality percentage was 18.75% (21Nos). Lowest percentage of mortality (0%) was found in Achai breed calves, followed by Azikheli breed calves 14%. The results showed that milk replacer is 117.39% less expensive than natural milk.

Key words: Milk replacer, birth weight, weaning weight, growth rate, achai, azikheli

INTRODUCTION
Livestock production is growing rapidly as a result of the increasing demand for animal products. Food and Agriculture Organization (FAO) study: Livestock to 2020: The Next Food Revolution, suggested that global meat production and consumption will rise from 233 million tons (2000) to 300 million tons (2020) and milk from 568 to 700 million tons over the same period. These predictions show a massive increase in animal protein demand, needed to satisfy the growth in the human population. Highest mean weight gain (35.05±1.69 kg) was recorded in Azikheli breed, followed by Nili Ravi (33.31±1.14 kg) and Achaia (29.82±0.98 kg). While lowest weight gains (29.03±1.17 kg) was recorded for cross bred cattle during experimental period.

Calves are the future producers of milk and meat for human consumption, unfortunately in Khyber Pakhtunkhwa calves of very young age are slaughtered indiscriminately in every commercial and even in some public dairy farms. This is due to two reasons. First the farmers feel burden to feed milk the early born calves due to high demand and price of milk. Secondly the farmers feel worry due to early calves mortality. Consequently the early calf crops has been goes to the slaughter houses which causes genetic drain of the elite productive breeds and leaving the province dependent on other province regarding elite productive dairy breeds. Special emphasis needs to be given the calves. One of the most important factors which affect calf crops percentage is calf nutrition (Own observation).

The nutrient requirement of pre-ruminants varies with the stage of growth. Because of the anatomical and physiological changes taking place in the gut, pre-ruminants solely depend on milk or such similar liquid food in the early stages and gradually adapt to solid food. Liquid food used as a substitute for whole milk is known as milk replacers and the solid food used to supplement or replace milk replacers is known as starter feed (NRC, 1989). Regardless of species, infant pre-ruminants are unable to digest solid food and hence liquid milk or milk replacers are indispensable for nourishment. However, the demand for milk for human consumption restricts availability of milk for pre-ruminant feeding, resulting in underfeeding or starvation with a consequence of stunted growth and mortality (Ranjhan and Pathak, 1979). If suitable substitutes for milk are made available, the nutrition of infant pre-ruminants can be improved and survivability can be increased. In developed countries, alternatives to whole milk feeding to pre-ruminants are formulated using by-products of milk processing industry. Such practice is not feasible in the developing countries where milk by-products are scarce and expensive. There have been attempts to restrict whole milk feeding by making use of alternatives such as milk from other ruminant species and/or milk by-products such as fresh skim milk together with starter feed. Usage of milk replacer for feeding young dairy calves saving more milk for human consumption and sell to secure economic considerations (BAMN, 2002).

Livestock Research and Development Station Surezai is one of the pioneer research farms of this province which is working with the mandate to improve livestock productivity and overcome farmer's difficulties through research and development methodology. The buffalo farmers of Khyber Pakhtunkhwa province are also dependent on other provinces of the country for elite dairy animals, because the farmers do not give any consideration to grow own calves as replacement of

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their herds. Keeping in view these problems a research trial was conducted at LR and DS Surezai with following objectives.

OBJECTIVES

- To find out an alternate source of feeding to the calves
- To study the effect of milk replacer on performance parameters of bovine breeds (cattle and buffalo)
- To find out the economic suitability of natural milk or milk replacer

MATERIALS AND METHODS

The experiment was conducted in Livestock Research and Development Station Surezai Peshawar. This research station is located 23 Kms away from Peshawar city. Climate is arid type. Total 112 numbers of calves including 28 Nilli Ravi and 10 Azikheli buffalo, while cattle calves contained 31 achai and 41 crossed bred (HF and Sahiwal cross). The birth growth rate was recorded of each calf borne in the station. Colostrum feeding was started to the calves just 30 minutes after birth. Colostrum was given upto four days to the calves. After four days milk replacer feeding was started to the calves.

Preparation of milk replacer: Commercially available milk replacer was used for calves feeding in this experiment. the composition of milk replacer was CP 24%, Fat 21%, DM 96%, CF 0.05%, Crude Ash 8% with Vit B, D3, E and C. To prepare 1 liter of milk replacer 110 gms of milk replacer powder was mixed with 900 ml water. Half of the required quantity powder was poured into the pot containing half of the required quality of clean tape water. The water was heated slowly with gentle mixing. During slow heating the remaining quantity of milk replacer along with reaming 50% of required water was added and mixed thoroughly. Temperature of solution was regularly checked when temperature reached upto $50^\circ C$ the heating was stopped and temperature was down to $40^\circ C$. The prepared milk replacer was poured to the bucket having nipples and offered to the calves according to their requirements twice in a day. Per calf daily requirements of milk replacer was 2 liters upto 7 days of age, 4 liter upto 4 weaks, 6 liters milk replacer upto 8 weaks, 4 liters upto weaning (12 weaks). Weakly growth rate was recorded upto 12 weaks after which weaning weight was recorded and the calf were weaned from experiment. The data was entered sorted in MS Excel, means were compared with descriptive statistics by using computer software SPSS 16.

RESULTS AND DISCUSSION

Effect of milk replacer on Birth and Weaning weight (kg) of different bovine breeds: Effect of milk replacer on birth and weaning weight of different bovine breeds

Table 1: Effect of milk replacer on weight gain (kg) with Standard Error (SE) of different bovine breed from birth up to weaning

Breed	Wt. Gain	Minimum	Maximum	P value
Achaia	29.82±0.98	19.5	43	0.009
Azikheli	35.05±1.69	23	40	
Cross	29.03±1.17	17	44	
Nili Ravi	33.31±1.14	19	44.5	

was significant (P<0.05) Table 1. Average birth weight of Achai, Azikheli, Cross and Nili Ravi breed were 15.23±0.49, 28.70±1.00, 21.92±0.70 and 31.90±1.10 kg respectively. Highest mean birth weight was recorded in Nili Ravi breed calves 31.90±1.10 kg, followed by Azikheli breed buffalo calves 28.70±1.00 kg. Razzaque et al. (2009) found mean birth weight (Kg) 30.07 of cross bred cattle in hutches and 28.45 kg in conventional housing system. This finding is in line with finding of present study. Akhtar et al. (2012) found 35.86±4.30 Kg average birth weight of Nili Ravi calves. A study of birth weight as a measure of prospective value of calf is therefore justified since it is one of the first measures that can be obtained and also one of the easiest to record with reasonable accuracy. If phenotype at an early age is an expression of genotype, it should be possible to select superior individuals on the basis of their early performance. For a successful breeding program, an understanding of the degree of genetic, phenotypic and environmental association among traits is essential (Massey and Benyshek, 1982). In present study highest average weaning weight was also found in Nili Ravi Bafalo breed 65.21±1.31 kg, followed by Azikheli breed calves 63.75±1.8. Average weaning weight of cross bred and achai calves were 50.95±1.29 and 45.05±0.84 respectively. The average weaning weight at 90 days was 66.12±9.16 kg found by Akhtar et al. (2012) in Nili Ravi buffalo calves which strongly support the findings of present studies.

Effect of milk replacer on weight gain and pre weaned growth rate (kg) of different bovine breed from birth to weaning age.

Effect of milk replacer on performance of various bovine breeds was significant (P<0.05) Table 2. Highest mean weight gain (35.05±1.69 kg) was recorded in Azikheli breed, followed by Nili Ravi (33.31±1.14 kg) and Achaia (29.82±0.98 kg). While lowest weight gains (29.03±1.17 kg) was recorded for cross bred cattle during experimental period. The highest mean pre weaned daily weight gain 0.39 kg was found in Azikheli buffalo calves followed by Nili Ravi 0.37 Kg. The mean daily growth rate of Achai cattle calves was 0.33 kg while in cross bred cattle calves 0.32 kg was found. Akhtar et al. (2012) reported 316.47±88.33 g pre-weaning average daily gain in calves. The results of the present studies shows that performance of the provincial local buffalo and cattle breeds (Azikheli and Achai) calves is better as

Table 2: Effect of milk replacer on mean birth body weight and weaning weight (kg) with Standard Error (SE) of different bovine breed

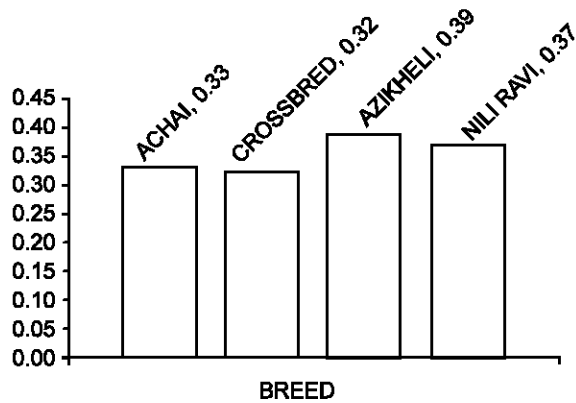| Breed	B. weight	W. weight	Wt Gain	P-value
Achaia	15.23±0.49	45.05±0.84	29.82±0.98	0.009
Azikheli	28.70±1.00	63.75±1.8	35.05±1.69	
Cross	21.92±0.70	50.95±1.29	29.03±1.17	
Nili Ravi	31.90±1.10	65.21±1.31	33.31±1.14	

Fig. 1: Effect of milk replacer on daily weight gain (kg) of different bovine breed from birth up to weaning

compared to other breeds (Nili Ravi and Cross bred) in terms of weight gain and pre weaned growth rate. The probable reason of this could be the harsh and tough environment of the location of the research station. As Azikheli and Achai are local breeds of this area, therefore they are well adopted with this environment and performed well. Razzaque *et al.* (2009) reported significant effect of rearing environment on growth rates of calves in two types of calf housing (conventional crates in closed calf barns and hutches) indicated that in conventional housing, the calves were presumably subjected to stressful environment such as behavioral, physical and spread of diseases. However, in hutch housing in the open environment and use of clean sand beds irrespective of seasonal changes of temperature appeared to have provided a comfortable environment to calves. These findings are consistent with results of Hill *et al.* (2007). Behavioral satisfaction of calves in open environment hutches in our studies might have contributed to a better growth rate than calves housed in confined crates (Heinrichs *et al.*, 2005). A comfortable resting posture and display of increased social behavior were earlier observed to be positively associated with an increased growth rate of calves (Andrighetto *et al.*, 1999; Chua *et al.*, 2002).

Mortality: Total numbers of calves was 112 in this experiment. Total mortality percentage was 18.75% (21Nos). Akhtar *et al.* (2012) found 22.95% mortality in dairy calves given natural milk in conventional housing system. Lowest percentage of mortality (0%) was found

in Achai breed calves, followed by Azikheli breed calves 14%. Highest percentage of mortality was found in Nili Ravi calves (47 out of 18.75%) followed by cross bred calves 39%. Achai and Azikheli are local bovine breeds of Khyber Pakhtunkhwa. Basically these breeds belong to the temperate areas of this province (Malakand Division) but its performance is even same good in arid areas, therefore they resist and survive well in this experiment at LR and DS Surezai Peshawar. At livestock farms, calf mortality is a major problem. Sharma and Jain (1979) reported that 27.7% mortality in Murrah buffalo calves occurred from birth to 6 months of age.

Economic analysis: One of the main reasons of not rearing the calves in the farms is high milk price and demand. Therefore the economic analysis was performed to check the rearing and growth inputs by using commercially available milk replacer. Information on calf growth and cost of calf rearing is important for cattle breeding and production and sustainability of any cattle enterprise depends upon the successful raising of calves for replacement stock. Several studies indicated that milk replacer had several benefits to the calf raiser and dairy producer, including consistency of product from day to day, ease and flexibility of storage, disease control, good calf performance and economics (Davis and Drackley, 1998; Compinis *et al.*, 2002; Langhout, 2003; and wagenaar and Langhout, 2007). During 12 weeks from birth to weaning age one calf consumes 265 liters milk or milk replacer. The per liter expenses of milk replacer was 22 rupees while that of natural milk was 70 rupees. The total no of calves in this study was 112. The results showed that milk replacer is 117.39% less expensive than natural milk.

Conclusion: It is concluded from the present study that:

- Performance of the provincial local buffalo and cattle breeds (Azikheli and Achai) calves is better as compared to other breeds (Nili Ravi and Cross bred) in terms of weight gain and pre weaned growth rate
- Milk replacer is 117.39% less expensive than natural milk
- Provincial local bovine breeds (Achai and Azikheli) have very less mortality

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