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PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 3 (3): 372-373, 2000
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Effects of Individual and Group Housing System on the Growth Characteristics of Brown Swiss Calves Fed Milk Replacer

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Abstract: The study was carried out to compare growth, weight gain and feed efficiency traits of Brown Swiss calves which were fed milk replacer and raised in individual, group and individual +group housing systems. Weights, gains in weights and body measurements at various ages were determined. The results revealed that group-housing could be attractive concerning growth rate of Brown Swiss calves, easiness and economical construction of the group pens, although young animals in group pens had slightly less favourable feed conversion efficiency ratio.

Key word: Calves, Growth, Housing Type, Milk Replacer, Brown Swiss

Introduction

Calves raised in the closed barns in Eastern Turkey are kept in either individual or group pens. The results of several studies revealed that the influence of different housing systems on the grown features of calves were not clear yet. While the findings of some research are in favour of group pens (Warnick *et al*., 1977; Gjestang, 1985; Andrighetto *et al*., 1999), some other reports (Arave *et al*., 1985; Smits, 1988; Maatje and Verhoeff, 1993) indicate that individual calf pens are equal or better than group pens for calf rearing.

There is lack of information about the effects of individual and group housing on the growth rate and feed efficiency characteristics of the calves fed milk replacer in Eastern Turkey. The study was undertaken to determine comparative growth, weight gain and feed efficiency traits of Brown Swiss calves housed in different system.

Materials and Methods

A total of 32 new-born calves from Brown Swiss herd raised in the Research Farm of Agricultural College at Ataturk University, Erzurum, Turkey were used in this research. The calves were housed in the same building which had group and individual pens with milk-water buckets and feeders. The calves, 16 males and 16 females were assigned randomly one of the treatments (group, individual, individual + group). The calves in first treatment were kept in the group pens which provided 2 m^2 area per calf. The second group of the calves were housed individually in cages made from iron and wood measuring 107 cm width, 168 cm length, 103 cm height. Third group of calves were reared as for the second group, but transferred to the group pens at weaning time (63 days of age). The experiment lasted for 6 months. The chemical composition of the milk replacer in the meal form were 24.5 percent protein, 19.0 percent ether extract, 41.5 percent carbohydrate, 9.5 percent ash, 0.5 percent cellulose. The starter ration contained 18.5 percent protein, 3.6 percent ether extract, 6.7 percent ash, 11.2 percent cellulose. The composition of the dried hay consisted of 6.4 percent protein, 3.2 percent ether extract, 10.2 percent ash, 29.1 percent cellulose. The mil replacer in dried form was diluted with warm water whose temperature was 50°C to give about 14 percent solid content (1 unit milk replacer in 7 unit water). Then, it was cooled to around 35-36°C before giving to the calves. All calves received colostrum from birth to 3 days of age. The milk replacer was fed, 10 percent of birth weight of the calves, by using water-milk bucket once-a-day (every morning) for 9 weeks. The daily amount of starter offered to the calves was limited to 2 kg/head, but the calves were fed dried hay *ad libitum* during the experiment.

The data obtained from the study were analyzed statistically by using 3x2 completely randomised factorial experimental design. The analysis were carried out by using SAS statistics program (SAS, 1986).

Results and Discussion

The influences of individual, individual + group and group housing systems on the weight and weight gains of calves fed milk replacer are presented in Table 1. There was no difference among housing treatments for calf birth weights. However, female calves had lower birth and weaning weights. The weights at weaning and 6 months of age were also not affected significantly by the types of housing.

Table 1: Weight and daily weight gains of Brown Swiss calves

		Weights (kg) at			Total weight gains (kg) between		
	N	Birth	Weaning	6 Months of age	Birth and weaning	Weaning and 6 months of age	Birth and 6 months of age
Housing Systems							
Individual	12	37.00 ± 1.66	61.25 ± 2.30	136.66 ± 4.71	24.33 ± 1.67	75.41 ± 4.08	99.75 ± 4.47
Individual + Group	10	38.96 ± 2.05	63.61 ± 2.84	134.18 ± 5.82	24.66 ± 2.06	70.56 ± 5.04	95.22 ± 5.52
Group	10	36.80 ± 2.05	56.20 ± 5.52	137.40 ± 5.16	19.40 ± 1.83	81.20 ± 4.47	100.60 ± 4.89
Significance		NS	NS	NS	NS	NS	NS
Sex of calves							
Male	16	40.22 ± 1.44	63.38 ± 1.99	141.33 ± 4.09	23.15 ± 1.44	77.95 ± 3.54	101.11 ± 3.87
Female	16	34.95 ± 1.56	57.33 ± 2.17	130.83 ± 4.44	22.44 ± 1.57	73.49 ± 3.84	95.94 ± 4.21
Significance		**	*	NS	NS	NS	NS

NS: Non-significant, *, $p<0.05$; **, $p<0.01$

Table 2: Gains in body measurements (cm) of Brown Swiss calves

	N	Gains in body measurements between birth and weaning				Gains in body measurements between weaning and months of age			
		Body length	Height at	Chest depth withers	Heart girth	Body length	Height at withers	Chest depth	Heart girth
Housing systems									
Individual	12	11.67±1.02	9.58±0.92a	4.08±4.09	14.58±1.12	21.16±1.29a	17.08±1.20	10.75±0.81a	21.19±1.79a
Individual+Group	10	11.26±1.11	5.75±0.99b	5.38±0.57	13.07±1.40	15.37±1.49	13.68±1.38	6.15±0.94b	28.78±2.07b
Group	10	10.03±1.11	7.08±0.99ab	4.26±0.57	11.18±1.40	19.15±1.49	14.46±1.38	10.26±0.94a	23.45±2.07ab
Significance		NS	*	NS	NS	*	NS	*	*
Sex of Claves									
Male	16	10.77±0.98	7.74±10.2	4.15±0.43	12.27±1.05	17.15±1.12	13.87±1.04	13.87±1.04	24.61±1.55
Female	16	11.26±1.06	7.19±1.10	4.99±0.46	13.62±1.13	19.98±1.20	16.28±1.12	16.28±1.12	24.82±1.67
Significance		NS	NS	NS	NS	NS	NS	NS	NS

NS: Nonsignificant, *, $p<0.05$

The findings were similar to those reported in other trails in (Warnick *et al*., 1977; Nocek and Braund, 1986). Body weight gain from birth to weaning were higher for calves in individual and individual + group treatments than for those in group pens, but the differences were statistically insignificant. The results were in accordance with findings of Richard *et al*. (1988) and Andrighetto *et al*. (1999). At the post-weaning period, group calves gained higher than others, but the difference among the housing treatment were not significant. Similar results were also reported by several researchers (Warnick *et al*., 1977; Nocek and Braund, 1986; Richard *et al*., 1988). Although total weight gains of male calves were higher than those of females, the difference in weight gains were not statistically significant as already reported by Prasad *et al*. (1986).

Average feed conversion efficiency ratios for calves housed in group, individual and individual + group systems were found as 3.33, 3.13 and 3.08 respectively. Calves individually housed had slightly better feed conversion efficiency ratio compared with those raised in groups. The result was in agreement with findings of Lalande *et al*. (1980).

The differences between the gains in body measurements of calves housed individually and in group pens were not statistically significant. However, calves in individual + group treatments had significantly lower growth in height at withers in the pre-weaning period and body length, chest depth and heart girth in the post-weaning period than individually reared calves (Table 2). The findings were in agreement with results of Prasad *et al*. (1986). In conclusion, group-housing could be attractive in terms of animal growth rate, easiness and economical construction of the group pens, although group penned animals had slightly lower feed conversion efficiency ratio.

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