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The effect of individual and group housing systems on the growth rate and feed efficiency of Brown Swiss calves

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Calves reared in barns are generally housed in individual or group pens. The influence of the individual and group pens on the growth characteristics of calves is not clear yet. Gjestang (1985), Richard *et al.* (1988) and Andrighetto *et al.* (1999) found that group-housed calves had better growth performance than calves in individual pens. However, several workers (Arave *et al.* 1985, Smits 1988, Maatje and Verhoeff 1993) have reported that individual calf pens were equal to or better for calf rearing than group pens.

In eastern region of Turkey, the young animals in the calf rearing facilities are kept in either individual or group pens, and there is no research comparing growth performance of calves in different housing systems. The objectives of this study were to determine the effects of group and individual housing on growth and developmental characteristics of Brown Swiss calves.

New-born calves (32) from Brown Swiss herd raised in the Research Farm of Agricultural College at Atatürk University, Erzurum, Turkey were used in this research. The young animals were housed in the same building which had individual and group pens with feeders and milk-water buckets. The calves, 17 males and 15 females, were assigned randomly on the treatments (individual, individual+group or group housing). The calves in first treatment were housed individually in cages made from iron and wood measuring 168 cm length, 107 cm width, 103 cm height. Second group of calves were reared as for the 1st group, but transferred to the group pens at weaning time (63 days of ages). The third group of the calves were placed in the group pens which provided 2 m^2 area per calf. The experiment lasted for 6 months.

All calves received colostrum from birth to 3 days of age. Milk was fed once daily at 10% of birth weight and the amount of milk was kept constant during milk feeding period (9 weeks). Calves were offered good quality dry hay and water *ad lib.* and up to 2 kg starter ration per calf daily. The chemical composition of the dry hay consisted of 5.25% crude protein, 2.85% ether extract, 9.70% crude ash, 27.85% crude cellulose, 46.43% nitrogen free extract and 92.08% dry matter. The starter ration contained 18.80% crude protein, 3.24% ether extract, 7.25% crude ash, 10.32% crude cellulose, 48.89% nitrogen free extract and 88.50% dry matter.

The weights and body measurements of all calves were

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

	N	Weights (kg) at			Daily weight gains (kg) between		
		Birth	Weaning	6 Months of age	Birth and weaning	Weaning and 6 months of age	Birth and 6 months of age
Significance		NS	NS	NS	NS	NS	NS
Housing systems							
Individual	12	37.45±1.95	67.21±3.17	143.17±6.21	0.472±0.028	0.649±0.030	0.587±0.028
Individual + group	10	38.30±2.10	64.20±3.43	145.10±6.71	0.411±0.031	0.691±0.040	0.593±0.030
Group	10	38.50±2.10	69.20±3.43	151.40±6.71	0.487±0.031	0.702±0.040	0.627±0.030
Significance		**	*	*	NS	NS	NS
Sex							
Male	17	41.30±1.63	71.20±2.66	154.71±5.21	0.474±0.024	0.713±0.031	0.630±0.023
Female	15	34.86±1.71	62.53±2.80	138.40±5.48	0.439±0.025	0.648±0.033	0.575±0.024

NS: Nonsignificant; *, P<0.05; **, P<0.01.

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Table 2. Gains in body measurements (cm) of calves

		Gains in body measurements between birth and weaning				Gains in body measurements between weaning and 6 months of age			
	N	Body length	Height withers	Chest depth	Heart girth	Body lenght	Height at withers	Chest depth	Heart girth
Housing systems									
Individual	12	13.34±0.89	8.34±0.75	4.97±0.59	14.42±1.19	20.48±1.14	15.93±0.79	10.97±0.48	25.27±1.69
Individual+group	10	11.30±0.96	6.00±0.81	4.90±0.63	14.30±1.29	21.40±1.23	13.00±0.86	9.50±0.52	27.90±1.82
Group	10	13.20±0.96	7.70±0.81	4.50±0.63	15.00±1.29	19.70±1.23	15.00±0.86	11.10±0.52	26.40±1.82
Significance		NS	NS	NS	NS	NS	NS	NS	NS
Sex									
Male	17	12.89±0.75	6.89±0.63	4.78±0.49	14.01±1.00	20.12±0.95	14.35±0.67	10.44±0.40	26.78±1.41
Female	15	12.33±0.79	7.80±0.66	4.80±0.52	15.13±1.05	20.93±1.00	14.93±0.70	10.60±0.42	26.26±1.49
Significance		NS	NS	NS	NS	NS	NS	NS	NS

NS, Nonsignificant; *, P<0.05.

taken at birth, weaning and 6 months of ages. The quantity of concentrate and dry hay that remained in feeders were weighed daily and amount consumed was recorded. The data were analysed statistically by using 3 × 2 completely randomised factorial experimental design. The ANOVA analysis was carried out by employing the SAS statistics program.

The effects of different housing systems on weights and weight gains is summarised in Table 1. The birth weights of the calves assigned for different housing treatments were not significant, since the calves used in this research were randomly distributed to these treatments. However, the average birth weight of male calves were 6.44 kg heavier than that of female calves and the difference between sex groups were statistically significant (Table 1). Similiar results have been reported by Yanar and Ockerman (1993), Yanar *et al.* (1994), and Turgut *et al.* (1997). The average weaning weights of calves in group, individual and individual+group treatments were 69.20 kg, 67.21 kg and 64.20 kg respectively. However, the differences among the treatments were not statistically significant (Table 1). These results are in accordance with findings of Arave *et al.* (1985), Richard *et al.* (1988).

The average 6 month weight of group penned calves was higher than other treatments. However, the difference among the different housing systems were not statistically significant. The result is in agreement with finding of Broucek *et al.* (1986). The daily weight gains betweeen weaning and 6 months of age for calves in the group, individual and individual+group treatments were 0.702 kg, 0.649 kg and 0.691 kg respectively. The results regarding the postweaning performance of the calves indicated that weight gains of the group calves were slightly higher than the other groups, but the differences were not statistically significant (Table 1). Although males had higher average daily weight gains than females during the weaning to 6 months of ages, the difference was also not significant. Similar results have also been reported by Prasad *et al.* (1986), Richard *et al.* (1988), Andrighetto *et al.* (1999). Average feed conversion efficiency ratios for calves reared in the group, individual and individual+group treatments were 3.15, 2.90 and 3.55 respectively. Individually housed calves had slightly better feed conversion efficiency ratio than group calves. These results have also been supported by findings of Broucek *et al.* (1986). The gains in body measurements such as body length, chest depth and heart girth were not significantly influenced by the housing systems and sex (Table 2). The differences concerning the gains in height at withers between the group penned and individually housed calves were also not statistically significant. These findings are in accordance with results of Prasad *et al.* (1986).

The results obtained from this research suggest that Brown Swiss calves reared in the groups had slightly better weights and daily weight gains, but slightly less favourable feed conversion efficiency ratio.

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