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Fattening of Crossbreed Akkaraman Lambs in Extensive Condition

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Abstract: The objective of this study is to investigate fattening performance of Akkaraman crossbreed F_1 lambs obtained from Chios, Border Leicester, Dorset Down and Ile de France breeds and to compare them with native pure Akkaraman lambs under extensive farmer's condition in Central Anatolia. A total of 124 crossbreed lambs were obtained from 200 oestrus synchronized and artificially inseminated ewes in normal breeding season. Average weight at birth and weaning varied significantly by genotype. The live weights at 28th day of fattening were 29.73±0.353 and 27.45±0.371 kg for males and females, respectively. At 56th day of fattening, Dorset Down and Border Leicester F_1 lambs were significantly heavier than pure Akkaraman and Chios F_1 lambs. Total live weight of finishing at 84th day was not affected by birth weight for all genotypes. Final weights of pure Akkaraman and Chios F_1 lambs were significantly lower than other genotypes (37.11±0.388 and 38.77±0.613 kg vs 39.99±0.569; 40.90±0.523 and 40.34±0.431 kg). However, mortality from birth to weaning was almost doubled in these breeds, compared to pure Akkaraman and Chios F_1 lambs.

Key words: Fattening, crossbreed lambs, akkaraman, extensive condition

INTRODUCTION

Turkey is considered among principal countries regarding sheep production, although dramatical decrease at the rate 30% in sheep population during last 30 years. This decrease is related in socio-economic and cultural factors, beside structural and climatic changes affecting the large part of the country where sheep breeding, especially well-adapted indigenious breeds became essential. Nowadays, there are more than 25 millions of sheep producing 267.000 ton of meat. This is 18 % of total domestic production in Turkey (Akman *et al*., 2006). As subvention and support-based policy which was practiced for long term on agriculture was terminated, competitive marketing condition became dominant for animal production. Therefore, a considerable changes have appeared in this sector. For example, supports became mostly driven to large scale exploitations. Another major change is the transformation of selfconsuming family-based production into commercial production system resulting in restriction, besides disappearance of traditional farm animal breeding. In this case, it would be necessary to find new prospects, especially to increase the income for sheep breeders in order to sustain their durable activity in the sector. A rapid advance may be obtained by crossing local sheep breeds with high yielding exotic ones, beside the spreading of improved production techniques.

The objective of this study is to observe grazing performance of pure and cross-bred Akkaraman offsprings obtained from Chios, Border Leicester, Dorset-Down and Ile de France and to make a comparison between breeds regarding their grazing performance. Also, to investigate applicability of cross-breeding under extensive farmer condition in harsh environment.

MATERIALS AND METHODS

Location: The study was conducted in Golkoy village of Kalecik district located in 40° 03' N latitude and 33° 23' E longitude from 1200 m of sea level.

Animal material: The basic material was composed of 350 multiparious ewes and 5 rams of pure Akkaraman (Ak) breed raised in a private farm of Golkoy . Twenty pure bred rams of Chios (Ch), Border Leicester (BL), Dorset Down (DD) and Ile de France (IF) breeds were provided from Central Research Institut of Field Crops of Agricultural Ministry. In addition, 124 cross-bred lambs obtained from above material were used for this research. The distribution of F_1 lambs regarding their genotype and gender were shown in Table 1.

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Table 1: Distribution of F_1 lambs by genotype and gender

	Ak	C×Ak	Bl×Ak	DD×Ak	IF×Ak	Total
Male	18	11	17	6	11	63
Female	17	9	15	6	14	61
Total	35	20	32	12	25	124

Oestrus synchronizatin and artificial insemination: Among 350 ewes, a total of 200 multiparious ewes were randomly chosen for hormon treatment. The oestrus was synchronized by using two times a prostaglandin F_2 α analogue (*Cloprostenol*) of 125 μg for each with 11 days interval on september which is normal breeding season in Central Anatolia. The ewes showed oestrus within 48-60 h after second prostaglandin $F_2\alpha$ analogue. Artificial insemination was not performed on first-appeared heat. But it was done in subsequent heat which was observed after 17 days and lasted 7 days. Oestrus observations were made twice a day using taiser rams. The ewes were artificially inseminated at once with cervical method using 0.2 mL of fresh non-diluted ram semen collected with artifical vagina in the farm.

Lambing: Lambs were kept with their mothers in a common covered pen which is built of traditional material such as stone and wood. Genotype, birth weight and type, gender and birth weight of lambs were registered. Individual ear cups were used for each of lambs. The flock was grazed near willage, when lambs reached 2 weeks-old. Then, flock was brought to higland which is extended between 1650 and 1880 m of altitude, when lambs reached 75 days-old.

Suckling, milking and feeding: Twice-a-day milking was performed for ewes, when their lambs became 115 days-old. Thus, grazing of lambs was practiced separately. Only once-a-day suckling was permitted until 145 days-old. Moreover, lambs have been received daily 200 g $lamb^{-1}$ concentrated feed containing 2500 kcal kg^{-1} ME and 16% of crude protein. The ingredients of concentrate were 67% barley, 20% vetch, 10% bran, 0.1% premixed vitamin, 0.1% premixed mineral, 1.3% salt and 1.5% lime. This feeding program was performed until the end of the study. Growth performence was observed by weighing of lambs since 75 days old for every period of 28 days. These data were used for calculation of total and daily live weight gain. Lambs were totally weaned at the age of 145 days. Last weighing was made at 159th day.

Statistical analysis: Average weights and weight gains by 28 days of period from birth to finishing were compared by General linear model (Minitab, 1993). The differences between groups were also controlled with Duncan multiple comparison test. Below model was used for investigating the effect of genotype and gender on birth weight:

$$Yijk = \mu+ai+bj+aibj+eijk$$

Where,

μ = Population mean.
ai = Effect of genotype.
bj = Effect of gender.
aibj = Commun effect of gender and genotype.
eijk = Residual.

When the weight at beginning of one-day suckling affected significantly, this factor was eliminated before comparing genotypes.

RESULTS

Among PGF2α-administrated ewes, 180 of them showed oestrus, then all ewes on oestrus were artificially inseminated within 12-20 h after observation of first signs. A total of 99 crossbred lambs were obtained from 94 ewes (Table 2).

Birth weight: Average birth weights of lambs by genotype and gender are given in Table 3. Significant differences were found with regard to genotype ($p<0.05$) and gender ($p<0.01$). But, genotype×gender interaction was not found. The highest birth weight was obtained from Ch×Ak (4.22±0.156 kg) which was significantly higher than these of pure Ak and DD×Ak lambs ($p<0.05$). This value was also higher in IF×Ak (4.18±0.126 kg) when comparing with DD×Ak ($p<0.05$) (Table 3).

Table 2: Some reproductive traits of artificially inseminated ewes

Traits	n	(%)
Ewes traited	200	100
Ewes showed oestrus	180	90
Ewes inseminated	180	90
Ewes lambed from AI	94	52.22
Twin birth	5	5.32
Total lambs	99	55

Table 3: Average birth weights of lambs by gender and genotype

	Genotypes (x±SE)					
Gender	Ak	n	S×Ak	n	BL×Ak	n
Male	3.93±0.083	18	4.52±0.165	11	4.17±0.192	17
Female	3.82±0.063	17	3.86±0.237	9	3.95±0.108	15
General	3.87 ± 0.053^{de}	35	4.22 ± 0.156^{c}	20	4.07 ± 0.114^{cd}	32
	DD×Ak	**n**	**IF×A**	**n**	**General**	**n**
Male	3.83±0.108	6	4.49±0.171	11	4.19 ± 0.076^{A}	63
Female	3.65±0.152	6	3.93±0.155	14	3.87 ± 0.060^{B}	61
General	3.74 ± 0.093^{e}	12	4.18±0.126cd	25	4.03±0.051	124

A-B: $p<0.01$, c,d,e: $p<0.05$

Table 4: Adjusted live weights of lambs at weaning by genotypes

	Genotypes (x±SE)					
Gender	Ak	n	SxAk	n	BLxAk	n
Male	20.65±0.601	17	21.88±0.305	11	24.09±0.373	15
Female	18.70±0.444	16	21.24±0.626	8	22.97±0.318	14
General	19.71±0.409^{c}	33	21.61±0.316^{b}	19	23.55±0.264^{a}	29
	DD×Ak	**n**	**IF×A**	**n**	**General**	**n**
Male	22.67±0.900	6	23.43±0.806	10	22.43±0.310	59
Female	20.29±0.745	5	23.66±0.554	13	21.42±0.347	56
General	21.59±0.679^{b}	11	23.56±0.459^{a}	23	21.94±0.211	115

a, b and c $p<0.01$

Table 5: Total live weight at the finishing of fattening (84th day) by genotype and gender

	Genotypes (x±SE)					
Gender	Ak	n	S×Ak	n	BL×Ak	n
Male	38.61±0.472^{b}	17	40.28±0.562^{ab}	11	41.70±0.691^{a}	14
Female	35.52±0.283^{d}	16	36.70±0.783^{cd}	8	38.28±0.649^{bc}	14
General	37.11±0.388	33	38.77±0.613	19	39.99±0.569	28
	DD×Ak	**n**	**IF×A**	**n**	**General**	**n**
Male	41.10±0.899^{a}	6	40.98±0.742^{a}	10	40.98±0.742	58
Female	40.65±0.515^{a}	5	39.84±0.488^{ab}	13	37.84±0.344	56
General	40.90±0.523	11	40.34±0.431	23	39.11±0.262	114

a, b, c and d $p<0.05$

Live weight at once-a-day suckling period: It was performed at 75 days-old for both pure and crossbred lambs. As the lambing period was spred into 10 days, the live weights of genotypes were compared following the elimination of lamb age which affecting significantly the weight in this period ($p<0.05$). The difference was found significant between genotypes ($p<0.01$) (Table 4).

Live weight at 28th day of once-a-day suckling period: The live weights were taken in every 28 days from the beginning of this period. The weights taken in this period were significantly affected by the weight taken in the beginnig of the period ($p<0.05$). After the elimination of this factor, a significant genotype×gender interaction was observed ($p<0.01$). Average live weights for males and females were found as 29.73±0.353 and 27.45±0.371 kg, respectively.

Live weight at 56th day of once-a-day suckling period: Average weights by genotype did not vary according to gender at 56th day. The weight at the beginning of this period also affects the weight taken at 56th day. In addition, the differences between genders and as well as genotypes were also significant. Average weights were found as 34.05±0.292 kg for females, 35.58±0.304 kg for males, respectively. The lambs DD×Ak (36.20±0.419 kg) and BL×Ak (35.93±0.489 kg)were significantly heavier (p0.05) than these Ch×Ak(34.34±0.503 kg) and pure Ak (33.13±0.294 kg).

Live weight at 84th day once-a-day suckling period: Total live weights obtained at 84th day which was the end of fattening was not affected by the weight at birth, except the weight at the beginnig of once-a-day suckling ($p<0.01$). Moreover, a significant interaction of genotype×gender ($p<0.05$) was found. Besides, the effect of genotype and gender was significant on the weight reached at the end of fattening ($p<0.01$). Final live weights of pure Ak and Ak×Ch crossbred lambs were significantly lower when comparing with these of Akk×DD and Akk×IF genotypes ($p<0.01$). Similar result was observed with regard to total weight gain from the beginnig of once-a-day suckling to the end of fattening: All crossbred male lambs had superior live weight than those pure Ak genotype ($p<0.05$). When females were considered only, Ak×DD lambs were found significantly heavier than other genotypes, except IF×Ak ($p<0.05$).

Live weight gain: It was observed that live weight gain did not vary significantly by genotype and gender from the birth to the beginnig of once-a-day suckling (234.5±0.25 g day^{-1}). But, the effect of the weight at birth and once-a-day suckling and the weaning age were significant on daily weight gain for this period ($p<0.01$). Compared to other genotypes except Ak×IF, a higher weight gain ($p<0.01$) was observed for Ak×DD female lambs for primary 28 days of fattening (265.2±3.46 g day^{-1}).

When total weight gain was considered from the beginning of once-a-day suckling to finishing, the effect of genotype and gender became significant ($p<0.01$). Overall crossbred male lambs gained significantly more weight ($p<0.05$) than pure Akkaraman lambs for this period. These values were found as low as in Akk×Ch female lambs. However, the weight at birth and once-a-day suckling and also the age at the beginning of this period did not affect it (Table 5).

DISCUSSION

Maximum benefitting from pastures is one of basic way to minimize the production cost of lamb fattening. Moreover, the cross-breeding of local races with meat breeds would be advantageous for increasing meat production by lamb and also for reducing the size of fat tail which may involve 15-20% of carcass in some native Akkaraman varieties (Tufan, 1997; Tekin *et al*., 1993). However, the succes of cross-breeding is obviously linked to the survivability and adaptation capability of crossbreeds. In this study, mortality rates from birth to once-a-day suckling were found as 5.7, 5.0, 9.4, 8.3 and 8.0% in pure Ak, AK×Ch, Ak×Bl, Ak×DD and Ak×IF lambs, respectively. The survivability was % 100 in every breeds from the beginning of once-a-day suckling to finishing, except in Ak×Bl (% 96.5). It can be suggested

that crossbreed lambs are more vulnerable except Ak×Ch, in this period. Compared to pure Ak, the fattening performance of Ak×Bl, Ak×DD and Ak×IF was found higher in previous researches under intensive feeding condition (Ertugrul *et al*., 1989a, b). Daily weight gain was reported as 259 g day^{-1} in pure Ak and Ak×IF lambs for 60 days of fattening (Cengiz, 1989). Recently, the weight of weaning and finishing after 70 days of fattening were found as 23.4 and 42.3 kg for a distinct type of Akkaraman called Karakas and 23.7 and 40.8 kg for its crossbreeds (F_1), respectively, under semi-intensive condition in Eastern Anatolia (Karakus, 2007).

CONCLUSION

The results of this study showed that crossbred lambs of meat breeds can keep their advantage in fattening under extensive breeder condition of Central Anatolia. However, it is essencial to increase the survivability of crossbreeds and to investigate major factors affecting viability in suckling period. Another point is that artificial insemination is indispensable for spreading meat breeds within fat-tailed sheep herds. Therefore the success in cross-breeding is basicly linked to the success in practicing of artifical insemination which is most labouring and costly part of this activity.

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