COMPARATIVE PERFORMANCE OF AWASSI, KACHHI AND CROSSBRED (KACHHI X AWASSI) LAMBS

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Data on 678 Awassi, 401 Kachhi and 240 Awassi X Kachhi cross-bred lambs were analysed for for growth characteristics and wool production. Overall average birth weights for Awassi, Kachhi and crossbreds were 4.71 ± 0.03, 3.24 ± 0.04 and 3.75 ± 0.09 kg, respectively. The single born lambs were 11.65 to 22.50% heavier than the twin born lambs in the three breed groups. Average weaning weights for Awassi, Kachhi and crossbred lambs were 28.61 ± 0.44, 20.05 ± 0.49 and 23.97 ± 0.60 kg, respectively. Average daily gain upto weaning in Awassi, Kachhi and crossbred was 204 ∓ 4, 137 ± 3 and 166 ± 3 g, respectively. Differences in birth weight adjusted to 120-day weaning weight for single born lambs and in average daily gain upto weaning were significant between breeds as well as between sexes. Differences in birth weight were also significant between years.

The twinning rates were 16.7, 9.5 and 5.3% for Awassi, Kachhi and crossbred ewes, respectively. Survival rates for Awassi, Kachhi and crossbred groups were 86.7, 91.0, and 80.2%, respectively. Average wool production in the same order, respectively, was 2.81 ± 0.05, 2.65 ± 0.08 and 2.93 ± 0.09 kg, per annum. Differences in wool production due to breed and year were significant.

INTRODUCTION

Crossbreeding of sheep has been widely used in different parts of the world to improve the productivity of mutton and wool. Breeding programmes involving some of the exotic breeds of sheep have been carried out in Pakistan to improve the genetic merit of indigenous breeds for mutton and wool. The impact of such breeding plans has not been studied and, probably for this reason, such breeding programmes could not be extended for overall improvement in sheep product-

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ivity. Although Pakistan has 23 million sheep, yet the per capita availability of mutton is exceedingly low (Anonymous, 1983). There seems to be an urgent need, therefore, to increase the production per animal to cope with the increasing requirements for fast growing human population. To increase per animal productivity, Awassi breed from Middle East was crossed with a native Kachhi breed. Awassi is well known for high milk, meat and wool production, whereas Kachhi is adapted to desert and semi-desert conditions, and known to possess good mothering ability. The present study was designed to compare the performance of Awassi, Kachhi and their crossbred progeny for growth characteristics and wool production.

MATERIALS AND METHODS

Experimental Material : A breeding flock of Awassi sheep was imported from Lebanon in 1964 and maintained at Livestock Production Research Institute, Bahadurnagar, District Okara. Since its import the breed has been used in crossbreeding programmes with some of the native breeds, and also as purebred flock. Awassi rams were crossbred with Kachhi ewes during 1966-74 to obtain Awassi X Kachhi crossbred progeny.

Breeding and performance records were maintained for Kachhi and Awassi breeds, as well as for Awassi X Kachhi crossbred progeny. Data were obtained for the present study on birth type and sex, birth weights, weaning weights, survival rate and wool production of the three breed types. All three flocks were kept under similar feeding and management conditions. A good quality forage was provided to all animals which was supplemented with concentrates during scarcity period. Flushing of breeding ewes and rams was practised a few weeks before and during the mating season. Breeding was restricted to autumn season, thus lambing taking place during spring.

Statistical Analysis : Twinning rates being very low in Kachhi and Awassi X Kachhi crossbred ewes, and also being unevenly distributed in different years, it was not possible to compare birth weights, weaning weights and rate of again in two birth types. Therefore, data on single births were analysed for variation due to year of lambing, sex and breed. Weaning weights were adjusted to 120 days age by using correction factors developed from the present data. Daily weight gains were calculated from the actual weaning weights. Data thus obtained for birth weights, weaning weight and daily gain were subjected to analysis of variance assuming the following model :

$X_{ijk} = \mu + B_i + Y_j + S_k + (BY)_{ij} + (BS)_{ik} + (YS)_{jk} + (BYS)_{ijk} + \epsilon_{ijk};$

where, μ is the overall mean,

B_i is the effect of the ith breed,

Y_j is the effect of the jth year,

S_k is the effect of the kth sex,

$(BY)_{ij}$ is the breed X year interaction,

$(BS)_{ik}$ is the breed X sex interaction,

$(YS)_{jk}$ is the year X sex interaction,

$(BYS)_{ijk}$ is breed X year X sex interaction,

ϵ_{ijk} is error term, which is $NID \sim (0, \delta_e)^2$

The data were analysed by the method of unweighted means. Wool production data were subjected to analysis of variance, using two-way classification, to obtain differences due to breeds, years and breed X year interaction.

RESULTS AND DISCUSSION

Birth Type and Sex Ratio : Number of lambs born, birth types, twinning rates and sex ratio for Awassi, Kachhi, and Awassi X Kachhi crossbred sheep are presented in Table 1. The twinning percentage was highest in Awassi breed, followed by Kachhi, and was the lowest in crossbred ewes. The sex ratio did not show much variation in the three breed groups. No specific reason could be ascribed to the low rate of twinning in crossbred over the two parental breeds except for a smaller number of observations in crossbred as compared to purebred animals and that no selection was practised for this trait in the flock under study.

Table 1. *Birth type, twinning percentage and sex ratio in Awassi, Kachhi and Awassi X Kachhi crossbred lambs*

Breed group	Lambs born	Birth type		Twinning percentage	Sex ratio	
		Single	Twin		Male	: Female
Awassi	678	484	97	16.70	49.26	: 50.74
Kachhi	401	331	35	9.56	48.88	: 51.12
Crossbred	240	216	12	5.26	50.87	: 49.18

Birth Weign, Weaning Weight and Preweaning Daily Weight Gain : The average birth weight, weaning weight and average preweaning daily gain in Awassi, Kachhi and Awassi X Kachhi crossbred lambs are shown in Table 2. The overall birth weights in Awassi, Kachhi and crossbreds were 4.17 ± 0.03, 3 24 ± 0.04 and 3.75 ± 0.09 kg, respectively. These data showed that birth weight for crossbred lambs was 16% higher than native Kachhi lambs. Male lambs were heavier than females within each breed group. The single born lambs were also heavier than twin born lambs in the three groups under study.

The average weaning weight for Awassi, Kachhi and Awassi X Kachhi cross bred lambs was 28.61 ± 0.44, 20.05 ± 0.49 and 23.97 ± 0.60 kg, respectively. Crossbred lambs exceeded Kachhi lambs by about 21% in weaning weight. Male lambs were heavier at weaning compared to females lambs within each breed group. Similarly, the single born lambs excelled the twin born lambs of Awassi, Kachhi and Awassi X Kachhi crossbred lambs, respectively, by 16.3 11.6 and 21.5 % in weaning weight. The overall preweaning daily weight gain was the highest for Awassi and lowest for Kachhi. Preweaning daily gain for cross-bred lambs was 21% higher than for Kachhi lambs. Male lambs showed better growth rate than female lambs in the three breed groups.

Analysis of variance for birth weight, weaning weight, and preweaning daily weight gain in single born lambs of the three breed groups is presented in Table 3. It revealed that differences between breeds and between sexes were highly significant for birth weight, weaning weight, and preweaning daily gain. However, between years differences were significant only for birth weight, and were non-significant for weaning weight and average daily gain. Breed X sex interaction was significant for weaning weight, whereas it was non-significant for birth weight and daily gain. Breed X year interaction was significant for all the three traits, whereas sex X year interaction was non-significant for the three traits under study. Breed X year X sex interaction was significant for daily weight gain, and non-significant for birth weight and weaning weight. These results are in accordance with those reported by various other workers (Singh et al., 1967 and Kaul and Tomar, 1982).

Survival Rate : Preweaning survival rate for Awassi, Kachhi and Awassi X Kachhi crossbred lambs is given in Table 4. The survival rate was the highest (91.0%) for Kachhi, lowest (85.2%) for crossbred, and intermediate (86.7%) for

Table 2. Average birth weight, weaning weight and preweaning daily gain for Awassi, Kachhi and Awassi X Kachhi crossbred lambs according to birth type and sex

Character	Breed groups	Single			Twins			Overall
		Male	Female	Combined	Male	Female	Combined	
Birth weight (kg)	Awassi	4.49 ±0.04	4.23 ±0.04	4.35 ±0.03	3.74 ±0.06	3.60 ±0.08	3.67 ±0.05	4.17 ±0.03
	Kachhi	3.39 ±0.05	3.28 ±0.04	3.34 ±0.03	2.78 ±0.12	2.72 ±0.08	2.74 ±0.07	3.24 ±0.04
	Crossbred	3.03 ±0.06	3.74 ±0.06	3.84 ±0.04	2.99 ±0.13	2.79 ±0.18	2.90 ±0.10	3.75 ±0.09
Weaning weight (kg)	Awassi	31.61 ±0.37	28.13 ±0.28	29.85 ±0.25	26.72 ±0.56	24.67 ±0.30	25.66 ±0.27	28.61 ±0.44
	Kachhi	20.86 ±0.39	19.99 ±0.29	20.42 ±0.24	19.96 ±1.14	17.14 ±0.62	18.29 ±0.62	20.05 ±0.49
	Crossbred	25.84 ±0.42	23.10 ±0.39	24.48 ±0.39	21.17 ±1.08	18.43 ±0.63	19.98 ±0.72	23.97 ±0.60
Preweaning daily gain (g)	Awassi	227 ±3	200 ±2	213 ±2	192 ±3	175 ±2	182 ±2	201 ±4
	Kachhi	150 ±3	136 ±2	141 ±2	127 ±8	106 ±4	114 ±2	137 ±3
	Crossbred	182 ±3	169 ±3	168 ±2	144 ±9	118 ±5	132 ±6	166 ±3

Awassi lambs. Relatively better survival upto weaning in Kachhi breed may be attributed to its inherent adaptive potential for the local conditions.

Table 3. *Analysis of variance for birth weight, weaning weight and preweaning daily gain in Awassi, Kachhi and Awassi X Kacchi crossbred lambs*

Source of Variation	Birth weight		Weaning weight		Preweaning daily gain	
	df	Mean squares	df	Mean squares	df	Mean squares
Breed	2	24,545**	2	1591.45**	2	0.089227**
Sex	1	1,703**	1	329.85**	1	0.027075**
Year	8	0.802**	7	9.31^{NS}	7	0.000200^{NS}
Breed X sex	2	0.089^{NS}	2	23.74*	2	0.000568^{NS}
Breed X year	16	0.204*	14	23.28**	14	0.001815**
Year X sex	8	0.089^{NS}	7	6.93^{NS}	7	0.000470^{NS}
Breed X year X sex	16	0.089^{NS}	14	10.74^{NS}	14	0.000812*
Error	977	0.120	762	7.007	762	0.000445

*Significant at 5% level of probability; **significant at 1% level of probability. NS = non-significant.

Table 4. *Survival percentage in Awassi, Kachhi and Awassi X Kachhi crossbred sheep*

Genetic groups	Single		Twin		Overall
	Male	Female	Male	Female	
Awassi	85.8	85.1	84.8	95.7	86.7
Kachhi	89.8	92.1	86.7	95.0	91.0
Crossbred	83.6	86.8	86.7	90.9	85.2

Wool Production : The average wool production of adult female Awassi, Kachhi and Awassi X Kachhi crossbred sheep is presented in Table 5. Shorn once in a year, Awassi, Kachhi and crossbred animals produced 2.81 ± 0.05, 2.65 ± 0.48 and 2.93 ± 0.09 kg of greasy wool, respectively. Awassi X Kachhi crossbred female progeny produced more wool than both the parental breeds, indicating the evidence of heterosis for the trait. The amount of heterosis was, therefor,

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estimated and was found to be 7.33%. Analysis of variance for wool production in Awassi, Kachhi and crossbred ewes is presented in Table 6. It showed significant differences between the breed groups. The yearly variation for wool production and breed X year interaction was also significant. The results of wool production as obtained in the present study were in agreement with those reported by Sidwell et al. (1971).

Table 5. *Average annual greasy wool production of experimental breed groups shorn once a year*

Breed group	Number of Animals	Annual wool production (kg)	
		Mean	SE
Awassi	242	2 81	0 05
Kachhi	133	2 65	0.48
Awassi X Kachhi	105	2 93	0,09
Overall	480	2.79	0.04

Table 6. *Analysis of variance for wool production in Awassi, Kachhi and Awassi X Kachhi crossbred sheep*

Source of variation	df	Sum of squares	Mean squares
Breed	2	3.90	1.950**
Year	7	14.04	2.006**
Breed X year	14	15.04	1.074**
Error	456		0.167

**Significant at 1% level of probability.

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