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THE INFLUENCE OF BREED AND WEANING AGE ON FEEDLOT PERFORMANCE OF IRANIAN FAT–TAILED SHEEP[1]

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ABSTRACT

Fifty six spring-born ram lamb of three fat-tailed Iranian breeds, Mehraban (M), Karakul (K) and Naeini (N) were randomly allocated to suckling periods of 45, 60 and 75 days to study the effect of suckling period length on feedlot performance. The lambs were creep-fed during the suckling period and were put in individual feeding boxes at weaning and fed *ad libitum* until 195 days of age.

Due to unequal number of lambs in subgroups, the data were analyzed by the least squares procedure. Significant differences were found for daily gain in the feedlot between M and K and also between M and N ($p < .01$). Weaning age did not have a significant effect on feedlot daily gain. Significant differences were not apparent between breeds and between suckling periods as far as feed efficiency was concerned. The least squares means of daily gain for M, K and N breeds were 167.1, 135.3 and 123.9 grams, respectively; and adjusted means of daily gain for lambs weaned at 45, 60 and 75 days after birth were 140.7, 139.6 and 146.1 grams, respectively. The least squares means of feed efficiency for M, K and N breeds were 6.3, 7.1 and 6.8 and for lambs weaned at 45, 60 and 75 days of age were 6.6, 6.6, and 6.9, respectively.

Analysis of the data for gain from 45 to 195 days of age, disregarding weaning age showed that while weaning age had no significant influence on total gain, nevertheless the breeds differed significantly in this respect.

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Mortality in the feedlot for those weaned at 45, 60 and 75 days of age for M was 40.0, 33.3 and 20.0; for K, was 60.0, 57.0 and 0.0 and for N, was 66.6, 25.0 and 20.0 percent, respectively. Lambs which were culled due to severe illness are indluded.

INTRODUCTION

Research on the effect of early weaning of lambs has shown variable results on post-weaning performance. Some investigators have reported that early weaning has either positive or non-harmful effect on post-weaning performance (1, 5, 11, 12, 14, 15, 16), while others have found negative effects (1, 3, 13).

The purpose of this study was to compare the influence of weaning age of three different fat-tailed Iranian breeds of sheep (Mehraban, Karakul and Naeini) on their feedlot performance. Since reliable data on the performance of fat-tailed indigenous Iranian breeds of sheep are very limited, it was also decided to compare the feedlot performance of the above mentioned breeds under standard conditions.

MATERIALS AND METHODS

Experimental animals: The lambs used in this study were from three fat-tailed Iranian breeds of sheep including Mehraban (M), Karakul (K) and Naeini (N). These are all carpet-wool breeds. Mehraban is raised in farms of the western part of the country but K and N are mainly range sheep. Naeini has a relatively small size adapted to the central poor ranges of Iran. Karakul is famous for raising lambs with high quality fur at birth, but is also raised for meat production in the southern and eastern parts of the country. M has higher live body weight followed by K and N. No classical selection for meat, milk and wool has been performed on these breeds.

Experimental procedures: Fifity-six ram lambs of the three breeds that were born single from March 1 through April 16, 1972, were randomly weaned at 45, 60 and 75 days of age. All the lambs were creep-fed during the suckling period. The creep ration consisted of 50% barley, 10% sunflower seed meal, 20% wheat bran, 18% molasses of dried sugar-beet pulp, 1% bone meal and 1% salt. Alfalfa was fed free choice, and lambs had access to the ewes for only about 12 hours at nights.

After weaning, the lambs were put in individual cages and fed *ad libitum* until 195 days of age. The ration was ground, mixed and sampled for proximate analysis by the method described in A.O.A.C. (6). Mixed feed consisted of 46% barley, 12% molasses of dried beet plup, 27% alfalfa, 13% wheat straw, 1% salt and 1% bone meal which provided 93% dry matter, 9.23% crude protein, 1.78% ether extract, 16.08% crude fiber and 7.36% ash. Lambs and their feed intake were individually weighed at 15 day intervals.

Analysis of data: The data were analyzed by the method of least squares, as outlined by Harvey (4), according to the following model: $Y_{ijk} = \mu + a_i + b_j + a_ib_j + e_{ijk}$ where i = 1, 2, 3, and j = 1, 2, 3. In the model Y_{ijk} is the gain or feed efficiency of the K^{th} individual on the j^{th} weaning age group belonging to the i^{th} breed. μ is the mean that would exist if all classes had equal numbers, a_i is an effect due to breed, b_j is an effect due to weaning age, a_ib_j is the interaction effect and e_{ijk} is the random effect peculiar to each lamb. In obtaining the estimates of the above parameters, the assumption was made that the total effect of each variable would add up to zero i.e. $\sum_i a_i = \sum_j b_j = \sum_i a_ib_j = \sum_j a_ib_j = 0.0$. After imposing the necessary restriction on the equations in order to make them independent, they were solved by computer and the sum of squares were obtained.

Pairwise tests of significance among the least squares means were completed with the Ducan's Multiple Range Test as modified by Kramer (2, 8).

RESULTS AND DISCUSSION

Breeds: Least squares means of daily gain and feed efficiency in feedlot and daily gain from 45 to 195 days of age are presented in Table 1. The results indicate that daily gain in feedlot was significantly higher for M as compared with K and N($p < .01$). But there was no significant difference between K and N at the same period. No significant differences were found in feed efficiency among the three breeds, although M had a higher feed efficiency than the other two breeds.

Disregarding the weaning age, it was revealed that daily gain from 45 to 195 days of age was significantly higher in M followed by K and N($p < .05$).

The greater growth potenital of M lambs, as compared to the other two breeds, might be due to the fact that M is usually raised on farms while K and N are originally

TABLE 1. The effect of breed and weaning age on feedlot performance of lambs.

Classification	Number of lambs	Daily Gain in Feedlot (g)	Feed Efficiency in Feedlot	Daily Gain from 45 to 195 Days of Age (g.)
Overall mean	35	142.1 ± 4.1	6.7 ± .1	145.1 ± 3.9
Breed:				
Mehraban	9	167.1 ± 7.59b	6.3 ± .2a	170.5 ± 7.3a
Karakul	9	135.3 ± 7.5a	7.1 ± .2a	143.3 ± 7.3b
Naeini	17	123.9 ± 6.8a	6.8 ± .2a	121.6 ± 6.3ab
Weaning age:				
45 days	8	140.7 ± 7.9b	6.6 ± .3b	141.3 ± 7.7a
60 days	11	139.6 ± 6.9b	6.6 ± .3b	144.4 ± 6.7a
75 days	16	146.1 ± 6.5b	6.9 ± .2b	149.6 ± 6.3a

All means differ significantly ($p < .05$) except those designated by the same letter.

range sheep adapted to desert conditions. This is in agreement with the report of Demiruren *et al.* (3) who found that Kizil (a large size fat-tailed breed indigenous to western part of Iran) gained significantly faster than two other native breeds (Kallakui and Balluchi) which are very similar to Naeini.

In Table 2 the daily gain from 45 to 195 days of age is given at 30–day intervals for the three breeds. In this case, except for the 75 to 105 days of age where M was superior to K, overall performance of M and K was quite similar as far as daily gain was concerned. On the other hand, N had significantly lower daily gain than the other two breeds in the first (45 to 75 days) and the last (165 to 195 days of age) periods. The lower daily gain of N at the first stage could be attributed to their lower ability for feed conversion at this early age compared with the other two breeds. The lower daily gain of N, in comparison with K and M at the final stage, might be due to the fact that N has a lower capacity for gain than the other two breeds and therefore should be kept for a shorter period in feedlot.

The results presented in Table 3 show that there was no significant difference in feed efficiency among the three breeds at 30 day intervals.

Weaning age: According to the results, weaning age had no significant influence on daily gain in feedlot, daily gain from 45 to 195 days of age and feed efficiency. The results are in agreement with the findings of several investigators (1, 5, 11, 12, 14, 15, 16). On the other hand Demiruren *et al.* (3) found a significant difference in post-weaning daily gain of some fat-tailed Iranian breeds weaned at 30, 60, 90, and 120 days of age. It must be noticed that the weaning age groups in our trial were not the same as in the above mentioned experiment. Similar results were also reported by other investigators (1, 3, 13).

As table 2 indicates, those lambs weaned at 75 days of age had a significantly higher daily gain from 45 to 75 days of age (while suckling) and lower daily gain from 75 to 105 days of age compared with those weaned at 45 and 60 days of age. This may be due to the fact that lambs which were weaned later gained more during their suckling period, while those which were weaned earlier compensated their light weights at weaning at the later stages in feedlot.

Table 3 indicates feed efficiency to be significantly lower for lambs weaned at 75

TABLE 2. Daily gains at 30-day intervals of three breeds of lambs weaned at three different ages.

Classification	45 to 74 Days of Age (g)	75 to 104 Days of Age (g)	105 to 134 Days of Age (g)	135 to 164 Days of Age (g)	165 to 194 Days of Age (g)
Overall mean	105.2 ± 10.8	133.0 ± 10.9	162.4 ± 11.3	163.7 ± 10.0	161.4 ± 8.0
Breeds:					
M	129.3 ± 20.0 a	184.1 ± 20.4a	165.2 ± 20.8a	188.8 ± 18.6a	170.3 ± 14.7a
K	117.5 ± 20.0ab	103.1 ± 20.4b	175.0 ± 20.9a	150.1 ± 18.6a	186.0 ± 14.8a
N	68.3 ± 17.2b	111.7 ± 17.8b	147.1 ± 17.9a	152.1 ± 15.9a	127.9 ± 12.7b
Weaning age groups:					
45 days	55.7 ± 21.1a	155.0 ± 21.1a	176.6 ± 22.0a	175.4 ± 19.6a	155.1 ± 15.6a
60 days	98.4 ± 18.5a	160.5 ± 19.6a	139.0 ± 19.3a	157.5 ± 17.1a	161.5 ± 13.6a
75 days	161.6 ± 21.0b	83.3 ± 17.8b	171.7 ± 18.0a	158.1 ± 16.0a	164.6 ± 12.7a

All means differed significantly ($p < .05$) except those followed by the same letter.

TABLE 3. Feed efficiency at 30-day intervals of three breeds of lambs weaned at three different ages*.

Classification	75 to 104 Days of Age	105 to 134 Days of Age	135 to 164 Days of Age	165 to 194 Days of Age
Overall mean	7.1 ± .7	5.6 ± .2	7.1 ± 8	8.7 ± .7
Breeds:				
M	5.2 ± 1.3a	6.0 ± .4a	6.8 ± 1.4a	9.5 ± 1.3a
K	9.6 ± 1.3a	5.4 ± .4a	6.8 ± 1.4a	6.8 ± 1.3a
N	6.4 ± 1.2a	5.5 ± .3a	7.9 ± 1.2a	9.8 ± 1.1a
Weaning age groups:				
45 days	4.8 ± 1.5a	5.6 ± .4a	6.8 ± 1.5a	9.6 ± 1.4a
60 days	5.4 ± 1.3a	5.4 ± .4a	6.7 ± 1.3a	8.2 ± 1.2a
75 days	11.0 ± 1.2b	5.8 ± .4a	7.9 ± 1.2a	8.4 ± 1.1a

* Units of feed consumed per unit gain.

All means differed significantly ($p < .05$) except those followed by the same letter.

days of age compared with the other two groups from the 75-104 day interval. This is reasonable because the lambs weaned later would require an adjusting period in order to become adapted to the feedlot ration.

There was no interaction between breed and weaning age for daily gain and feed efficiency.

Mortality percentages in the feedlot, including the lambs which were culled due to severe illness in groups weaned at 45, 60 and 75 days of age in M were 40.0, 33.3 and 20.0, in K were 60.0, 57.1 and 0.0 and in N were 66.6, 25.0, and 20.0, respectively. Some reports indicate that early weaning of lambs does not increase mortality (4, 7, 13), but high lamb losses in this study could be partly due to the low protein content of the ration (9.23% crude protein). The ration was formulated for a 27 Kg. fattening lamb according to the N.R.C. recomendations (8), while the average weaning weights of the lambs at 45, 60 and 75 days of age were 13.38, 14.28 and 16.46 Kg., respectively. Apparently feed intake did not supply the protein requirement of early weaned lambs (4). The protein content of the ration was kept constant in order to avoid periodical changes of the ration during the trial. The high percentage of mortality could also be partly attributable to the epidemic lamb pneumonia prevelant in the area which contaminated the lambs under stress due to early weaning. The resluts of the autopsies on the dead lambs revealed pneumonia in most of the cases. Lamb losses in this study were mostly during the first month after weaning.

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