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The Effect of Sex and Weaning Age on Growth Performance of First Generation Lambs Derived from Crossing ½Romanov and Zel

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Abstract

The increase in birth rate is one of the most important objectives in sheep breeding. One way to increase the birth rate and yield is to hybrid the weak native breeds with those of strong from the view point. To this aim, the study has investigated the effects of sex and weaning age on the first-generation lambs growth result according to ½Romanov and Zel. Also it has used the completely randomized factorial experiments with 6 treatment and 4 replication. The lambs weaning age has been 40, 50 and 75 days. The experimental diets have been the same to the all treatments in terms of energy, protein and other nutrients. The feed intake given to lambs has been measured and weighed with interval specification. By evaluating the feed consumption results and daily weighing, in 2 first weeks, as well as fourth and fifth weeks, there were significant differences have been observed in sex and weaning age ($p < 0.05$). In the fourth 2 weeks, a significant statistical difference has observed in the feed conversion ratio ($p < 0.05$). By result investigation, it has been observed that the male lambs have had better performances than the females in the term of feed consumption, feed conversion ratio and daily weight gaining during the experiment weeks. The lambs of 75 days have had the best performance in feed consumption and daily weight gain.

grown in the coastal area around Caspian sea and Gorgan plain. So, they have small bodies, light and early maturity as well as puberty age of 6 to 7 months however, the first parturition has occurred when they have been 1 year [2]. Romanov's sheep origin comes back to Volga valley in the North-West of Moscow. They are a kind of pure breed. The Mating time for Romanov Lambs' is at 8 months, although they do not have high weight, they have a desirable daily growth. Romanov breed has the reproduction capability the whole year and the breed rams can fertilize ewes in every season. Romanov is a kind of sheep birth with a short tail and high lambing and of 4, 5 Even 6 lambs a birth in this breed is not unexpected which may have early puberty. Their wool color is generally black at birth time and puberty age it become, somehow brighter. The so percentage blood sharing Romanov's ewes can also have high twinning about 270. The percentage of 2.7 shows that each 100 ewes may have 270 lambs born [3]. This breed ability to reproduce out season has caused it's quick proliferate in herds [3]. Many researches have shown the effect of sex and weaning age is significant on lambs growth performance [4,5]. Considering this fact that, there is no evidence to show the lambs performance has resulted in Romanov and Zel's, so this study has been evaluated as one scientific investigation.

Materials and Methods

This research has carried out in Dr Mousavi's sheep breeding station located in Jouybar, Mazandaran, Iran. It is resulted from the crossing the ½Romanov × Zel lambs in autumn birth for 75 days. In this experiment Zel ewe has been used as the base mother, and the presented lambs have been born through laparoscopy (Intrauterine insemination). The experiment has been done by 6 treatments and 4 replicates using 24 male and female lambs (12 lambs of each sex) in factorial experiment of 3 × 3 in a totally randomized designed. Initial average weight of lambs was close together ($4/5 \pm 0/53$) (birth weight when the experiment was as a covariate in the model placed) [6]. Treatments has been weaned during 3 periods of 45th, 60th and 70th days. Traits measured in this study are including the feed intake amount, the daily weight gaining and the feed

Keywords: Weaning age; Performance; Romanov and Zel

Introduction

The important goals in sheep breeding, is to increase the birth rate and milk production to create the efficient and appropriate lambs for the market supply. One way to increase the efficiency in sheep breeding systems is to raise the number of lambs born alive by every ewe and to improve the lambs growing performance. To achieve this goal, the birth rate, the birth number, should be increase, although they should be progressed, too. Then, the result of providing the necessary conditions would be a higher performance [1]. Zel sheep are

conversion ratio. The Starter diet given to lambs has been hay (70 to 30%) which comes with milk replacer. Milk replacers used for lambs was based on 3% of body weight. The diet ingredients in this study are presented in **Table 1**. The data collected are analyzed using statistical software SAS.9.1. To compare the means, Duncan's multiple range tests are used. The mathematical model of the experiments can be explained as following: $X_{ijk} = \mu + T_j + S_j + (TS)_{ij} + e_{ijk}$ that X_{ijk} : the amount of observation T_i : the effect of sex, S_j : the effect of weaning time, $(TS)_{ij}$: the interaction between sex and weaning age, e_{ijk} : effect of experimental error and μ : the average in total population.

Table 1: Ingredients of the diet used in the experiment

Ingredient	% At starter
Corn	30
Barley corn	35
Soybean meal	20
Sugar beet molasses	2
Cottonseed meal mill	5.5
Vegetable oil	1.5
Wheat bran	3.8
Salt	0.2
Sodium Bicarbonate	0.5
Vitamin + mineral supplement	0.5
Calcium carbonate	1
The chemical composition of the diet	
ME(Mcal/kg)	2.3
NE _m (Mcal/kg)	1.98
NE _g (Mcal/kg)	1.35
Crude protein(%)	18
Calcium (%)	0.7
Phosphorus (%)	0.48
Sodium (%)	0.15

Results and Discussion

Feed intake and daily weight gain: The results of feed intake and the daily weight gain have been provided in **Tables 2 and 3**, respectively. 75 day weaned lambs have had the greatest amount of feed intake and daily weight gain. Also, male lambs have a better performance than the female lambs. The increase in the weaning age duration may cause lambs longer milk using that can increase to receive the nutrients. Also, it would be a stimulating factor for lambs feed intake as well as their daily gaining weight which is a raising trend [7,8].

To increase the lambing rate, in different countries cross breeding has conducted between interracial multiparity (such as Romanov breed) and the native breeds. On the other hand, the resulted lamb adjusting is different depending on their paternal

breed. For example it has been cleared there has been better performance in Spain when there has been crossing from the Romanov breed in compare with the Finn sheep. So since 1973 Romanov breed males, rare widely brought to Spain and are used in cross breeding system. Then the result is to produce a kind of 2 hybrid breed named Salz and Marina from cross breeding of Romanov male with the Spanish native sheep. In the system associated with the production meat and feedlot, Romanov breed males are not priority, because of the poor growth performance in this breed and some carcass characteristics listed. Thus, major researches have focused on reproductive ability in Romanov breed [1].

The lambs growth in the first three location months, depends on the ewe lactation amount or intake the replaced milk. So, by increasing the weaning time, lambs can be feed by more milk so that there will be an increase in the lambs feed intake. By raising the lambs age, the daily feed intake would be increased [9]. There is also greater growth rate in the males, generally and the weight gain is through forming the stored protein in them. Therefore, this increasing procedure would require more feed intake [10]. Considering in the present study, milk replacer used to feed the lambs has contained 24 to 30% of fat, 20 to 25% of protein and 30 to 35% of lactose. So, it can supply some important nutrition resource to the lambs during their milk intake [11]. The weaning age is different based on the environmental conditions, breeding way ewe's milk production and the lambs digestive organs grown to consume feed. Before weaning the lambs weight is more affected by ewe's milk than that of genetic issues which is less. Therefore, it is effective to choose a kind of ewe which produces more milk because it may improve this trait. The difference in weaning weight in various seasons time is due to the environment factor impact mention like temperature as well as the other factor such as nutrition, disease and management. Generally, sex is more effective on the weaning weight than on the birth weight. In some sources, the most appropriate age to wean lambs is announced in 60-90 days, while the others, prefer 45 days [6,12].

Regardless of the weaning time or how to implement it, the development in digestive organs, especially gastric fermentation, depends on the type of feed intake. This development considered in the time evolution of pre-rumination (milk replacing intake with the starting diet) to rumination, mostly follows the volatile fatty acids. The feeding type also effects on the rumen growth and development [13]. The research result have shown that the milk replacing intake in suckling ruminants, can cause a significant statistical difference in the feed intake and the daily weight gain between different weaning times [14] the found results would be conformed with those of the present study.

The study results have shown the amount of feed intake would be increased by raising the weaning age [15]. Also, a study on lamb Lori has shown that by raising the weaning age, the daily weight gain and final weight would be higher [16]. Some experiments have shown that weaning weight of lambs is strongly associated with increasing body weight, final weight and feed conversion ratio. It has been reported the weaning age is 75-90 days, after birth [17,18] Abdel-Fattah et al. have

investigated the effects of age and sex on the performance of Barki lambs. The results in this study have shown the lamb weaned earlier, have higher final weight gain than the lambs weaned later [1].

Bath et al. have studied the effect of early weaning on growth in different ages (60, 90 and 120 days) done on male and female Awassi lambs their study results have shown the lambs final weight weaned in 60 days is higher than that of the other groups in 120 and 145 days [20]. This study has shown the early weaning effects on body weight in male and female lambs in different ages (60, 90 and 120 days). The final weight in males has been higher than that of the females. Also, the daily weight gain in male lambs would be more than that of the females [21].

In a study to examine the effects of lambs weaning age and their sex on their growth, it is shown the males grow faster than the females [22] corresponded to the present study. The results obtained in this study is slightly different from those reported by the other researches in some aspects which is due to differences in genetic potential in this breed and the other breeds, growth traits and environmental factors such as age and weight of starting feedlot, experiment, time, maintenance conditions and the difference in the nutrients amount [23,24].

Lee et al. have assessed the effect of the weaning age and the lamb sex on the lambs performance weaned in different ages. The results have shown the lambs weaned in lower ages may have slighter decrease in weight at the end of the period than the other groups. The study results have shown the body weight rate would be increase by weaning age raise [5]. Also, Fogarti et al. have evaluated the effect of sex and weaning age on the male and female lambs growth when they are 6, 9 and 8 months. These results have shown, at the end of the period, the male lambs have had greater weight than the female ones so, the results are matched with the present study results [25].

A study conducted on Sangsari lambs has shown the weight in live male and female lambs has had a significant statistical differences with the slaughter time in various weaning groups (1,2,3 and 4 months). The weight in the live lambs weaned in 3 and 4 months has been more than that of the other 2 groups at the slaughter time [26] a study results have shown in compare with the other treatments, the animals which have weaned in 75 days have had greater weight. This is conformed to the present study result [27].

Table 2: Lambs' feed intake during different times of the experiment (gr).

Variables	First two weeks	Second two weeks	Third Two weeks	Fourth two weeks	Fifth two weeks
The main effect of the age of weaning					
75 days	192.52 ^a	367.33	318.5	351.45 ^a	362.05 ^a
60 days	178.22 ^b	370.06	312.39	292.89 ^b	328.22 ^b
45 days	181.33 ^{ab}	361.76	304.27	313.00 ^{ab}	347.77 ^{ab}
P.V	0.05	0.7	0.38	0.03	0.05
The main effect of sex					
Male	190.77 ^a	377.63 ^a	318.22	330.22	357.92 ^a
Female	177.31 ^b	355.13 ^b	305.22	308	340.77 ^b
P.V	0.01	0.01	0.13	0.18	0.03
Interactions of the age of weaning × Lambs' sex					
45 × Male	191.11	364.22	297.67	310.22	348.22
45 × Female	170.55	359.29	310.89	315.78	347.33
60 × Male	184.44	381.89	318	311.77	352
60 × Female	172	358.22	306.78	274	324.44
75 × Male	195.77	386.78	339	368.67	373.55
75 × Female	189.4	347.88	297.99	334.22	350.55
P.V	0.04	0.12	0.09	0.08	0.05
SEM	2.31	4.11	4.06	7.96	3.7
The average of each column which have been shown with different Latin letters have significant difference (p<0.05)					
SEM: standard error mean					

Table 3: Daily weight gain of lambs during different times of experiment (gr).

Variables	First two weeks	Second two weeks	Third Two weeks	Fourth two weeks	Fifth two weeks
The main effect of the age of weaning					
75 days	65.6	83.33	161.11	254.44 ^a	117.78
60 days	61.11	73.3	170	184.44 ^b	161.11
45 days	68.89	83.33	158.89	241.11 ^a	161.11
P.V	0.82	0.81	0.9	0.004	0.14
The main effect of sex					
Male	74.07	85.92	172.59	255.55 ^a	189.63 ^a
Female	56.3	74.05	154.07	197.78 ^a	103.63 ^a
P.V	0.1	0.44	0.4	0.001	0.0008
Interactions of the age of weaning × Lambs' sex					
Male × 45	79.99	82.22	162.22	273.33	202.22
Female × 45	57.77	84.44	155.55	208.89	120
Male × 60	66.67	82.22	168.89	208.88	213.33
Female × 60	55.55	64.37	171.11	160	108.89
Male × 75	75.55	93.33	186.66	284.44	153.33
Female × 75	55.55	73.33	135.55	224.44	82.22
P.V	0.61	0.9	0.81	0.003	0.01
SEM	5.1	7.44	10.65	7.27	9.62
The average of each column which have been shown with different Latin letters have significant difference (p<0.05)					
SEM: Standard Error Mean					

FCR

The results in feed conversion ratio, **Table 4**, have shown obtaining favorable improving trends by decreasing weaning age. Also, in compare with the female lambs, the males which have increase in the feed intake amount as well as gaining weight trend, have had better feed conversion ratio. By decreasing the weaning age and starting the starter feed sooner there would be a progress in rumen development and feed conversion ratio [13]. Karami et al. have evaluated the milk intake length effect on Lori-Bakhtiari lambs. The results obtained from feed conversion ratio have shown the significant difference in average of feed conversion ratio in male and female lambs (p<0.05) [15]. The research results got from Akhlaghi et al. have shown it probably seems the groups using replacer milk may provide better conditions to the rumen microorganisms by using more water [27].

Then, there is the possibility to wean earlier in these groups than that of the control groups, which is effective in improving the feed conversion ratio in suckling animals. The studies results have shown 45-day weaning age may cause lower feed conversion ratio, and the 75-day weaning lambs have higher

weight gain. These results are conformed to the present study results [15]. On the experiment on Lori lambs, the best feed conversion ratio has been on 60-day weaning age and the worst has been on 120 days [28]. It has been observed a study. The feed conversion ratio would be lower if the weaning age were lower [29] reducing the milking period in suckling lambs usually makes the favorable results including better sell in ewes extra milk, help to the farmers economic issues, gaining the early weaned lambs to feed lot system and training them in completely controlled conditions because of nutrition, feed lot term, slaughtering weigh and roper time to offer to the consumption markets. This difference would be intensified and more intuitive by increasing the length in suckling period lamb [30].

Conclusion

This study result have shown there would be better performance in male lambs rather than the females based on feed intake amount, feed conversion ratio and daily weight again in some experimental weeks. Also the 75-days weaning age is observed as the better performance in terms of feed intake and daily weight gain.

Table 4: Lambs' FCR during different times of experiment

Variables	First two weeks	Second two weeks	Third Two weeks	Fourth two weeks	Fifth two weeks
The main effect of the age of weaning					
75 days	3.23	3.72	2.14	1.39 ^{ab}	3.49
60 days	3.09	4.24	1.99	1.63 ^a	2.53
45 days	2.99	4.54	1.92	1.30 ^a	2.38
P.V	0.93	0.32	0.83	0.06	0.08
The main effect of sex					
Male	2.74	3.92	2.022	1.31 ^b	2.00 ^b
Female	3.47	4.41	2.021	1.57 ^a	3.60 ^a
P.V	0.2	0.28	0.99	0.02	0.001
Interactions of the age of weaning × Lambs' sex					
Male × 45	2.61	4.34	1.86	1.13	1.72
Female × 45	3.37	4.75	1.99	1.48	3.04
Male × 60	2.96	3.93	2.19	1.5	1.71
Female × 60	3.23	4.56	1.79	1.76	3.35
Male × 75	2.66	3.5	2.01	1.31	2.57
Female × 75	3.8	3.93	2.27	1.47	4.42
P.V	0.79	0.59	0.93	0.07	0.015
SEM	0.27	0.21	0.15	0.05	0.2
The average of each column which have been shown with different Latin letters have significant difference ($p < 0.05$)					
SEM: standard error mean					

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