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Evaluation Of Hb_1 Genotype Obtained By The Crossbreeding Of Hampshire Down And Kıvırcık Sheep Breeds

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Summary: This study is a part of the project carried out by The Ministry of Agriculture and Rural Affairs together with several Associations in order to improve meat type sheep breeding in Turkey. The general aim of the project was determined as fixing high meat yield meat sheep breeds which have good adaptation to the environmental conditions of Turkey and to cover the meat type ram need for improving the meat yielding of indigenous sheep breeds within the country. By this project crossbreeding of Kıvırcık sheep which is the common indigenous sheep breed of the region with Hampshire Down rams which were brought to İnanlı State Farm from Britain, was begun in 1987. In 1988 F_1 lambs, in 1990 by the crossbreeding of Hampshire Down x F_1, HB_1 lambs were produced. In the following years type fixing studies were held by the mating of HB_1's among themselves.

In this study, the live weight before mating, greasy fleece weight and fertility characters of 115 HB_1 ewes which were used in 1995-1996 breeding season and the survival and growth characters of 113 lambs until 90th day of age were investigated. Live weight before mating of HB_1 ewes was 59.70 kg, greasy fleece weight was 2.26 kg, birth rate was 80.87%, litter size was 1.21, birth and 90th day live weights of HB_1 lambs were 4.10 kg and 20.25 kg respectively and survival rate of lambs till 90th day was 81.4%.

Key Words: Sheep, Hampshire Down, Crossbreeding.

Hampshire Down ve Kıvırcık Koyun Irklarının Melezlemesi İle Elde Edilen HG1 Genotipinin Değerlendirilmesi

Özet: Bu çalışma, Tarım ve Köyişleri Bakanlığı ile çeşitli kurumların ortaklaşa yürüttükleri Türkiye'de et koyunculuğunu geliştirme kapsamında yer alan projenin bir bölümünü içermektedir. Projenin genel amacı yetiştirildiği çevre koşullarına iyi adapte olabilen, yüksek et verimine sahip damızlık etçi ırkları tespit etmek ve yerli koyunların et verimlerini artırmak için kullanılacak etçi koç ihtiyacını yurt içinden karşılamak olarak belirlenmiştir. Bu proje kapsamında 1987 yılında İnanlı Tarım İşletmesine İngiltere'den getirilen Hampshire Down ırkı koçlar ile bölgenin hakim yerli ırkı olan Kıvırcık koyunları arasında melezleme çalışmaları başlatılmıştır. 1988 yılında F_1'ler, 1990 yılında Hampshire Down x F_1'lerin birleştirilmesi ile HG1'ler elde edilmiştir. Daha sonraki yıllarda HG1'ler kendi aralarında birleştirilerek tip sabitleştirilmesine gidilmiştir.

Bu araştırma, 1995-1996 yılı sıfat sezonunda kullanılan HG1 genotipindeki 115 baş koyunun sıfat öncesi canlı ağırlığı, kirli yapağı verimi ve dölverimi özellikleri ile bu dönemde elde edilen 113 baş kuzunun 90. güne kadar olan yaşama gücü ve büyüme özellikleri üzerinde durulmuştur. HG1 koyunların sıfat öncesi canlı ağırlıkları 59,7 kg, kirli yapağı verimleri 2,26 kg, doğum oranı %80,87, bir doğuma düşen yavru sayısı 1,21, HG1 kuzuların doğum ve 90. gün ağırlığı 4,10 kg ve 20,25 kg ve 90. güne kadar yaşama gücü ise %81,4 olarak tespit edilmiştir.

Anahtar Kelimeler: Koyun, Hampshire Down, Melezleme.

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Introduction

The geography and climate of Turkey is more suitable for sheep breeding and a great portion of the agricultural area is occupied with poor pastures which can be utilised more effectively by sheep. Also the demand within the country for sheep products like meat, milk and fleece and the employment opportunity given by sheep breeding in several parts of the country shows that sheep breeding will preserve its importance for the agriculture of Turkey in the future as it used to do.

Sheep population, with 33.8 million heads has an important place in the total farm animal population of Turkey[1]. When it is regarded as population, Turkey is at the 7th place among the sheep breeding countries of the world[2]. But 97% of the sheep population is consisted of indigenous sheep breeds which have good adaptation to environmental conditions but low production yields. The average birth weight of lambs is about 3.5-4.0 kg, weaning weight is 15-22 kg, adult live weight is 35-55 kg, lactation milk yield is 40-180 kg and greasy fleece weight is 1.2-2.3 kg[3,4].

For sheep breeding facilities in Turkey the breeding of lambs which are fast growing and giving good carcasses has gained more importance since the last ten years period. The proportion of the meat production income in the general income of sheep breeding is estimated to have a part as 60-90%. The average carcass weight of sheep produced in Turkey is 13 kg and this is less than the world average of 15 kg. There have been lots of crossbreeding studies for improving the meat yield characters of indigenous sheep breeds[5-11]. When the results obtained from these studies are evaluated generally, it can be seen that Hampshire Down sheep breed has shown a good adaptation to the environmental conditions of Turkey. Also the crossbreed genotypes which are the results of the studies in which Hampshire Down was used as ram line, have given the expected results[5-8,10,12].

In a study which was carried out in order to investigate the adaptation abilities of the import sheep breeds as German Black Headed Mutton Sheep, Hampshire Down and Dorset Down at Bandırma conditions it was determined that these sheep breeds have shown good adaptation to the environmental conditions of Marmara Region. In the study, conception rate of Hampshire Down sheep breed was 59.3%, birth rate was 58.1%, average litter size was 1.15, greasy fleece weight was 3.2 kg, weight of ewes before mating was 75.86 kg, birth weight of lambs was 4.8 kg and survival rate of lambs until weaning was 75.4%[12].

In a study carried out to obtain quality slaughter lambs by crossbreeding Hampshire Down rams with Kıvırcık ewes at İnanlı State Farm, conception rate, birth weight, weight before weaning and survival rates of F_1 lambs were found as 82.2%, 4.41 kg, 22.17 kg and 78.3%, respectively[8]. It was declared that Hampshire Down x Kıvırcık (F_1) lambs had a better fattening performance and better carcass quality than Kıvırcık lambs[7].

It was informed that in the environmental conditions of Middle Anatolia Region F_1 lambs obtained by the crossbreeding studies using Hampshire Down rams with White Karaman, Awassi and Merino ewes had better growth, fattening and carcass characters than the crossbreed lambs obtained from crossbreeding studies with the rams of other meat type breeds[5,6].

This study is a part of the project carried out by The Ministry of Agriculture and Rural Affairs together with several Associations in order to improve meat type sheep breeding in Turkey. The general aim of the project was determined as fixing high meat yielding meat sheep breeds which have good adaptation to the environmental conditions and to cover the meat type ram need for improving the meat yield of indigenous sheep breeds, within the country. By this project crossbreeding of Kıvırcık sheep which is the common indigenous sheep breed of the region with Hampshire Down rams which were brought to İnanlı State Farm from Britain, was begun in 1987. In 1988 F_1 lambs, in 1990 by the crossbreeding of Hampshire Down x F_1, HB_1 lambs were produced. In the following years type fixing studies were held by the mating of HB_1's among themselves. In this study HB_1 ewes were investigated for fertility characters, live weight before mating and greasy fleece weight and lambs were investigated for survival and growth characters.

Materials and Methods

The material of the study is consisted of 115 HB_1 (Hampshire Down x Kıvırcık) ewes

used at 1996 breeding season and 113 lambs born at the end of the season at İnanlı State Farm.

Births at the farm were between the dates of 15th of January and 15th of March. The birth weight of lambs were obtained by the weighing of lambs within 24 hours after birth and the birth date, sex, birth type and the identification of dams were recorded.

From the beginning of May until the end of October besides pasture 300-350g barley was given to each ewe. In winter feeding 1kg of alfalfa hay was given besides intensive feed. Lambs were put together with their dams for the first 3 days after birth. Until weaning (at 90th day of age) lambs were put together with their dams only in the evenings. Lambs were weighed monthly with 0.5 g sensitive scales until weaning. In order to determine the weaning weight (90th day live weight) of lambs interpolation and extrapolation methods were applied.

The effect share of the factors effecting the birth weight and weaning weight of lambs were determined by Least Squares Method[13]. In the model used it was supposed that there were no interactions among the factors investigated and the sum of the effect shares of a factor's subgroups were accepted to be zero. In order to determine the effect shares, the statistical model below was used:

$$Y_{ijkl} = \mu + a_i + b_j + c_k + e_{ijkl}$$

In the model, Y_{ijkl} is the live weight of any lamb in the investigated period, μ is the average of the population for the investigated character, a_i is the effect of the lamb's dam, b_j is the effect of the sex of lamb, c_k is the effect of lamb's birth type, e_{ijkl} is the share of random error.

Results

Fertility of ewes: The fertility results of HB_1 ewes in 1996 breeding season are presented in Table I. According to this 115 HB_1 ewes were selected for mating, 93 (80.87%) of ewes gave birth to lambs, 22 (19.13%) of ewes were infertile. While 73 (78.50%) of ewes gave birth to single lambs, 20 (21.50%) of ewes gave birth to twin lambs. By the end of births, 113 lambs were obtained and litter size (according to the number of ewes which gave birth) was determined as 1.21.

Table I. The data related to the main fertility characters of ewes.

Investigated Characters	1.5 years of age		2.5 years of age		General	
	n	%	n	%	n	%
Ewes mated	61	-	54	-	115	-
Ewes lambing	48	78.69	45	83.33	93	80.87
Infertile ewes	13	21.31	9	16.67	22	19.13
Ewes single lambing	39	81.25	34	75.55	73	78.50
Ewes twin lambing	9	18.75	11	24.45	20	21.50
Live born lambs	57	-	56	-	113	-
Single lambs	39	68.42	34	60.71	73	64.60
Twin lambs	18	31.58	22	39.29	40	35.40
Lambs born/ewes mated	0.93	-	1.04	-	0.98	-
Lambs born/ewes lambing	1.19	-	1.24	-	1.21	-

Survival of lambs: The survival values of Hampshire Down x Kıvırcık (HB_1) crossbreed lambs until 60th and 90th days of age are presented in Table II. The survival rates of lambs until 60th and 90th days of age were determined as 87.61% and 81.41%, respectively.

Table II. Survival rates of lambs until 60th and 90th days of age.

Investigated Characters	Number of live born lambs	60th day of age		90th day of age	
		n	%	n	%
Age of dam					
2	57	50	87.72	47	82.45
3	56	49	87.50	45	80.36
Sex					
Male	54	49	90.74	45	83.33
Female	59	50	84.75	47	79.66
Birth type					
Single	73	66	90.41	62	84.93
Twin	40	33	82.50	30	75.00
General	113	99	87.61	92	81.41

Weight before mating and greasy fleece weight of ewes: The weight before mating and greasy fleece weight of HB_1 ewes determined before the breeding season of 1996 are presented in Table III.

Growth of lambs: Birth weight and weaning weight of Hampshire Down x Kıvırcık (HB_1) crossbreed lambs are presented in Table IV and are determined as 4.097 kg and 20.249 kg, respectively.

Table III. The weight before mating and greasy fleece weight of HB_1 ewes.

Age of ewe	Weight before mating				Greasy fleece weight			
	n	$\bar{x}$	$s_{\bar{x}}$	Min.-Max.	n	$\bar{x}$	$s_{\bar{x}}$	Min.-Max.
1.5 years	55	54.6[a]	0.46	47-60	55	2.21[a]	0.04	1.4-2.7
2.5 years	52	65.1[b]	0.54	55-74	52	2.42[b]	0.05	1.5-3.1
General	107	59.7	0.62	47-74	107	2.26	0.03	1.4-3.1

a, b: The differences between the age groups averages carrying various letters in the same column are important (P<0.05).

Table IV. Least squares means of birth weight and weaning weight of HB_1 lambs, standard error of means, effect shares of the investigated characters (ES) and standard error of effect shares (SE).

Factors	Birth weight					Weaning weight (90 days of age)				
	n	$\bar{x}$	$s_{\bar{x}}$	ES	SE	n	$\bar{x}$	$s_{\bar{x}}$	ES	SE
General	113	4.097	0.055	-	-	92	20.249	0.326	-	-
Age of dam			*					*		
2	57	3.916	0.077	-0.181	0.053	47	18.982	0.456	-1.267	0.309
3	56	4.278	0.076	0.181	0.052	45	21.517	0.442	1.267	0.309
Birth type			*					*		
Single	73	4.417	0.066	0.319	0.055	62	21.624	0.374	1.375	0.330
Twin	40	3.778	0.089	-0.319	0.055	30	18.874	0.539	-1.375	0.330
Sex			*					*		
Male	54	4.355	0.078	0.257	0.053	45	22.459	0.457	2.209	0.306
Female	59	3.840	0.074	-0.257	0.053	47	18.039	0.437	-2.209	0.306

P<0.05.

Discussion and Conclusion

Birth rate (80.87%), twinning rate (21.50%) and litter size (1.21) for Hampshire Down x Kıvırcık (HB_1) crossbreed ewes in this study were higher than the results informed by Başpınar et al.[12] as birth rate of 58.1%, twinning rate of 14.8% and litter size of 1.15 for Hampshire Down ewes raised at Bandırma conditions. In a study carried out by Bulmuş and Demir[8] at İnanlı State Farm in former years birth rate of 78.6%, twinning rate of 7.5% and litter size of 1.10 for Hampshire Down x Kıvırcık (F_1) ewes were determined. In the study the fertility characters levels of HB_1 ewes were better than the results of Hampshire Down x Kıvırcık (F_1) ewes. In a study carried out by Altınel et al.[11] in order to obtain good quality slaughter lambs by the use of three way commercial crossbreeding, the birth rate of F_1 (Sakız x Kıvırcık) ewes mated to German Black Headed Mutton rams were lower than HB_1 ewes and twinning and the litter size of F_1 ewes were higher than HB_1 ewes. Birth rates of Kıvırcık ewes determined in different regions were higher than the birth rate of HB_1 ewes determined in this study and twinning rates of Kıvırcık ewes were found lower than the twinning rate of HB_1 ewes[3,14,15].

The survival rate of HB_1 lambs until weaning was, lower than the determined survival rates of Kıvırcık lambs (89.1-94.6%) in the environmental conditions of Marmara Region[8,16,17], higher than the survival rates of Hampshire Down lambs (75.4) at Bandırma environmental conditions and Hampshire Down x Kıvırcık (F_1) crossbreed lambs in Thrace environmental conditions[8]. Besides these the survival rate of HB_1 lambs until weaning showed similarity with the survival rates of crossbreed lambs obtained from German Black Headed Mutton Sheep, Sakız and Kıvırcık crossbreeding[11].

The birth weight of HB_1 lambs was, higher than 3.69-4.03 kg of Kıvırcık lambs, however lower than 4.41 kg of Hampshire Down x Kıvırcık (F_1) crossbreed lambs[8], 4.8 kg of Hampshire Down lambs[12], 4.76-5.24 kg of Hampshire

Down and White Karaman, Awassi and Merino crossbreed lambs given in different studies and 4.34-4.28 kg of different genotype crossbreed lambs[11,17]. The weaning weight of HB_1 lambs was found higher than the results determined for Kıvırcık lambs[16,17], lower than the results given for other crossbreed lambs[14].

In this study the average live weight before mating of 1.5 and 2.5 years aged HB_1 ewes were determined as 59.7 kg. This value is determined to be higher than the average live weights of Kıvırcık ewes obtained from different studies[3,14,15] and seemingly lower than 75.86 kg value of Hampshire Down ewes[12].

The 2.26 kg greasy fleece weight of HB_1 ewes was determined to be higher than 1.28-1.67 kg values of Kıvırcık ewes[12] and similar to the values given for Ramlıç and its crossbreeds of different genotypes[9].

It was determined that HB_1 ewes, which were the result of Hampshire Down x Kıvırcık crossbreeding, having 75% Hampshire Down and 25% Kıvırcık genotype and the lambs obtained from these ewes, performed higher fleece and live weight production results than indigenous Kıvırcık sheep breed's production results. It was seen that the HB_1 sheep which were kept under semi-intensive conditions in Marmara Region have normal and acceptable reproductive performance, nevertheless they have shown rather low lamb survival rates. As a result, it is determined that in Marmara Region environmental conditions, better management and feeding conditions should be provided to HB_1 ewes and particularly to their lambs and the usage of HB_1 rams for crossbreeding could be a help for the improvement of meat production of indigenous sheep breeds in the region.

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