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Effect of Line on the Production Traits of Fine Fleece Rams

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Abstract

In order to establish the effect of genealogical line of herd rams on the quantity and quality traits of wool and live weight was conducted a study on two groups of rams at 1.5 years of age of the Karnobat fine wool breed. The animals of the first group (153 in number) were born in the period 1991-1996 year, and the second group (63 in number) were born in the period 2002-2007 year. The rams had a comparative assessment by own productivity, and the animals were from 4 genealogical lines. Line 2081 and line 777 originated from breeding Australian merino, and line 1825 and line 576 – from rams of the North-East-Bulgarian fine wool breed.The data on wool productivity, wool yield, clean wool, staple length, wool thickness and live weight was processed by the methods of variation statistics and were adjusted by the year impact. Between the lines of the Karnobat fine wool breed was established certain differentiation, as by the trait of wool productivity was distinguished line 777, by wool yield, clean wool, staple length and live weight – line 2081, and by wool thickness – line 576. During the period of 1991-2007 year the wool productivity, amount of clean wool and live weight were slightly lower, whereas the wool yield was significantly increased. Wool thickness was preserved within the requirements for merino wool.

Key words*: ram productivity, line, wool productivity, wool yield, clean wool, staple length, wool thickness, live weight*

Introduction

The sheep herd of the Karnobat fine wool breed at the Institute of Agriculture in Karnobat is a product of great intellectual, organizational and physical work of a number of scientists, organizers and workers. The highly limited number of fine fleece animals in Bulgaria necessitated the study of the line impact on the productive traits of fine fleece rams.

To preserve and improve the sheep breeds, it is particularly important to assess the progeny of breeding animals after line breeding. Investigation on the linear structure of the Bulgarian fine fleece breeds were carried out by **Mihaylova,** 1992; **Boikovski**, 1994; **Dimitrov,** 1994-1995; **Iliev,** 1999; **Slavov**, 2007.

In breeding programs great significance has been placed on the selection of breeding rams by own productivity and by progeny quality (**Tanev et al.,** 1994; **Tsenkova et al.,** 1995; **Nedelchev et al.,** 1998; **Todorova,** 1999; **Slavov**, 2007; **Manolov, Georgieva,** 2009; **Panayotov, Pamukova,** 2012).

The objective of this study was to establish the effect of genealogical line on wool quantity and quality traits of wool and live weight of fine fleece rams.

Material and Methods

Subject of this study were two groups of rams at 1.5 years of age of the Karnobat fine wool breed from the herd at the Institute of Agriculture in Karnobat. The animals in the first group (153 in number) were born in the period from 1991 to 1996 year, and those in the second group (63 in number) were born in the period from 2002 to 2007 year, i.e. eleven years later. The rams had a comparative assessment by own productivity, with the animals being from 4 genealogical lines. Line 2081 and line 777 originated from breeding Australian merino, and line 1825 and line 576 – from rams of the North-East-Bulgarian fine wool breed. The wool productivity was established during harvesting time by shearing the rams individually. For this study were taken wool samples from the two topographical sections of the body – side and round. The study of wool thickness and wool yield was performed according to the method adopted in Bulgaria, which is used in the wool studies laboratories in the towns of Yambol and Shumen.

The primary data necessary for this investigation was acquired from the tribal genealogical records kept at the Institute of Agriculture in Karnobat.

The data on wool productivity, wool yield, clean wool, staple length, wool thickness and live

weight was processed by the methods of variation statistics and adjusted by the year impact.

Results and Discussion

Table 1 shows the data on wool productivity, which is a basic breeding trait. The mean value of wool productivity for the animals of the first group born in the period from 1991 to 1996 year was 13.56 kg. The differences between the lines were small and insignificant. For the animals in the second group born in the period from 2002 to 2007 year, the mean value of this trait was 11.33 kg, i.e. 16.4 % lower than the established for the first group. Significantly higher wool productivity was observed for line 777 (P<0.01). The other lines didn't show significant differences. The variability between the lines was more significant in this group. In the two groups the rams in line 777 distinguished with higher wool productivity.

The wool yield of the animals in the first group had the mean value of 51.55 %. Significantly higher wool yield distinguished line 2081-52.81 % and line 1825-52.71 % (P<0.05), whereas it was significantly lower for line 576 and line 777 (P<0.01 and P<0.001). For the animals in the second group the mean yield value was 54.88 %, i.e. 6.5 % higher than the established in the first group. The differences between lines were small and insignificant. Higher yield distinguished the rams in line 2081-56.07 % and line 1825-55.83 %. One-way results on the highest wool yield for both groups were seen for the animals of line 2081. The values of this trait are comparatively high for the rams.

The results obtained for wool yield were higher than established by **Slavov** 2007 for rams of the North-East-Bulgarian fine wool breed.

The clean wool was an average of 7.001 kg for the first group. Mathematically was demonstrated a greater amount of clean fleece for the animals of line 1825 (P<0.05), and significantly smaller amount for the animals of line 576 (P<0.05). With the rams in the second group the clean fleece was an average of 6.231 kg, which was 11 % less than the first group. The differences between the lines were small and insignificant. More clean fleece in the first group had the animals of line 1825, and in the second group – of line 777. The results in both groups were mixed.

The results obtained for clean fleece were higher than what was established by **Tsenkova et al.,** 1995 for the rams of the Thracian fine wool breed.

The average staple length (Table 2) for the rams in the first group was 14.73 cm. For those of line 2081 – 15.57 cm it was highly significant (P<0.001), whereas for the animals of line 576 and line 777, it was less significant (P<0.01 and P<0.001). Variability within the group was between 13.89 cm and 15.57 cm. For the second group the staple length was an average of 15.12 cm, which was 2.6 % more than the first group. For the second group the wool was significantly longer with the rams of line 2081 – 15.92 cm (P<0.01). For the other lines the differences were smaller and insignificant. One-way results for longer wool distinguished the animals of line 2081.

Wool thickness at the side in the first group was an average of 22.35 μ, and at the round it was 23.16 μ. At the side it varied from 21.75 μ for line 576 to 22.72 μ for line 2081, and the differences between these lines were highly significant (P<0.001). At the round they varied from 22.73 μ for line 576 to 23.41 μ for line 2081. The differences were significant for lines 2081, 576 and 777 (P<0.05 and P<0.001). In the second group the average wool thickness at the side was 23.33 μ, and at the round it was 24.63 μ. At the side it varied from 22.66 μ for line 576 to 23.62 μ for line 1825. At the round it varied from 24.49 μ for line 2081 to 24.79 μ for line 1825, and the differences between the lines were small and insignificant. There is certain thickening of the wool for the investigated period.

The data for the live weight trait is presented in Table 3. It shows that for the first group the weight of male lambs at weaning was an average of 27.07 kg. Higher live weight was observed with the animals of line 576 – 27.93 kg and line 2081 – 27.77 kg. The trend of higher live weight was kept for these lines for rams at 1.5 years of age. The male lambs at weaning with significantly lower weight were from line 777 (P<0.001). For the lambs in the second group the live weight was an average of 31.91 kg – 15.2 % higher than the lambs in the first group. Significantly higher weight was seen with the lambs at weaning from line 2081 – 33.12 kg (P<0.05). With this line the live weight was also higher for the rams at 1.5 years of age – 88.75 kg. It was significantly lower with the lambs at weaning from line 576 (P<0.05). Data shows that the line differentiation was greater in the first group. In both groups higher live weight distinguished the animals from line 2081.

The data on live weight of male lambs at weaning and rams at 1.5 years of age showed comparatively good early maturing for the animals of the Karnobat fine wool breed, regardless that for the studied period it decreased by approximately 9 %.

Table 1. Wool Productivity, Wool Yield, Clean Wool

Линии Lines	Година/Year					
	1991 – 1996			2002 – 2007		
	Вълнодобив, кg/Wool Productivity, кg					
	N	x ± S_x	C	N	x ± S_x	C
2081	53	13.47 ± 0.33	17.66	19	10.99 ± 0.37	14.44
777	31	13.63 ± 0.43	17.45	15	12.10** ± 0.41	13.12
1825	38	13.79 ± 0.40	17.25	17	10.98 ± 0.39	14.45
576	31	13.40 ± 0.43	17.75	12	11.33 ± 0.46	14.01
Общо средно Average	153	13.56 ± 0.19	17.54	63	11.33 ± 0.20	14.01

	Рандеман на вълната, % Wool Yield, %			Чисто влакно, kg Clean Wool at 1.5 years, kg			Рандеман на вълната, % Wool Yield, %			Чисто влакно, kg Clean Wool at 1.5 years, kg		
	n	x ± S_x	C	n	x ± S_x	C	n	x ± S_x	C	n	x ± S_x	C
2081	53	52.81* ± 0.33	11.24	53	7.113 ± 1.19	19.53	19	56.07 ± 1.45	11.01	19	6.162 ± 0.19	13.06
777	31	49.42*** ± 1.10	12.01	31	6.736 ± 0.26	20.62	15	53.28 ± 1.59	11.59	15	6.447 ± 0.22	12.41
1825	38	52.71* ± 1.03	11.26	38	7.269* ± 0.23	19.11	17	55.83 ± 1.47	11.06	17	6.131 ± 0.21	13.05
576	31	50.11** ± 1.10	11.84	31	6.714* ± 0.26	20.69	12	53.82 ± 1.78	11.47	12	6.098 ± 0.24	13.12
Общо средно Average	153	51.55 ± 0.49	11.51	153	7.001 ± 0.11	19.84	63	54.88 ± 0.79	11.25	63	6.231 ± 0.10	12.84

* P <0.05 ** P <0.01 *** P <0.001

Table 2. Staple Length, Wool Thickness

Линии Lines	Година/Year					
	1991 – 1996			2002 – 2007		
	Дължина на щапела,cm/Staple Length,cm					
	n	x ± S_x	C	n	x ± S_x	C
2081	53	15.57*** ± 0.22	10.42	19	15.92** ± 0.40	10.56
777	31	13.89*** ± 0.27	11.68	15	14.83 ± 0.44	11.34
1825	38	14.53 ± 0.27	11.16	17	14.86 ± 0.42	11.32
576	31	14.35** ± 0.29	11.30	12	14.67 ± 0.49	11.47
Общо средно Average	153	14.73 ± 0.13	11.01	63	15.12 ± 0.21	11.12

	Дебелина на влакната, µ /Wool Thickness, µ											
	Страна/Side			Бут/Round			Страна/Side			Бут/Round		
	n	x ± S_x	C	n	x ± S_x	C	n	x ± S_x	C	n	x ± S_x	C
2081	53	22.72*** ± 0.15	4.88	53	23.41* ± 0.15	4.78	19	23.46 ± 0.69	12.54	19	24.49 ± 0.46	8.03
777	31	22.40 ± 0.20	4.95	31	23.38* ± 0.20	4.78	15	23.39 ± 0.76	12.57	15	24.53 ± 0.51	8.02
1825	38	22.27 ± 0.18	4.98	38	22.99 ± 0.18	4.86	17	23.62 ± 0.73	12.45	17	24.79 ± 0.48	7.93
576	31	21.75*** ± 0.20	5.10	31	22.73***± 0.20	4.92	12	22.66 ± 0.85	12.98	12	24.74 ± 0.57	7.95
Общо средно Average	153	22.35 ± 0.09	4.96	153	23.16 ± 0.09	4.83	63	23.33 ± 0.38	12.61	63	24.63 ± 0.25	7.99

* P <0.05 ** P <0.01 *** P <0.001

Table 1. Live Weight of Rams, кg

Линии Lines	Година/Year											
	1991 – 1996						2002 - 2007					
	При отбиване At Weaning			На 1.5 години At 1.5 years			При отбиване At Weaning			На 1.5 години At 1.5 years		
	n	x ± S_x	C	n	x ± S_x	C	n	x ± S_x	C	n	x ± S_x	C
2081	53	27.77 ± 0.70	18.46	53	96.62 ± 1.33	10.05	19	33.12* ± 1.53	20.14	19	88.75 ± 1.99	9.78
777	31	25.25*** ± 0.91	20.30	31	95.45 ± 1.74	10.17	15	31.60 ± 1.72	21.11	15	86.86 ± 2.41	10.00
1825	38	26.94 ± 0.85	19.03	38	96.79 ± 1.57	10.03	17	32.08 ± 1.62	20.63	17	88.25 ± 2.11	9.89
576	31	27.93 ± 0.91	18.35	31	98.26 ± 1.74	9.88	12	30.17* ± 1.93	22.11	12	87.83 ± 2.51	9.89
Общо средно Average	153	27.07 ± 0.42	18.94	153	96.76 ± 0.78	10.03	63	31.91 ± 0.84	20.91	63	88.03 ± 1.11	9.86

* P <0.05 *** P <0.001

Conclusions

Between the lines of the Karnobat fine wool breed was established certain differentiation, as by the trait of wool productivity was distinguished line 777, by wool yield, clean fleece, staple length and live weight – line 2081, and by wool thickness – line 576.

During the period of 1991-2007 year the wool productivity, amount of clean wool and live weight were slightly lower, whereas the wool yield was significantly increased. Wool thickness was preserved within the requirements for merino wool.

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