

EFFECT OF THE GENOTYPE, SEX AND HARVESTING METHOD ON THE WOOL PRODUCTION AND
WOOL QUALITY OF ANGORA RABBITS

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Introduction

In Europe, two very different methods of wool production has been developed. In Germany, the Angora rabbits are kept in cages with wire-mesh floor and the Angora rabbits German type are shoren in every 80-85 days. This wool has fine thin hair used mainly for making underclothes. In France, the Angora rabbits are kept in solid floor cages with thick litter (straw). The wool of the Angora rabbits French type are plucked in every 98-110 days. This type of wool had longer fibers and more guard hair used mainly for overwairs (e.g. for pullovers).

Earlier, Hungary has bought exclusively Angora rabbits of German type and these were bred and shorn. With the overproduction of the wooly wool, the bristly wool production has come to the foreground. For this purpose, French type of Angora rabbits were imported.

However, it could not be cleared whether the bristly wool trait is depended on the genotype or it is the result of the hair plucking method as a method of harvesting. No answer could be found concerning this problem in the literature.

According to statistical data (de Rochambeau, 1988; Schley and Schlolaut, 1988) the rabbits of German type were superior to the rabbits of French type for the wool production. This is confirmed by the experiments carried out similar conditions. Dai et al. (1985) observed that the wool production of the rabbits of French type amounted to 62 %, that of the crossings amounted to 84-91 % compared to the 100 % of the rabbits of German type. At the fibre diameter was by 15 % higher for the French type of rabbits.

The results of INRA experiments showed a diference of 12 % for the shorn does of the German type compared to the plucked does of French type (1,217 g vs. 1,071 g) and of 26 % for the bucks of the German type (1.098 vs.

815 g; Thébault and de Rochambeau, 1989). Fleischhauer et al., (1988) reported the wool production data of French and German types and of their crossings. The wool production of 3 groups consisting of both sexes between 16-18 and 29-31 weeks amounted to 173, 311 and 215 g, the fibre diameter amounted to 15.5 μm , 14.9 μm and 15.9 μm , resp.

Investigations were carried out on the influence of the type (German purebred vs. German x French crossings) harvesting method (shorn vs. plucked) and of the sex (males vs. females) to the quantity and quality of the wool.

Material and Methods

The investigations were carried out at the Research Station, PANNON University of Agr. Sciences Kaposvár, on German purebred rabbits and on German x French crossings from both sexes. Half of the animals in each group was shorn in every 79-84 days and the others were plucked in every 104-110 days. The fourth plucking and the fifth shearing was carried out on the same day (after 387 days). The animals of the same types were litter mates. The method of the experiment was as follows:

	German purebred				German x French crossings			
	Female		Male		Female		Male	
	Plucked	Shorn	Plucked	Shorn	Plucked	Shorn	Plucked	Shorn
No of animals	10	11	15	15	14	13	8	9
No of shearings/pluckings	4	5	4	5	4	5	4	5

The animals were allocated in individual cages, ad libitum feeding the pellet (crude protein 20.3 % and crude fiber 14.0 %) and hay, water was supplied by automatic drinkers.

In all cases (i.e. shearings and pluckings), the quantity of the wool was weighted. For the measuring of the fibre thickness by micrometer caliper the samples were taken from the hind leg. The number of the mixed samples (birstle, awn and down) amounted to 2,000-3,000. The measurements were carried out 1 cm above the base of the hairs. The number of the staples per μm was displayed on the computer from 7 to 64 μm .

Results and Discussion

The average wool production of the rabbits per shearing/plucking may be seen from the Table 1. The highest average wool production could be stated at the third or fourth shearing/plucking. The total wool production during the experiment, together with the so called baby-wool, is shown on the Table 2. Agreeing with the experiences and literary data, the wool production of the females was higher compared to that of the males. The differences amounted to 5.4 - 16.7 % (average = 12.4 %).

Under similar feeding and management conditions, the wool production of the German purebred animals was superior to the production of the crossings (Table 2). These results are in agreement with the data of various authors, e.g. de Rochambeau (1988), Dai et al., (1985), Thébault and de Rochambeau (1989), Fleischhauer et al., (1988). Apparent differences could be stated for the wool production between the German purebred and the crossed population: 12.0 - 15.5 % for the plucked and 29.2 - 43.2 % for the shorn animals. It appeared that the higher producing ability of the German rabbits was more effective in the case of the shearings. On the basis of the difference of 24.8 % between the German purebred and crossed animals about 50 % difference could be supposed between the German and French purebred populations. According to the experiments of Dai et al. (1985) the differences are just not extremes.

Because of the longer wool growth period, higher wool production per plucking could be achieved compared to the shearings. Regarding the whole experimental period (5 shearings and 4 pluckings = 387 days) the rabbits that were shorn were superior to the plucked ones by about 12.7 %, (Table 2). Apparent differences could be stated for the German rabbits (18.3 - 27.1 %) and these were very low for the German x French crossings (2.5 - 2.6 %). No explanations could be found for the differences between the plucked and shorn animals in the German purebred group.

Significant visual differences could be stated between the experimental groups for the wool quality. Irrespective of the type, the plucked animals had longer and bristly wool with more guard hair. The wool of the plucked German purebred rabbits was much more bristly compared to the shorn German x French crossings.

The average diameter of the fibres (mixed sample of bristle, awn and down) are shown on the Table 3. The staples of the females were on average by 0.61 μm , the plucked ones by 0.53 μm the German types by 0.17 μm thicker

compared to the males, the shorn ones and the German x French crossings. Similarly to the subjective judgements, the results of the measurements showed that the sex and the harvesting method are the most important influencing factors of the wool thickness. Taking into account the investigated factors (sex, type and harvesting method) the greatest differences amounted to 1.84 μm between the plucked German females and crossed males shorn.

It could be definitely stated that by the plucking the rabbits were much more shattered stress compared to the shearings. The rate of losses was also higher for the plucked animals.

No experiences are available about the influence of the investigated factors on the structure of the skin and on the suitability to pluckings. The investigation of these problems may be very important because of the animal protection.

Conclusions

On the basis of the literary data and of the own investigations it may be concluded that

- the wool production per year of the German type rabbits, of the females and of the shorn individuals was higher. For the production of fine wool it is of worth to keep female German type rabbits and to shear the wool.
- the production of the bristly wool is not caused by the French type rabbits but by the method of the harvesting method, i.e. by the plucking. To follow the changes of the market demands, the method of the wool removal must be changed (plucking vs. shearing) without the replacement of the herd.
- on the basis of the own experiments, the differences could not be determined in the skin structure of the French and German type rabbits, therefore, it is not clear the suitability of the various types for the plucking.

References

1. Dai, H.N.-Shen, Y.Z.-Shen, M.X.-Liang, M.L. (1985): Chinese J. Rabbit Farming. 3. 27-29.
2. Fleischhauer, H.-Schlölaut, W.- Lange, K. (1988): 6. Arbeitstagung über Pelztier- und Kaninchenproduktion, Celle.
3. de Rochambeau, H. (1988): 4th World Rabbit Congress, Budapest, Proc. Gen. Phys. 1-68.
4. Schley, P.-Schlölaut, W. (1988): 4th World Rabbit Congress, Budapest. Proc. Gen. Phys., 209-217.
5. Thébault, R. G.-de Rochambeau, H. (1989): INRA Prod. Anim., 2. (2.) 145-154.

Table 1

Effect of sex, genotype and harvesting method on daily wool production per shearing/plucking

Effect of sex

Serial	No of	G plucked		G shorn		F x G plucked		F x G shorn	
		♂	♀	♂	♀	♂	♀	♂	♀
1st =	baby	0.43	0.48	0.43	0.47	0.36	0.42	0.42	0.48
	2nd			1.83	1.88			1.50	1.71
2nd	3rd	1.63	1.78	2.25	2.60	1.41	1.53	1.68	2.06
3rd	4th	2.07	2.38	2.85	2.98	1.76	2.07	1.93	2.01
4th	5th	2.02	2.57	2.77	2.82	1.82	2.20	1.59	2.01

Effect of genotype

		Male pl		Female pl		Male sh		Female sh	
		FxG	G	FxG	G	FxG	G	FxG	G
1st =	baby	0.36	0.43	0.42	0.48	0.42	0.43	0.46	0.47
	2nd					1.50	1.83	1.71	1.89
2nd	3rd	1.41	1.63	1.53	1.78	1.69	2.25	2.06	2.60
3rd	4th	1.76	2.07	2.07	2.38	1.93	2.85	2.01	2.98
4th	5th	1.82	2.02	2.20	2.57	1.59	2.77	2.01	2.82

Effect of harvesting method

		G male		G female		FxG male		FxG female	
		P1	Sh	P1	Sh	P1	Sh	P1	Sh
1st =	baby	0.43	0.43	0.48	0.47	0.36	0.42	0.42	0.48
	2nd							1.50	1.71
2nd	2nd	1.63	2.25	1.78	2.60	1.41	1.68	1.53	2.06
3rd	4th	2.07	2.85	2.38	2.98	1.76	1.93	2.07	2.01
4th	5th	2.02	2.77	2.57	2.82	1.82	1.59	2.20	2.01

Remarks: pl or P1 = plucking or plucked; sh or Sh = shearing or shorn

Table 2

Effect of sex genotype and harvesting method on the total wool production

Effect of sex

Parameters	G plucked		G shorn		FxG plucked		FxG shorn		All together	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Wool production,g	650	736	826	871	563	657	577	674	654	735
Difference,%	13.2		5.4		16.7		16.7		12.4	

Effect of genotype

	Male plucked		Female plucked		Male shorn		Female shorn		All together	
	FxG	G	FxG	G	FxG	G	FxG	G	FxG	G
Wool production,g	563	650	657	736	577	826	674	871	618	771
Difference,%	15.5		12.0		43.2		29.2		24.8	

Effect of harvesting method

	G male		G female		FxG male		FxG female		All together	
	P1	Sh	P1	Sh	P1	Sh	P1	Sh	P1	Sh
Wool production,g	650	826	736	871	563	577	657	674	654	737
Difference,%	27.1		18.3		2.5		2.6		12.7	

Table 3

Effect of sex, genotype and harvesting method on the average diameter of wool fibres

Effect of sex

Parameters	G plucked		G shorn		FxG plucked		FxG shorn		All together	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Diameter, μm	14.2	15.5	13.7	14.4	14.4	14.4	13.6	14.3	14.0	14.6

Effect of genotype

	Male plucked		Female plucked		Male shorn		Female shorn		All together	
	FxG	G	FxG	G	FxG	G	FxG	G	FxG	G
Diameter, μm	14.4	14.2	14.4	15.5	13.6	13.7	14.3	14.4	14.2	14.4

Effect of harvesting method

	G male		G female		FxG male		FxG female		All together	
	P1	Sh	P1	Sh	P1	Sh	P1	Sh	P1	Sh
Diameter μm	14.2	13.7	15.5	14.4	14.4	13.6	14.4	14.3	14.6	14.1