

PREDICTION OF BREEDING VALUE OF RAMS FOR GROWTH OF LIVE WEIGHT BY PROGENY TEST, EVALUATED BY THREE METHODS

P.G. Vicovan, A. Vicovan, R. Radu, A. Enciu, A. Ida

*Institute of Research –Development for Sheep and Goat Breeding Palas-Constanța
e-mail: icdoc@canals.ro*

Abstract

The researches were made on a sheep population of 8 rams of Suffolk breed, 51 ewes of Palas Merino breed and 54 male descendants to which the growths of live weight during the period from birth to 5 months were determined. The heritability of the growth and the breeding value of the rams were estimated by REML method [4]. The breeding value of the rams was also estimated by other two methods, [1], [2], [3], [5]. The value of $h^2 = 0,55$ for the growth of live weight at lambs makes the estimation of the breeding value of rams also efficient by the 2 presented methodologies, which are less modern comparatively to BLUP. In this case the selection by the own performance becomes also efficient.

Key words: Breeding value, heritability, variance

INTRODUCTION

Until 1990 in Romania the increasing and improving of wool production was the main objective of the Sheep Breeding Program (except Karakul breed). In the present conditions, the milk and meat productions became main directions in sheep breeding, imposing the revision of the breeding program, considering this fact.

The meat production at the sheep specie depends on many characters, out of which, the weight growth of the lambs until the age of 5-6 months having a priority role.

Knowing the value of the heritability coefficient for this character and estimating the breeding value of the rams by the performances of the descendants, are important in the elaboration of any program of improving the meat production at the sheep species.

MATERIAL AND METHOD

The researches were made on a sheep population of 8 rams of Suffolk breed, 51 ewes of Palas Merino breed and 54 male descendants to which the growths of live weight from birth to the age of 150 days was determined.

The estimation of the genetic parameters and the prediction of the breeding value was made by using REML (Restricted Maximum Likelihood) method, described by Patterson and Thompson [4]. REML method is an iterative procedure and it is based on the BLUP (Best Linear Unbiased Prediction) solutions.

The breeding value for the growth of the live weight by the performances of the descendants was also estimated by other 2 methods, as follows:

- Method 1 – [1]; [2]; [3]

$$V_a = \frac{n \cdot r_1 \cdot h^2}{1 + (n-1) \cdot r_2 \cdot h^2} (y - A_y)$$

where:

V_A – the breeding value (in kg of growth).

n – number of descendants.

h^2 – heritability of the character.

r_1 – coefficient of relationship between father and descendant = 0.5.

r_2 – coefficient of relationship between semi-brothers = 0.25.

y – average growth at descendants (semi-brothers).

A_y – average growth at contemporaries.

- Method 2 – [5]

$$V_A = \frac{(n_1 \cdot y) - (n_1 \cdot A)}{W}$$

$$A = \frac{(n_1 \cdot y) + (n_1 \cdot A_y)}{n_1 \cdot n_2}$$

$$W = \frac{n_1 \cdot n_2}{n_1 + n_2}$$

where:

V_A – the breeding value.

y – average growth at descendants.

A_y – average growth at contemporaries.

A – average weight growth at descendants and their contemporaries.

W – number of „effective descendants”.

n_1 – number of descendants.

n_2 – number of contemporaries.

The breeding value can also be established in relative values (%) as:

$$VA\% = \frac{A + V_A}{A} \cdot 100$$

It is considered improver the ram which makes V_A equal or bigger with 103% and indifferent is the ram at which V_A has the value of 101-102%.

RESULTS AND DISCUSSIONS

The values of heritability and of variances for the growth of live weight are presented in table 1.

Table 1
The heritability of the growth of live weight

Character	Genetic variance (V_A)	Environment variance (V_M)	Phenotypic variance (V_B)	Heritability (h^2)
GROWTH OF LIVE WEIGHT	35,4095	28,9902	64,3997	0,55

It can be observed that the growth of live weight since birth to 5 months has a high heritability, that of $h^2 = 0,55$.

In table 2 the breeding value at the 8 rams of Suffolk breed, estimated by three methods is presented.

Table 2
The breeding value for the growth in the period of birth-5 months by the Performances of the descendants, estimated by three methods, at the rams of Suffolk breed

Rank number	Registry number of the ram	Number of descendants	Breeding value						Observations
			Method 1		Method 2		BLUP Method		
			V_A (kg)	V_A (%)	V_A (kg)	V_A (%)	V_A (kg)	V_A (%)	
1	2198	13	5,842	117,93	4,35	113,35	5,849	117,94	Improver
2	2183	10	3,937	112,08	3,22	109,9	4,423	113,57	Improver
3	2184	4	1,33	104,08	1,71	105,3	1,954	105,99	Improver
4	2203	10	0,589	101,81	0,48	101,5	1,617	104,96	Improver BLUP indifferent by methods 1 and 2
5	2188	4	-2,023	92,87	-2,60	92,0	-1,160	92,02	Worse-grower
6	2181	5	-2,826	91,33	-3,20	90,2	-4,203	87,10	Worse-grower
7	2182	7	-4,591	85,91	-4,36	86,6	-2,768	91,51	Worse-grower
8	2196	3	-6,672	79,53	-10,31	68,4	-5,712	82,47	Worse-grower

From the 8 Suffolk rams used to produce F1 Suffolk x Palas Merino genotype, only 4 rams are improvers for the growth of live

weight at the descendants in the period since birth to the age of 5 months.

These rams have the following registry numbers: 2198, 2183, 2184 and 2203, having

the breeding value of 1.617-5.849 kg or, in relative values it was of 104.96-117.94%, V_A being established by BLUP methodology.

By the other two methods the breeding value is a little lower and only the first 3 rams from the tested eight are improvers (registry numbers: 2198, 2183, 2184).

The ram with the registry number of 2203 is improver by BLUP methodology and indifferent by the other 2 methods having $V_A = 0.48 - 0.589$ kg or in relative values: 101.5-101.8%.

CONCLUSIONS

The high value of h^2 for the growth of live weight of the lambs until the age of 5 months makes efficient the estimation of the breeding value of rams by progeny test and by other methodologies than BLUP. Also, in the presented case the selection by own performance becomes also efficient.

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