PREDICTION OF BREEDING VALUE OF BUCKS BY PROGENY TEST (GROWTH OF LIVE WEIGHT)

P.G. Vicovan, A. Vicovan, R. Radu, C.Z. Zamfir, 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 population of 51 F1 Boer x Carpathian male kids, descendants of 8 bucks of Boer breed. The kids were fattened for 100 days since the age of 80 days to 6 months, during this period the individual growths of live weight being registered. The heritability for the growth of the live weight was calculated according to the methodology presented by [1] and [4]. The estimation of the breeding value was made according to the methodology used by [2] and [3]. The estimated value of h^2 for the growth of the live weight at kids was of 0.39. From the 8 bucks which were progeny tested, only 3 were improvers. In elaborating and developing a program of improving the meat production at goats, the use of bucks which were tested improvers for the growth of live weight of the kids until the age of delivery (6 months) becomes necessary.

Key words: Coefficient of heritability - h^2, breeding value

INTRODUCTION

The researches regarding the genetic improvement of the meat production at goats in Romania are a few and recent.

Boer goat breed is recognized due to its aptitudes for the meat production and it was used by the Institute from Palas-Constanța to produce hybrid kids for meat.

MATERIAL AND METHOD

The researches were made on 8 bucks of Boer breed and 51 F1 Boer x Carpathian male kids, their descendants.

The kids were fattened in semi-intensive system with lucerne hay and supplement of barley grains since the age of 80 days until the age of 6 months. It was measured their growth of live weight during this period of time.

The heritability (h^2) of the growth was determined through the analysis of variance according to the methodology presented in table 1 [1], [4].

Table 1
The analysis of the variance for the growth of live weight at kids for a period of 100 days of fattening

Source of variation	*Degrees of freedom*	*Sum of SP squares*	*MP Average square*	*s^2 Variance*
Total (T)	$GL_T = N - 1$	$SP_T = \Sigma\Sigma_X^2 - CT$	$MP_T = \frac{SP_T}{GL_T}$	$V_P = V_I + V_i$
Between families of bucks	$GL_I = n - 1$	$SP_I = \Sigma \frac{(\Sigma X)^2}{n_i} - CT$	$MP_I = \frac{SP_I}{GL_I}$	$V_I = \frac{MP_I - MP_i}{K}$
Intra families of bucks	$GL_i = GL_T - GL_I$	$SP_i = SP_T - SP_I$	$MP_i = \frac{SP_i}{GL_i}$	$V_i = MP_i$

N –total number of descendants.
n – number of bucks (families of half-brothers).
n_i – number of descendants in each family.
CT – term of correction.
Σ_X – sum of individual values.
Σ_X^2 – sum of the squares of individual values.

$$CT = \frac{(\Sigma\Sigma X)^2}{N}$$

$$h^2 = \frac{4s_S^2}{s_S^2 + s_W^2}$$

where:

s_S^2 = genetic variance due to the differences between families of half-brothers. This estimates ¼ of the additive genetic variance.

s_W^2 = the remained additive variance plus the variance due to dominance, interaction and variance of environment.

$$s_S^2 = \frac{MP_I - MP_i}{K}$$

$$s_W^2 = MP_i$$

K – coefficient which is used in the case of unequal size of the families of half-brothers.

$$K = \frac{1}{n-1}\left(N - \Sigma\frac{n_i^2}{N}\right)$$

Standard error of h^2

$$seh^2 * = \left(h^2 + \frac{4}{n}\right)\sqrt{\frac{2}{S}}$$

where:

seh^2 –standard error of h^2.

n – number of bucks (families of half-brothers).

S – average size of the families of half-brothers.

$$S = \frac{N}{n}$$

* by the formula of A.Robertson, quoted by [4].

The breeding value of the bucks was estimated according to the formula of [2], [3], [4]:

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

where:

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

n – number of descendants.

h^2 – heritability of character.

r_1 – coefficient of father-descendent relationship = 0.5.

r_2 – coefficient of half-brothers' relationship = 0.25.

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

A_y – average growth at contemporaries.

The breeding value in percents is calculated according to the formula:

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

where:

A – the average growth pondered at descendants and contemporaries.

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

where:

n_1 – the number of descendants.

n_2 – the number of contemporaries.

RESULTS AND DISCUSSIONS

In table 2 the morphoproductive indicators of the lots of half-brothers since birth to the age of 6 months are presented.

Table 2

The morphoproductive indicators at the lots of half-brothers by father

Specification	*UM*	*Registry numbers of father bucks*							
		500	*445*	*412*	*507*	*543*	*535*	*2247*	*2250*
		X±sx	*X±sx*	*X±sx*	*X±sx*	*X±sx*	*X±sx*	*X±sx*	*X±sx*
Weight at birth	*kg*	*2,58 ± 0,0770*	*2,45 ± 0,1148*	*2,44 ± 0,1811*	*2,39 ± 0,1207*	*2,48 ± 0,1241*	*2,08 ± 0,1327*	*2,15 ± 0,1464*	*2,43 ± 0,0973*
*Weight at weaning**	*kg*	*17,50 ± 1,8028*	*16,68 ± 2,2186*	*13,19 ± 1,5177*	*13,01 ± 0,8143*	*15,46 ± 2,3101*	*13,82 ± 3,0079*	*16,98 ± 0,9063*	*13,52 ± 0,6711*
Weight at 6 months	*kg*	*33,80 ± 1,3454*	*28,18 ± 2,5860*	*26,98 ± 2,5328*	*25,53 ± 1,5784*	*29,64 ± 2,8911*	*25,78 ± 2,8900*	*29,17 ± 1,0006*	*26,06 ± 0,8806*
Growth since weaning to 6 months	*kg*	*16,30 ± 0,8999*	*11,50 ± 0,8888*	*14,38 ± 1,7087*	*12,22 ± 0,5464*	*13,43 ± 0,9995*	*11,97 ± 0,4709*	*13,23 ± 1,1575*	*12,56 ± 0,6607*

* body weight corrected at the age of 80 days.

From the table it can be noted that the total average growth of live weight for a period of 100 days at the hybrid kids was between the limits of 11.50 kg/animal – 16.30 kg/animal.

In table 3 there are presented the h^2 value and its standard error for the studied indicators.

Table 3

The coefficient of heritability (h^2) and standard error (seh^2) at the studied morph-productive indicators

No.	*Specification*	*Coefficient of heritability (h^2)*	*Standard error of h^2 (seh^2)*
1.	*Body weight at birth*	*0,09*	*0,25*
2.	*Body weight at weaning*	*0,18*	*0,34*
3.	*Weight at 6 months*	*0,26*	*0,38*
4.	*Growth of the live weight after weaning*	*0,39*	*0,45*

It is noted that the growth of kids until the age of 6 months has a middle heritability, that of $h^2 = 0.39$.

In table 4 it is presented the breeding value of the Boer bucks for the growth of the live weight during a period of 100 days of fattening.

Table 4

The breeding value for the growth of live weight since weaning to the age of 6 months at the progeny tested bucks

Registry number of father-buck	*Achieved parameters*						
	y	*n_1*	*n_2*	*A_y*	*V_A (kg)*	*V_A (%)*	*Decision of selection*
500	*16,3*	*3*	*48*	*12,77*	*1,73*	*113,5*	*Improver*
445	*11,50*	*4*	*47*	*13,11*	*-0,97*	*92,6*	*Worse-grower*
412	*14,38*	*6*	*45*	*12,79*	*1,25*	*109,8*	*Improver*
507	*12,22*	*9*	*42*	*13,14*	*-0,91*	*93,07*	*Worse-grower*
543	*13,43*	*7*	*44*	*12,91*	*0,45*	*103,5*	*Improver*
535	*11,97*	*6*	*45*	*13,12*	*-0,90*	*93,1*	*Worse-grower*
2247	*13,23*	*6*	*45*	*12,95*	*0,22*	*101,7*	*Indifferent*
2250	*12,56*	*10*	*41*	*13,08*	*-0,54*	*95,9*	*Worse-grower*

From the table it is noted that from the 8 tested bucks only 3 are improvers for the growth of live weight until the age of 6 months: registry no.500 with $V_A = 113.5\%$; registry no.412 with $V_A = 109.8\%$ and registry no.543 with $V_A = 103.5\%$.

CONCLUSIONS

Considering the value of under 0.4 of h^2 for the growth of live weight under the age of 6 months, in developing a program of improving the goat meat production the progeny test of bucks for this feature is needed.

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