

# STUDY OF THE BODY WEIGHT AND BIOMETRIC MEASUREMENTS IN CROSSBREED NEWBORN CALVES

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## Abstract

The aim of this study was to evaluate the body weight and biometric measurements on crossbreed newborn calves comparative with Romanian Black Spotted newborn calves. Our researches was carried out in the Dairy cows' Farm of I.C.D.C.B. Balotesti. We have taken into consideration four experimental groups (E<sub>1</sub> Romanian Black Spotted x Charolaise, E<sub>2</sub> Romanian Black Spotted x Blanc Blue Belgique, E<sub>3</sub> Romanian Black Spotted x Aberdeen Angus, E<sub>4</sub> Romanian Black Spotted x Limousine) and one control group (M) Romanian Black Spotted, with n=5 heads/group. The main body measurements performed were: body length (BL), height at withers (HW), height at rump (HR), height at chest (HC), perimeter of the thorax (PT), perimeter of the shin (PS), length of rump (LR). Means± (standard error), standard deviations (sd) and coefficients of variation (V) of body weight and biometric measurements were calculated. To obtain the significance of the differences, the Student's test was applied. The mean values obtained for the body weight was distinct statistically significant ( $p < 0.01$ ) in the case of group E<sub>1</sub> and statistically significant ( $p < 0.05$ ) in the case of group E<sub>2</sub> comparative with the control group M. The average values recorded for height of chest (HC) was  $34.20 \pm 0.37$  cm in E<sub>2</sub> comparative with  $31.80 \pm 0.49$  cm in M group ( $p < 0.01$ ). The mean value for perimeter of the shin varied between groups, for E<sub>2</sub> and E<sub>3</sub> groups values were close to the native race (BNR), but very statistically significant differences between group E<sub>4</sub> and control group M ( $p < 0.001$ ). The analyzed quantitative traits showed some better performances for crossbreed calves comparative with BNR calves.

**Key words:** crossbreed calves, birth weight, biometric traits

## INTRODUCTION

Improvement of the economic position of the farm is an ongoing process for many commercial cow-calves producers. Profitability may be enhanced by increasing the volume of production (the pounds of calves market) and/or the value of the sold products (improving quality). The reduction of production costs, and the increasing of selling prices, can also improve profitability [8]. The use of crosses breeding systems, as a mean of increasing meat production by using the "heterosis" phenomenon, remains one of the most perspective attribute of cattle breeding. The heterosis is the superiority of the crossbreed animal comparative with the average of breed parents performances, under the same environmental conditions [3, 7, 8].

Thanks to the hybrid vigor, the obtained calves will be, from a biological point of view, more vigorous, more resistant to diseases and the most part of them will survive to the age of slaughter [2]. Heterosis should be very important driving factor in female and bull breed selection [4].

## MATERIALS AND METHODS

The performances of twenty-five calves have been evaluated at their birth. They have been distributed in four experimental groups, n=5: E<sub>1</sub> Romanian Black Spotted x Charolaise, E<sub>2</sub> Romanian Black Spotted x Blanc Blue Belgique, E<sub>3</sub> Romanian Black Spotted x Aberdeen Angus, E<sub>4</sub> Romanian Black Spotted x Limousine and one control group M, n=5: Romanian Black Spotted. Our studies were carried out in the Dairy cows' Farm of I.C.D.C.B. Balotesti. The body weight was determined by using certified digital scale PCANTV 1500 kg/1.2 x 2M (Instanbul, Turkey). The body length (BL),

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The manuscript was received: 29.08.2017  
Accepted for publication: 13.03.2018

height at withers (HW), height at rump (HR), height at chest (HC) were determined by using zoometer. The perimeter of the thorax (PT) and the perimeter of the shin (PS) were measured using the thribbon. The length of rump (LR) was measured by the compass. Means± (standard error), standard deviations (sd) and coefficients of variation (V) of body weight and biometric measurements were calculated. To obtain the significance of differences, the Student's test was applied.

## RESULTS AND DISCUSSIONS

The usual statistic estimators calculated for body weight in newborn calves are presented in table 1. The mean body weight for E<sub>1</sub> BNR x CH (45.40±2.06 kg) was distinct statistically significant (p<0.01) comparative with control group (M) BNR (38.00±0.71 kg). In case of group E<sub>2</sub> BNR x BBB was observed a mean values of 41.60±1.17 kg comparative with control group M (p<0.05).

Table 1 The results for body weight in newborn calves

| Group/Breed <sup>1</sup> | BW (body weight), kg     |      |       |
|--------------------------|--------------------------|------|-------|
|                          | $\bar{X}\pm s_x$         | sd   | V%    |
| E <sub>1</sub> BNR x CH  | 45.40±2.06**             | 4.62 | 10.18 |
| E <sub>2</sub> BNR x BBB | 41.60±1.17*              | 2.61 | 6.27  |
| E <sub>3</sub> BNR x AA  | 39.00±0.55 <sup>ns</sup> | 1.22 | 3.13  |
| E <sub>4</sub> BNR x LI  | 39.40±0.40 <sup>ns</sup> | 0.89 | 2.26  |
| M BNR                    | 38.00±0.71               | 1.58 | 4.16  |

<sup>1</sup>CH=Charolaise, BBB=Blanc Blue Belgique, AA=Aberdeen Angus, LI=Limousine, BNR=Romanian Black Spotted.\*\*p<0.01; \*p<0.05; ns=non significant.

Regarding to experimental groups E<sub>3</sub> BNR x AA and E<sub>4</sub> BNR x LI (figure 1) was recorded a mean body weight between 1.00-1.40 kg comparative with control group (M)

BNR, without statistical differences (p>0.05). The coefficient of variation calculated for body weight (BW) was lower than 10%, expressing a very homogeneous population.



Fig. 1 Graphical representation of birth weight in newborn calves

Biometric traits are used to characterize the different breeds of livestock, for growth comparison of different individuals [5]. Estimates of newborn calves for biometric measurements by breed are presented in table 2. At the birth, the body length for E<sub>3</sub> BNR x AA and E<sub>4</sub> BNR x LI was between 2.00-2.40

cm larger than the control group of BNR (M), without statistical significance (p>0.05). The other experimental group (E<sub>1</sub> BNR x CH, p<0.01; E<sub>2</sub> BNR x BBB, p<0.05) had significantly differences from the control group (M) BNR, as is shown in the above table. The average values obtained for height

at withers (HW) and height at rump (HR) in all experimental groups were statistically insignificant towards control group M ( $p>0.05$ ).

Table 2 The results for biometric measurements in newborn calves

| Group/Breed <sup>1</sup>         | Biometric measurements    |      |       |
|----------------------------------|---------------------------|------|-------|
|                                  | BL (body length), cm      |      |       |
|                                  | $\bar{X}\pm s_x$          | sd   | V%    |
| E <sub>1</sub> BNR x CH          | 71.80±1.36*               | 3.03 | 4.22  |
| E <sub>2</sub> BNR x BBB         | 72.20±0.58 *              | 1.30 | 1.80  |
| E <sub>3</sub> BNR x AA          | 66.00 ±1.44 <sup>ns</sup> | 2.55 | 3.86  |
| E <sub>4</sub> BNR x LI          | 66.40±2.64 <sup>ns</sup>  | 5.90 | 8.89  |
| M BNR                            | 64.60±2.44                | 5.46 | 8.45  |
| HW (height at withers), cm       |                           |      |       |
| E <sub>1</sub> BNR x CH          | 73.80±0.73 <sup>ns</sup>  | 1.64 | 2.22  |
| E <sub>2</sub> BNR x BBB         | 72.40±0.51 <sup>ns</sup>  | 1.14 | 1.57  |
| E <sub>3</sub> BNR x AA          | 72.40 ±1.40 <sup>ns</sup> | 3.13 | 4.32  |
| E <sub>4</sub> BNR x LI          | 73.60±1.94 <sup>ns</sup>  | 4.34 | 5.90  |
| M BNR                            | 72.60±1.86                | 4.16 | 5.73  |
| HR (height at rump), cm          |                           |      |       |
| E <sub>1</sub> BNR x CH          | 77.00±1.26 <sup>ns</sup>  | 2.83 | 3.68  |
| E <sub>2</sub> BNR x BBB         | 75.6±0.51 <sup>ns</sup>   | 1.14 | 1.51  |
| E <sub>3</sub> BNR x AA          | 74.60 ±0.98 <sup>ns</sup> | 2.19 | 2.94  |
| E <sub>4</sub> BNR x LI          | 77.00±2.10 <sup>ns</sup>  | 4.69 | 6.09  |
| M BNR                            | 75.20±1.80                | 4.02 | 5.35  |
| HC (height at chest), cm         |                           |      |       |
| E <sub>1</sub> BNR x CH          | 34.60±1.44 <sup>ns</sup>  | 3.21 | 3.21  |
| E <sub>2</sub> BNR x BBB         | 34.20±0.37**              | 0.84 | 0.84  |
| E <sub>3</sub> BNR x AA          | 31.80 ±0.66 <sup>ns</sup> | 1.48 | 1.48  |
| E <sub>4</sub> BNR x LI          | 33.00±0.84 <sup>ns</sup>  | 1.87 | 1.87  |
| M BNR                            | 31.80±0.49                | 1.10 | 1.10  |
| PT (perimeter of the thorax), cm |                           |      |       |
| E <sub>1</sub> BNR x CH          | 89.80±0.84**              | 1.87 | 2.08  |
| E <sub>2</sub> BNR x BBB         | 84.60±0.51 <sup>ns</sup>  | 1.14 | 1.35  |
| E <sub>3</sub> BNR x AA          | 87.20±1.71 <sup>ns</sup>  | 3.83 | 4.39  |
| E <sub>4</sub> BNR x LI          | 83.00±1.45 <sup>ns</sup>  | 3.24 | 3.90  |
| M BNR                            | 84.00±1.05 <sup>ns</sup>  | 2.35 | 2.80  |
| PS (perimeter of the shin), cm   |                           |      |       |
| E <sub>1</sub> BNR x CH          | 12.60±0.51**              | 1.14 | 9.05  |
| E <sub>2</sub> BNR x BBB         | 10.60±0.40 <sup>ns</sup>  | 0.89 | 8.40  |
| E <sub>3</sub> BNR x AA          | 10.60 ±0.60 <sup>ns</sup> | 1.34 | 12.64 |
| E <sub>4</sub> BNR x LI          | 11.80±0.20***             | 0.45 | 3.81  |
| M BNR                            | 10.20±0.20                | 0.45 | 4.41  |
| LR (length of rump), cm          |                           |      |       |
| E <sub>1</sub> BNR x CH          | 22.20±1.39*               | 3.11 | 14.01 |
| E <sub>2</sub> BNR x BBB         | 19.60±1.44 <sup>ns</sup>  | 3.21 | 16.38 |
| E <sub>3</sub> BNR x AA          | 20.12 ±0.21 <sup>ns</sup> | 0.34 | 1.69  |
| E <sub>4</sub> BNR x LI          | 23.80±1.07**              | 2.39 | 10.04 |
| M BNR                            | 18.40±0.40                | 0.89 | 4.84  |

<sup>1</sup>CH=Charolaise, BBB=Blanc Blue Belgique, AA=Aberdeen Angus, LI=Limousine, BNR=Romanian Black Spotted.\*\*\* $p<0.001$ ; \*\* $p<0.01$ ; \* $p<0.05$ ; ns=non significant.

The mean value registered for height at chest (HC) was distinct significantly ( $p<0.01$ ) in case of E<sub>2</sub> BNR x BBB (34.20±0.37 cm) comparative with control group (M) BNR (31.80±0.49 cm). The coefficient of variation

calculated for BL, HW, HR, HC showed a very homogeneous groups. The perimeter of the thorax was distinct significantly ( $p<0.01$ ) for group E<sub>1</sub> BNR x CH (89.80±0.84 cm) with a coefficient of variation of 2.08%

comparative with control group (M) BNR (84.00±1.05 cm) with a coefficient of variation of 2.80%. The obtained values for perimeter of the shin was very statistical significantly for experimental group E<sub>4</sub> BNR x LI (11.80±0.20 cm, p<0.001) and distinct significantly for experimental group E<sub>1</sub> BNR x CH (12.60±0.51 cm, p<0.01) comparative with the control group (M) BNR (10.20±0.20 cm). So, the calves from E<sub>4</sub> BNR x LI and E<sub>1</sub>

BNR x CH experimental groups had better development of bones, the other experimental groups (E<sub>2</sub> BNR x BBB, E<sub>3</sub> BNR x AA) having the perimeter of the shin very close to BNR breed (figure 2). Acatincai et al. [1] reports that the most developed dimensions of calves at birth, relative to the native breed, were the perimeter of the shin, followed by the height, length, and then the width of the body dimensions.

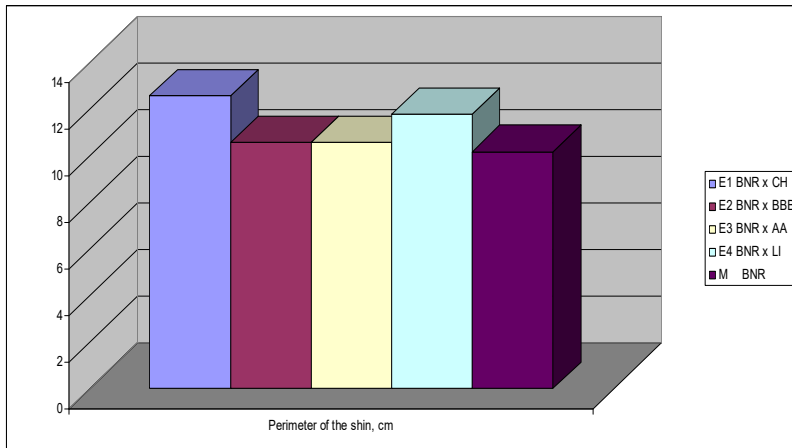


Fig. 2 Graphical representation of perimeter of the shin in newborn calves

The recorded values of length of rump (LR) were differentiated between the experimental studied groups, in absolute value of 1.20-5.40 cm. The biggest length of rump was recorded by E<sub>4</sub> BNR x LI (23.80 cm) and de smallest length of rump was recorded by E<sub>2</sub> BNR x BBB (19.60cm) comparative with the control group (M) BNR (18.40 cm). The calculated coefficient of variation was also homogeneous for perimeter of the shin (PS) and the length of rump (LR).

## CONCLUSIONS

As response to the requests of the world market, the industrial crossbreeding are used in the most part of beef producing countries, in order to obtain a high quality meat with a favorable protein-fat ratio. The use of crossbreeding offers two distinct and important advantages over the use of a single breed : the crossbreed animals have heterosis and combine the strengths of the parent breeds.

The obtained results for crossbreed calves comparative with BNR calves, justify the usefulness of these industrial crosses in order to improve the production of beef meat.

## ACKNOWLEDGEMENTS

This study was supported by Sectoral Project ADER 5.1.10/2015 „Research on the compatibility of crossbreeding autochthonous cattle with meat breeds bulls”.

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