CONTRIBUTION TO THE STUDY OF CURRENT GENETIC VALUE OF CHAROLAISE SIRES FROM FRANCE

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Abstract

In France the beef cattle are well represented by specialized race, and in first place as number, genetic value distribution area is Charolaise race. Using data from official control and race herdbook from 2009 we conducted a study to see the current genetic value of bulls for the some selection index. After we processing statistic data result that calving ease index have an average of 96.39 ± 0.241 with a standard deviation of 8.65, and the synthetic weaning index has an average of 110.82 ± 0.156 with a standard deviation of s = 5.614, values with a precision of CD = 0.86. The analyzed indices had a medium to height genetic determinism like: IFNAIS – h^2 0.29; ISEVR - h^2 0.25; CRsev - h^2 0.32; DMsev – h^2 0.27; DSsev - h^2 0.34; AVel - h^2 0.23; ALait - h^2 0.42; IVMAT - h^2 0.21. The genetic, phenotypic and environmental correlation between selection indices was different as intensity and sense. The correlations between calving ease index and CRsev, DMsev, DSsev were negative with moderate intensity; between IFNAIS and ISEVR – positive correlation with moderate intensity; between IFAIS and AVel, ALait, IVMAT are positive and very strong correlation. In the end was made the classification of sires in which 916 bulls (70.7%) were in RVS class (recognized for quality of calves at weaning day), 34 bulls in RQM class (recognized and confirmed for maternal quality), 86 bulls (6.6%) in RR3P class (recognized for the third time), 16 bulls (1.2%) in RRB class (recognized for their quality for meat production), 11 bulls (0.9%) was in RRE class (recognized like elite sires) and 233 (18,0%) young bulls qualified or recommended for reproduction. From all analyzed sires the most valuable bull was SAPRISTI code 8504242227 for calving ease index (value 145) qualified in RR3P class; the most valuable for muscle development was LANZAC cod 1295106604 (DMsev= 135); for the ISEVR index was the same SAPRISTI (137). This exceptional value may contribute to improvement of morphologic and productive traits and meat attributes of cows.

Key words: Charolaise race, selection indices, genetic amelioration

INTRODUCTION

If we know that the Charolaise race was introduce in some particular farms, and this had an extension tendency in Romania for beef production and for traits transmission in descent, is good to know the genetic value of Charolaise race.

The necessity of this study result from the scientific substantiation of selection and genetic amelioration, most be based on medium value and variability of morphologic traits analyse for the active population from different breeding area.

The problem is more important if the economic and market necessity want cows for beef.

In France beef cattle are well represented by specialized race and the first place like effectives, genetic value and area distribution is for Charolaise race.

MATERIAL AND METHOD

Using the literature and a data base published in Charolaise race Herd-Book in France 2009, we make a study about actual genetic value of sires, after a statistical processing. We take in study following selection indices:

- IFNAIS – calving ease index
- CRsev –growing until weaning index
- DMsev – muscular development until weaning index
- DSsev –skeletal development until weaning index
- ISEVR – synthetic weaning index
- AVel – cows calving aptitude index
- ALait – maternal udder-feeding aptitude index
- IVMAT - the synthetic index who mix direct effects (IFNAIS, Crsev, Dmsev, Dssev) and maternal effects (Alait, Avel).

It was analysed 1294 Charolaise bulls from all breeding race departments, who had the synthetic weaning index more than 104.

First time was calculated medium values and variability estimators for traits take in study. The second step of this research was to stabiles the genetic variability percentages in population using analyse of variance for half-brothers groups and REML method. The results are listed below.

Data processing was made by V. Ujică and V. Maciuc from the Animal Science Faculty, University of Agricultural Sciences and Veterinary Medicine, Iasi.

Were estimated medium value and the variability for selection indices, heritability, genetic and phenotypic correlation between selection indices and the results is synthetically presented in graphics and tables.

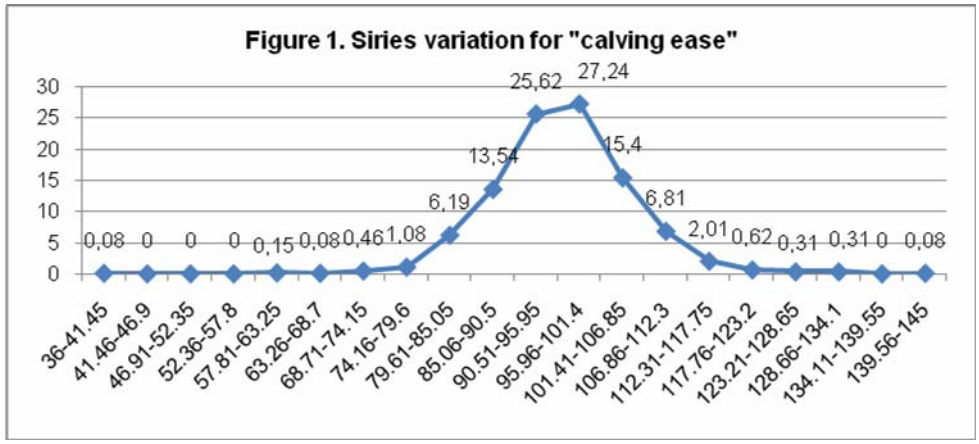
RESULTS

After statistic processing result that calving ease index has an average value of 96.39 ±0.241 and standard deviation of s=8.65, values who shows a pronounced variability as can be seen from series variation (Figure 1).

Table 1

Medium values and variability for principal indices on analysed traits

Specification	No.	$\overline{X}$	±s $\overline{x}$	s	V%	Min.	Max.
calving ease index (IFNAIS)	1292	96.39	0.241	8.65	8.974	36	145
growing until weaning index (CRsev)	1293	108.51	0.152	5.455	5.027	91	127
muscular development until weaning index (DMsev)	1293	105.6	0.186	6.69	6.335	86	135
skeletal development until weaning index (DSsev)	1294	105.01	0.193	6.947	6.615	76	128
synthetic weaning index (ISEVR)	1294	110.82	0.156	5.614	5.066	104	137
Index precision (CD)	246	0.86	0.005	0.072	8.379	0.74	0.99
cows calving aptitude index (AVel)	305	98.28	0.461	8.047	8.188	69	119
maternal udder-feeding aptitude index (ALait)	246	96.49	0.486	7.626	7.903	76	117
the synthetic index who mix direct effects and maternal effects (IVMAT)	245	106.22	0.415	6.502	6.121	93	131



Growing until weaning index (CRsev), muscular development until weaning index (DMsev) and skeletal development until weaning index (DSsev) has values who shows a very good body development. The frequency histogram for this trace classifies population for a normal Gauss curve distribution (figure 2-4).

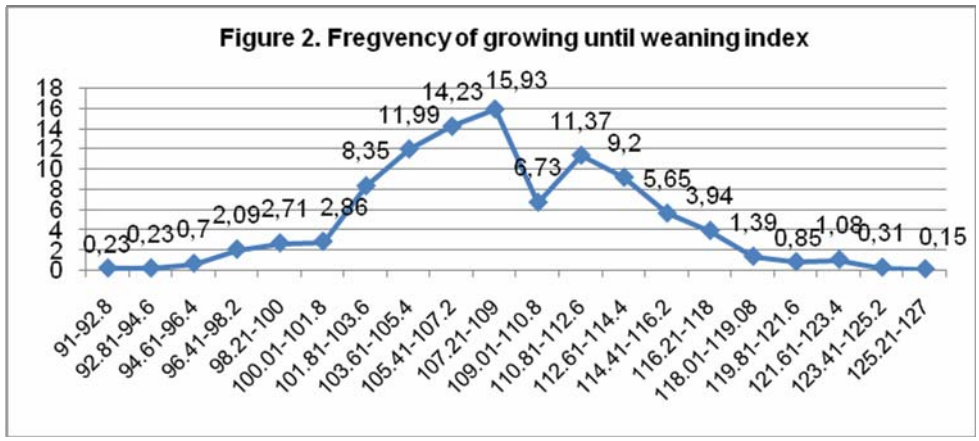


Figure 2. Fregvency of growing until weaning index
0,23
0,23
0,7
2,09
2,71
2,86
8,35
11,99
14,23
15,93
6,73
11,37
9,2
5,65
3,94
1,39
0,85
1,08
0,31
0,15
91-92.8
92.81-94.6
94.61-96.4
96.41-98.2
98.21-100
100.01-101.8
101.81-103.6
103.61-105.4
105.41-107.2
107.21-109
109.01-110.8
110.81-112.6
112.61-114.4
114.41-116.2
116.21-118
118.01-119.08
119.81-121.6
121.61-123.4
123.41-125.2
125.21-127

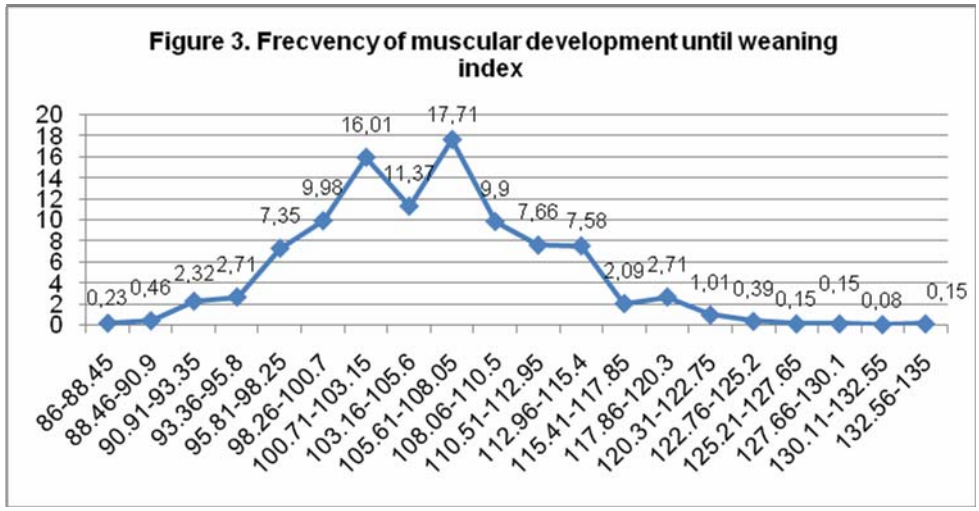


Figure 3. Frecvency of muscular development until weaning index
0,23
0,46
2,32
2,71
7,35
9,98
16,01
11,37
17,71
9,9
7,66
7,58
2,09
2,71
1,01
0,39
0,15
0,15
0,08
0,15
86-88.45
88.46-90.9
90.91-93.35
93.36-95.8
95.81-98.25
98.26-100.7
100.71-103.15
103.16-105.6
105.61-108.05
108.06-110.5
110.51-112.95
112.96-115.4
115.41-117.85
117.86-120.3
120.31-122.75
122.76-125.2
125.21-127.65
127.66-130.1
130.11-132.55
132.56-135

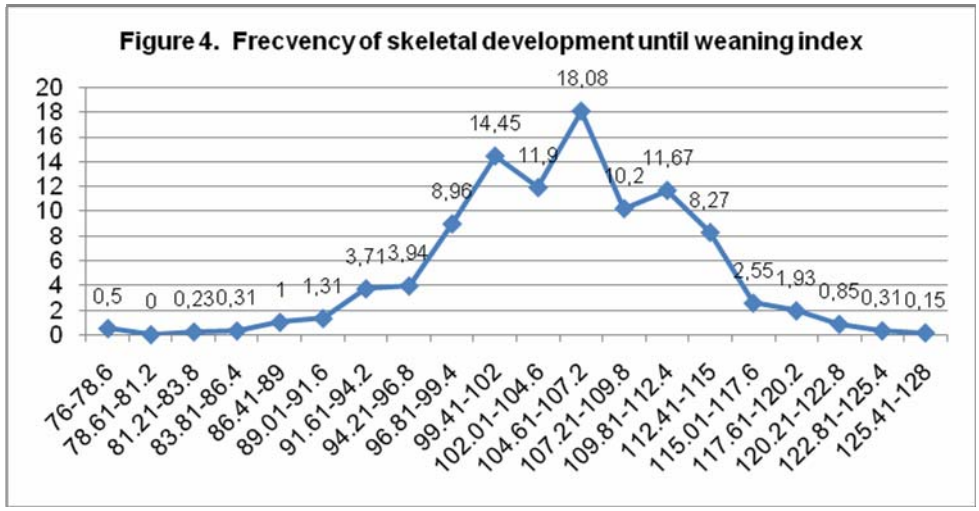
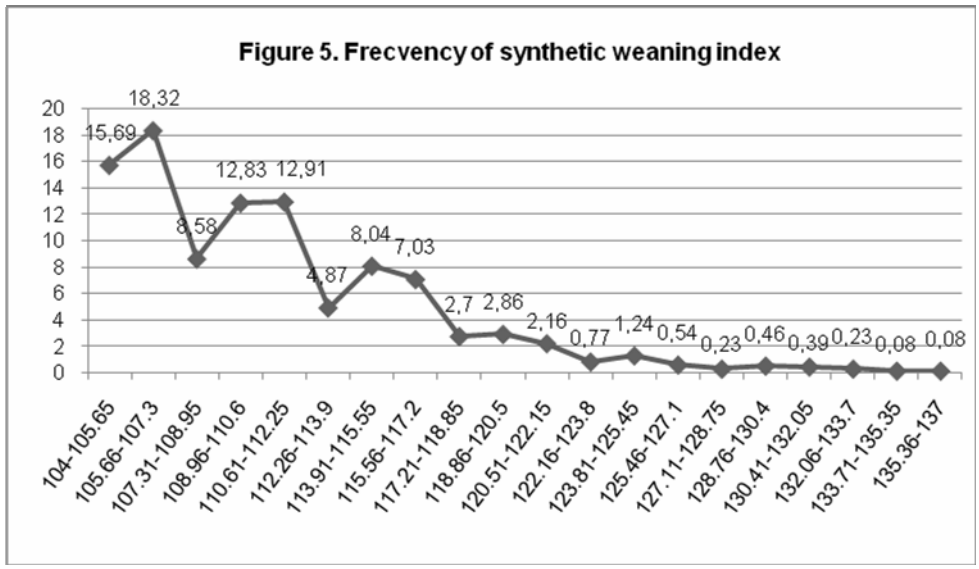


Figure 4. Frecvency of skeletal development until weaning index
0,5
0
0,23
0,31
1
1,31
3,71
3,94
8,96
14,45
11,9
18,08
10,2
11,67
8,27
2,55
1,93
0,85
0,31
0,15
76-78.6
78.61-81.2
81.21-83.8
83.81-86.4
86.41-89
89.01-91.6
91.61-94.2
94.21-96.8
96.81-99.4
99.41-102
102.01-104.6
104.61-107.2
107.21-109.8
109.81-112.4
112.41-115
115.01-117.6
117.61-120.2
120.21-122.8
122.81-125.4
125.41-128



Synthetic weaning index (ISEVR) has an average value of 110.82 ± 0.165 and standard deviation of s=5,614, values with a precision of CD=0.86.

The population take in study has a big variability (Figure 5), good for most good genotype selection, who must contribute for Charolaise race genetic breeding.

We remark the maternal Carolaise qualities shows by values of cows calving aptitude indices, maternal udder-feeding aptitude indices and maternal value synthetic index.

The analyse of medium value, traits variability and beef sires traits shows a good development for beef aptitude characteristic for Charolaise race with good traits for beef production.

The quantitative traits for beef cattle have a genetic complex determinism, for creation and supervision of these respond especially major genes (Mather 1941).

In the international literature is study intense the morphologic traits and meet aptitude heritability but in Romania this studies missing and is necessary for the farmer who breed beef cows races.

The results of all investigations carried out in order to study the hereditary behavior of quantitative characters in beef steers confirmed the hypothesis of polygenic heredity and therefore transmission by Mendel laws.

The study of heritability of characters in beef steers, although not known the same magnitude as in cattle milk, developed with the passage of the genetic improvement, optimized.

Heritability estimates for performance in meat, varies widely, depending on the ownership considered and exogenous factors. Most research considers a weak genetic determinism for breeding characteristics, which means that genetic improvement of these features should be based on genotypic selection.

Examining the heritability coefficient values for the characters studied, resulted that, they have a different degree of genetic determination, following the inter-relationship of each character and genetic variability of genotypes that make up the groups of animals analyzed.

A common feature of heritability characters, in Charolaise race, is the average degree of genetic determination for ease parturition index ($h^2 = 0.29$), muscle development ($h^2 = 0.27$), weaning synthetic index ($h^2 = 0.25$), skills at birth ($h^2 = 0.23$) and maternal skills synthetic index ($h^2 = 0.21$). Meanwhile, skeletal development and udder feeding ability was recorded a mean level of genetic determination to high, which tally with the dates mentioned in the literature.

Table 2
The heritability coefficient values for the characters analyzed in Charolaise race.

Traits	Heritability	Total variance	Var. inter.	Var. intra.	Var. inter. zone	Var. intra. intra
ifn_ais	0.29	74.82	71.76	42.44	72	38
cr_sev	0.32	31.76	29.05	1.87	29	42
dm_sev	0.27	45.55	44.90	20.51	45	118
ds_sev	0.34	49.72	47.65	46.51	48	153
isevr	0.25	33.92	30.96	29.79	30	63
cd	0.41	0.21	0.14	0.09	2	3
avel	0.23	65.84	64.52	62.36	65	40
alait	0.42	59.39	56.39	50.29	56	186
ivmat	0.21	46.42	42.43	30.39	42	26
cd	0.37	0.17	0.12	0.07	2	3

The share of medium and high genetic determination for clues review reflects, on the one hand, the genetic variability of biological material females, and on the other hand, high genetic variance among breeding males.

Environment for these indices, had less influence in determining the total variance, leading to guidelines, methods and different management systems in the process of selection and genetic improvement compared with low transmission of hereditary characters, such as those of breeding.

Genetic correlation (rG), phenotypic (rP) and medium (rM) between selection indices analyzed were different in meaning and intensity. Thus, correlations between the index of ease parturition (IFNAIS) and CRsev, DMsev, DSsev were negative and of medium intensity (rP = -0.13, -0.31, rG = -0.10, -0.35, rM = -0.14, -0.29). Between ease parturition and weaning synthetic index correlations were positive and medium intensity (rG = 0.22), and the ease of parturition and maternal qualities correlations were positive and very strong (rp = 0.31 – 0.42; rG = 0.42 – 0.56; rM = 0.43 – 0.45).

Finally, was made a classification of breeding male, analyzed (Table 4).

Table 4
Classification of bulls Charolaise analyzed

Specification	No.	%
1. RJ-Young bull	72	5.6
2.2. RJC – Young bull qualified	144	11.1
2.2. RJC – Young bull recommended	17	1.3
3.1. RVS – Recognized for calves at weaning	916	70.7
3.2. RBB – Recognized for meat	16	1.2
3.3. RQM – Recognized and confirmed for maternal qualities	34	2.6
3.4. RRE – Recognized as elite breeding	11	0.9
3.5. RR3P – Recognized for the third time	86	6.6
Total	1296	100.0

Of the 1296 bulls analyzed, the majority, or 916 bulls (70.7%) were located in class SVR, recognized for the quality of weaning calves, 34 bulls (2.6%) in class RQM,

recognized and confirmed for maternal qualities, 86 bulls (6.6%) in class RRB, recognized for outstanding qualities for meat, 11 bulls (0.9%) in class ERR, recognized as elite breeding bulls and 233 youth (18.0%) classified or recommended for breeding.

CONCLUSIONS

- Following the study, regarding the mean values and variability of characters and meat characteristics of males used for breeding, has resulted in a very good development of skills for the meat, giving the type characteristic of the breed Charolaise with very favorable qualities for meat production.
- Heritability estimates for characters analyzed, vary widely, with an average index of genetic determination for ease calving, muscle development and maternal skills.
- Genetic correlations (rG), phenotypic (rP) and medium (rM) between the indices analyzed were different in spirit and intensity. Between ease parturition and weaning synthetic index correlations were positive and medium intensity and the ease of parturition and maternal qualities are positive and very strong correlations.
- Of all bulls analyzed, most valuable for the calving ease index was bull SAPRISTI, code 8504242227, IFNAIS value of 145, qualifying in class RR3P; most valuable for developing muscle was bull LANZAC, code 1295106604, the value DMsev 135; the most valuable for weaning synthetic index was the same bull SAPRISTI, ISEVR value of 137.

These breeders, with exceptional breeding value can help to improve the qualities and skills morfoproductive of cattle meat.

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