CONTRIBUTIONS TO THE STUDY OF LONGEVITY FOR THE RBSB POPULATION IN THE DANCU FARM IAŞI

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Abstract

Taking into consideration the fact that the Romanian Black Spotted Breed has a significant part in the Moldavian cattle breed structure we thought it would be relevant to undertake studies and researches on its productive and longevity performances in one of the most representative farms (Dancu Iasi) that has dealt with its breeding and improvement for more than forty years.

Longevity research has been made on the whole population of the Romanian Black Spotted Breed in the Dancu-Iasi Farm considering all the cows that ended their productive life between 1995-2008. There is also important to underline the fact that the Dancu Farm has the most valuable biological material of the Romanian Black Spotted Breed as it was here that the first nucleus of the Frieze breed imported from Danmark in 1967 was introduced.

The longevity traits have been studied for a population of 999 cows as well as the precocity for all the primiparous selected between the years 2000-2008. The present study will show the synthetic scheme together with the experimental protocole, the research objective, the biologic material and the results obtained.

Key words: productive longevity, Romanian Black Spotted Breed, primiparous, biologic material

INTRODUCTION

The research concerning the productive precocity and longevity for the cattle population, their genetic and economic implications in the mangement of dairy farms is still poor in the literature both for breeds from our country and other countries as well (V. Ujică, Gh. Georgescu, Gh. Mărginean, I. Vintilă, Gh. Mureşan, C. Velea, Şt. Acatincăi *et. al*). That is why the necessity of an extensive study for the general biologic traits (fitness) appeared, hence their introduction in programmes of cattle improvement as important selection criterion. This tendency is obvious for all breeds where in improvement programms the productive and precocity criterion has become as important as other basic criteria (productive performance, body building, development, appearance, udder and legs).

MATERIAL AND METHOD

There are rather few and quite incomplete studies concerning the productive longevity for the Romanian Black Spotted Breed population from different regions of our country. For the Moldavia region there can be noticed the latest studies made over ten years before by *Partazi D.* (2000), *Ujică V. et al.* (1993), *Silistru Maria* (2004), *Jeana Murat* (1992). *Florescu Elena* (1997), *Bălăiţă Carmen* (2010), *Margareta Mihăilescu* (2007) for the Black Breed, *Geluca Grogoroşcuţă* and *Popşor P.* (2008) for the Romanian Spotted Breed and so on.

The productive longevity research was made on 999 Romanian Black Spotted cows from the Dancu-Iassy Farm that ended their productive activity between 1995-2008.

For this study there has been used the primary data base of the official production survey together with our personal observations and determinations.

The data have been statistically processed using the methodology indicated by the literature for zootechnics research (A. Tacu, Gh. Sandu, H. Grosu, V. Ujică *et al.*) synthesized in tables and graphics.

RESULTS AND DISCUSSIONS

The average values and the productive longevity variability for the RBS cattle population of the Dancu-Iasi Farm.

Our study on the RBS cattle population of the Dancu-Iasi Farm between 1995-2008 reveals the following essential aspects (Table 1).

Table 1. The productive longevity for the RBS population of the Dancu Farm

Specification		*n*	$\overline{X} \pm s_{\overline{X}}$	s	V%	Min	Max
Period of total lactation, days		999	1188.81 ± 18.11	572.53	48.16	218	3272
Milk, kg		999	23031.09 ± 360.21	11385.15	49.43	2640	66162
Fat, %		999	4.20 ± 0.22	6.99	50.40	3.68	4.42
Fat, kg		999	968.89 ± 15.89	502.45	51.85	110	2927
Protein, %		881	3.17 ± 0.32	9.75	124.76	2.88	3.71
Protein, kg		881	730.08 ± 10.08	299.42	59.91	47	2259
Life period, days		999	2002.7				
It amounts on day of productive life	**Milk, kg**	999	19.37				
	Fat, kg	999	0.81				
	Protein, kg	999	0.61				
It amounts on day of life	**Milk, kg**	999	11.50				
	Fat, kg	999	0.48				
	Protein, kg	999	0.36				
Use index (%)		999	59.36				

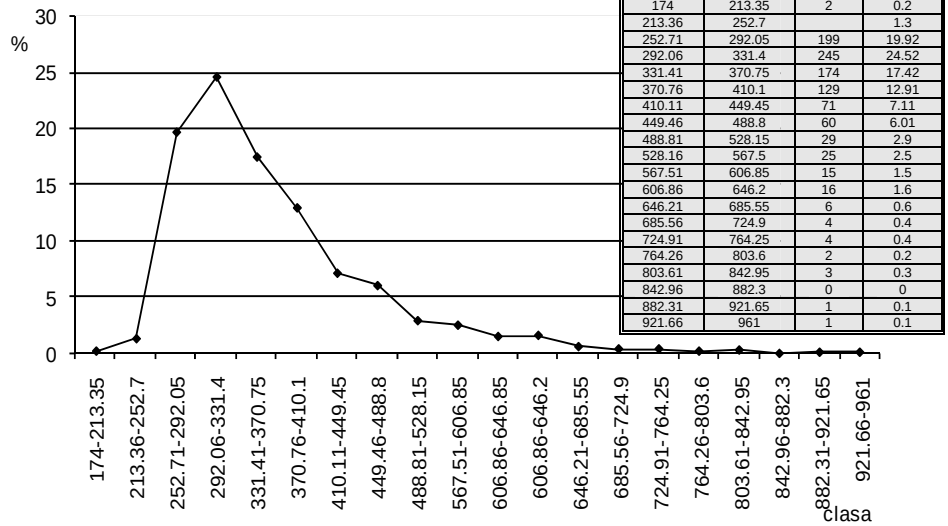
Period of productive life of the 999 cows that ended their productive career in the Dancu Farm, between 1995-2008 was of 1188.81 ± 18.11 days, with limits within 80 and 3272 days (tab. 1), with a high variability (V%=48.16). The cows of this farm were exploited, in average, 3,89 normal lactations (of 305 days) without expressing their maximum productive potential during their life. The variation for length of productive life means that 74.77% of the cows that ended their productive career were exploited between 252 and 410 days therefore very little, which means approximately 1,5 normal lactations.

A number of 16 cows were exploited over 750 days, out of which 2 cows (0.2%) had a period of exploitation between 882 and 961 (table 2 and fig. 1).

Taking into consideration the age at first calving of 813.39 days (27 months and 4 days) it means that the life lenght was of 2502.7 days i.e. 6.56 lactations.

The average milk production on period of productive life was of 23,031.9±360.21 milk kg with limits between 2,640 kg and 77,566 kg milk**.**

The highest milk production on length of productive life was of 77566 kg milk and 2927.49 kg fat and use index 70.16%, from the cow serial number 930078 daughter of the bull code 50704, followed by the cow serial number 890228 with a production of 72845 kg milk and 2772.0 fat and the third was the cow serial number 960004 with a production of 71256 kg milk and 2899 kg fat. The list of the first twelve cows with the best productive longevity from the Dancu Farm is shown in table 3.



Minimum class	Maximum class	Abs. Freq.	Relative Freq.
174	213.35	2	0.2
213.36	252.7		1.3
252.71	292.05	199	19.92
292.06	331.4	245	24.52
331.41	370.75	174	17.42
370.76	410.1	129	12.91
410.11	449.45	71	7.11
449.46	488.8	60	6.01
488.81	528.15	29	2.9
528.16	567.5	25	2.5
567.51	606.85	15	1.5
606.86	646.2	16	1.6
646.21	685.55	6	0.6
685.56	724.9	4	0.4
724.91	764.25	4	0.4
764.26	803.6	2	0.2
803.61	842.95	3	0.3
842.96	882.3	0	0
882.31	921.65	1	0.1
921.66	961	1	0.1

Fig.1. Period of total lactation

Table 3. List of RBS cows of the Dancu Farm with the highest productive longevity

No.	Serial number	Father code	No. of lactations	Milk, kg	Fat, kg	Usage index, %
1	930078	50704	8	77566	2927.49	70.16
2	890228	50387	8	72845	2772.06	70.20
3	960004	50819	6	71256	2899.00	70.04
4	910330	13470	8	68593	2645.62	66.16
5	900404	50651	8	65413	2585.65	69.78
6	890412	50669	6	63127	2422.33	67.46
7	840286	5923	11	58659	2222.34	65.24
8	900024	9649	8	58204	2406.67	67.46
9	890162	50648	9	56919	2235.13	67.32
10	840440	50558	9	53767	2015.36	66.18
11	830550	5923	9	53439	2001.04	64.67
12	830308	50307	9	50647	1903.65	68.73

Taking into consideration the period of exploitation and the total milk production it appears that for the population under study there amounts to 19.37 kg milk, 0.81 kg fat and 0.61 protein kg on day of productive life, 11.50 kg milk, 0.48 kg fat and 0.36 kg protein on day of life respectively. These values are much lower than those obtained from the Friese breed in different countries yet they are the best obtained in our country by the RBSB. From the research made by *Elena Florescu* (1999) it occured that the milk production for the RBSB in different farms was between 10,549.08 kg milk and 410.35 kg fat in the Dulbaru Farm and 18,889.12 kg milk with 750.80 kg fat in the Pantelimon farm, lower than those obtained in the Dancu Farm. In the case of this farm, *Elena Florescu*, for a previous generation, found a mean of 19,504.96±662.10 kg milk comparatively to the mean of 23031.09 kg milk obtained during our research on another generation. A genetic improvement of the productive longevity is notified which accounts for the selection objectives in this farm.

The large nonproductive period correlated with a small/reduced period of exploitation and a milk production on small productive life accounts for a low efficiency of cows exploitation in some farms reflected by very low milk, fat and protein production that amounts on a day of productive life and a day of biological life (table 4). This situation implies a low usage index that, compared to estimates made by other authors

for this very breed, and other breeds as well, was bellow the optimal value quoted in literature (83% by Drăgănescu I.C.).

We have to notice that the populations studied by *I. Fişteag* in 1979 and by *Gh. Mureşan* in 1984 were herds imported from Holland, Denmark and Germany while those studied by *V. Ujică* in 1993 and by *Elena Florescu* in 1996 are samples of the Black Spotted Breed from Romania.

If we compare the values of the usage index of the cows from the Dancu Farm with the optimal value of 83% (*Drăgănescu I.C.*) it is necessary to raise this synthetic parameter value in the selection by improving the technological factors, especially the diet and the breeding of the youth reproductive.

Table 4. Comparative results regarding the productive longevity for the RBSB cattle

Specification		U/M	Ujică V. et col. 1993	Florescu E. 1996	Mureşan Gh. 1984	Fişteag 1. 1979	Popşor P., 2008 (rasa BNR)	Bologa Zinaida, (rasa Brună)1999
Analized population		n	1514	2353	556	430	394	1520
Number of lactations on productive life		n	3.79	3.66	3.81	3.73	5.17	3.15
Milk quantity on productive life		kg	11592	15872	12805	16825	12569	920.2
Fat quantity on productive life		kg	438.9	617.8	530.06	656.17	516.69	357.90
Period of productive life		days	1509	1257.5	1394.9	1607.7	1579.0	963.29
Period of biologic life		days	2510	2176.2	2234.9	2509.8	2774.5	2069.70
Age at first calving		days	915.55	900.7	855	898.5	1096.30	1053.92
It amounts on a day of productive life	**milk**	kg	7.63	7.95	9.18	10.46	7.96	9.64
	fat	kg	0.27	0.31	0.38	0.408	0.32	0.37
It amounts on a day of biologic life	**milk**	kg	4.58	5.32	5.70	6.70	4.53	4.48
	fat	kg	0.165	0.208	0.23	0.26	0.18	0.17
Usage index		%	60.11	66.91	62.41	64.35	56.91	46.54

The maximization of the milk production (25-30 kg on day of productive life) and, consequently, of the net income on day of biological life, implies an optimization of the period of exploitation There has to be considered a reduction of the age at first calving to 26-28 months, which was already done in the Dancu Farm for the present population, the improvement of exploitation technologies their management as well as the use of superior genetics. The genetic improvement of the herd studied in the Dancu Farm carried on results close to the biological optimum (19.37 kg milk) for some individuals even over this mean value.

These data demonstrate that within the studied population there are plus variants that can be selected and efficiently used for the herd genetic improvement and the dairy cows profitability for this breed. The period of exploitation improvement is thus compulsory as the mean values of 2-3 lactations prove a weak exploitation efficiency for this cattle.

The longevity analiyis by „Survival Analysis" method

Recently many countries (Holland, Germany, Switzerland, Austria, France, Italy, USA, Canada) have introduced the „Survival Analysis" to genetically evaluate the cattle longevity.

This method, also used in medicine and genetic engineering, has certain advantages in comparison with the traditional method as it uses information not only for cows that didn't end their career (culled by reasons of health, age, alteration of their reproductive function, production and morphology) but it includes the evaluation of all the animals in the farm while they are still alive (Bruno, Biseo, 1999).

Another important advantage of the „Survival Analysis" method is the fact that it takes into consideration many factors effect which influences the productive life as well

as the combination of these factors when the animal is still alive: milk production, size of the farm, lack of desease and so on. This method main advantage is a very simple estimation as there can be genetically evaluated all the populations small or big by the survival analysis.

The results obtained in the Dancu Farm are shown in Table 5.

Table 5. The productive longevity for the RBSB by the „Survival Analysis"

Lactation	n	%
I	999	100.0
II	855	85.5
III	646	64.6
IV	442	44.2
V	252	25.2
VI	119	11.9
VII	48	4.8
VIII	21	2.1
IX	5	0.5
X	3	0.3

The data of this table show that after the first three lactations, only 64.6% survived (646 cows) and after the first five lactations there survived only 25.2% from the total number of 999 heads. These data show a good productive longevity for the analysed herd if we compare these results to the situation in other farms and the total population where the rate of survival is much lower. The data of our research underline that there were 21 cows (2.1) in this farm that were exploited over eight lactations, and three cows have reached a tenth lactation. These results obtained in the Dancu Farm make us concude that it is necessary to undertake such studies and to use plus-variants in the genetic improvement of the RBSB in Moldavia by optimizing the length of exploitation together with the amelioration of exploitation technologies and management.

The weak use of cows in the production as well as the high length of nonproductive period has unpleasant economical effects as the costs are big and the losses in production have a direct influence upon the profitability in breeding dairy cattle.

The results we had concerning the length of exploitation of RBSB cows are the scientific basis for its optimization but they need corroboration with value elements of economy. That is why the maximization of the milk production and the net profit on life has to be our main objective, target in the selection of this population. The optimization of the length of exploitation also has to take in consideration the age at first calving, the breed and the exploitation system as essential limiting factors. Analysing the milk amount variability on productive life we found out:

From the 1424 cows that ended their productive career in the studied period (1995-2008) 232 cows were found (16.;2%) to have realised bellow 10,000 kg milk, the length of exploitation being very low. Most animals (802 heads) i.e. 52.29% realised between 10,000 kg and 30,000 kg milk and 348 cows (24.42%) between 30,000 kg and 50,000 kg milk. There were 42 cows (2.94%) with performances of over 50,000 kg on productive life in the studied population (table 6 and fig. 2).

Class	n	%
1000-4999	38	2.66
5000-9999	194	13.62
10000-14999	169	11.86
15000-19999	219	15.37
20000-24999	207	14.53
25000-29999	207	14.53
30000-34999	143	10.04
35000-39999	113	7.93
40000-44999	64	4.49
45000-49999	28	1.96
50000-54999	19	1.33
55000-59999	13	0.91
60000-64999	5	0.35
65000-69999	2	0.14
70000-74999	2	0.14
75000-79999	1	0.07
TOTAL	1424	99.93

Fig. 2. Milk quantity variability on productive life for the RBSB in the Dancu Farm-Iasi

The first three classified realised over 70,000 kg milk which are the highest performances for this farm:

First place: cow no. 930078 - father code 50704 – 8 lactations, 77566 kg milk, 2927.49 kg fat and 70.16% use index

Second place: cow no. 890228 – father code 50387 – with eight lactations, 72845kg milk, 2772.06 kg fat and 70.20% use index

Third place: cow no. 960004 – father code 50818 – with 6 lactations, 71256 kg milk, 2899 kg fat and 70.04% use index.

Cow no. 800108 – father code 50342 realised the most lactations on productive life (12 lactations) and a total production of 57012 kg milk and 2162.18 kg fat, being a champion from this view point.

If we take into consideration the paternal origin of the cows with the highest productive longevity we see that most of them come from imported bulls which justifies the use of import genetics for the improvement of the Romanian Black Spotted Breed.

CONCLUSIONS

Our study concerning the productive longevity of the Romanian Black Spotted Breed of the Dancu Iassy Farm reveals the following:

- The bulls used in breeding came both from other countries and from Romania (indigenous bulls) and had an amelioration value which influenced upon the cows longevity from this breed;
- The life length was of 2002.7 days and length of productive life of 1188.81 days respectively. It results that the cows were kept in the herd 5 years, 5 months and 27 days and realised 3.5 lactations which indicates a weak efficiency of the RBSB cows exploitation in the studied population;
- In the studied population the use index (UI%) in cows production had a mean value of 59.36% and the average milk production on productive life was of 23031.09 kg with limits between 2640 and 66162 kg;
- The weak utilisation in production of the studied cows through their too early culling from the herd led to undesirable economical effects in recorded losses in production and products.

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