

CONTRIBUTIONS REGARDING STUDIES ON MILK PRODUCTION AND REPRODUCTIVE CHARACTERISTICS OF THE BNR POPULATION IN DOAGA-VRANCEA FARM

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The Romanian Black spotted held in one of the best elite farms in the country, placed in Vrancea County, was studied over 15 years (approximate three generations).

The cows of active population and those out of herd were studied as concern: the descendency depending on the provenance of sires (indigenous or imported); the characteristics of milk production, for normal and total lactation and subsequent lactation; the reproduction characteristics: VPF, CI, RM, SP; the productive longevity.

The results indicate that cows descending from imported sires have a mean production of 7496.44 kg milk per normal lactation and those descending from indigenous sires produced a mean of 7367.79 kg milk, that means a genetic gain of 128 kg milk (1.74%).

The active population of the investigated holding attained 7,426 kg milk compared to the out of herd population with a mean 7,291 kg milk per normal lactation. A genetic amelioration of 135 kg milk (1.85% genetic gain) from a generation to another was observed.

The age at first calving was 835.97 days; the calving interval was 439.48 days and the dry period 80.6 days.

The mean holding period was 2.77 lactations and the milk quantity per productive life was 23328.9 kg.

Key words: BNR breed, productive and reproductive performances, longevity

INTRODUCTION

The management of dairy cows in various sized holdings has some particularities considering the breed and genetic value of animals, the technical-material conditions, the nutrition and farming of the land used for forage production, the mechanization of the technological line, the labour, the economic administration and capitalization of farms, the production turn to profit or even the tradition of each region (Ujică, V. și col., 2007, Acatincăi, Șt. 2010).

In Vrancea County a good practical experience management of dairy cows exists, that matches well with the viticulture characteristics of the region (Dascălu, C. 1999).

MATERIALS AND METHODS

The biological material was represented by the BNR breed managed in Doaga farm over 15 years (about three generations). For a

detailed study, research was conducted on the parameters of milk production and reproduction on subsequent lactation and on the total population for:

- active population;
- out of herd population.

For the two cases (active and out of herd) two sub-cases were studied:

- population descendant of indigenous sires;
- population descending from imported sires.

The following phenotype parameters were studied: genetic value of the ascendants; total and normal lactation length; milk production parameters, milk fat and protein; reproductive parameters: VPF, CI, RM, SP; productive longevity.

All the primary data were obtained by personal observation and from the official control of production and statistical analysis

was performed with a program elaborated by Prof. dr. eng. V. Ujică, Assoc. prof. dr. eng. V. Maciuc and a group of mathematicians.

RESULTS AND DISCUSSION

Value of sires ascendancy

Tab. 1 and fig. 1 show the values of ascendancy for sires used in reproduction at Doaga-Vrancea farm.

Table 1 Values of ascendancy for sires used for reproduction in Doaga-Vrancea farm

Specification	n	$X \pm s_{\bar{X}}$	s	V%	Min.	Max.	
ACTIVE POPULATION							
Mother (M):	Milk (kg)	464	7694.13±61.563	1326.11	17.24	3398	11685
	Fat (%)	464	4.18±0.01	0.34	8.29	3.3	5.13
	Fat (kg)	464	322.16±2.89	62.35	19.36	135.9	548.9
	Proteins (%)	447	3.34±0.01	0.19	5.74	2.6	3.97
Paternal Mother (MT):	Proteins (kg)	447	257.56±2.13	45.04	17.49	111.9	382.8
	Milk (kg)	407	13115.70±143.22	2889.38	22.03	8534	19497
	Fat (%)	407	3.93±0.02	0.45	11.48	3.3	5.34
	Fat (kg)	407	515±5.42	109.43	21.21	309	701
	OUT OF HERD POPULATION						
Mother (M):	Milk (kg)	149	7190.56±109.96	1342.32	18.67	3398	10874
	Fat (%)	149	4.10±0.03	0.36	8.67	3.63	5.13
	Fat (kg)	149	295.30±5.47	66.84	22.64	135.9	492.4
	Proteins (%)	130	3.38±0.02	0.21	6.44	2.2	3.85
	Proteins (kg)	130	243.64±4.20	47.89	19.66	119.9	360.4
Paternal Mother (MT):	Milk (kg)	134	11529.10±211.66	2450.14	21.25	6137	17124
	Fat (%)	134	4.22±0.04	0.56	13.42	3.3	5.34
	Fat (kg)	134	485.38±8.24	95.39	19.65	309	642

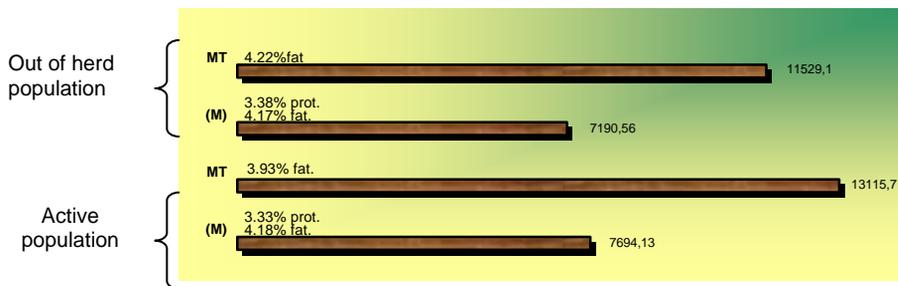


Fig.1 Values of ascendancy for sires used for reproduction in Doaga-Vrancea farm

For the active population the imported sires used for artificial insemination have high value ascendancy. Mothers (M) have a milk production of 7694.13±61.563, with a milk fat content of 4.18% and 3.34% milk protein and the paternal grandmothers (MT) 13115.70±143.22 kg milk with 3.93% fat.

For the *out of herd population* the genetic value of mothers was 7190.26±109.96 kg milk, with 4.10% fat and 3.38% protein, and paternal grandmothers 11529.10±211.66 kg milk and 4.22% fat (fig. 1).

The ascendancy of active population is higher compared to that of the out of herd generation, with 70% (503.57 kg milk) for the milk production of sire mothers and with 13.76% (1586.6 kg milk) for paternal grandmothers. It was also noticed the high fat and protein content for the ascendancy of sires used in this farm, characteristics that have been found in the genetic value of the actual cow generation managed at Doaga farm.

The high value of the ascendancy of sires is also confirmed by the amplitude of

the variability of milk quantitative production, with a maximum of 11685 kg milk for mothers and 19497 kg milk for sire grandmothers in the case of active population and 10874 kg milk and 17124 kg milk for grandmothers for out of herd population.

Mean values and variability of milk production in subsequent lactation

In tab. 2 is shown the evolution of milk production for total and normal lactation, in the first three lactation periods, for the active and out of herd population.

The length of the total lactation has similar mean values in all lactations; for the active population the mean values are lower, and tend to those for the normal lactation length. The mean value for all lactations was 368.19 and 357.03 days for out of herd and active population, respectively.

The variability of this parameter is high, with a standard deviation of 87.81 days and 71.66 days for the out of her and active population, respectively.

The length of normal lactation is 297-298 days, with approximate 7-8 days shorter than the standard lactation length and influences the milk production for the normal lactation.

The same high variability as for the total lactation was observed, with a standard deviation of 16.69 and 13.44 days for the out of herd and the active population, respectively.

Quantitative and qualitative characterization of milk. By analyzing the milk production parameters for subsequent lactation of the investigated population, productive performances of 7000-8000 kg milk were observed, and thus it's superior genetic quality.

The milk production for total lactation was 8552.7 kg milk and 8449.4 kg milk for the out of herd and active population respectively, with a very high variability.

Depending on the lactation number, the maximum individual limits were 16030 kg milk for the active population and 17262 kg milk for the out of herd population and between 11905 and 11680 kg milk for normal lactation.

A difference of 1261.2 kg in milk production in case of total lactation was observed for the out of herd population and of 1023.4 kg for the active population. The difference between the two populations was 134.5 kg for normal lactation.

Table 2 Milk production parameters for subsequent lactation for BNR cows in Doaga-Vrancea farm

Out of herd population					
Specification		Lactation			
		1 st	2 nd	3 rd and over	Total lactation
Total lactation:	- lactation period, days	378.79	358.67	362.31	368.19
	- milk, kg	8234.1	8585.1	9093.0	8552.7
	- fat, %	4.09	4.15	4.29	4.16
	- proteins, %	3.33	3.76	3.38	3.35
Normal lactation:	- lactation period, days	299.80	295.39	301.82	298.86
	- milk, kg	6708.0	7539.4	7986.6	7291.5
	- fat, %	4.06	4.19	4.29	4.14
	- proteins, %	3.30	3.33	3.37	3.32
Active population					
Specification		Lactation			
		1 st	2 nd	3 rd and over	Total lactation
Total lactation	- lactation period, days	361.91	345.74	362.00	357.03
	- milk, kg	8061.3	8385.2	9458.3	8449.4
	- fat, %	4.11	4.13	4.17	4.13
	- proteins, %	3.33	3.33	3.33	3.33
Normal lactation:	- lactation period, days	297.14	297.37	298.45	297.53
	- milk, kg	6888.5	7569.3	8447.8	7426.0
	- fat, %	4.09	4.12	4.16	4.11
	- proteins, %	3.31	3.32	3.32	3.31

The analysis of variation in the milk quantity at the first normal lactation of the active population indicates that 60.37% of cows show performances between 5843 kg and 7725 kg milk, that means production close to the genetic potential of the studied population and similar to the performances of Frize cows from other countries. In the studied nucleus 19.7% of population shows performances at first lactation of over 8000 kg milk and 2.96% with over 9000 kg milk, which sustain that cows from this farm have a high genetic value and the effect of imported sires is significant.

A similar situation is observed for the fat and protein content for total and normal lactation of the two populations. High fat and

protein content is observed, with mean values over 4% milk fat and 3.3% protein.

When compared the actual mean values of productive performances with those of two generations before, a genetic amelioration of the existing population is obvious, without attending the expression of the genetic potential of the breed. By analyzing the productive performances of the animals from indigenous sires compared to those of imported sires the positive influence of the imported sires is evident (tab. 3 and fig. 2).

The milk production of the active and out of herd population is enhanced with over 200 kg milk per normal lactation, with the most significant increase in the third and fourth lactation (tab. 4 and fig. 3).

Table 3. Milk production for cows from indigenous and imported sires

Specification	Indigenous steer population		Imported steer population		Difference indigenous-imported (±)			
	Total lactation	Normal lactation	Total lactation	Normal lactation	Total lactation		Normal lactation	
					absolut (kg)	relativ (%)	absolut (kg)	relativ (%)
1 st lactation	7474.53	6343.06	8272.01	6923.36	-797.48	90.35	-580.30	91.61
2 nd lactation	7623.87	7194.10	8653.20	7630.93	-1029.33	88.10	-436.31	94.27
3 rd lactation	10033.84	8290.13	9105.30	8238.41	+927.70	110.19	+51.72	100.62
Total lactations	8518.56	7367.79	8483.16	7496.44	+35.40	100.41	-128.65	98.28

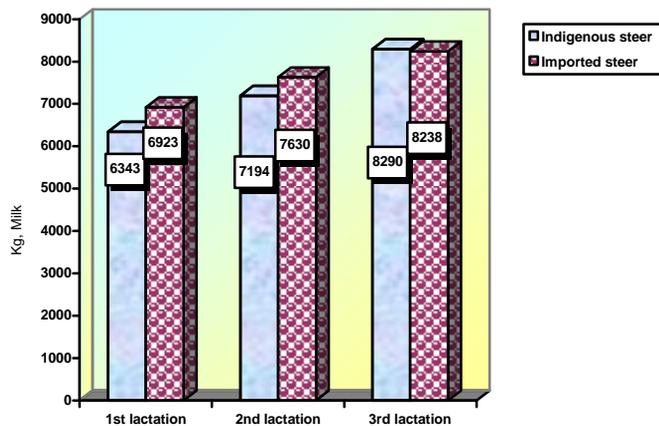


Fig. 2 Evolution of the milk production for the population from indigenous and imported sires

Table 4 Milk production of the active and out of herd population

Specification	Out of herd population		Active population		Total population	
	Total lactation	Normal lactation	Total lactation	Normal lactation	Total lactation	Normal lactation n
1 st lactation	8234,1	6708,0	8061,3	6888,5	8126,9	6820,3
2 nd lactation	8585,1	7539,4	8385,2	7560,3	8472,3	7551,4
3 rd lactation	9093,0	7986,6	9447,3	8447,8	9297,5	8246,7
Total lactations	8552,7	7291,5	8449,4	7426,0	8491,8	7371,4

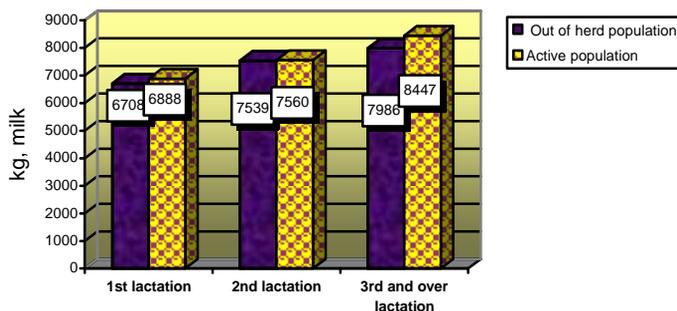


Fig. 3 Evolution of milk production for the active and out of herd population

Mean values and variability of the main reproductive parameters

The age at first calving (VPF), as fundamental indicator for estimating the reproductive precocity, has a mean value of 835.97 days (27 months and 25 days) ranging from 554 to 1453 days.

The analysis of data variation indicates that 63.34% of heifers have the VPF between 734 and 913 days, 16.46% below 24 months and 20.2% over 30 months.

The age at first calving is genetically determined by the reproductive males, but the holding technological factors and their management have a decisive influence.

The dry period (RM) as depending on lactation has different mean values that are higher than the optimum value for all lactations. For the total population the mean value is 86.6 days, ranging from 10 to 279 days.

For 56.33% of the investigated herd the optimum dry period ranged from 40 and 70 days and for 11.72% below 40 days, as shown by the range of variation. The percent of cows with dry period over 100 days is 11.93% and these are exceptions in a normal husbandry.

The calving interval (CI) for all lactations is higher than 400 days that is considered the

maximum acceptable limit for this synthetic reproductive parameter. The mean value for all lactations is 439.48 days, with amplitude of 482 days. The calving interval has a great individual variability, indicated by the maximum values of dispersion parameters.

Mean values and variability of productive longevity

The results on productive longevity for the BNR cows in Doaga farm are shown in tab. 5 and fig. 4.

The mean holding period was 2.77 lactations, in range from 1 to 7 lactations. The cows in this farm were managed for a too short period, being out of herd after a mean of 997.12 days of lactation.

The milk production per productive life ranged from 5339 and 65839 kg milk. The variability of this parameter indicates that the studied herd was heterogeneous, with maximum standard deviation ($s=11626.52$ kg) and coefficient of variation ($V\%=49.83$). The variation in data set shows that 41.4% of cows ended their productive life and 6.5% (5 cows) produced over 40000 kg milk. The most advanced cows as concern the productive longevity are presented in tab. 6.

Table 5. Productive longevity of BNR cows in Doaga farm

Specification	U.M.	n	$\bar{X} \pm s_{\bar{X}}$	s	V%	MIN	MAX
Number of lactations	nr.	167	2.77±0.11	1.45	52.62	1	7
Mean lactation period	days	167	997.12±36.74	474.89	47.62	254	2142
Milk quantity per productive life	kg	167	23328.90±899.68	11626.52	49.83	5339	65839
Fat content per productive life	kg	167	961.56±36.34	469.70	48.84	205.5	2287.7
Fat percentage per productive life	%	167	4.16±0.01	0.22	5.33	3.56	4.66
Protein content per productive life	kg	167	789.71±34.44	445.10	56.36	123.5	3691
Protein percentage per productive life	%	167	3.35±0.01	0.12	3.82	2.93	3.81

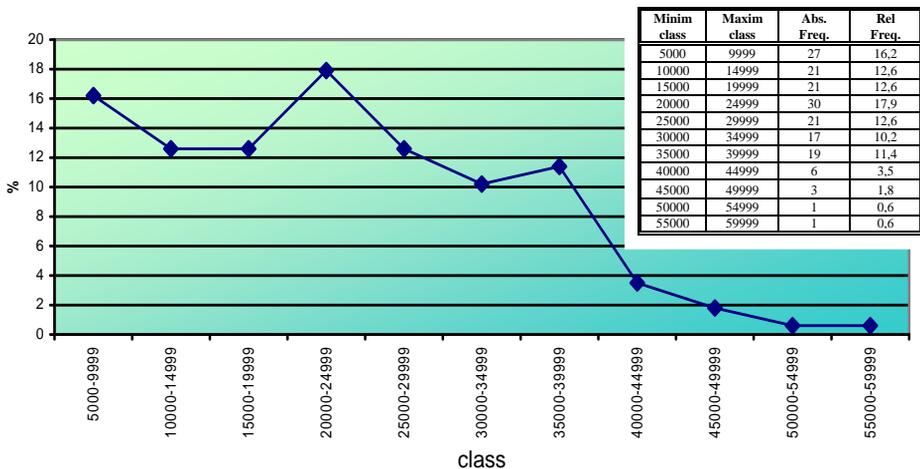


Fig. 4 Variability of productive longevity for BNR population in Doaga farm

Table 6 Cows with the best productive longevity in Doaga farm

Registration number	Father's code	Number of lactation	Total lactation days	Milk, kg	Fat, kg	Proteins, kg
000050	51023	7	2142	52958	2186.6	1780.5
000101	51030	5	2085	53914	2287.7	1770.8
000146	51031	4	1685	45473	1875.2	1518.8
000156	51031	5	1650	43053	1745.4	1438.7
000210	51025	5	1867	46753	2017.5	1652.8
010070	19801	5	1607	42424	1964.3	1474.6
010198	19201	4	1783	41017	1632.9	1057.9
970062	50892	6	1779	40396	1629.0	1321.8
970171	51026	6	1996	42367	1749.9	1388.5
980016	51026	6	2034	45067	1805.4	1469.1
980101	18070	5	1973	43064	1841.6	1455.1

Considering the length of productive life and productive performances could be observed that the investigated herd realised 23.39 kg milk per day of productive life, with 0.964 kg fat and 0.791 kg protein, values which highlight the genetic potential of BNR breed from this farm.

CONCLUSIONS

By analyzing the evolution of milk production, on subsequent lactation, a first significant aspect is the high level of productive performances of BNR cows managed in Doaga farm, based on the genetic value of imported sires but also on the nutrition

and carrying quality and the management of the holding technological factors.

Second conclusion is that the maximum lactation was recorded for the third lactation that indicates a good precocity degree, as shown by the age at first calving of 835.97 days.

The third significant conclusion is the productive longevity of cows in Doaga farm, a management deficiency materialized by the early taking out of the animals from the herd, without expressing their maximum productive capacity.

Compared to other results from literature the results obtained at Doaga farm are obvious better, even if the holding period and the total milk production per productive life do not reflect the actual genetic potential of these animals. It was observed that a great number of animals were too early taken out from the herd because of management and technological factors. 40 of 167 investigated cows (23.95%) were held for one lactation and were taken out only partly as a selective reform.

REFERENCES

- [1] Acățincăi, Șt., 2000 – Producțiile bovinelor. Ed. Mirton, Timișoara
- [2] Bagnato, A., 1993 - Lunghezza della vita productive e morfologia nella Friziona Italiana, Bianco Nero, nr.5.
- [3] Bocănci, Mioara, 2007 - Contribuții la studiul creșterii taurinelor în exploatațile private din bazinul Dornelor și Câmpulung Moldovenes. Teză de doctorat, U.S.A.M.V., Iași.
- [4] Bucătaru, N., Ujică, V., Maciuc, V., 1999 – Cercetări privind heritabilitatea unor însușiri de producție la populații de taurine Bălțată cu negru moldovenească, Lucrări științifice, Seria Zootehnie, Vol. 41, 42, Editura "Ion Ionescu de la Brad", Iași.
- [5] Csiszter L.T., 2008 – Factorii tehnologici și producția de lapte, Revista "Ferma", anul X, nr. 8 (63), august.
- [6] Dascălu, C., 1999 - Studiul tehnico-managerial privind tehnologia de creștere a vacilor pentru lapte în exploatațile mijlocii și mici din zona Vrancei .Teză de doctorat, U.S.A.M.V. Iași.
- [7] Dănăilă, Rodica, Ujică, V., Maciuc, V., 2007 – A study on the growing of Romanian dappled cows in some private exploitations from county Botoșani, International Scientific symposium "Performances and competitiveness in animal production", 26, 27 aprilie, Iași
- [8] Georgescu, Gh., Ujică, V. și col., 1990 – Tehnologia creșterii bovinelor. Editura Didactică și Pedagogică, București
- [9] Grosu, H., 2006 – Criterii utilizate pentru selecția rasei Holstein-Friză în unele țări membre Interbull, Revista de Zootehnie, nr. 5, martie, Iași
- [10] Lupan, V., Chilimar, S., Ujică, V., 1997 – Tehnologia creșterii bovinelor. Tipografia Centrală Chișinău, Republica Moldova
- [11] Maciuc, V., Ujică, V., Nistor, I., 2003 – Ghid de ameliorare genetică a bovinelor pentru producția de lapte. Editura Alfa, Iași
- [12] Mureșan, Gh. și col., 1980 – Rasa Friză bălțată cu negru pe plan mondial, Simpozion "Probleme de ameliorare, tehnologie de creștere și patologie la taurine și ovine" Inst. Agr. Cluj-Napoca, 16-17 mai 1980
- [13] Neaga, Gh., 2008 – Contribuții la studiul creșterii vacilor de lapte în unele exploatați mici și mijlocii din Dobrogea. Teză de doctorat, UȘAMV, Iași
- [14] Mureșan, Gh. și col., 1983 – Însușiri morfo-productive ale populației de rasă Bălțată cu negru de la IAS Iernut, ferma Lechința Mureș. Seminarul VIII, Ameliorarea, tehnologia și patologia rumegătoarelor, 11-12 noiembrie
- [15] Pipemea, N., Ujică, V., ș.a., 1991 - Studiul parametrilor genetici la unele populații de taurine din Moldova, Lucr. șt., U.A. Iași, vol. 33-34, seria Zootehnie și Medicină Veterinară, p. 3-9
- [16] Pîntea, M., 1998 – Contribuții la studiul populației de taurine Bălțată cu negru românească. Teză de doctorat, U.Ș.A.M.V. Iași
- [17] Stanciu, G., Acățincăi, Șt., Csiszter, L.T., 2005 – Tehnologia creșterii bovinelor. Ed. Eurostompa, Timișoara
- [18] Șonea, Al., 2003 – Fiziologia animalelor. Vol. 1, 2, 3, Editura Ceres, București
- [19] Ujică, V. și col., 1995 - Aspecte actuale ale ameliorării taurinelor din zona de est a țării, Simpozion științific național, UȘAMV. Iași, 7 – 8 decembrie
- [20] Ujică, V., Chelmu, S., Nistor, I., Marc Mioara, Șonea, C., 1998 – Evoluția și ameliorarea genetică a taurinelor de rasă Brună din România, Simpozion "Relansarea zootehniei românești, o certitudine a mileniului III", U.S.A.M.V. Iași, 10–12 decembrie
- [21] Ujică, V. și col., 2000 – Aspects of Cattle Breeding in Small and Medium Family Farms in the Hill and Mountains Zones of Moldova, Romania, Buletin FAO, Revista Technical Series 57
- [22] Ujică, V. și col., 2003 – Contribuții la studiul longevității productive a taurinelor de rasă Friză și Bălțată cu negru românească din zona de Est a țării, Sesiunea anuală de Comunicări Științifice „Probleme actuale și de perspectivă în Zootehnie”, 9, 10 mai, Iași
- [23] Ujică, V. și col., 2007 – Managementul creșterii vacilor de lapte, Editura Alfa, Iași
- [24] Velea, C., Mureșan, Gh., și col., 1980 – Caracterizarea morfo-productivă a metişilor din Friză Bălțată cu negru și Bălțată românească și a metodei de creștere în exploatarea de tip industrial. Simpozion „Probleme de ameliorare, tehnologie de creștere și patologie la taurine și ovine”, USAMV Cluj-Napoca, p. 160-165
- [25] Velea, C., Mărginean, Gh., 2004 – Producția, reproducția și ameliorarea taurinelor. Vol. III, Ed. Agrotehnică București
- [26] Vintilă, I., 1988 - Bazele ameliorării genetice a populațiilor de animale domestice. Ed. Facla, Timișoara