

## EVALUATION OF MILK PRODUCTION FOR SOME CATTLE POPULATIONS REARED IN THE NORTH-EAST AREA OF ROMANIA

S. Olaru<sup>1\*</sup>, I. Gîlcă<sup>1</sup>, V. Maciuc<sup>1</sup>, C.E. Nistor<sup>1</sup>, V. Ujică<sup>1</sup>

<sup>1</sup>University of Agricultural Sciences and Veterinary Medicine from Iasi, Romania

### Abstract

It is well known the fact that function of maintenance way, exploitation type animals could or couldn't manifest their biological potential. Thus it is important to know how will react dairy animals of different breeds (Romanian Black Pied, Brownish and Romanian Pied) at free stabulation in a private farm. To reach the proposed goal, were studied on productions of total lactation and normal lactation characters connected with milk qualitative and quantitative production: milk quantity, fat quantity, fat content, protein quantity and content in milk. Also a remarkable importance is given to the age of first calving, reason for studying it. The obtained primary data from farm were statistically processed and interpreted. Were aimed to obtain position and variation estimators (arithmetic mean  $\bar{X}$ , respectively variance  $S^2$ , standard deviation  $s$ , standard deviation of mean  $\pm s\bar{x}$  and variation coefficient  $V\%$ ). The obtained data show the following aspects. Age of first calving was 982.90 days, with variations between 545 days and 1395 days ( $V\%=15.89$ ). Milk production was 5440.89 kg at 1<sup>st</sup> lactation, 5043.52 kg in 2<sup>nd</sup> lactation and 4764.19 kg in 3<sup>rd</sup> lactation.

**Key words:** cows, productive performances, free stabulation

### INTRODUCTION

It is well know the fact that function of maintenance way, exploitation type animals could or couldn't manifest their biological potential [1], [2], [4], [5], [7], [8]. Thus it is important to know how dairy animals from different breeds (Romanian Black Pied – BNR, Brownish – B, and Romanian Pied - BR) will react at free stabulation into a private farm [3], [6].

### MATERIAL AND METHOD

The research aim was study of cow milk production in a private farm form Neamț County, in which exist animals of different breeds, making a comparison between performances function of breed, age and lactation.

Biological material consisted in 364 cows of different breeds and ages, from which 191 Romanian Black Pied cows, 154 Romanian Pied cows and 19 Brownish cows.

To reach the proposed aim were studied

productions on total and normal lactation regarding milk quantity, fat quantity, fat content, protein quantity and protein content in milk.

All the primary data collected from farm were statistically processed, the values of statistical estimators being synthesised in tables and interpreted comparatively on breeds and lactations.

### RESULTS AND DISCUSSIONS

**Age at first calving.** Appreciations for this character (and also for the rest of them) were made on total population and on those three breeds: Romanian Black Pied, Brownish, Romanian Pied cows.

In the studied unit were 119 primiparous cows, at which, in average, age at first calving was 982.90 days, with variations between 545 days and 1395 days ( $V\%=15.89$ ) (tab. 1.).

\*Corresponding author: sergiu\_usamv@yahoo.com

The manuscript was received: 19.12.2014

Accepted for publication: 26.03.2015

Table 1 Values of estimators and variability of character age at first calving at studied cow population

Breed	Estimators	Age at first calving (days)
BR	n	46
	$\bar{X} \pm s\bar{X}$	983.80±24.30
	s	164.82
	V%	16.75
	Min	545.00
	Max	1395.00
BNR	n	60
	$\bar{X} \pm s\bar{X}$	981.67±19.02
	s	147.30
	V%	15.01
	Min	635.00
	Max	1365.00
B	n	13
	$\bar{X} \pm s\bar{X}$	985.38±49.01
	s	176.71
	V%	17.93
	Min	760.00
	Max	1275.00

**Duration of lactation.** Similar to age of first calving, character *duration of total lactation* was appreciated on total population

on Romanian Black Pied, Brownish and Romanian Pied cow breeds, on three successive lactations (tab. 2).

Table 2 Values of estimators and variability of character duration of lactation at studied cow population

Lactation	Estimators	Duration (days)	
		Total lactation	Normal lactation
1 <sup>st</sup> lactation	n	119	119
	$\bar{X} \pm s\bar{X}$	367,61±9,96	305,00±0,00
	s	108.63	0.00
	V%	29.55	0.00
	Min	194.00	305.00
	Max	891.00	305.00
2 <sup>nd</sup> lactation	n	95	95
	$\bar{X} \pm s\bar{X}$	339,26±7,14	305,00±0,00
	s	69.57	0.00
	V%	20.50	0.00
	Min	191.00	305.00
	Max	611.00	305.00
3 <sup>rd</sup> lactation III-a	n	63	63
	$\bar{X} \pm s\bar{X}$	331,37±7,16	305,00±0,00
	s	56.81	0.00
	V%	17.15	0.00
	Min	223.00	305.00
	Max	491.00	305.00

Those 119 primiparous cows had, in average, a lactation duration of 367.61 days, with variations between 194 days and 891 days.

At 2<sup>nd</sup> lactation were 95 cows which had a lactation duration of 339.26 days, with an inferior limit of 191 days and the superior one of 611 days.

Variation series realised on lactation duration for those 63 cows in 3<sup>rd</sup> lactation show that variations limits are between 223 days and 491 days, with a mean of 331.37 days.

Comparing the mean values on three successive lactations can be observed that those ones are in decreasing from the first to the third.

The character represented by duration of lactation aimed for each breed, presented similar variations to the ones for entire population, both for Romanian Pied and also for Romania Black Pied cows. Population of Brownish cows is an exception regarding ranking of lactation duration (tab. 3).

Table 3 Values of estimators and variability of character duration of lactation function of breed at studied population

Breed	Estimators	1 <sup>st</sup> lactation		2 <sup>nd</sup> lactation		3 <sup>rd</sup> lactation	
		Duration (days)		Duration (days)		Duration (days)	
		Total lactation	Normal lactation	Total lactation	Normal lactation	Total lactation	Normal lactation
B	n	13	13	10	10	8	8
	$\bar{X} \pm s\bar{X}$	319.38±22.00	305.00±0	323.30±18.02	305.00±0	312.63±18.88	305.00±0
	s	79.33	0	56.98	0	53.39	0
	V%	24.84	0	17.62	0	17.08	0
	Min	217.00	305.00	217.00	305.00	260.00	305.00
	Max	510.00	305.00	448.00	305.00	438.00	305.00
BNR	n	60	60	51	51	28	28
	$\bar{X} \pm s\bar{X}$	384.37±16.58	305.00±0	342.14±10.62	305.00±0	338.43±12.77	305.00±0
	s	128.41	0	75.83	0	67.60	0
	V%	33.41	0	22.16	0	19.97	0
	Min	58.00	305.00	204.00	305.00	223.00	305.00
	Max	891.00	305.00	611.00	305.00	491.00	305.00
BR	n	46	46	34	34	27	27
	$\bar{X} \pm s\bar{X}$	348.50(12.81)	305.00±0	339.65±10.98	305.00±0	329.59(8.65)	305.00±0
	s	86.90	0	64.00	0	44.94	0
	V%	24.93	0	18.84	0	13.63	0
	Min	194.00	305.00	191.00	305.00	273.00	305.00
	Max	611.00	305.00	510.00	305.00	461.00	305.00

So those 13 Brownish cows at first lactation had a mean lactation of 319.38 days, with variations between 217 days and 510 days, with a variation coefficient of 24.84%.

For the same character 323.30 days is the mean value calculated for those 10 Brownish cows in 2<sup>nd</sup> lactation. The shortest lactation lasts 217 days, and the longest one 448 days.

At 3<sup>rd</sup> lactation were 8 Brownish cows with a lactation duration of 312.63 days, with inferior limit of 260 days and superior of 438 days (V%=17.08).

At primiparous from Romanian Black Pied breed, in mean, duration of lactation was 384.37 days, with variations between 58 and 891 days (V%=33.41). Also primiparous but from Romanian Pied breed are other 46 cows at which mean lactation duration was 348.50 days, with variations between 194 and 611 days (V%=24.93).

At 2<sup>nd</sup> lactation were 51 cows from Romanian Black Pied breed and 34 from Romanian Pied, had a mean duration of 342.14 days, with an inferior limit of 204 days, and the superior one was 611 days, respectively 339.65 days, with an inferior limit of 191 days and the superior one of 510 days.

Variation series is designed for duration of lactation for those 28 Romanian Black

Pied breed cows in 3<sup>rd</sup> lactation show that the extremes are 223 days and 491 days, with a mean of 338.43 days, variation coefficient being 19.97%, and for those 27 Romanian Pied breed cows, the mean was 329.59 days, with variations between 273 and 461 days.

Comparing the mean values for the duration of those three lactations on both breeds (BNR and BR), the highest value is recorded at 3<sup>rd</sup> lactation, followed by the 2<sup>nd</sup> lactation and by 1<sup>st</sup> lactation.

**Milk quantity.** Character was appreciated during three successive on total cattle population and on each breed, being presented the values for total lactation and also for normal one (tab. 4 and 5).

In studied unit, cows at first lactation had, in mean, a milk quantity of 5440.89 kg, with variations between 1964.75 kg and 12949 kg.

At 2<sup>nd</sup> lactation were 95 cows, which had a mean milk quantity of 5043.52 kg, with an inferior limit of 1341 kg, and the superior one of 11419 kg, being able to calculate a variation coefficient of 34.85%.

Variation series designed for duration lactation for those 63 cows in 3<sup>rd</sup> lactation show that the extremes are 2320 kg and 8433 kg, with a mean of 4764.19 kg.

Character milk quantity tracked for each breed presented similar variations with the ones for entire population.

Table 4 Values of estimators and variability of character milk quantity at studied cow population

Lactation	Estimators	Milk quantity (kg), on	
		Total lactation	Normal lactation
1 <sup>st</sup> lactation	n	119	119
	$\bar{X} \pm s\bar{X}$	5440.89±193.02	4604.65±110.70
	s	2105.58	1207.57
	V%	38.70	26.23
	Min	1964.75	2215.00
	Max	12949.00	7765.00
2 <sup>nd</sup> lactation	n	95	95
	$\bar{X} \pm s\bar{X}$	5043.52±180.34	4604.51±126.77
	s	1757.72	1235.64
	V%	34.85	26.84
	Min	1341.00	1321.00
	Max	11419.00	8000.00
3 <sup>rd</sup> lactation	n	63	63
	$\bar{X} \pm s\bar{X}$	4764.19±180.65	4459.46±144.57
	s	1433.83	1147.51
	V%	30.10	25.73
	Min	2320.00	2320.00
	Max	8433.00	7257.00

So, primiparous of Brownish breed had at first lactation a mean milk quantity of 4511.62 kg, with variations between 2386 and 7223 kg.

For the same character 4378.20 kg of milk is the mean value calculated for 10 Brownish cows in 2<sup>nd</sup> lactation. The lowest milk quantity was of 2601 kg, and the highest one was 6608 kg.

At 3<sup>rd</sup> lactation were 8 Brownish cows which had a mean milk quantity of 4311.5

kg, with an inferior limit of 3036 kg and a superior one of 7418 kg (V%=33.94).

For those 60 primiparous cows belonging to Romanian Black Pied breed, in average, milk quantity was 6079.05 kg, with variations between 2315 kg and 12949 kg. Also primiparous, but from Romanian Pied, were other 46 cows, at which mean milk quantity was 4883.85 kg, with variations between 2418 kg and 10149 kg (V%=29.57).

Table 5 Values of estimators and variability of character milk quantity at studied cow population

Breed	Estimators	1 <sup>st</sup> lactation		2 <sup>nd</sup> lactation		3 <sup>rd</sup> lactation	
		Milk quantity (kg)		Milk quantity (kg)		Milk quantity (kg)	
		Total lactation	Normal lactation	Total lactation	Normal lactation	Total lactation	Normal lactation
B	n	13	13	10	10	8	8
	$\bar{X} \pm s\bar{X}$	4511.62±480.47	4159.31±427.48	4378.20±434.01	4167.30±355.40	4311.50±517.42	4201.88±486.15
	s	1732.37	1541.28	1372.47	1123.88	1463.48	1375.05
	V%	38.40	37.06	31.35	26.97	33.94	32.72
	Min	2386.00	2386.00	2601.00	2601.00	3036.00	3036.00
	Max	7223.00	7170.00	6608.00	5775.00	7418.00	7257.00
BNR	n	60	60	51	51	28	28
	$\bar{X} \pm s\bar{X}$	6079.05±309.75	4931.48±158.05	5138.27±270.09	4580.43±176.90	5235.00±326.70	4774.36±244.66
	s	2399.30	1224.26	1928.81	1263.32	1728.71	1294.61
	V%	39.47	24.83	37.54	27.58	33.02	27.12
	Min	2315.00	2315.00	1341.00	1321.00	2754.00	2754.00
	Max	12949.00	7765.00	11419.00	8000.00	8433.00	6928.00
BR	n	46	46	34	34	27	27
	$\bar{X} \pm s\bar{X}$	4883.85±212.91	4293.72±141.71	5097.06±271.11	4775.24±216.40	4410.07±171.10	4209.22±160.82
	s	1444.01	961.13	1580.84	1243.10	889.06	835.62
	V%	29.57	22.38	31.01	26.03	20.16	19.85
	Min	2418.00	2215.00	2526.00	2171.00	2320.00	2320.00
	Max	10149.00	6410.00	9331.00	7924.00	6282.00	5882.00

At 2<sup>nd</sup> lactation were 51 Romanian Black Pied breed cows and 34 Romanian Pied breed cows, which had a mean milk quantity of 5138.27 kg, with an inferior limit of 1341 kg,

and the superior one of 11419 kg, respectively 5097.06 kg, with an inferior limit of 2526 kg, and a superior limit of 9331 kg.

Variation series designed for milk quantity obtained from 28 Romanian Black Pied cows in 3<sup>rd</sup> lactation show that extremes are of 2754 kg and 8433 kg, with a mean of 5235 kg, variation coefficient being 33.02%, and for those 27 Romanian Pied breed cows, average was 4410.07 kg, with variations between 2320 kg and 6282 kg.

**Fat quantity and content in milk.** At studied cow population, both on total lactation and also on normal lactation, *fat quantity* in milk present a very high variability during lactations. *Fat content in milk*, had values of variation coefficient under 10%, which show that for this character population is more homogenous (tab. 6).

Table 6 Values of estimators and variability of characters fat quantity and content in milk at the studied cow population

Lactation	Estimators	G (kg)		G (%)	
		Total lactation	Normal lactation	Total lactation	Normal lactation
1 <sup>st</sup> lactation	n	119	119	119	119
	$\bar{X} \pm s\bar{X}$	210.80±7.85	177.48±4.48	3.86±0.02	3.85±0.02
	s	85.65	48.91	0.25	0.27
	V%	40.63	27.56	6.53	7.04
	Min	66.03	85.70	3.26	3.11
	Max	522.40	317.20	4.64	4.64
2 <sup>nd</sup> lactation	n	95	95	95	95
	$\bar{X} \pm s\bar{X}$	198.22±7.38	180.61±5.19	3.92±0.02	3.92±0.02
	s	71.89	50.61	0.23	0.24
	V%	36.27	28.02	5.88	6.12
	Min	57.90	57.10	3.45	3.45
	Max	485.20	339.50	4.42	4.49
3 <sup>rd</sup> lactation	n	63	63	63	63
	$\bar{X} \pm s\bar{X}$	190.28±7.53	178.34±6.11	3.98±0.03	3.99±0.03
	s	59.79	48.50	0.22	0.23
	V%	31.42	27.20	5.60	5.88
	Min	85.00	85.00	3.52	3.52
	Max	357.90	298.60	4.51	4.51

Cows from Brownish breed had an atypical dynamics for fat quantity and content in milk, presented higher mean values at first lactation followed by 3<sup>rd</sup> lactation and finally the lowest mean value was recorded at 2<sup>nd</sup> lactation (tab. 7).

Variation series designed for character fat content in milk show that recorded values are correlated with the ones from fat quantity, being lowest at highest milk quantities and highest at lowest milk quantities.

Table 7 Values of estimators and variability of characters fat quantity and content in milk at studied population of Brownish breed cows

Lactation	Estimators	G (kg)		G (%)	
		Total lactation	Normal lactation	Total lactation	Normal lactation
1 <sup>st</sup> lactation	n	13	13	13	13
	$\bar{X} \pm s\bar{X}$	173.52±19.08	160.52±17.50	3.83±0.07	3.84±0.07
	s	68.78	63.09	0.26	0.27
	V%	39.64	39.30	6.74	6.96
	Min	85.70	85.70	3.36	3.36
	Max	290.80	290.80	4.25	4.25
2 <sup>nd</sup> lactation	n	10	10	10	10
	$\bar{X} \pm s\bar{X}$	164.27±16.55	155.94±13.201	3.75±0.039	3.75±0.038
	s	52.32	41.744	0.124	0.121
	V%	31.85	26.77	3.31	3.23
	Min	101.70	101.70	3.55	3.54
	Max	257.00	216.60	3.91	3.91
3 <sup>rd</sup> lactation	n	8	8	8	8
	$\bar{X} \pm s\bar{X}$	169.71±22.00	165.40±20.61	3.92±0.08	3.92±0.08
	s	62.23	58.29	0.21	0.22
	V%	36.67	35.24	5.45	5.52
	Min	106.90	106.90	3.52	3.52
	Max	303.30	296.40	4.14	4.14

Situation is similar also for Romanian Black Pied breed cows which had an atypical dynamics for fat quantity and content in milk, presenting mean values higher at first

lactation followed by 3<sup>rd</sup> lactation and finally the lowest mean value was recorded at 2<sup>nd</sup> lactation (tab. 8).

Table 8 Values of estimators and variability of characters fat quantity and content in milk at studied population of Romanian Black Pied breed cows

Lactation	Estimators	G (kg)		G (%)	
		Total lactation	Normal lactation	Total lactation	Normal lactation
1 <sup>st</sup> lactation	n	60	60	60	60
	$\bar{X} \pm s\bar{X}$	235.98±12.58	190.09±6.46	3.87±0.03	3.85±0.04
	s	97.45	50.05	0.26	0.28
	V%	41.30	26.33	6.73	7.38
	Min	89.10	89.10	3.26	3.11
	Max	522.40	317.20	4.64	4.64
2 <sup>nd</sup> lactation	n	51	51	51	51
	$\bar{X} \pm s\bar{X}$	204.46±11.077	182.00±7.292	3.98±0.032	3.97±0.033
	s	79.103	52.077	0.226	0.238
	V%	38.69	28.61	5.69	5.98
	Min	57.90	57.10	3.57	3.54
	Max	485.20	339.50	4.42	4.49
3 <sup>rd</sup> lactation	n	28	28	28	28
	$\bar{X} \pm s\bar{X}$	209.38±13.48	191.22±10.22	3.99±0.04	4.00±0.04
	s	71.33	54.09	0.20	0.22
	V%	34.07	28.29	5.10	5.56
	Min	108.70	108.70	3.60	3.60
	Max	357.90	298.60	4.48	4.48

Character fat quantity in milk studied on a population of cows belonging to Romanian Pied breed had the highest mean value at 2<sup>nd</sup> lactation and the lowest one at 3<sup>rd</sup> lactation (tab. 9).

Like at the other breeds, at Romanian Pied the values of variation coefficients are

more over the level of 20%, population being non-homogenous for this character.

Fat content in milk follows the same curve like fat quantity in milk, recording the lowest values at highest milk quantities and the highest values at the lowest milk quantities.

Table 9 Values of estimators and variability of characters fat quantity and content in milk at studied population of Romanian Pied breed cows

Lactation	Estimators	G (kg)		G (%)	
		Total lactation	Normal lactation	Total lactation	Normal lactation
1 <sup>st</sup> lactation	n	46	46	46	46
	$\bar{X} \pm s\bar{X}$	188.93±8.93	165.84±5.70	3.89±0.04	3.87±0.04
	s	60.59	38.67	0.24	0.25
	V%	32.07	23.32	6.31	6.34
	Min	85.90	85.90	3.37	3.37
	Max	432.40	273.10	4.30	4.30
2 <sup>nd</sup> lactation	n	34	34	34	34
	$\bar{X} \pm s\bar{X}$	198.86±10.96	185.84±8.83	3.86±0.04	3.89±0.04
	s	63.91	50.75	0.24	0.25
	V%	32.14	27.31	6.04	6.35
	Min	93.40	79.10	3.45	3.45
	Max	365.10	310.00	4.41	4.44
3 <sup>rd</sup> lactation	n	27	27	27	27
	$\bar{X} \pm s\bar{X}$	176.57±7.40	168.82±7.02	3.99±0.05	4.00±0.05
	s	38.46	36.49	0.25	0.26
	V%	21.78	21.62	6.21	6.40
	Min	85.00	85.00	3.59	3.59
	Max	233.40	233.40	4.51	4.51

**Protein quantity and content in milk.** On cow population from unit were studied the characters protein quantity and content in milk. Similar as milk quantity, mean values

are in decreasing from first lactation till the 3<sup>rd</sup> lactation, for protein quantity and in increasing from first lactation to the last one for protein content (tab. 10).

Table 10 Values of estimators and variability of characters protein quantity and content in milk at studied cow population

Lactation	Estimators	P (kg)		P (%)	
		Total lactation	Normal lactation	Total lactation	Normal lactation
1 <sup>st</sup> lactation	n	119	119	119	119
	$\bar{X} \pm s\bar{X}$	180.53±6.46	151.00±3.63	3.32(0.02)	3.29(0.02)
	s	70.48	39.57	0.27	0.25
	V%	39.04	26.21	8.02	7.46
	Min	60.95	65.20	2.89	2.80
	Max	429.50	248.70	4.67	4.61
2 <sup>nd</sup> lactation	n	95	95	95	95
	$\bar{X} \pm s\bar{X}$	172.03±6.08	157.17±4.23	3.42±0.02	3.42±0.02
	s	59.29	41.23	0.21	0.20
	V%	34.46	26.23	6.00	5.89
	Min	50.00	49.30	2.86	3.09
	Max	395.10	274.10	4.13	4.13
3 <sup>rd</sup> lactation	n	63	63	63	63
	$\bar{X} \pm s\bar{X}$	165.63±6.05	154.83±4.76	3.49±0.03	3.49±0.03
	s	48.03	37.77	0.22	0.22
	V%	29.00	24.40	6.36	6.42
	Min	81.50	81.50	3.16	3.16
	Max	299.30	239.70	4.13	4.13

Cows belonging to Brownish breed had an atypical dynamics for protein quantity and content, presenting higher mean values at 3<sup>rd</sup>

lactation, followed by first lactation and finally the lowest mean value to be recorded at 2<sup>nd</sup> lactation (tab. 11).

Table 11 Values of estimators and variability of characters protein quantity and content in milk at studied population of Brownish breed cows

Lactation	Estimators	P (kg)		P (%)	
		Total lactation	Normal lactation	Total lactation	Normal lactation
1 <sup>st</sup> lactation	n	13	13	13	13
	$\bar{X} \pm s\bar{X}$	148.25±16.46	137.12±15.17	3.27±0.04	3.28±0.04
	s	59.34	54.69	0.15	0.16
	V%	40.03	39.88	4.53	4.93
	Min	79.10	79.10	3.07	3.07
	Max	244.50	244.50	3.55	3.55
2 <sup>nd</sup> lactation	n	10	10	10	10
	$\bar{X} \pm s\bar{X}$	147.40±13.92	140.52±11.16	3.39±0.07	3.39±0.08
	s	44.02	35.30	0.23	0.24
	V%	29.86	25.12	6.83	6.99
	Min	91.80	91.80	3.09	3.09
	Max	230.90	195.10	3.74	3.74
3 <sup>rd</sup> lactation	n	8	8	8	8
	$\bar{X} \pm s\bar{X}$	151.14(15.95)	147.14(14.75)	3.54(0.10)	3.54(0.10)
	s	45.12	41.73	0.27	0.27
	V%	29.85	28.36	7.68	7.70
	Min	99.50	99.50	3.28	3.28
	Max	245.10	239.70	4.01	4.01

Protein quantity in milk was recorded with highest values for variation coefficients at all lactations (over 30%), which show a non-homogenous population for this character.

Situation is similar for Romanian Black Pied breed cows, which had an atypical dynamics also for protein quantity and content in milk, presenting highest mean values at first

lactation, followed by 3<sup>rd</sup> lactation and finally 1<sup>st</sup> lactation (tab. 12).  
the lowest mean value was obtained at 2<sup>nd</sup>

Table 12 Values of estimators and variability of characters protein quantity and content in milk at studied population of Romanian Black Pied breed cows

Lactation	Estimators	P (kg)		P (%)	
		Total lactation	Normal lactation	Total lactation	Normal lactation
1 <sup>st</sup> lactation	n	60	60	60	60
	$\bar{X} \pm s\bar{X}$	204.55±10.07	163.50±4.99	3.40±0.04	3.34±0.04
	s	78.03	38.66	0.33	0.30
	V%	38.15	23.64	9.65	8.89
	Min	75.80	75.80	2.95	2.92
	Max	429.50	248.70	4.67	4.61
2 <sup>nd</sup> lactation	n	51	51	51	51
	$\bar{X} \pm s\bar{X}$	177.11±9.09	157.45±5.89	3.46±0.03	3.45±0.03
	s	64.89	42.05	0.21	0.21
	V%	36.64	26.71	5.94	6.17
	Min	50.00	49.30	3.12	3.09
	Max	395.10	274.10	4.13	4.13
3 <sup>rd</sup> lactation	n	28	28	28	28
	$\bar{X} \pm s\bar{X}$	183.43±10.83	167.10±7.99	3.53±0.05	3.52±0.05
	s	57.29	42.26	0.25	0.25
	V%	31.23	25.29	7.01	7.18
	Min	93.80	93.80	3.16	3.20
	Max	299.30	238.20	4.13	4.13

Character protein quantity in studied milk 1<sup>st</sup> lactation and the lowest value at 3<sup>rd</sup> lactation  
at a population of Romanian Pied cow (tab. 13).  
population had the highest mean value at 2<sup>nd</sup>

Table 13 Values of estimators and variability of characters protein quantity and content in milk at studied population of Romania Pied breed cows

Lactation	Estimators	P (kg)		P (%)	
		Total lactation	Normal lactation	Total lactation	Normal lactation
1 <sup>st</sup> lactation	n	46	46	46	46
	$\bar{X} \pm s\bar{X}$	158.72±7.31	138.61±4.49	3.24±0.02	3.23±0.02
	s	49.57	30.47	0.16	0.16
	V%	31.23	21.98	4.87	4.88
	Min	75.60	65.20	2.89	2.89
	Max	328.80	207.90	3.60	3.68
2 <sup>nd</sup> lactation	n	34	33	34	33
	$\bar{X} \pm s\bar{X}$	171.64±9.20	161.60±7.33	3.37±0.03	3.39±0.03
	s	53.66	42.11	0.19	0.17
	V%	31.26	26.06	5.60	5.03
	Min	81.80	69.00	2.86	3.09
	Max	319.00	263.50	3.72	3.72
3 <sup>rd</sup> lactation	n	27	27	27	27
	$\bar{X} \pm s\bar{X}$	151.47±5.87	144.39±5.39	3.44±0.03	3.44±0.03
	s	30.51	28.03	0.17	0.17
	V%	20.14	19.41	4.91	4.87
	Min	81.50	81.50	3.16	3.16
	Max	203.60	200.80	3.82	3.82

Similar to the other breeds, at Romanian Pied values of variation coefficients are much more over the level of 20%, population being non-homogenous for this character.

Protein content in milk didn't follow the same curve as protein quantity in milk,

recording the lowest values at highest milk quantities and the highest values at lowest milk quantities, but it is in an increase from the first lactation till the last one.



## CONCLUSIONS

From the current study regarding productivity and reproduction indexes of the studied cow population, exploited in free stabulation resulted the following conclusions:

- Total population numbered 364 adult cows, with the following breed structure: 191 Romanian Black Pied breed cows, 154 Romanian Pied breed cows and 19 Brownish breed cows.
- Age at first calving, for the entire population, was in average of 982.9 days, with variations between 545 days and 1395 days.
- Milk production was 5440.89 kg on entire population at first lactation, 5043.52 kg in 2<sup>nd</sup> lactation and 4764.19 kg in 3<sup>rd</sup> lactation.
- Function of breed, the best performances were realised by Romanian Black Pied breed cows, and the lowest ones were the performances realised by Brownish nucleus.

- Qualitatively, milk production is in standard of each breed, differences being insignificant.

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