

THE EFFECT OF SOME FACTORS ON THE MILK MAIN COMPONENTS

INDICI AI PRODUCTIEI CANTITATIVE SI CALITATIVE DE LAPTE IN FAZA MAXIMA A CURBEI DE LACTATIE

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The paper emphasizes the results of the research performed on 317 Romanian Spotted cows from six private exploitations located in the central part of the country. The main qualitative and quantitative traits of the milk production, season and familial structures (half sisters by father) effect were recorded in dynamics by four lactations on the above mentioned population. The research concerning the evolution of some traits of the quantitative and qualitative milk production in dynamics by lactation reveals many aspects, which in all cases equally reflects both the genetic potential of the biological material that can be expressed and putting into practice of the rearing and exploitation technologies. Concerning the quantitative milk production, by normal and total lactation an almost plane curve is described (Table 1, Figure 1). This aspect was also reported for the collecting areas and farms (Tables 2 and 3). Concerning the season effect, it is observed function of the adopted technology of exploitation, that for effectives is significantly observed only in summer (Table 4). In last part of the paper, the main traits of the milk production in 16 familial structures of primiparous half sisters by father, classified function of the quantity of fat and protein yield by normal lactation are emphasized (Table 5). The obtained results are concluding.

Key words: milk, lactation, Romanian Spotted, genetic potential

Introduction

The main physical–chemical and bacteriological traits of the milk represent the traits which define its feeding value, but in the mean time, they are under poly-factorial influence. In this context, our intention is to approach the scientific basis of this problem in order to establish the effect of some influence factors on phenotypic traits milk production in cattle and we present them by functional groups.

Materials and Methods

The research aimed 317 Romanian Spotted cows from six private farms located in central part of our country. On the above mentioned population, the main quantitative and qualitative traits of the dairy production were recorded in dynamics by 4 lactations and within them by control time interval (28 days each). The results were statistically processed and presented in tables and graphics. In this context, the results were structured by three groups of factors, and in this paper we present the effect of the lactation, season and familial structures (paternal half sisters).

Results and Discussions

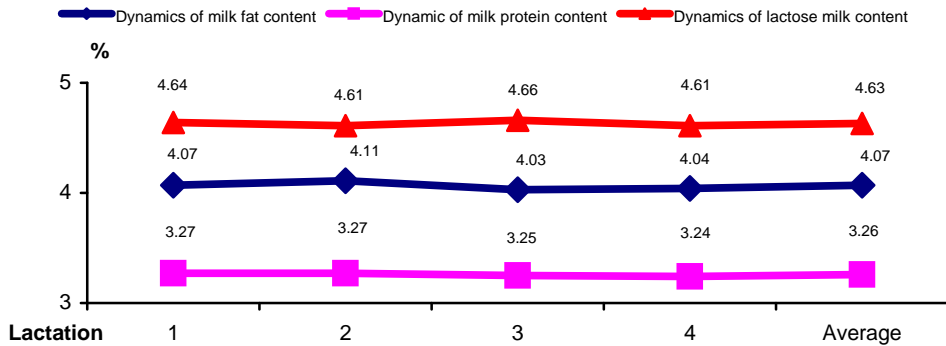
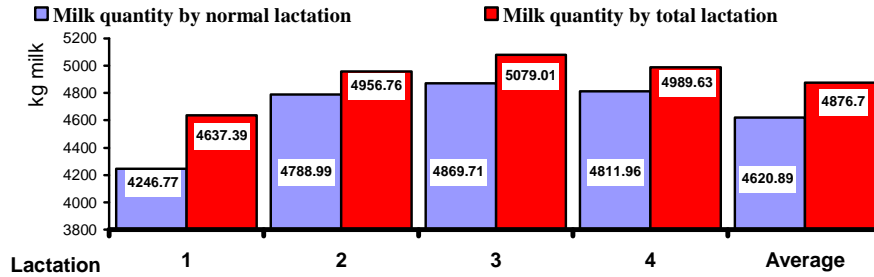
The research concerning the evolution of some quantitative and qualitative traits of the dairy production in dynamics by lactations reveal several aspects which in all cases equally reflect on one had the expressed genetic potential of the biological material and on the other hand the adopted rearing and exploitation technology. Among the reproduction indices, we mention the age at the first calving, which even we consider acceptable is with 12.8% higher compared to the optimal age, length of calving interval, respectively, which corresponds to an average natality index of more than 94%. Concerning the quantitative milk production, for both normal and total lactation, it describes an almost plate curve (Figure 1). This aspect is clearer if we consider several interrelations in dynamics, by lactation, as follows:

Issue	MU	Lact.I	Lact.II	Lact.III	Lact.IV	Tot.lact.
a. Production compared to maximum lactation						
By total lactation	%	91.30	97.65	100	98.24	
b. Difference of some traits between normal and total lactation						
- Duration of lactation	%	12.29	5.96	5.14	5.37	7.92
- Milk yield	%	9.20	3.50	4.30	3.69	5.54
2. Average daily milk production						
-by total lactation	kg	14.11	16.45	16.65	16.08	15.58
-by normal lactation	kg	14.51	16.84	16.78	16.34	15.94
-by dif. d.l.t. d.l.n.	kg	10.85	11.18	13.95	11.12	11.12

The main quantitative and qualitative traits of the dairy production in dynamics by lactations

Trait	U/M	LACTATION				AVERAGE/TOTAL
		1	2	3	4	
n	head	317	265	197	131	910
BY TOTAL LACTATION (V.P.F. 934.18±8.57 days)						
DIM	days	328.63±2.18	301.26±3.02	305.07±3.19	310.23±3.76	312.91±2.25
Days dry	days	71.60±5.11	78.97±6.22	76.83±4.48	-	75.43±5.06
Calving interval	days	-	396.25±4.03	380.97±4.11	382.43±9.37	388.12±7.58
Milk quantity	kg	4637.39±93.17	4956.76±81.12	5079.01±117.14	4989.63±128.62	4876.70±42.85
Fat quantity	kg	188.75±2.60	203.57±2.82	204.93±4.23	201.50±4.18	198.40±2.72
Fat content	%	4.07±0.01	4.11±0.01	4.03±0.01	4.04±0.02	4.07±0.01
Protein quantity	kg	151.44±2.11	162.02±2.57	165.03±3.61	161.88±3.38	158.97±2.11

Protein content	%	3.27±0.01	3.27±0.01	3.25±0.01	3.24±0.01	3.26±0.01
Lactose quantity	kg	215.02±2.96	228.53±3.32	236.95±4.22	230.04±5.63	225.86±1.97
Lactose content	%	4.64±0.01	4.61±0.01	4.66±0.01	4.61±0.02	4.63±0.01
B NORMAL LACTATION						
DIM	days	292.67±1.28	284.31±1.91	290.16±2.23	294.41±2.05	289.94±0.92
Milk quantity	kg	4246.77±46.50	4788.99±69.15	4869.71±110.14	4811.96±120.15	4620.89±38.89
Fat quantity	kg	171.80±2.03	194.94±2.83	195.39±3.97	193.76±4.65	186.81±3.05
Fat content	%	4.06±0.01	4.07±0.01	4.01±0.01	4.03±0.02	4.04±0.01
Protein quantity	kg	137.91±1.58	155.89±2.13	158.02±3.17	155.75±3.86	150.07±1.42
Protein content	%	3.25±0.01	3.26±0.01	3.24±0.01	3.24±0.02	3.25±0.01
Lactose quantity	kg	196.69±2.32	220.18±3.18	226.46±5.17	220.57±5.89	213.41±3.02
Lactose content	%	4.63±0.01	4.60±0.01	4.65±0.02	4.58±0.02	4.62±0.02



We notice that the same aspects were recorded in structure of the farms by provenience area (Table 2) of each farm (Table 3). Between them, significant differences concerning the qualitative and quantitative traits of the dairy production were recorded, but their character and evolution are almost identical.

The seasonal effects on the main traits of the milk production are very numerous and reveal that this factor has an inverse proportional impact with the improvement level of the biological material and degree of intensifying of the exploitation technology. This aspect is also revealed by our research (Table 3). Thus, the seasonal effect is manifest under the aspect of reproduction activities, especially, production performances in summer, with significant differences compared to the other seasons. Generally, the weaker production performances during summer were especially determined by the feeding level and technology.

Table 4

The seasonal effect on some dairy production indices in primiparous (by normal lactation)

Issue	MU	Winter	Spring	Summer	Autumn
n	heads	84	107	65	61
	%	26.50	33.75	20.50	19.25
Milk	Kg	4882.27±56.18	4632.39±73.28	4232.73±115.63	4673.42±111.44
Fat	%	4.02±0.01	3.99±0.01	3.96±0.02	3.98±0.02
	Kg	196.27±2.31	184.83±3.11	167.62±3.98	186.00±2.37
Protein	%	3.35±0.01	3.34±0.01	3.31±0.02	3.32±0.02
	Kg	163.56±3.98	154.72±2.54	140.10±2.38	155.16±3.25
Lactose	%	4.66±0.01	4.65±0.01	4.64±0.01	4.65±0.01
	Kg	227.51±2.35	215.41±3.23	196.40±3.19	217.31±3.28
Reproduction indices					
Days dry	days	75.73±0.62	75.31±1.02	76.28±	75.75±1.37
Calving interval	days	423.06±1.51	425.72±1.41	427.32±	425.09±1.78
Days open	days	137.55±1.53	140.25±1.33	142.52±	139.43±1.81
Nativity	%	86.28	85.57	85.42	85.88

The identification of the effect of the familial structures of paternal half sisters was performed on a total population of 496 primiparous, offspring of 16 bulls (Table 5). The results emphasized the significant differences of the main quantitative and qualitative traits of the dairy production. Among these we mention as maximal values the age at the first calving (27.22%), milk production by normal lactation (59.12%) and cumulated quantity of fat and protein (61.09%), trait function of which we performed the hierarchy of the familial structures of paternal half sisters. These results are in a great measure determined by the farms, and applied rearing and exploitation technologies. The effect of this factor is very significant and conclusive.

Conclusions

In the context of the above mentioned results of our research, the conclusions were revealed during the presentation, but we underline the expressed genetic potential of production and adopted technology of exploitation, mentioning that such studies are necessary in any rearing farm, which take into consideration the modality of using the biological material by production destinations.

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Table 2

Average values of milk production by area and lactation

Trait	U/M	LACTATION				AVERAGE/ TOTAL
		1	2	3	4	
n	heads	106	101	79	47	333
Area 1 (CLUJ County)						
DIM	days	336.34±4.82	296.46±3.92	300.46±3.81	309.71±4.74	312.98±4.87
Days open	days	63.57±3.11	71.32±3.98	71.86±3.42	-	68.60±3.75
Calving interval	days	-	389.54±11.31	370.82±10.12	372.73±9.10	379.54±10.15
Milk quantity	kg	5371.92±118.26	5779.11±97.48	5792.94±147.17	5742.56±211.23	5647.62±179.16
Fat quantity	kg	212.57±4.27	231.85±3.79	230.8±6.76	225.37±8.96	225.25±10.12
Fat content	%	3.96±0.02	4.01±0.02	3.98±0.02	3.92±0.03	3.99±0.03
Protein quantity	kg	173.70±3.93	187.90±3.61	184.64±4.98	180.35±9.17	181.54±8.36
Protein content	%	3.23±0.002	3.25±0.02	3.19±0.02	3.14±0.03	3.21±0.02
Lactose quantity	kg	247.79±4.78	268.11±5.01	270.11±6.11	264.77±12.14	261.64±8.27
Lactose content	%	4.61±0.02	4.64±0.02	4.66±0.02	4.61±0.03	4.63±0.03
Area 2 (MUREŞ County)						
n	heads	211	164	118	84	577
DIM	days	324.75±3.17	304.22±4.21	308.16±4.85	310.52±5.89	313.99±5.12
Days open	days	75.63±4.36	83.68±5.35	80.15±3.62	-	79.39±4.43
Calving interval	days	-	400.38±8.11	387.77±6.12	387.86±5.69	393.44±7.68
Milk quantity	kg	4268.39±78.26	4450.31±99.58	4601.04±6.68	4568.34±151.96	4439.77±87.54
Fat quantity	kg	176.78±3.54	186.16±3.71	187.61±4.48	188.15±6.49	183.32±4.42
Fat content	%	4.14±0.01	4.18±0.02	4.08±0.02	4.12±0.04	4.13±0.02
Protein quantity	kg	140.25±3.05	146.08±3.18	151.90±3.08	151.55±4.35	145.93±4.18
Protein content	%	3.29±0.01	3.28±0.02	3.30±0.01	3.32±0.03	3.29±0.02
Lactose quantity	kg	198.55±3.97	204.16±3.75	214.75±4.31	210.60±5.94	205.21±5.18
Lactose content	%	4.65±0.02	4.59±0.02	4.66±0.02	4.61±0.03	4.62±0.02

Table 3

The average values by total lactation of some dairy production indices comparative by farms

Issue	MU	S.C. Gherla	S.C. Ada	S.C. Nora LY	ACP Cristești	F Botorca	F. Ernei
Age of the first calving	days	865.07	924.03	947.76	914.01	983.46	944.47
Natality index	%	98.00	95.39	94.76	94.75	90.04	93.02
Duration of the total lactation	days	307.13	315.04	307.17	303.03	326.66	312.56
Duration of the normal lactation	days	292.18	295.06	290.04	882.04	296.83	286.84
Maximum production by lactation	no.	IV	II	II	IV	II	IV
Dairy production by total lactation	kg	6519.15	5361.34	4884.09	4046.19	4286.83	4939.84
Dairy production by normal lactation	kg	6301.95	5080.58	4676.26	3850.24	4000.16	4639.84
Average daily production by total lactation	kg	21.23	17.02	15.90	13.32	13.12	15.80
Average daily production by normal lactation	kg	21.57	17.22	16.12	13.65	13.48	16.16
Average daily production by differences LT-LN	kg	14.38	14.02	12.22	9.07	9.53	11.72
Fat quantity by normal lactation	%	3.94	3.97	3.99	4.10	4.16	4.10
Protein quantity by normal lactation	%	3.20	3.18	3.25	3.37	3.31	3.21
Lactose quantity by normal lactation	%	4.69	4.54	4.65	4.65	4.50	4.69

Table 5. The main dairy production indices in primiparous groups of paternal half sisters

No.	Bull	Daught. n	AFC days	Dairy production by total lactation									Dairy production by normal lactation									Reproduction	
				DIM(days)	Milk yield Kg	Fat		Protein		Lactose		DIM (days)	Milk yield Kg	Fat		Protein		Lactose		D.D. (days)	C.I. (days)		
						%	Kg	%	Kg	%	Kg			%	Kg	%	Kg	%	Kg				
1	51263	25	845.18 ±28.76	324.18 ±12.53	5725.17 ±167.57	3.98 ±0.05	227.86 ±8.17	3.25 ±0.05	186.07 ±7.9	4.60 ±0.06	263.36 ±10.05	287.99 ±4.37	5515.78 ±172.74	3.96 ±0.05	218.42 ±4.63	3.25 ±0.05	179.26 ±5.96	4.60 ±0.06	253.73 ±8.21	57.52 ±17.12	387.17 ±11.81		
2	51244	15	922.14 ±13.60	341.54 ±26.55	6146.23 ±298.42	3.97 ±0.07	244.01 ±6.83	3.21 ±0.08	197.29 ±8.64	4.58 ±0.07	281.50 ±9.24	299.98 ±9.54	5363.43 ±217.35	3.95 ±0.08	211.86 ±5.54	3.20 ±0.05	171.63 ±8.36	4.58 ±0.06	245.65 ±10.24	55.72 ±12.46	401.27 ±18.33		
3	51638	21	922.08 ±36.16	343.72 ±19.17	5735.42 ±285.36	3.99 ±0.06	228.84 ±10.23	3.24 ±0.07	185.83 ±6.67	4.55 ±0.004	260.96 ±8.41	297.18 ±8.22	5306.37 ±232.73	3.97 ±0.06	210.66 ±4.27	3.22 ±0.06	170.87 ±9.01	4.54 ±0.06	240.91 ±7.48	54.22 ±12.53	399.74 ±10.97		
4	51263	40	968.60 ±12.44	323.19 ±10.43	5184.78 ±139.26	4.07 ±0.03	210.76 ±5.24	3.27 ±0.02	169.39 ±5.01	4.62 ±0.04	239.49 ±7.66	291.01 ±120.19	4864.08 ±120.19	4.04 ±0.03	196.75 ±4.37	3.27 ±0.02	159.11 ±4.90	4.62 ±0.04	224.92 ±7.42	70.49 ±12.28	396.72 ±14.93		
5	51635	26	946.41 ±14.29	332.69 ±11.45	5237.71 ±169.32	3.99 ±0.03	209.03 ±8.46	3.22 ±0.03	168.86 ±7.36	4.60 ±0.03	240.83 ±4.98	296.75 ±2.64	4929.20 ±147.18	3.97 ±0.03	195.84 ±7.81	3.21 ±0.03	158.26 ±7.85	4.61 ±0.04	227.19 ±4.19	66.96 ±16.94	400.32 ±18.47		
6	45145	28	961.14 ±20.82	330.36 ±11.53	4791.71 ±199.31	4.16 ±0.04	199.05 ±8.46	3.45 ±0.04	169.63 ±7.65	4.64 ±0.02	222.34 ±6.78	295.96 ±3.31	4473.35 ±133.88	4.14 ±0.04	184.63 ±5.20	3.52 ±0.04	157.46 ±4.93	4.63 ±0.05	207.12 ±4.79	69.88 ±15.38	402.18 ±15.22		
7	50946	40	953.95 ±12.35	340.24 ±10.60	4779.74 ±157.43	4.18 ±0.06	198.74 ±6.65	3.56 ±0.03	170.00 ±5.23	4.58 ±0.03	218.91 ±5.13	297.51 ±2.59	4407.61 ±116.70	4.14 ±0.01	181.62 ±4.75	3.55 ±0.03	156.47 ±4.23	4.59 ±0.04	202.31 ±4.53	70.12 ±10.44	408.78 ±19.15		
8	50817	42	997.27 ±13.62	358.88 ±11.51	5397.21 ±197.09	3.77 ±0.05	203.56 ±7.93	3.24 ±0.06	174.87 ±9.14	4.59 ±0.03	247.73 ±4.67	299.38 ±2.12	4802.96 ±123.33	3.76 ±0.05	179.90 ±4.71	3.19 ±0.04	153.21 ±4.83	4.58 ±0.04	219.98 ±4.97	69.38 ±8.67	401.05 ±11.34		
9	50944	39	932.26 ±14.19	353.87 ±14.39	4963.76 ±198.07	4.03 ±0.05	200.52 ±9.78	3.57 ±0.04	177.21 ±10.49	4.53 ±0.03	224.86 ±5.37	296.66 ±2.89	4397.86 ±142.34	3.98 ±0.04	174.76 ±4.83	3.50 ±0.04	153.93 ±4.74	4.55 ±0.04	200.10 ±4.098	69.94 ±11.31	404.32 ±12.28		
10	50945	36	930.03 ±15.28	327.66 ±11.52	4505.35 ±176.30	4.32 ±0.07	193.39 ±8.17	3.59 ±0.02	165.74 ±6.83	4.63 ±0.02	208.60 ±5.83	291.11 ±4.20	4148.02 ±145.00	4.28 ±0.05	176.32 ±5.11	3.56 ±0.03	147.67 ±4.21	4.61 ±0.05	191.22 ±4.73	71.44 ±9.15	398.98 ±18.22		
11	51265	28	920.32 ±27.44	321.55 ±15.27	4828.44 ±165.41	4.18 ±0.04	201.86 ±6.87	3.38 ±0.03	163.20 ±8.64	4.68 ±0.02	225.97 ±9.12	287.81 ±2.87	4263.82 ±128.17	4.16 ±0.05	177.37 ±6.27	3.39 ±0.03	144.54 ±6.22	4.68 ±0.03	199.55 ±7.29	79.42 ±6.47	401.87 ±18.15		
12	50943	38	948.76 ±20.65	349.11 ±11.33	4585.54 ±158.54	4.29 ±0.06	169.51 ±7.15	3.60 ±0.03	165.03 ±0.3	4.62 ±0.03	211.85 ±6.33	297.22 ±2.37	4101.20 ±108.74	4.26 ±0.06	174.19 ±4.66	3.56 ±0.03	146.00 ±4.13	4.62 ±0.05	189.48 ±5.12	66.38 ±10.11	410.22 ±14.23		
13	51576	20	912.72 ±21.16	316.48 ±16.17	4603.38 ±235.11	3.90 ±0.11	179.53 ±8.68	3.20 ±0.07	147.31 ±6.42	4.56 ±0.04	209.91 ±7.47	292.16 ±8.86	4332.44 ±222.12	3.69 ±0.08	159.87 ±4.27	3.20 ±0.07	138.64 ±8.36	4.54 ±0.04	196.69 ±8.74	72.17 ±13.29	392.65 ±27.43		
14	51260	18	981.36 ±23.24	328.11 ±11.89	4032.52 ±149.45	4.20 ±0.02	169.37 ±6.97	3.31 ±0.03	133.48 ±6.32	4.51 ±0.03	181.87 ±8.67	296.31 ±2.71	3740.72 ±93.74	4.18 ±0.03	156.36 ±2.73	3.30 ±0.02	123.44 ±8.47	4.53 ±0.02	169.45 ±10.26	76.46 ±7.32	405.22 ±15.64		
15	50788	45	950.60 ±18.42	324.40 ±9.75	4152.85 ±170.36	3.76 ±0.02	165.82 ±6.26	2.85 ±0.02	118.36 ±4.93	4.58 ±0.04	190.20 ±5.66	291.26 ±2.52	3830.30 ±132.23	3.74 ±0.03	142.73 ±4.37	2.85 ±0.02	109.16 ±3.92	4.59 ±0.04	175.81 ±6.55	70.12 ±9.11	403.18 ±13.41		
16	50987	55	1075.14 ±38.26	346.61 ±9.22	3886.57 ±143.45	3.94 ±0.01	151.23 ±6.11	3.26 ±0.02	120.11 ±4.18	4.58 ±0.02	175.42 ±5.09	294.16 ±2.53	3466.34 ±103.97	3.93 ±0.01	136.01 ±4.29	3.17 ±0.02	110.86 ±3.94	4.59 ±0.02	159.11 ±4.28	71.12 ±15.17	415.11 ±23.15		