RESEARCHES REGARDING MILK PROCESSING IN QUALITY CONDITION IN A DAIRY FARM IN ROUMANIA EAST AREA

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Abstract

The European Commission approved the Romanian request for extension of the transitional period to achieve the EU requirements on quality of cow raw milk until 31 December 2013. Hence, the need to see how milk is processed in dairy farms and areas of Romania. The study was conducted on 250 cattle heads, which was followed animal origin, quantitative and qualitative indicators of milk production. Average performance of production was 8439.87 kg milk, with a range of 6650-10556 kg milk, 3.84% fat and 3.31% protein respectively. Temperature of the milk at delivery was 3.95 ^0C with a range between 3-4 ^0C and the density of 1.0287g/cm^3. In terms of physical-chemical characteristics of milk produced on the dairy farm studied, the values are within normal limits. Evolution of somatic cell count is different depending on the season, higher values in spring-summer 247170-337500/ml and less than autumn-winter 223400-195570/ml but not exceeding a maximum accepted at 400000/ml. Corresponding values of the total number of germs in milk (TNG) were 183400-137607/ml autumn-winter and spring-summer 178730-247300/ml. Because the farm is in the process of modernization, with large investments in the technological process, we believe that it will fulfil all EU standards for milk quality.

Key words: farm, cattle, production, milk, quality indicators

INTRODUCTION

Milk quality enables manufacturers to produce a wide range of healthy products for buyer. If we talk about milk quality, should be regarded as the physicochemical and sensorial characteristics thereof, as well as a number of indicators such as the bacterial and biological (bacterial count and somatic cell count) and on inhibitory substances [5]. In terms of milk quality in Romania, have made efforts and have made progress, it was shown in a statement the National Health and Food Safety (NHFS), but manufacturers have requested a further transitional period until 31 December 2013 to improve the quality of raw milk and therefore milk collection system and hygiene of dairy farms. Therefore, Romania will continue to inform European officials on the progress to ensure compliance with all quality requirements of milk until the deadline. It is important that this additional time obtained, to be constructive and used for the application of measures and implementation of programs to improve the quality of raw milk from cows, collection system, and respectively modernization and development of farms in line with EU requirements and regulations.

Hence the need for such research to help identify problems and solutions of breeders to further regulate the transitional period.

MATERIAL AND METHODS

The research was conducted on a herd of 250 cattle heads Frieze, intensively farmed, loose housing, at the farm from Brosteni, Vlădeni common, Iasi county, north-east area of Romania, which belongs to SC PanifCom SRL Iasi. Were analyzed several indicators of milk quality: temperature, acidity, density, dry matter (DM), freezing point, the total number of germs and fat content, protein and somatic cells. The values of mentioned indicators were determined in the specialized laboratory of "DORNA LACTATE S.A." company. The devices used

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are LACTOSCAN, SOMACOUNT, and BACTOCOUNT 70.

The sample is collected in sterilized plastic bottles of 10 ml, placed in a state with 20 seats, which is inserted into the support rail of the device. From each vial are extracted 3 ml of milk and are transported through a hose to the incubator, which is fitted with 23 seats-wells. In each well is inserted 1 ml of milk and 1 ml of acrydine-orange staining solution. Incubation lasts for 7-8 minutes at 45°C, after which it is extracted with a syringe and diluted with a solution containing 3 drops of Triton X and 1 ml of ammonia/1 liter of distilled water. Then filtered through a membrane filter of 0.6 μ polyvinyl propylene 1 ml of the extract is sent to a reader with laser. The result is displayed on the screen reading and printed. The result is a raw number (2780, for example) which represent the number of whole cells and broken cells, followed by cfu (cfu 973, for example) which is TNG/ml. The result is multiplied by 1000.

Processing was done using a statistical program, analysis of variance and covariance (S.A.V.C) developed by V. Maciuc in 2002-2003 at USAMV Iasi Ro. All data were processed statistically, $\overline{X}$, $\pm s_{\overline{x}}$, s, V% and summarized in tables and graphic. Analysis and interpretation of results was correlated with the many observations made directly at the farm [2, 4].

RESULTS AND DISCUSSIONS

Buildings are loose housing semi-open, and on metal structure. The interior of the shelter distinguish three functional areas, namely: rest, movement and feeding.

Rest area is common and delimited of the movement area through a threshold of 20-25 cm high. The space allocated per cow is 6-7 m^2, thus benefiting from comfort. Straws are used as bedding material that which are refreshed every few days. The area of movement it's 3 m wide. Manure evacuation is mechanically. Feeding takes place through a metallic grid individualized feeding area. Concentrates are used rationally. Milking cows is done in the milking parlour "Side by Side" [5].

Analyzing the value ascending (table 1) shows those cows came from mothers with average performance of 9965.75 kg milk, 4.07% fat, pure fat 401.39 kg and 337.48 kg pure protein. Paternal grandmother (MF) achieved superior performance mothers (MM) with average values of 12998.55 kg milk, 4.27% fat, pure fat 554.7 kg and 440.09 kg pure protein with the possibility of obtaining sires of higher genetic potential.

Average performance production (table 2) was 8439.87 kg milk, with a range of 6650-10556 kg and 4.18% fat respectively 3.38% protein. Accordingly, the amount of fat was 352.63 kg and of the protein 284.81 kg. Production is showing a good level, with opportunities for improvement by selection and use of semen with known genetic value.

Analysis of the main body dimensions shows good growth with an average value for the size of 133.34 cm and 636.41 kg of body weight. On body weight the studied herd is heterogeneous the limits of these traits have been between 524-687 kg and the variability of 26%.

Monthly average values for the main indices of milk quality studies are presented in Figures 1, 2 and 3.

The highest value of the percentage of fat was found in the cold months, from January to April (4.55-4.15%) respectively from September to December (4.01-4.31%). Evolution of density and dry matter (DM) is shown in figure 2. Delivery temperature of the milk varies from month to month and the highest value was recorded in July 4.44ºC. The total number of germs at delivery reaches the maximum value of 241000/ml in July and the minimum in December of 98000/ml. Also, there were higher values in April and May, between 200500-230000/ml. The number of somatic cells in milk delivery months is higher in July and August 378000-351000/ml and lowest recorded level was in December of 163000/ml.

Recorded values do not exceed normal/400000 ml, but in warm months is an increase of the values which should lead the farmer to greater attention at the conditions of hygiene and storage temperature of milk.

Table 1 Mean and variance estimates of production traits studied at ancestry core of Frieze

Ancestry	Character	n	$\bar{X}$	$\pm s_{\bar{x}}$	s	V%	Min	Max
MF	Milk (kg)	250	12998.55	168.531	2057.18	15.826	9009	17356
	Fat (%)	250	4.27	0.05	0.612	14.352	3.36	6.07
	Fat (kg)	250	554.7	10.06	122.794	22.137	390.39	865.4
	Protein (%)	250	3.39	0.014	0.174	5.145	2.94	3.75
	Protein (kg)	250	440.09	6.052	73.872	16.786	306.31	639.77
M	Milk (kg)	250	9967.75	133.498	1629.555	16.348	7616	14037
	Fat (%)	250	4.07	0.037	0.452	11.118	2.74	5
	Fat (kg)	250	401.39	4.443	54.239	13.513	281.83	536.06
	Protein (%)	250	3.4	0.016	0.197	5.802	3.03	3.88
	Protein (kg)	250	337.48	3.852	47.017	13.932	236.13	448.81
MM	Milk (kg)	250	9502.48	138.947	1696.063	17.849	4362	13239
	Fat (%)	250	4.22	0.044	0.537	12.72	3.08	5.51
	Fat (kg)	250	399.21	6.343	77.423	19.394	163.14	595.46
	Protein (%)	250	3.4	0.016	0.199	5.852	3.07	3.94
	Protein (kg)	250	321.88	4.423	53.985	16.772	168.81	482.45

Table 2 Mean and variance estimates for production traits studied at core of Frieze

Character	n	$\bar{X}$	$\pm s_{\bar{x}}$	s	V%	Min	Max
Milk (kg)	250	8439.87	51.826	632.614	7.496	6650	10556
Fat (%)	250	4.18	0.022	0.268	6.411	3.52	4.67
Fat (kg)	250	352.63	2.805	34.24	9.71	271.43	447.57
Protein (%)	250	3.38	0.031	0.375	11.1	2.54	4.5
Protein (kg)	250	284.81	2.93	35.761	12.556	209.47	364.78
Dry period (days)	250	51.89	0.414	5.056	9.744	42	72
Shoulder height (cm)	250	133.34	0.145	1.77	1.327	129	136
Body weight (kg)	250	636.41	2.184	26.663	4.19	524	687

Studying the average values mentioned indicators depending on the season (table 3) indicates that during winter and autumn, there were the highest values of 4.38 to 4.17% and lowest in the spring - summer 4.10 - 3.95%. The average protein content has the same trend. In winter feed rations are much better balanced in energy, protein, vitamins and minerals, which affects milk both quantitatively and qualitatively [3, 6, 7, 8].

Also, the results obtained highlights that the warm seasons (spring-summer) had a greater number of somatic cells (247170-337500/ml) and TNG/ml (178730-247300/ml).

Coulon and colleagues (1996) studied changes in milk somatic cell counts obtained from 208 cows (404 lactations), clinical mastitis-free and have concluded that this character is influenced by season and temperature. Somatic cell count is low in winter and increased in the summer months (July, August, September). The same author found that at higher temperatures are recorded a greater number of somatic cells in milk [1].

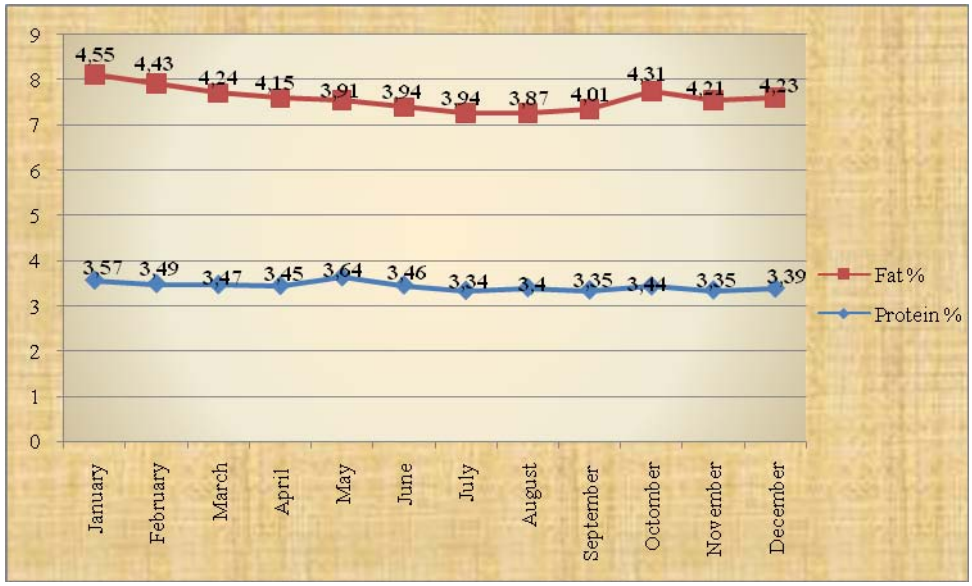

Fig. 1 Average monthly value for protein and fat (%)

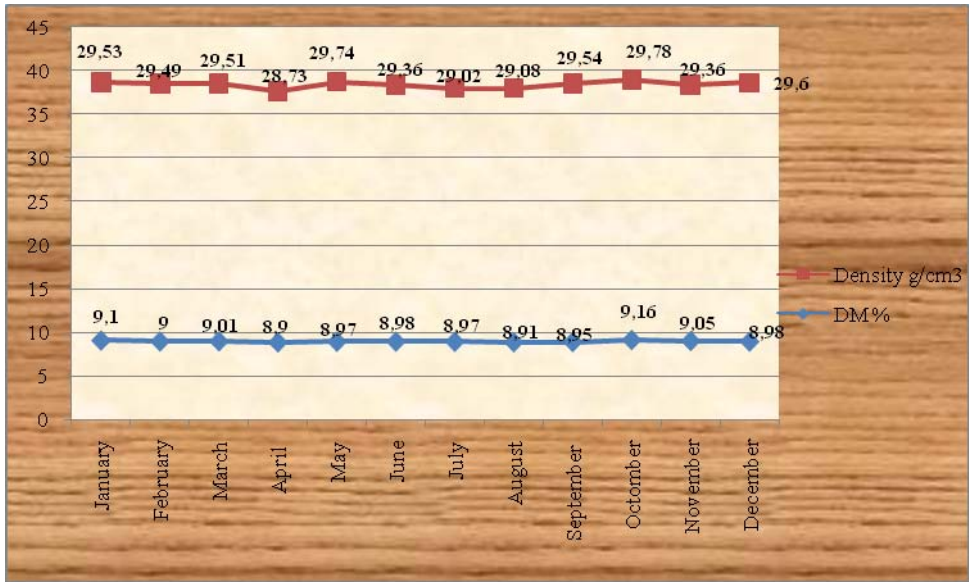

Fig. 2 Average monthly value for density and dry matter (DM) of milk

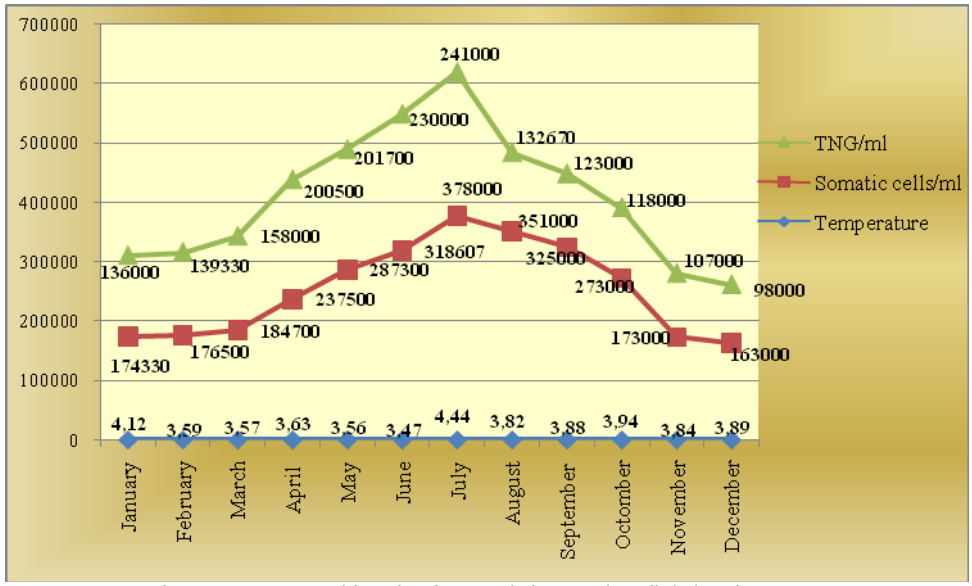

Fig. 3 Average monthly value for TNG/ml, somatic cells/ml and temperature

Table 3 Mean and variance estimates for milk quality indicators depending on the season, the nucleus studied

Season	Character	n	$\bar{X}$	$\pm s_{\bar{x}}$	s	V%	Min	Max
Winter	Milk (kg)	65	7749.76	287.265	1675.029	21.614	4338.00	9466.00
	Fat (%)	65	4.38	0.025	0.144	3.291	4.10	4.63
	Temperature (°C)	65	3.80	0.072	0.419	11.013	3.10	5.00
	Density g/cm^3	65	29.54	0.067	0.389	1.318	27.80	30.10
	Protein (%)	65	3.47	0.016	0.091	2.639	3.19	3.66
	DM(%)	65	9.01	0.031	0.179	1.984	8.10	9.20
	Somatic cells	65	195570	21.917	57.988	24.616	113000	310000
	TNG	65	137607	50.952	124.807	39.043	73000	290000
Spring	Milk (kg)	60	8701.67	239.759	1497.294	17.207	4186.00	10000.00
	Fat (%)	60	4.10	0.027	0.165	4.027	3.80	4.37
	Temperature (°C)	60	3.58	0.042	0.260	7.281	3.10	4.00
	Density g/cm^3	60	29.44	0.126	0.786	2.671	25.10	30.20
	Protein (%)	60	3.53	0.015	0.096	2.705	3.35	3.68
	DM (%)	60	8.97	0.025	0.154	1.715	8.84	9.84
	Somatic cells	60	247170	23.680	58.005	16.952	123000	406000
	TNG	60	178730	53.866	131.945	34.829	115000	397000
Summer	Milk (kg)	60	7082.02	336.216	2647.370	37.382	1524.00	10800.00
	Fat (%)	60	3.92	0.013	0.099	2.527	3.70	4.15
	Temperature (°C)	60	3.95	0.180	1.358	34.426	3.10	12.00
	Density g/cm^3	60	29.14	0.049	0.383	1.314	28.20	30.30
	Protein (%)	60	3.40	0.015	0.118	3.463	3.18	3.94
	DM (%)	60	8.95	0.010	0.079	0.881	8.75	9.20
	Somatic cells	60	337500	40.988	122.965	26.584	229000	524000
	TNG	60	247300	28.073	79.401	49.626	99000	370000
Autumn	Milk (kg)	65	7446.66	284.037	2181.729	29.298	2319.00	11505.00
	Fat (%)	65	4.17	0.022	0.170	4.063	3.80	4.43
	Temperature (°C)	65	3.88	0.047	0.361	9.291	3.40	6.00
	Density g/cm^3	65	29.56	0.089	0.682	2.307	28.30	32.70
	Protein (%)	65	3.38	0.013	0.097	2.869	3.26	3.80
	DM (%)	65	9.05	0.021	0.159	1.757	8.68	9.82
	Somatic cells	65	223400	31.965	55.365	15.625	133000	347000
	TNG	65	154670	58.359	101.081	69.872	78000	248000

DISCUSSION

The results obtained in this study confirms that analysis shows that technologies operating as feeding, milking, facilities hygiene and other environmental factors such as season and high temperatures affect the quality of milk [1, 9]. To comply with EU requirements, farmers must follow both the hereditary and animal exploitation technologies that can solve the problem for the most part of milk quality.

CONCLUSIONS

Milk quality indicators followed in this study are influenced by the production technology applied, the season and warmer temperatures during the year. The farm studied is in a process of modernization, with large investments in technological flow and we believe that will fulfil all EU standards for milk quality.

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