The Synthesis Potential of Milk in Buffaloes Cows from the Făgăraș Area

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Abstract
Currently, approximately 20,000 buffaloes are raised in Romania, of which 11% are found in the Făgăraș area. The present study was carried out to estimate the capacity of milk synthesis by 205 buffaloes cows raised in this area, which achieved 1059 lactations, with the rank of lactations from 1 to 14, in an observation interval of 15 years, by determining the correlation between the indicators of milk production and reproduction (lactation duration, total amount of milk of a lactation, total amount of fat, total amount of protein, interval between calvings and service period). The variability analysis shows a lack of homogeneity of the milk production and reproduction characteristics, regardless of the lactation rank, their average being moderately representative, except for the interval from calving to the fertile mount where the average is not representative. Reducing the variability of milk production and reproduction indicators can be achieved over time through management. Increasing the potential of milk production, in buffaloes cows, can be done through a simultaneous selection that takes into account the duration of lactation, the milk production from the control days and the service period. Based on the correlation between some measurable indicators of the synthesis potential of milk, the value of other characteristics of milk production can be predetermined.

Keywords: buffaloes dairy, correlation, milk, lactation, reproduction, variability

1. Introduction

On the territory of Romania, buffaloes have been bred since the 4th-5th centuries, entering in two ways: from the Balkan Peninsula, being brought by the Turks and spread in the Romanian Plain and Dobrogea, and from the west, being brought by the Huns and spread by the Avars, in especially in the 9th and 12th centuries. Although the world population of buffalo showed a general upward trend, in Romania it decreased significantly in number during the same period. The strongest decrease in herds occurred after 1990, being caused by factors such as the reduction of the importance of buffaloes in milk production, the decrease of the importance of buffaloes in labor production, the intensive mechanization of agriculture and the lack of policies to support the growth of buffaloes. Buffaloes raised in our country have mixed productive skills, milk-meat, the main one being for milk production. Currently, approximately 20,000 buffaloes are raised in Romania, of which 11% are found in the Făgăraș area [1]. The assessment of milk production in buffaloes is based on diversified periodic control. In the production control system, total lactation is taken into account, not being able to work on normal lactation, because the buffalo dairy does not have a known normal lactation. The total lactation is determined by two factors: the amount of milk synthesized daily, which is estimated by the milk production measured on control days, and the number of days of lactation, which determines the duration of lactation. The amount of milk

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milked, measured on control days, is used to calculate total production or can be used for various other estimates. For example, the sum of the milk quantities measured on the control days is a good indicator of the lactogenic capacity of the udder, and the average production of the control days can be assimilated to the average daily milk production during lactation. The question arises whether for selection work in buffalo herds it is preferable to have the total production per lactation as a selection criterion, or to take into account the size of the two factors that determine it: the lactogenic capacity of the udder and the duration of lactation, especially since these two indicators have different sources of formation [2].
In this paper, we set out to find out the importance of the milk synthesis capacity of the udder and the body of buffaloes dairy as a whole. As indicators of the potential of milk synthesis, two indicators were used derived from the milk measured on the control days, namely the sum of kg milk measured and the average production of the control days, which were put in relation to the amount of milk milked, with the total amount of lactation fat and the estimated amount of protein.

2. Materials and methods

The work was carried out based on the records made during 15 years, on 205 buffaloes dairy raised in 5 farms in the Făgăraș area, which produced 1059 lactations, with the rank of lactations from 1 to 14. For each lactation, the effective duration of lactation (DL), the total amount of milk of a lactation (TL), the total amount of fat (TG), the total amount of protein (TP), the interval between calvings (CI) and service were taken into account period (SP) [3]. For each of these main indicators, the arithmetic mean, standard deviation and coefficient of variability were statistically calculated. The sum of the amounts of milk from the control days (∑kg) was deduced from the total lactation (TL) based on the 28-day interval between the control days and the average value of the amount of milk milked in a control day (LP) was deduced also from total lactation using the duration of lactation. To estimate the economic effect of milk production of buffaloes, the average milk per feed day (LZF) deduced from the estimated total lactation and the interval between calvings in which the lactation took place was used as an indicator. The obtained data were statistically processed and interpreted. In order to determine and interpret the main statistical indicators, a simple variance analysis was used. To determine how strong the relationship between the variables is, the correlation coefficient was also calculated.

3. Results and discussion

The statistical parameters of the indicators of milk production and reproduction in buffaloes dairy, for the 1059 lactations, are presented in tables 1, 2 and 3.

Table 1. Duration of lactation in buffaloes dairy

Rank lactation	Number heads (n)	Duration of lactation DL (days)		
		$\sum n/n^1$	s^2	$CV\%^3$
1	174	199.1	69.78	35
2	169	209.6	72.27	34
3	146	229.5	73.04	32
4	132	236.3	66.11	28
5	113	238.2	63.89	27
6	86	259.0	74.19	29
7	72	242.3	65.90	27
8	57	242.1	63.62	26
9	43	233.7	67.51	29
10	32	244.4	50.11	21
11	15	231.6	75.22	32
12	9	251.1	48.01	19
13	6	239.8	55.11	23
14	5	193.8	83.58	43

$\sum n/n^1$ = average; s^2 = deviation standard; $CV\%^3$ = coefficient of variability.

From the analysis of the variability, there is a lack of homogeneity of the characters of milk production (tables 1, 2) and reproduction (table 3), regardless of the rank of lactation, their average being moderately representative and representative in a broad sense, except for the interval from calving to fecund breeding, where the average is not representative. The relatively close values of the variability of the duration of lactation and the total quantities of milk, fat and protein, are explained by the way of their constitution, which includes the duration of lactation. The very high variability of the service

period is explained by the large dispersion of this character, in the studied population.

Table 2. Parameters of milk production in buffaloes dairy

Lactation rank	Milk production								
	Total quantity TL (kg)			Fat quantity TG (kg)			Protein quantity TP (kg)		
	∑n/n[1]	s[2]	CV%[3]	∑n/n[1]	s[2]	CV%[3]	∑n/n[1]	s[2]	CV%[3]
1	965.5	364.87	38	68.6	26.44	39	42.4	13.60	32
2	1062.9	424.56	40	74.3	31.40	42	49.0	15.17	31
3	1248.2	480.25	38	85.5	35.67	42	59.5	17.73	30
4	1278.6	462.76	36	87.4	36.08	41	61.7	19.69	32
5	1315.5	467.67	36	89.5	35.99	40	60.1	20.70	34
6	1467.8	537.01	37	100.7	40.76	40	68.7	25.63	37
7	1340.0	464.95	35	95.1	35.11	37	62.1	17.22	28
8	1365.3	455.46	33	94.0	32.09	34	61.3	19.08	31
9	1360.7	355.80	26	94.3	24.95	26	58.9	14.86	25
10	1390.9	491.24	35	96.3	32.95	34	60.5	19.45	32
11	1255.9	272.58	22	86.9	20.00	23	51.9	10.27	20
12	1554.8	458.22	29	109.8	31.53	29	67.4	16.95	25
13	1501.3	641.52	43	101.3	45.32	45	66.8	19.18	29
14	1128.0	526.50	47	69.8	29.69	43	44.0	20.35	46

Table 3. Reproduction parameters in buffaloes dairy

Rank lactation	Service period SP (days)			Calving interval CI (days)		
	∑n/n	s	CV%	∑n/n	s	CV%
1	x	x	x	443.2	144.30	33
2	140.2	127.12	91	465.6	135.38	29
3	150.6	135.38	90	450.8	113.96	25
4	135.8	113.96	84	438.8	112.29	26
5	123.9	112.23	91	440.0	108.93	25
6	125.0	108.86	87	464.9	141.59	30
7	136.0	94.59	70	440.2	108.07	25
8	125.2	108.07	86	414.7	143.12	35
9	119.6	110.48	92	413.7	72.25	17
10	98.7	72.25	73	400.4	66.09	17
11	85.4	66.09	77	366.1	159.46	44
12	115.6	102.84	89	430.5	110.35	26
13	115.5	110.35	96	419.4	104.72	25
14	104.4	104.72	100	x	x	x

The relationship between the size of the indicators that express the ability to synthesize milk with the indicators of the commercial value of milk, was determined after deducting from the total lactation (TL), based on the 28-day interval between the control days, the average values of the quantities of milk milked in a control day (LP) and the sum of milk quantities from the control days (∑kg) are those shown in table 4.

Table 4. Average milk quantities milked on control day and on feed day

Rank lactation	∑ kg control days (∑kg)	Milk milked/day control (LP)	Milk milked/day fed (LZF)
1	34.48	4.85	2.18
2	37.96	5.07	2.28
3	44.58	5.44	2.77
4	45.66	5.41	2.91
5	46.98	5.52	2.99
6	52.42	5.67	3.16
7	47.86	5.53	3.04
8	48.76	5.64	3.29
9	48.60	5.82	3.29
10	49.68	5.69	3.47
11	44.85	5.42	3.43
12	55.53	6.19	3.61
13	53.62	6.26	3.58
14	40.29	5.82	x

The ability to synthesize milk by the udder and by the body as a whole was determined by determining the compatibility of the targeted indicators (∑ kg control days and the total amount milked, fat and protein, milk milked/day and the total amount milked kg fat and kg protein), on 1059 lactations, the correlations between these indicators, being those in table 5.

Table 5. The correlation coefficient and its error between the studied indicators

The correlation between:	Value (r ± rm)[1]
∑ kg control days and the total milked quantity	0.221±0.25
∑ kg control days and kg fat	0.229±0.25
∑ kg control days and kg protein	0.231±0.25
Milk milked/day and total quantity	0.834±0.08
Milk milked/day and fat kg	0.728±0.13
Milk milked/day and kg protein	0.634±0.16

[1] The correlation coefficient and the error

The correlation between the average daily production of milk and the total production of milk, fat and protein per lactation is very high because actually synthesizing milk means synthesizing butter and proteins. The correlation of the second indicator proposed to estimate the milk synthesis capacity with the amounts of butter and protein synthesized per total lactation is much lower. The explanation is simple, the size of the second indicator is also determined by the duration of lactation, which does not correlate with the synthesis of butter and protein. Regarding the economic effect of buffalo milk production, its compatibility with the average duration of lactation and reproductive indicators was studied, on 880 completed lactations (table 6).

Table 6. Correlation between milk milked per feed day, duration of lactation, service period and calvings

The correlation between:	Value (r)
Milk milked per feed day and lactation duration	0.68
Milk milked per feed day and service period	-0.73
Milk milked per feed day calving interval	-0.66

From the correlation analysis, it follows that extending the duration of lactation, without changing the reproductive indicators, would lead to the greatest economic efficiency. Extending the duration between calving and the fertile mount, would implicitly lead to a decrease in the economic efficiency of milk production, even with the extension of the duration lactation.

4. Conclusions

The calendar year (external environment) has the greatest participation in inducing the variability of milk production parameters in buffaloes, reducing its influence can be done through good organization. Age (lactation rank) has the smallest participation in inducing the variability of milk production and it is not necessarily necessary to include it in the selection activity. Reducing the variability of milk production indicators can be achieved over time through management. Lactation duration is an important productivity indicator in milk production in buffaloes. Increasing the potential of milk production, in buffaloes dairy, can be done through a simultaneous selection that takes into account the duration of lactation, the milk production from the control days and the service period. Based on the correlation between some measurable indicators of the synthesis potential of milk, the value of other characteristics of milk production can be predetermined.

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