Type Rating Due to Age, Stage of Lactation and Milk Level in Buffalo Cows

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Abstract

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The aim of the present study was to investigate the influence of some environmental factors on the sub ratings and over-all rating of buffalo cows. Ratings of 819 buffalo cows, classified a total 2457 times by one and the same classifier were used.

To asses the effect of the different factors was employed a linear model with the following factors: age, stage of lactation and level of milk yield of the buffalo cows.

Lactation numbers were used as a measure of age and ratings grouped into lactations 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10. Ratings were also grouped according to stage of lactation: (1) from day of calving to 90 days; (2) 91 days to 210 days and (3) 211 days to the next calving. According to the level of milk yield ratings were grouped into 4 levels: (1) to 1500 kg; (2) 1501 kg to 1800 kg; (3) 1801 kg to 2100 kg and (4) higher then 2101 kg.

Considerable and significant effect on the general appearance, body capacity and mammary system plays the age (lactation) of the buffalo cows; on dairy character, mammary system and over-all rating – the level of milk yield and on mammary system and over-all rating – the stage of lactation period.

Key words: buffaloes, dairy character, mammary system, body capacity, type rating, over-all rating

Introduction

As one of the oldest methods of selection in all domestic animals, in the resent decades the evaluation of type and body conformation becomes particularly important both to cattle and buffalo breeding. Along with the productive and reproduc-

tive traits, type rating is included in the combinations of traits to elaborate selection indices, especially in those concerning longevity of dairy animals.

In establishing the true relationships between type and economically important characteristics in dairy animals, it is necessary to establish a common basis for the

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comparison of animals with each other. Because of variation in many factors, which may conceivably influence a single type value, they must be establishing also.

The previous investigations and review of the literature by Wilcox et al. (1959), Peeva (1981), Ibrahim et al. (1991), Velea (1991), Velea et al. (1991), Peeva and Alexandrov (1993) and Bingzhuang et al. (2002) show that on the body measures and type rating the effect of the environmental factors is more substantial than of the additively determined ones. Peeva (1981) and Saini and Gill (1984), independently for Bulgaria and India, developed based-on-100 score cards involving four main groups of traits general appearance (30 points); dairy character (20 points); body capacity (20 points); mammary system (30 points).

In the present study we estimated the effect of age, stage of lactation and milk level on the sub rating and over-all rating of the buffalo cows.

Material and Methods

Subject of the study were 819 buffalo cows at first to tenth lactation. The type rating and the over-all rating were made for three lactation periods: (1) from calving to the 90th day; (2) from 91st to 210th day and (3) from 211th day to the next calving. Regarding their milk yield, the buffaloes were divided into four groups: (1) up to 1500 kg; (2) 1501 to 1800 kg; (3) 1801 to 2100 kg and (4) over 2101 kg.

Least squares analysis was used to examine the effect of the factors on the sub rating and over-all rating with the follow form:

$$Y_{aije} = \mu + Nl_a + SLP_i + LMY_j + e_{aij},$$

where: μ - mean value of the trait;

Nl_a - fixed effect of the lactation;
SLP_i - fixed effect of the stage of lactation period;
LMY_j -fixed effect of the milk level;
e_{aij} - the residual effect.

The used software product is GIBSA (Generator of Information Bases and Systems of Analysis, 1988, V.3).

Results and Discussion

The results of the studied effect of factors on sub ratings and over-all rating are shown in Tables 1, 2 and 3.

Effect of age

The evaluation of the general appearance, negative at first lactation, becomes positive and ascends up to sixth (Table 1). At these lactations (from second to sixth) the estimations are over the total LS-average mean. Further the values, lower than the LS-mean, gradually descend. The same trend is observed about the sub rating for the body capacity and for the over-all rating; the differences among the estimations for the different ages are highly significant (P<0.01 and P<0.001).

The estimations for dairy character are approximate to each other suggesting that age, i.e. lactation, plays substantial effect on this sub rating.

For mammary system highest are the estimations for the buffaloes at first and second lactation – a=1.411 and a=1.314 respectively. Further the LS-estimations are negative with a slight downward change. The differences in the sub rating among lactations are highly significant. The results show that the sub rating mostly is influenced by the qualification of labors and the used technique. These results are in conformation with those in the studies of Wilcox et al. (1959) and Peeva and

Table 1
LS-estimates (a) of the effect of the age

Lacta-tions:	n	General appearance		Dairy character		Body capacity		Mammary system		Over-all rating	
		a	SE	a	SE	a	SE	a	SE	a	SE
1	211	-0.147	0.310	-0.035	0.210	-0.683	0.217	1.411	0.480	0.472	0.864
2	190	0.679	0.300	0.049	0.204	-0.004	0.211	1.314	0.466	2.066	0.839
3	96	0.941	0.342	0.046	0.232	0.413	0.241	0.433	0.532	1.818	0.958
4	87	0.790	0.347	0.297	0.236	0.272	0.244	0.428	0.538	1.831	0.970
5	74	0.671	0.354	-0.058	0.241	0.398	0.249	0.641	0.550	1.473	0.992
6	46	0.451	0.397	0.158	0.270	0.340	0.279	-0.307	0.616	0.631	1.111
7	40	-0.581	0.418	-0.108	0.284	0.062	0.294	-1.441	0.650	-1.914	1.170
8	17	-1.479	0.572	-0.520	0.389	-0.318	0.403	-0.447	0.889	-2.650	1.602
9	24	-0.679	0.494	0.128	0.336	-0.519	0.347	-0.675	0.766	-2.098	1.381
10	34	-0.646	0.446	0.157	0.303	0.039	0.313	-1.358	0.692	-1.628	1.247
Total LS	819	25.356	1.282	17.569	0.872	17.653	0.902	22.222	1.990	82.526	3.588

* Total LS-average is the same in tables 2 and 3.

Table 2
LS-estimates (a) of the effect of the stage of lactation

Stage of lactation	n	General appearance		Dairy character		Body capacity		Mammary system		Over-all rating	
		a	SE	a	SE	a	SE	a	SE	a	SE
1. to 90 days	408	0.014	0.760	0.217	0.517	-0.143	0.536	2.186	1.180	2.314	2.127
2. 91-210 days	276	-0.210	0.761	-0.105	0.517	-0.018	0.535	0.093	1.181	-0.345	2.128
3. over 211 days	135	0.195	0.766	-0.113	0.520	0.160	0.538	-2.280	1.188	-1.970	2.143

Table 3
LS- estimates (a) of the milk level

Milk level	n	General appearance		Dairy character		Body capacity		Mammary system		Over-all rating	
		a	SE	a	SE	a	SE	a	SE	a	SE
1. to 1500 kg	233	-0.358	0.581	-0.354	0.395	-0.233	0.409	-1.626	0.902	-2.673	1.626
2. 1501 - 1800 kg	195	-0.080	0.582	-0.094	0.396	0.080	0.409	-0.269	0.903	-0.313	1.629
3. 1801 - 2100 kg	183	0.139	0.582	0.061	0.396	0.040	0.409	0.503	0.904	0.823	1.629
4. over 2101 kg	208	0.299	0.585	0.387	0.398	0.147	0.411	1.392	0.908	2.163	1.636

Alexandrov (1993) for Holstein cows and buffaloes respectively.

For over-all rating is observed highest estimation at second lactation (a=2.066), and slightly decreasing values up to fifth. After seventh lactation the LS-estimations are negative, between (-2.650) and (-1.628). These values differ with high significant to each other, suggesting substantial effect of lactation on over-all rating.

Effect of stage of lactation

The data in Table 2 show that during the first months of the lactation (up to 90th day), when the mean daily milk yield is comparatively high, the buffaloes have highest over-all rating and mammary system evaluation – respectively a=2.314 and a=2.186; the estimation for dairy character is just over the LS average, while for body capacity it is negative. All estimations about the interval 91-210 days of lactation are negative, excepting that for mammary system, approximating the LS average. At the end of lactation (after the seventh month) the buffaloes have lowest values for mammary system and over-all rating, a = -2.280 and a = -1.970 respectively. The estimation for the dairy character of the buffaloes is negative as well. On the contrary, the evaluations of body capacity and general appearance increase with the advance of lactation compared to the total LS average. Usually this is the period that is followed by the dry period and that coincides with the buffaloes' pregnancy, and hence the high values for these traits. The differences among the estimations about the three lactation intervals are statistically proved at P<0.05, P<0.01 and P<0.001; for mammary system the differences are not significant.

Effect of productivity level

For the buffaloes producing up to 1500 kg milk all sub ratings have values lower than the total LS average (Table 3). Also negative and substantial in value is the over-all rating (a = -2.673).

Though with much lower values, the same trend in the sub ratings characterizes the animals with 1501-1800 kg of milk yield. Over 1800 kg the LS-estimates increase parallel with the increase of the productivity and stay over the total LS average. Highest are the over-all (a=2.163) and mammary system (a=1.392) ratings of the animals producing over 2100 kg. There for the over-all type rating could to a great extent serve to predict the milk productivity. The relevant values of the different sub ratings compared to the maximal scores for general appearance, dairy character, body capacity and mammary system are 88.27, 87.85, 85.12 and 74.06 % respectively.

Least is this percentage for the mammary system, suggesting that selection is to be directed to the traits connected with this sub rating, regarding udder adaptability to machine milking as well as the correlation between the morphological udder characteristics and the milk productivity of the buffaloes.

The variance analysis (Table 4) reveals the effect of the buffaloes' age (lactation) on general appearance, body conformation, body capacity and mammary system to be highly significant (P<0.001) and on the over-all rating-minor (P<0.05).

Substantial is the effect of the milk level

Table 4
Variance analysis

Sources	df	General appearance	Dairy character	Body capacity	Mammary system	Over-all rating
1. Lactation	9	4.277 ***	0.617 n.s.	4.474 ***	4.173 ***	2.867 *
2. Milk level	3	2.675 *	6.643 ***	2.447 n.s.	22.376 ***	17.813 ***
3. Stage of lactation	2	1.562 n.s.	4.084 *	1.713 n.s.	79.234 ***	27.725 ***

on mammary system (F=22.376***) and over-all rating (F=17.853***), and not so well expressed on dairy character (F=6.643***). The mammary system evaluation and the over-all rating are determined to highest extend by the stage of lactation. General appearance and body capacity are not influenced by the stage of lactation, while dairy character slightly is (P<0.05).

Conclusions

Considerable and significant effect on the general appearance, body capacity and mammary system plays the age (lactation) of the buffalo cows; on dairy character, mammary system and over-all rating – the level of milk yield and on mammary system and over-all rating – the stage of lactation period.

In future work a priority is to be considered the selection work on the complex of traits determining the evaluation of mammary system, concerning machine milking and milk productivity of buffalo cows.

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