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GENETIC CONTRIBUTION OF MILK YIELD IN CROSSES OF THE BOHEMIAN PIED CATTLE WITH THE RED PIED HOLSTEIN AND AYRSHIRE CATTLE

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Abstract

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In comparison of crosses of the Bohemian Pied X Ayrshire cattle (CA) and dairy cows of the Bohemian Pied cattle (C), the highest milk yield was found in crosses of the Bohemian Pied X Red Holstein (CR) cattle in all three lactations. In the CR crosses also the fat per cent and total fat yield were very favourable. The sensitivity and response to housing conditions was higher in the CR crosses and worsened their condition during the period of the maximum lactation. As concerns the index of persistence $P_{2:1}$ (i. e. the ratio between the milk yield in the first and second 100 days of lactation), no significant differences were found among the groups compared. For the 1st lactation, the grade of persistence in all three breeding groups was good and the course of the lactation curve was physiological, whereas for the 2nd and 3rd lactation the persistence was less satisfactory and the course of the lactation curve tended to be steep. In all the three breeding groups, 25% of the lactations were abnormal. With continuing lactations, the occurrence of abnormal lactations was more frequent in the CR crosses and breeding cows of group C, while the percentage of abnormal lactations was the lowest in the CA crosses. When comparing the milk yield of the group of dairy cows investigated with that of their mothers, it was found that the CR crosses showed a higher milk production in all the three lactations, this difference being highly significant in the 1st lactation. A similar result was found in the dairy cows of group C, whereas the CA crosses did not reach the milk yield of their mothers in any of the three lactations.

Cattle crossing, Bohemian Pied, Ayrshire, Red Holstein, milk yield, milk fat, course of lactation.

In order to increase milk production, improvement breeding was performed with dairy breeds of cattle in a part of the popu-

lation of the Bohemian Pied cattle. The purpose of these investigations was to evaluate milk production and other commercially important traits of crosses of the Bohemian cattle with the Red Holstein breed (CR) and Ayrshire (CA) as compared with the Bohemian Pied breed (C).

Suchánek (1970) evaluated the results of improvement crossing of the Bohemian Pied cattle with Ayrshire in submontane and mountain regions; in the CA crosses of the F_1 and F_{11} generations he found that the milk yield was higher in the 1st and 3rd lactation by 300 - 800 kg of milk than in the C breed of the same age. Suchánek et al. (1972) compared the CA crosses with group C of the same age and found that the CA crosses produced by 224 - - 993 kg of milk more. Rüegsegger (1978) studied the milk yield of crosses of the Simmenthal with Holstein cattle in various regions of Switzerland; the crosses produced 854 - 1 342 kg of milk and 0.01 - 0.20 % of fat more than the Simmenthal dairy cows. According to Suchánek and Golda (1979), in a national average the CA crosses produced 174 - 444 kg of milk more in the 1st lactation and 190 - 329 kg of milk more in the 2nd and following lactations. Opichal (1979) compared the milk yield in primiparas of the Bohemian Pied cattle which reached 2 585 kg and 4.06 % fat content with the performance of the CA crosses which produced 2 906 kg of milk with 4.19 % of fat. In the 2nd lactation, the milk yield of cows of group C reached 3 409 kg of milk with 3.95 % of fat, while in the CA crosses 3 733 kg of milk and 4.07 % of fat. In the USSR, Sokolova (1979) reported that Holstein - Friesian bulls increased the milk yield in crosses of the F_1 generation during the 1st lactation by 812 kg as compared with their pure-bred Simmenthals. Suchánek et al. (1980) reported that CA crosses, as compared with dairy cows of group C of the same age, showed, on average, a higher milk yield during the 1st standardized lactation by 148 - - 328 kg of milk and 0.10 % of fat. Koubík (1981) evaluated the CA crosses during the 2nd and following lactations when their milk yield reached 4 556 of milk. Dairy cows in breeding herds produced 5 044 kg of milk with 4.00 % of fat in maximal lactations. Jongeling (1981) stated that crossing with the Finnish Ayrshire cattle in Germany did not meet the expectations, while crossing with the Red Holstein breed increased milk yield. Ulrych and Suchánek (1981) evaluated the performance of various types of crosses; in CA and CR crosses the milk yield was higher by as much as 642 kg of milk as compared with C cows of the same age. More significant differences in the milk fat content were not observed. When crossing the Swiss Simmenthal cattle with the Red Holstein, Schmidlin (1980) observed a marked increase in the milk yield but also a significant decrease in the fat percentage. Suchánek (1981) evaluated CR crosses which had a higher milk yield in the 1st lactation by 400 kg, decrease of the fat content by 0.07 % and lower proportion of abnormal lactations as compared with group C. In the CR crosses, Brauner and Suchánek (1982) showed that the decrease of the fat content and proteins was negative. They compared their results with studies carried out in Switzerland by Baumgartner and Hutzlich (1976) who drew attention to the fact that CR crosses were more sensitive and demanding to the conditions of their environment. In dairy cows of the Czech

Red Pied cattle, Suchánek et al. (1984) reported an average milk yield of 3 022 kg in the 1st lactation. During the 1st lactation, the CA 50 crosses produced 3 447 kg of milk with an average fat content of 4.08 - 4.10 %, the CR 50 crosses produced 3 650 kg of milk. During the 3rd and following lactations, the CR crosses produced 4 242 kg of milk. In crosses with more than 50 % of Holstein blood, the milk yield in the 1st lactation did not increase because the standard of nutrition was not sufficient any more to manifest their productive potential.

Materials and Methods

Investigations of the subject section of the research stage were carried out under usual conditions of the Veterinary School Training Farm of the University of Veterinary Science in Nový Jičín. The research task was solved as a comparative experiment with three groups of breeding cows: Czech Red Pied (C n = 48), crosses Bohemian Pied X Red Holstein with a 50 % proportion of blood (CR n = 62) and crosses Bohemian Pied x Ayrshire with a blood proportion ranging from 25 to 53.25 % (CA n = 65). In order to ensure the same environmental conditions, these breeding groups were concentrated in a barn at the Ženklava farm. The experimental groups were studied from June 1979 till March 1984. Over this period it was possible to evaluate the groups during the 1st to 3rd lactations. Milk yield in the 1st, 2nd and 3rd lactations was evaluated on the basis of data of performance testing for the standardized 305-day lactation, taking into account lactations lasting 250 to 305 days. The following indices of milk yield were studied: the amount of milk in kg, fat in kg, fat content in % and the course of lactation in terms of the index of persistence $P_{2.1}$. Mutual comparisons of these indices of milk yield were performed both in breeding groups and within the individual breeding groups according to the sequence of lactation. Milk yields of the individual dairy cows were compared with those of their mothers. Compared was also the milk production in experimental CR crosses and cows of the same age - also CR crosses (B) - housed in another environment in Bartošovice.

Abnormal lactations were observed in all the dairy cows of the groups compared.

Data obtained were analyzed using mathematical-statistical methods.

Results

Tab. 1 shows the distribution into categories according to the per cent of milk yield in the 1st lactation; in CR crosses, the milk yield was the highest (30.65 %) and ranged from 3 501 to 4 000 kg of milk. In group C and CA, the highest per cent of dairy cows was in the category of 2 501 to 3 000 kg of milk for the 1st standardized lactation, i. e. 29.17 % and 33.85 %, respectively. For the 2nd lactation the percentage was the same for the categories of 3 001 - 3 500 and 3 501 - 4 000 kg of milk.

Table 1

Percentual distribution of experimental dairy cows according to their milk yield during a standardized lactation

Group	Number of animals studied	Milk yield in kg in the 1st lactation				
		2500	2501-3000	3001-3500	3501-4000	4001
CR	62	-	25.8	25.8	30.7	17.7
C	48	22.9	29.2	20.8	27.1	-
CA	65	13.9	33.9	29.2	23.1	-
		Milk yield in kg in the 2nd lactation				
CR	44	-	22.7	27.3	27.3	22.7
C	31	16.1	29.0	22.6	16.1	16.1
CA	41	14.6	31.7	29.3	24.4	-
		Milk yield in kg in the 3rd lactation				
CR	32	-	6.3	15.6	43.8	34.4
C	19	-	15.8	36.8	21.1	26.3
CA	34	-	11.8	29.4	44.1	14.7

Table 2

Results of performance testing of dairy cows of the individual breeding groups according to standardized lactations

Group	Number of animals	Milk in kg	Fat %	Fat kg	Index of persistence
1st lactation					
CR	62	3446.1	4.06	139.11	73.61
C	48	2964.0	3.90	115.19	76.83
CA	65	3094.9	4.11	127.06	76.94
2nd lactation					
CR	44	3577.0	4.23	151.16	66.95
C	31	3243.8	4.13	133.81	67.23
CA	41	3116.8	4.18	129.71	67.49
3rd lactation					
CR	32	3885.3	4.16	161.34	65.25
C	19	3603.5	4.10	147.95	68.00
CA	34	3558.2	4.37	155.85	67.15

i. e. 43.75 % and 44.12 %, respectively. The highest representation of group C was in category 3 001 - 3 500 kg of milk, i. e. 36.84 %.

Due to culling, the number of animals investigated decreased in the following individual lactations.

Tab. 2 shows the results of performance testing of dairy cows of the individual breeding groups according to the sequence of lactation. The highest average amount of milk for the 1st lactation was observed in CR (3 446.05 kg); CA crosses produced by 351.13 kg of milk less and group C by 482.09 kg of milk less than the CR crosses. Tab. 3 shows the results of statistical evaluation. Fat content was the highest in CR crosses, i. e. 4.11 %; the fat content in the CR and C groups was by 0.05 % and 0.21 % lower, respectively, than that of the CA crosses. From the aspect of the total amount of fat for the 1st lactation, the highest value was found in the CR crosses, i. e. 139.11 kg; in the CA crosses and group C, the amount of fat was by 12.05 kg and 23.92 kg of fat lower, respectively, than in the CR crosses. The index of persistence in all the breeding groups CR (73.61), C (76.83) and CA (76.94) shows that the grade of persistence is good an that the course of the lactation curve is normal.

During the 2nd lactation, the CR crosses produced 3 577.00 kg of milk, group C produced by 333.23 kg less and the CA crosses by 460.19 kg less than group CR. Tab. 4 gives the results of statistical analyses. The fat content was the highest in the CR crosses, i. e. 4.23 %, in CA crosses and group C it was by 0.05 % and 0.10 % lower, respectively. The total amount of fat in kg was 151.16 kg in the CR crosses and as compared with them it was by 17.35 kg and 21.45 kg lower in group C and CA crosses, respectively. The index of persistence for the 2nd lactation in all the breeding groups ranged between 66.95 in the CR group and 67.49 in CA, which gives evidence that the level of persistence is not very satisfactory and that the lactation curve is very steep.

During the 3rd lactation, the CR crosses produced 3 885.31 kg of milk, group C produced by 281.78 kg less and the CA crosses by 327.07 kg less than the CR crosses. Tab. 5 also gives the result of statistical analyses. The highest fat content in per cent - 4.37 % - was found in the CA crosses and compared with them it was by 0.21 % and 0.27 % lower in the CR crosses and group C, respectively. The highest amount of fat in kg was produced by the CR crosses - 161.34 kg, followed by the CA crosses and group C which produced by 5.49 kg and 13.39 kg of fat less than the CR crosses, respectively. The values of the index of persistence in all the breeding groups compared again gave evidence of the fact that the level of persistence was not very satisfactory and that the lactation curve was very steep.

Results of statistical analysis of an average amount of milk for the individual standardized lactations within the experimental groups are given in Tab. 6.

Within the individual breeding groups, the occurrence of abnormal lactations according to their sequence was compared, as can be seen in Tab. 7. Lactations shorter than 250 days were taken as abnormal. In group CR, the highest per cent of abnormal

Table 3
Milk yield during 1st lactation
(mathematical-statistical characteristics, F - test and t - test)

Index	Group	Number of an.	$\bar{x}$	SD	SEM	v %	F - test value	F - test significance	Groups compared	t - test value	t - test significance
milk in kg	CR	62	3446.1	648.0	82.3	18.2			CR:C	3.989	++
	C	48	2964.0	581.8	83.97	19.6	9.025	++	CR:CA	3.085	++
	CA	65	3094.9	624.5	77.5	20.2			C :CA	1.119	-
fat in %	CR	62	4.06	0.40	0.05	9.98			CR:C	2.441	++
	C	48	3.90	0.26	0.04	6.65	6.099	++	CR:CA	0.820	-
	CA	65	4.11	0.30	0.04	7.37			C :CA	3.946	++
fat in kg	CR	62	139.1	25.84	3.28	18.58			CR:C	5.048	++
	C	48	115.19	22.47	3.24	19.51	12.375	++	CR:CA	2.607	++
	CA	65	127.06	25.83	3.20	20.33			C :CA	2.528	++
index of persist.	CR	62	73.61	10.75	1.37	14.60			CR:C	1.491	-
	C	48	76.83	11.58	1.67	15.07	1.935	-	CR:CA	1.848	-
	CA	65	76.94	9.35	1.16	12.15			C :CA	0.054	-

++ P< 0.01

Table 4
Milk yield during 2nd lactation
(mathematical-statistical characteristics, F - test and t - test)

Index	Group	Number of an.	$\bar{x}$	SD	SEM	v %	F - test value	F - test significance	Groups compared	t - test value	t - test significance
milk in kg	CR	44	3577.0	657.95	99.19	18.39			CR:C	2.075	+
	C	31	3243.8	699.76	125.68	21.57	5.351	++	CR:CA	3.253	++
	CA	41	3116.8	628.65	98.18	20.17			C :CA	0.797	-
fat in %	CR	44	4.23	0.37	0.06	8.66			CR:C	1.320	-
	C	31	4.13	0.26	0.04	6.40	1.036	-	CR:CA	0.802	-
	CA	41	4.18	0.26	0.04	6.12			C :CA	0.752	-
fat in kg	CR	44	151.16	28.97	4.37	19.17			CR:C	2.445	++
	C	31	133.81	31.07	5.58	23.22	6.749	++	CR:CA	3.640	++
	CA	41	129.71	24.31	3.80	18.74			C :CA	0.619	-
index of persist.	CR	44	66.95	11.08	1.67	16.55			CR:C	0.115	-
	C	31	67.23	8.47	1.52	12.59	0.030	-	CR:CA	0.237	-
	CA	41	67.49	9.48	1.48	14.05			C :CA	0.120	-

+ P< 0.05 ++ P< 0.01

Table 5
Milk yield during 3rd lactation
(mathematical-statistical characteristics, F - test and t - test)

Index	Group	Number of an.	$\bar{x}$	SD	SEM	v %	F - test value	F - test significance	Groups compared	t - test value	t - test significance
milk in kg	CR	32	3885.31	754.92	133.45	19.43			CR:C	1.335	-
	C	19	3603.53	640.02	146.83	17.76	2.223	-	CR:CA	1.999	-
	CA	34	3558.24	542.22	92.98	15.24			C :CA	0.286	-
fat in %	CR	32	4.16	0.46	0.08	11.15			CR:C	0.553	-
	C	19	4.10	0.26	0.06	6.28	4.220	+	CR:CA	2.179	+
	CA	34	4.37	0.28	0.05	3.41			C :CA	3.412	++
fat in kg	CR	32	161.34	30.05	5.31	18.63			CR:C	1.500	-
	C	19	147.95	30.55	7.00	20.65	1.219	-	CR:CA	0.765	-
	CA	34	155.85	27.36	4.89	17.55			C :CA	0.947	-
index of persist.	CR	32	65.25	6.28	1.46	12.68			CR:C	1.124	-
	C	19	68.00	8.28	1.90	12.18	0.621	-	CR:CA	0.813	-
	CA	34	67.15	10.24	1.76	15.25			C :CA	0.303	-

+ P< 0.05 ++ P< 0.01

Table 6

Comparison of milk yield according to sequence of lactations in the individual breeding groups

Index	Group	sequence of lactations	n	$\bar{x}$	Lactations compared	t - test value	t - test significance
milk in kg	CR	I	62	3446.05	I : II	1.009	-
		II	44	3577.00	I : III	2.909	++
		III	32	3885.31	II : III	1.869	-
	C	I	48	2963.96	I : II	1.901	-
		II	31	3243.77	I : III	3.881	++
		III	19	3603.53	II : III	1.785	-
	CA	I	65	3094.92	I : II	0.174	-
		II	41	3116.81	I : III	3.626	++
		III	34	3558.24	II : III	3.177	++
fat in %	CR	I	62	4.06	I : II	2.220	+
		II	44	4.23	I : III	1.105	-
		III	32	4.16	II : III	0.693	-
	C	I	48	3.89	I : II	3.826	++
		II	31	4.13	I : III	2.866	++
		III	19	4.10	II : III	0.373	-
	CA	I	65	4.11	I : II	1.114	-
		II	41	4.18	I : III	4.095	++
		III	34	4.37	II : III	3.106	++
fat in kg	CR	I	62	139.11	I : II	2.215	+
		II	44	151.16	I : III	3.694	++
		III	32	161.34	II : III	1.469	-
	C	I	48	115.19	I : II	3.047	++
		II	31	133.81	I : III	4.757	++
		III	19	147.95	II : III	1.540	-
	CA	I	65	127.06	I : II	0.521	-
		II	41	129.71	I : III	5.100	++
		III	34	155.85	II : III	4.320	++
index of persistence	CR	I	62	73.61	I : II	3.075	++
		II	44	66.95	I : III	3.610	++
		III	32	65.25	II : III	0.722	-
	C	I	48	76.83	I : II	3.931	++
		II	31	67.23	I : III	2.986	++
		III	19	68.00	II : III	0.298	-
	CA	I	65	76.94	I : II	4.993	++
		II	41	67.49	I : III	4.736	++
		III	34	67.15	II : III	0.146	-

\+ $P < 0.05$
++ $P < 0.01$

Table 7

Percentage of abnormal lactations in the experimental groups

Sequence of lactations	Number of calved cows	Normal lactations	Abnormal lactations	% of abnormal lactations	Test of difference in two relative values	
CR group						
I	83	62	21	25.30	I : II	1.575 -
II	70	44	26	37.14	I : III	2.037 +
III	55	32	23	41.81	II : III	0.535 -
C group						
I	64	48	16	25.00	I : II	1.194 -
II	48	31	17	35.42	I : III	1.373 -
III	31	19	12	38.70	II : III	0.297 -
CA group						
I	82	65	17	27.73	I : II	1.009 -
II	57	41	16	28.07	I : III	0.894 -
III	47	34	13	27.66	II : III	0.057

\+ $P < 0.05$

Test of difference in two relative values among groups

1st lactation		2nd lactation		3rd lactation	
CR : C	0.042 -	CR : C	0.222 -	CR : C	0.281 -
CR : CA	0.702 -	CR : CA	1.073 -	CR : CA	1.497 -
C : CA	0.616 -	C : CA	0.771 -	C : CA	1.028 -

Table 8

Comparison of the investigated groups with CR crosses raised at the Bartošovice farm

Index	CR		C		CA		CR(B)		Groups compared	t-test	
	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$	n	$\bar{x}$		value	signific.
milk in kg	62	3446.05	48	2963.96	65	3094.92	36	3291.72	CR:CR(B)	0.64	-
									C :CR(B)	2.57	++
									CA:CR(B)	1.57	-
fat in %	62	4.06	48	3.90	65	4.11	36	3.94	CR:CR(B)	1.55	-
									C :CR(B)	0.61	-
									CA:CR(B)	2.66	++
fat in kg	62	139.11	48	115.19	65	127.06	36	128.81	CR:CR(B)	2.02	+
									C :CR(B)	2.80	++
									CA:CR(B)	0.35	-
index of persistence	62	73.61	48	76.83	65	76.94	36	77.03	CR:CR(B)	1.63	-
									C :CR(B)	0.09	-
									CA:CR(B)	0.05	-
% of abnormal lactations		25.30		25.00		20.73		25.00	CR:CR(B)	0.04	-
									C :CR(B)	0	-
									CA:CR(B)	0.52	-

\+ $P < 0.05$ ++ $P < 0.01$

lactations was 41.81 % in the 3rd lactation, and the lowest in the 1st lactation - 25.30 %. In group C, the highest per cent of abnormal lactations was 38.70 % in the 3rd lactation and the lowest in the 1st lactation - 25.00 %. In group CA, the highest per cent of abnormal lactations was 28.07 % in the 2nd lactation and the lowest in the 3rd lactation - 27.66 %.

The experimental groups CR, C and CA were compared with the control group of contemporaries, CR crosses (B) raised in a different environment on their 1st lactation. Tab. 8 gives the results of this comparison. Milk yield was the highest in the experimental group CR and averaged 3 446.05 kg of milk, the CR (B) group produced by 154.33 kg of milk less. The fat percentage was the highest in CA crosses (4.11 %), in the CR group (B) it was by 0.17 % lower. The total amount of fat in kg was the highest in the CR crosses - 139.11 kg, in the CR group (B) it was by 10.30 kg lower. The index of persistence of the three breeding groups investigated did not considerably differ from the index of persistence of the CR crosses (B) where the value was 77.03 %, showing a good level of persistence and a normal course of the lactation curve. As concerns the occurrence of abnormal lactations, no differences were found between the experimental groups and group CR (B).

Fig. 1 compares the milk yield of the three breeding groups investigated with that of their mothers. Comparisons of the group of CR crosses with their mothers in the average milk yield of the individual lactations were all in favour of the experimental group of CR crosses. A highly significant difference between the experimental group CR and their mothers was observed only in the 1st lactation. In group C, the average milk yield was again higher than in their mothers. There is a highly significant difference also in the 1st lactation. In CA crosses, the average amount of milk in kg in all lactations is lower than in their mothers. There is a significant difference in the 1st and 3rd lactation and a highly significant difference in the 2nd lactation in favour of the mothers. The mothers of the CA crosses were dairy cows whose milk yield was above the average of the herd. They were stanchion housed on litter under optimal conditions of nutrition. In the comparative experiment, their CA daughters were stanchion housed

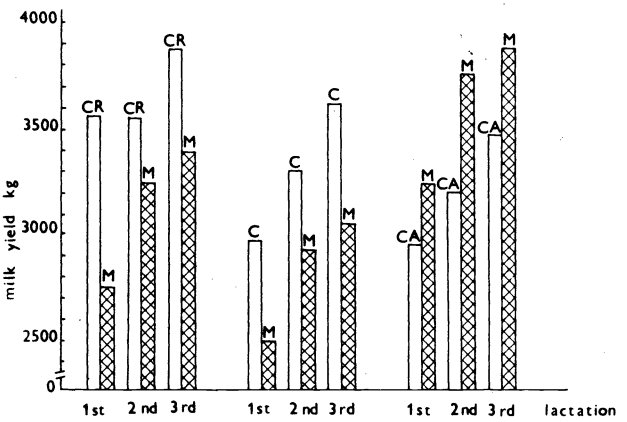

Fig. 1. Comparison of the milk yield of breeding groups investigated with that of their mothers.

together with other groups of C and CR with a dung grid and under different nutrition. In such changed conditions their is a relative decrease in the performance of CA daughters as compared with their mothers.

Discussion

The crossing of the Bohemian Pied breed with dairy breeds was to accelerate the improvement process in order to increase milk production and also to improve the morphological and physiological properties of the milk gland. The aim of this improvement process was to form a combined performance type with a predominating milk yield.

According to Suchánek et al. (1982), milk production of the CA crosses in the 1st lactation was higher in 1970 by 384 kg and by 241 kg of milk in 1980 as compared with the Czech Red Pied breed. The authors explains that this decrease in the difference of the yield is due to the fluctuating proportion of CA crosses and quicker increase of yield in cows of the Czech Red Pied breed in the course of the experimental years.

Many authors dealt with the evaluation of milk yield of the CA crosses as compared with contemporaries of the Bohemian Pied breed. Suchánek et al. (1972), Suchánek (1973, 1978, 1980, 1982), Ulrych and Suchánek (1981) stated that milk yield in the CA crosses was higher by 220 - 993 kg of milk and fat content was higher by 0.01 - 0.06 % of fat as compared with dairy cows of group C.

In the group of CA crosses investigated in the present study, milk production was found to increase with further lactations as well as the fat percentage. When comparing milk production of the CA crosses with dairy cows of group C, the difference in milk production for the 1st lactation was 130.96 kg in favour of the CA crosses, in the 2nd and 3rd lactations in favour of group C. Fat percentage in the 1st lactation was by 0.21 % higher in the CA crosses, in the 2nd lactation by 0.05 % and in the 3rd lactation by 0.27 %. The total amount of fat given in kg was by 11.87 kg higher in the CA crosses in the 1st lactation, in the 2nd lactation by 4.10 kg higher in group C and in the 3rd lactation by 7.90 kg higher in the Ca crosses. The results obtained in the dairy cows investigated showed that milk yield in the 1st lactation was in favour of the CA crosses, however, in the 2nd and 3rd lactations in favour of group C, through it is true that this was statistically insignificant.

If the differences given in the present paper in some of the indices of performance are not quite identical with data of other authors, they can be due to the differences in the breeding groups compared, number of animals, different genetic pool and to many external and internal factors under which were these comparison performed. The relatively favourable results obtained in group C are also the result of selection of cows and the use of improvement bulls.

Suchánek et al. (1975), in his evaluations of the performance indices of the CR crosses, reported that the average amount

of milk produced in the 1st lactation was 4 775 kg and the fat percentage 3.60 %; when evaluated using the CC-test it was by 1 903 kg of milk less and by 0.49 % lower fat percentage than in their contemporaries of group C. Lízal (1979) evaluated the CR 25 crosses which produced 1 292 kg of milk with 3.91 % of fat in 100 lactation days, what is by 159 kg of milk and 5.8 kg of fat more than contemporaries of group C. Suchánek (1980, 1981, 1982, 1983), Suchánek and Golda (1983), Váchal (1983) evaluated milk yield in CR crosses and found that milk production increased by 298 - 625 kg and fat percentage decreased by 0 - 0.10 % as compared with contemporaries of group C. The differences in milk yield did not change considerably with the sequence of lactations.

In the breeding groups of CR crosses investigated in the present study, the fat percentage was higher as compared with group C; so, in accord with the data of Váchal (1983), the fat content of milk did not decrease with the sequence of lactations. The results of milk yield correspond, in essence, with results of other authors and the majority of indices investigated are in favour of the CR crosses. Mutual comparisons of all three breeding groups showed that the CR crosses had the highest milk yield and total amount of fat in kg in all the three lactations. In the 2nd and 3rd lactations, the breeding cows of group C had somewhat higher, if insignificant, performance parametres and thus came close to both of the groups of crosses CR and CA compared. This finding can be explained, on the one hand, by the level of nutrition which was apparently not sufficient for a better manifestation of the genotype in the CR and CA crosses. Within the three groups investigated, the sensitivity and response to the given conditions was the highest because it was mainly in dairy cows with a milk production higher than the average of the group that the condition became worse during maximum lactation.

Similar to Suchánek et al. (1984), none of the groups of CR and CA crosses compared in the present study showed a significant difference in the persistence of the lactation curve $P_{2:1}$ in relation to breeding cows of group C.

Genetický přínos mléčné užitkovosti kříženek českého strakatého plemene s červeným holštýnským a ayrshirským

Kříženky CR dosáhly nejvyšší mléčné užitkovosti ve srovnání s kříženkami CA a plemenicemi C na všech třech laktacích. Rovněž příznivé hodnoty se projevily u kříženek CR v procentuálním obsahu tuku i v celkovém množství tuku. Větší citlivost a reaktivnost na dané podmínky chovu se projevila u kříženek CR zhoršením jejich kondice v době maximální laktace. V indexu persistence $P_{2:1}$ nebylo mezi srovnávanými skupinami zjištěno podstatných rozdílů . Na I. laktaci byl stupeň persistence u všech tří plemenných skupin dobrý s normálním průběhem laktační křivky, zatímco na II. a III. laktaci byla persistence méně uspokojivá se sklonem k příkrému průběhu laktační křivky. Procento nenormálních laktací činilo kolem 25 % na I. laktaci u všech tří plemenných skupin. S postupujícími laktacemi došlo k většímu výskytu

nenormálních laktací u kříženek CR a plemenic skupiny C, zatímco kříženky CA měly procento nenormálních laktací nejmenší. Při srovnání výše mléčné užitkovosti sledovaných plemenných skupin dojnic s užitkovostí matek vykázaly kříženky CR na všech laktacích vyšší mléčnou produkci, přičemž na I. laktaci byl tento rozdíl vysoce průkazný. Obdobný výsledek byl zjištěn u plemenic C, zatímco kříženky CA nedosáhly na všech třech laktacích užitkovosti svých matek.

Генетический вклад в молочную продуктивность помесей чешского пятнистого с красным гольштейнским и айширским племенами

Помеси CR достигли максимальной молочной продуктивности по сравнению с помесями CA и племенными матками C во всех трех лактациях. Благоприятные величины были также установлены у помесей CR в процентном содержании и общем количестве жира. Большая чувствительность и реакционная способность в данных условиях животноводства проявились у помесей CR в ухудшении их кондиции в период максимальной лактации. В индексе персистенции $P_{2:1}$ между сопоставляемыми группами не было установлено существенной разницы. В 1 лактации степень персистенции всех трех племенных групп была хорошая с нормальным протеканием кривой лактации, между тем как во II и III лактации персистенция была менее удовлетворительной с тенденцией к крутому протеканию кривой лактации. Процент ненормальных лактаций достигал около 25% в 1 лактации всех трех племенных групп. В последующих лактациях наблюдается большее количество ненормальных лактаций у помесей CR и племенных маток группы C, между тем как процент ненормальных лактаций у помесей CA был наименьший. Сравнивая уровень молочной продуктивности исследуемых племенных групп дойных коров с производительностью маток, помеси CR отличались в период всех лактаций большей молочной продуктивностью, при этом упомянутая разница в 1 лактации весьма значимой. Аналогичные результаты были установлены у племенных маток C, между тем как помеси CA во всех трех лактациях не достигли продуктивности своих маток.

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