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MILK PERFORMANCE AND BODY TYPE AND BUILD SCORING AS WELL AS BODY CONDITION SCORING OF FIRST-CALF COWS

Beata Sitkowska, Marta Bohaczyk

University of Technology and Life Sciences in Bydgoszcz
Department of Genetics and General Animal Breeding
Faculty of Animal Breeding and Biology
Mazowiecka 28, 85-084 Bydgoszcz

The research was carried out on the grounds of milk performance as well as the traits related to condition, type, and build of first-calf cows from the Kujawsko-Pomorskie province. The research covered the body condition scores of 333 cows as well as build and conformation scores of 645 animals. A group of 135 cows was distinguished from the analyzed cows which met the following criteria: first-calf cows, their first calving took place in 2007, all the animals in their first lactation were scored in the area of their type and build as well as the condition up to the hundredth day of lactation. The highest productivity of milk and its components was found in cows with the highest type and build scores. A negative relation between body condition scoring and first-calf cow milk performance results as well as cow type and build scoring was found. High and positive correlations between build general scoring and partial scoring pertaining to conformation were found.

Keywords: milk productivity, cow type and build scoring, cow body condition

1. INTRODUCTION

Conformation traits are not directly connected with cow milk productivity, however, their indirect influence has been found. Most of the available research results indicate that there is a positive relation between the elements of conformation and cow milk performance [1, 2, 5, 6, 7]. An animal of appropriate build of legs and rump is used longer in a herd. Appropriately built and capacious udder as well as its correct attachment means a possibility of producing more milk, easier machine milking as well as a smaller risk of injuries or dangerous udder diseases [11].

Consistent growth of milk productivity of cows sets higher requirements pertaining to maintenance, care, nutrition, and proper disease prevention they need. Examination of the body condition of cows carried out regularly is one of the superior methods enabling the monitoring of nutrition, reproduction, and state of health of the animals [1].

The purpose of this study was to present the results of utility of first-calf cows, originating from a leading farm of the Kujawsko-Pomorskie province, together with their type and build scoring as well as body condition scoring.

2. MATERIAL AND METHODS

The research covered the body condition scores of 333 cows as well as build and conformation scores of 645 animals. A group of 135 cows was distinguished from the analyzed cows which met the following criteria: first-calf cows, their first calving took place in 2007, all the animals in their first lactation were scored in the area of their type and build as well as the condition up to the hundredth day of lactation.

The following categories were considered in the evaluation of type and build of the cows: calibre and capacity, type and build, legs and hooves, udder as well as general evaluation. The following traits related to milking capacity of the first-calf cows were considered: productivity of milk, productivity and content of fat and protein in milk.

Conformation of the animals was evaluated in accordance with the Institute of Animal Production regulations (2004) in the period of 15 – 180 days after calving. Each category was scored between 50 and 100. The presented body condition assessment was carried out in the 5-point Wildman et al. scale [13]. The data came from milking cows used in the leading farm of the Kujawsko-Pomorskie province in identical environmental conditions. The cows were divided into categories with regard to type, build, and condition scores depending on the number of points they had scored. The first-calf cows of the first category of body condition scores (up to 3 points) were evaluated in view of their condition up to the hundredth day of lactation.

Numeric data came from the SYMLEK system and were prepared statistically by means of a variance analysis in the Statistica PL application [10]. A relation between evaluation categories pertaining to type, build, and body condition of cows and milk performance in the first lactation was studied. Significance of differences in the area of levels of the studied factors was described by means of Tukey's test [10]. Correlation coefficients between milk performance, type and build scoring and body condition of the cows were calculated.

3. RESULTS

While examining the relation between condition and build of the cows and productivity of the first lactation it was found that there is a significant connection between evaluation of calibre, udder as well as general evaluation and most of the researched traits of milk performance in the first lactation (Table 1). No statistically confirmed relation was found between the evaluation category referring to the condition of cows and the productivity of first-calf cows (Table 1).

While analyzing the results pertaining to milking capacity of the cows it was found that the first-calf cows belonging to the second category, the type and build of which were scored higher, produced more milk, fat, and protein in lactation (Table 2). The differences in compared groups often turned out to be statistically significant and highly

significant. The animals in the condition up to 3 points produced more milk and fat than the cows in better body condition. These differences were not confirmed as statistically significant (Table 2). More protein was found in milk of the cows in better body condition, the differences between the groups turned out to be statistically significant (Table 2).

Table 1. Value of F_{emp} and the level of the effect of the factors studied and dairy milk yield in first lactation

Tabela 1. Wartość F_{emp} oraz istotność zależności pomiędzy badanymi czynnikami a wydajnością mleka w pierwszej laktacji

Factor Czynnik	Trait – Cecha				
	Milk Mleko	Fat Tłuszcz		Protein Białko	
	[kg]	[kg]	[%]	[kg]	[%]
Condition Kondycja	3.03	2.38	0.56	4.59	0.31
Calibre Kaliber	15.10***	6.02**	5.70**	9.62**	7.40**
Type and conformation Typ i budowa	8.74***	2.70	4.23*	4.38*	7.80**
Legs and hooves Nogi i racice	4.76*	3.73	1.01	6.14*	0.01
Udder Wymię	12.00***	10.83***	1.98	10.34***	2.18
General score Ocena ogólna	24.73***	15.98***	5.80**	22.40***	2.92

*** – $P \leq 0.001$; ** – $P \leq 0.01$; * – $P \leq 0.05$

Table 2. Relationship between milk performance and overall conformation score

Tabela 2. Zależność pomiędzy użytkowością mleczną a oceną za pokrój

Evaluation of cows Ocena krów			Trait – Cecha				
			Milk Mleko	Fat Tłuszcz		Protein Białko	
Category (pts) – Kategoria (pkt)		n	[kg]	[kg]	[%]	[kg]	[%]
Condition	≤ 3	47	9859.10	377.23	3.86	314.98[a]	3.20
Kondycja	> 3.	88	9348.90	362.31	3.92	396.70[a]	3.18
Calibre	< 84	67	9002.60[A]	356.27[A]	4.00[A]	290.60[A]	3.23[A]
Kaliber	≥ 84.	68	10043.00[A]	378.57[A]	3.80[A]	315.35[A]	3.15[A]
Type and conformation	< 82	66	9112.9[A]	359.77	3.99[a]	294.36[a]	3.24[A]
Typ i budowa	≥ 82.	69	9922.2[A]	374.90	3.82[a]	311.39[a]	3.15[A]
Legs and hooves	< 80	51	9137.80[a]	356.14	3.96	290.22[a]	3.19
Nogi i racice	≥ 80.	84	9762.60[a]	374.40	3.87	310.87[a]	3.19
Udder	< 79	47	8885.40[A]	347.38	3.98[a]	285.55	3.22[A]
Wymię	≥ 79.	88	9869.00[A]	378.25	3.86[a]	312.42	3.17[A]
General score	< 80	44	8599.10[A]	342.27[A]	4.05[A]	277.05[A]	3.24
Ocena ogólna	≥ 80.	91	9975.00[A]	379.70[A]	3.84[A]	315.65[A]	3.17

[AA, aa] – values marked with the same capital are significantly different at $P \leq 0.01$ ($P \leq 0.05$)

[AA, aa] – wartości oznaczone tymi samymi literami różnią się od siebie istotnie przy $P \leq 0{,}01$ ($P \leq 0{,}05$)

A relation between body condition scoring and conformation scoring of the cows was tried to be analyzed and no statistical relation between body condition and build indices of the cows was found, the value was close to zero (Table 3). It is possible that the found relations resulted from various moments both evaluations had been made at. High and positive correlations between build general scoring and partial scoring pertaining to conformation were found. Also a very strong relation between type and build scoring and cow calibre scoring was found (Table 3).

A negative correlation between cow body condition scores and remaining researched traits of milk performance was found with the only exception of percentage of fat and protein in milk, the value close to zero (Table 3). All the type and build scoring was positively correlated with the productivity of milk, fat and protein in milk of first-calf cows. Negative relations between type and build scoring and fat and protein content in milk were found (Table 3).

Table 3. Correlation between condition and overall conformation score

Tabela 3. Korelacje pomiędzy kondycją a oceną za pokrój

Trait Cecha		$\overline{x}$	S_x	Condition Kondycja	Calibre Kaliber	Type and conformation Typ i budowa	Legs and hooves Nogi i racice	Udder Wymię	General score Ocena ogólna
				n					
				333	645	645	645	645	645
Condition Kondycja		3.42	0.15						
Calibre Kaliber		84.10	3.72	0.021					
Type and conformation Typ i budowa		81.02	2.76	0.039	0.748**				
Legs and hooves Nogi i racice		79.22	3.48	0.014	0.164**	0.318*			
Udder Wymię		79.88	2.87	0.014	0.357**	0.437**	0.196**		
General score Ocena ogólna		80.38	2.48	0.039	0.549**	0.663**	0.864**	0.531**	
Milk Mleko (kg)		9526.54	1634.51	–0.074	0.367**	0.301**	0.217**	0.255**	0.368**
Fat	kg	367.50	53.76	–0.005	0.247**	0.220**	0.149	0.162	0.241**
Tłuszcz	%	3.90	0.48	0.095	–0.236**	–0.169**	–0.144	–0.191**	–0.256**
Protein	kg	303.06	47.83	–0.074	0.301**	0.259**	0.217**	0.244**	0.338**
Białko	%	3.19	0.19	0.009	–0.259**	–0.183**	–0.041	–0.093	–0.165

** – $P \leq 0.01$; * – $P \leq 0.05$

4. DISCUSSION

The in-house studies confirm the results achieved by Juszczak [6], who claimed that bigger growth performance of cows is a trait positively connected with productive capabilities of the animals. An appropriate type and build of a cow boosts its production

and helps to achieve good health and longevity. A high productivity cow should have an excellent udder as well as strong legs and hooves [11]. Guliński [2] in his study claimed that beside leg and hoof evaluation, traits positively related to milk production capacity included the remaining elements of general evaluation of cows. Nogalski [8], while studying the relations between cow body dimensions and productivity of milk and fat and protein content, observed low and mostly positive coefficients of phenotype correlations.

Puchajda et al. [9] found low and mostly negative correlation coefficients between traits of milk performance and cow body dimensions. Only in the case of productivity of fat and width in the ischiadic tubers, a low but significant relation was found [9]. This was not confirmed by the presented results of the in-house studies.

According to Trela et al. [11], build and conformation scoring is an important tool in the husbandry work, as it provides additional information on an animal, its predisposition to higher productivity, longevity as well as beneficial changes in animal silhouette in every generation. According to Januś [4], body condition and daily productivity of milk were significantly influenced by the following factors: a farm, period of nutrition, level of daily productivity, stage after calving, another lactation, and genotype. Januś and Borkowska [5] showed that throughout the lactation the body condition of cows depends on the age and season of calving. First-calf cows and cows calved in the autumn-winter season were found to demonstrate a smaller loss of condition at the beginning of lactation and slower recovery in the following period [4]. Also Jankowska and Sawa [3] claimed that cow body condition is significantly influenced by the level of milk production in a farm, genotype of the animals, stage of lactation, age of the animals, and season the evaluation is made in.

The majority of available literature gives examples of positive relations between cow body condition scoring and their milk usability and the in-house studies do not correspond with these results. Waltner et al. [12] observed the highest production in the case of cows of medium fatty cover reserves at calving and the lowest at the head of extreme condition. Also Nogalski [9], while analyzing the productivity of ECM milk at standard lactation, found that cows of body condition in the range from 3.25 to 3.75 points produced most milk, fat, and protein. According to Wildman et al. [13], Body Condition Scoring (BCS) is a subjective measure of fat reserves used for assessing the correctness of nutrition and state of health of the animals [13]. Januś [4], on the basis of her studies, claims that she found the lowest condition scores < 2.0 at cows in the first month after calving, 4 plus scores were usually given to dried off cows or cows in late lactation.

At present, in Poland economic reasons as well as applied production technologies require carrying out the scoring of new traits which will enable longer and more effective use of the animals [11]. High production of milk in the country encourages breeders to work more on functional traits of cows, which influence production costs to be lower. Working on dairy cattle husbandry comprises developing production and functional traits [7]. A Productivity and Functionality (*Polish*: Produkcyjność i funkcjonalność – PF) general index has been in use since the 2007/1 assessment for dairy cattle, presented in animal catalogues and containing a conformation subindex.

5. CONCLUSIONS

1. In the in-house studies it was found that most milk and its components was obtained from cows of high type and build scores.
2. A negative relation between body condition scoring and milk performance of first-calf cows was found. The presented fact may result from too small population considered in the studies or subjective body condition scoring.
3. Studies on a relation between body condition scoring and milk performance should be extended with additional factors and repeated on a bigger population of cattle of the Kujawsko-Pomorskie province.

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UŻYTKOWOŚĆ MLECZNA A OCENA TYPU I BUDOWY ORAZ KONDYCJI KRÓW PIERWIASTEK

Streszczenie

Badania przeprowadzono na podstawie użytkowości mlecznej oraz cech związanych z typem i budową 645 krów pierwiastek z województwa kujawsko-pomorskiego. Pod uwagę wzięto również wyniki oceny 333 krów. Wyodrębniono grupę 135 krów pierwiastek, których data pierwszego wycielenia przypadała na 2007 r. Najwyższą wydajnością mleka i jego składników cechowały się krowy z najwyższymi ocenami typu i budowy. Stwierdzono istnienie ujemnej zależności między oceną kondycji a wynikami użytkowości mlecznej pierwiastek, a także wysokie, dodatnie korelacje między ogólną oceną za budowę oraz ocenami za pokrój.

Słowa kluczowe: wydajność mleka, ocena typu i budowy krów, kondycja krów