

## PRODUCTIVITY OF SIMMENTAL AND MONTBÉLIARDE COWS CULLED IN 2005–2016 TAKING INTO ACCOUNT THE REASONS FOR THEIR CULLING

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### ABSTRACT

The aim of the study was to compare selected characteristics of the lifetime productivity and longevity of Simmental (SIM) and Montbéliarde (MO) cows, taking into account the reasons for their culling. The analysis included a total of 812 cows (635 SIM and 177 MO) from the Parzniew evaluation region, culled in 2005–2016 after having completed at least one 305-day lactation. The study showed that milk production in Simmental cows began slightly later than in the Montbéliarde breed (886 vs. 878 days). At the same time, they were used longer and lived longer, but were inferior to MO cows in terms of yield of milk and its constituents, per lactation and for their entire productive life. Milk from SIM cows was also found to have higher content of fat and dry matter. Analysis of the reasons for culling showed that Simmental cows were most often culled due to sterility and reproductive disease (35%), while in Montbéliarde cows the main causes were poor yield and udder disease (30.5%) and random causes and other causes (30.5%). In both breeds, the least common cause of culling was old age (6.2% in SIM and 2.8% in MO).

**Key words:** culling, longevity, lifetime yield, cattle breed, milk composition

### INTRODUCTION

Owing to intensive breeding work on cattle and improvement of environmental conditions, an impressive increase in the milk productivity of cows has been achieved, and average annual yield of 8 or 10 thousand kg of milk is currently noted in many countries, as well as on many farms in Poland [Neja et al. 2013, Mohd Nor et al. 2014, PFCB&DF 2017]. However, yields exceeding 10,000 kg of milk have been associated with previously unknown problems with fertility, general health and the length of cows' life and productive life [Lucy 2007, Mohd Nor et al. 2014].

The length of life and length of productive life of cows are indicators that can be considered from the point of view of both genetic improvement and the profitability of milk production [Novaković et al. 2014]. Both an excessively short and an excessively long productive life are unfavourable in terms of the economic effectiveness of milk production. According to Ziętara et al. [2013], the optimal milk production period for cows should be

between 5 and 8 lactations. According to Mostert et al. [2001], cows should be used for at least four lactations. A reduction in the productive life increases production costs, e.g. for rebuilding the herd. A short production period means that the cow produces less offspring and its genetic potential is not fully developed [Nienartowicz-Zdrojewska 2008, Archer et al. 2014].

In order to extend the productive life of dairy cows, the risk of culling must be minimized. By analysing its causes we can assess the quality of the breeding work carried out in the herd [Zajac-Mazur 2007]. Hence there is a need for reliable records of the causes of culling, allowing for later analyses of culling and of the effects of breeding work in the herd. The causes of culling of cows can be divided into intended (economic) and random – not intended by the breeder [Krausslich 2003, Pokorska et al. 2012, Pawlina et al. 2015]. An analysis carried out by Morek-Kopeć and Żarnecki [2009] showed that the percentage of unintended culling in the Polish Black-and-White Holstein-Friesian cattle population was 68% in the years 1995–2002, and had increased to 86% by 2007.

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The aim of the study was to analyse selected features of the lifetime productivity of Simmental and Montbéliarde cows culled in the years 2005–2016, taking into account the reasons for their culling.

## MATERIAL AND METHODS

The study used information pertaining to 812 cows, including 635 of the Simmental breed (SIM) and 177 of the Montbéliarde breed (MO). The data, which included the productivity of cows and reasons for culling in the Parzniew assessment region, were obtained from SYMLEK breeding documentation kept by the Polish Federation of Cattle Breeders and Milk Producers. The analysis included cows culled in the years 2005–2016 after completing at least one 305-day lactation. The following were analysed:

- age at first calving (days),
- length of life (days),
- number of lactations,
- yield per lactation and lifetime yield, including yield (kg) of milk, fat, protein, lactose and dry matter and the percentage content of these constituents in the milk.

The following groups were distinguished according to causes of culling: low yield and udder disease, old age, sterility and reproductive disease, limb diseases and metabolic diseases, and random causes and other causes. This division was used for the purposes of statistical analysis, and certain reasons for culling were combined in one group due to their low frequency.

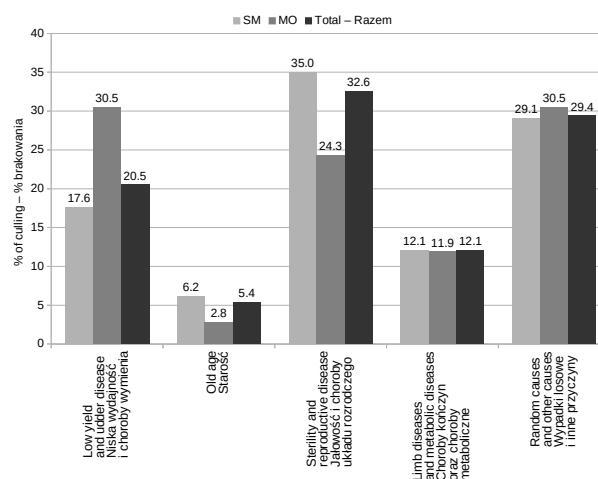
The results obtained were analysed statistically using Statistica ver. 13.1 software. The significance of differences between means for groups of cows was determined by the Tukey test. The chi-square test was used to verify the hypothesis concerning the effect of breed on the frequency of the reasons for culling.

## RESULTS AND DISCUSSION

The data in Figure 1 show that the most common cause (32.6%) of cow culling from herds during the period analysed was sterility and reproductive disease. Other causes were much less common, with the second being random causes and other causes (29.4%). The percentage of culling due to old age was the lowest and amounted to 5.4%.

Cows of the two breeds were found to differ in the distribution of causes of culling. As in the case of all the cows together, in the Simmental breed culling due to sterility and reproductive disease was the most common, and the percentage of cows culled due to old age was the lowest (35.0% and 6.2% respectively). In the case of Montbéliarde cows, the main causes of elimination from the herd were low yield and udder disease (30.5%) and

random causes and other causes (30.5%), while the least common cause, as in the case of the Simmental breed, was old age (2.8%). Limb diseases and metabolic diseases in both breeds were the cause of culling at a similar frequency of around 12%. A study by Hoerning et al. [2005] on Simmental cows confirms that sterility and reproductive disease were the most common health problems. According to Gołębiewski [2007], the main reason for culling of Montbéliarde cows was udder disease. Research by Jovanovac and Raguž [2011] showed that five udder conformation features of the Simmental cows had a significant impact on their longevity. Cows that obtained lower scores for the median suspensory ligament, length of rear quarters, udder depth and teat thickness were culled about 1.5 to 2.0 times more often than those with scores of 4 or higher. It was also observed that cows with lower scores for the length of the front quarters were culled less frequently.



**Fig. 1.** Causes of culling of cows depending on the breed ( $\chi^2 = 18.9$ ; value significant at  $P \leq 0.01$ )

**Rys. 1.** Przyczyny brakowania krów w zależności od rasy ( $\chi^2 = 18,9$ ; wartość istotna przy  $P \leq 0,01$ )

Age at first calving is one of the factors that determines the fertility and length of productive life in cows. Adamczyk et al. [2016] showed that cows that calved at a younger age achieved greater lifetime milk yield, but this was associated with earlier culling. Research by Bogucki [2017] also indicates that the lifespan of cows shows a clear tendency to increase with the delay in first calving. According to Szewczuk et al. [2015], the most favourable age for first calving for the Simmental breed is over 30 months. In the present study, the productive life of cows of this breed began on average at 886 days of age (Table 1). This was about 8 days later than in the Montbéliarde breed (878 days). According to PFCB&DF [2017], in 2016 the average age at the first calving of Simmental cows was 868 days, which was one day later than in 2015.

**Table 1.** Age at first calving and lifetime performance traits of Simmental and Montbéliarde cows

**Tabela 1.** Wiek przy I wycieleniu i cechy użyteczności życiowej krów rasy simentalskiej i montbeliarde

Characteristics Cechy		Breed – Rasa		Razem – Total (n = 812)
		SIM (n = 635)	MO (n = 177)	
Age at first calving, days	$\bar{x}$	886	878	884
Wiek przy I wycieleniu, dni	SD	137	110	132
Number of lactations	$\bar{x}$	6.04 <sup>a</sup>	5.31 <sup>b</sup>	5.88
Liczba laktacji	SD	1.78	1.27	1.71
Length of life, days	$\bar{x}$	3144 <sup>a</sup>	2855 <sup>b</sup>	3081
Długość życia, dni	SD	638	507	623

a,b – means in rows with different superscript letters differ significantly at  $P \leq 0.05$ .

a,b – średnie w wierszach oznaczone różnymi literami różnią się istotnie przy  $P \leq 0,05$ .

In Montbéliarde cows, the first calving took place at 867 days of life, which was 21 days earlier than in the previous year.

Simmental cows were used longer than Montbéliarde cows, by 0.7 lactation ( $P \leq 0.05$ ). The average number of lactations was 6.04 in the case of SIM cows and 5.31 in MO. The number of lactations was directly reflected in the longevity of the cows. Simmental cows lived on average 3144 days (8.6 years), and Montbéliarde cows 2855 days (7.8 years). The difference in lifespan was 289 days in favour of the Simmental breed. Litwińczuk and Barłowska [2015] report that according to data from PFCB&DF milk performance inspections, Simmental cows lived on average 6.08 years and Montbéliarde 5.52 years. Strapák et al. [2011], in a study on a population of over 100,000 Slovak Simmental cows, showed that the average productive life of cows of this breed was 1451 days (3.98 years) and depended on the milk yield in the first lactation, age at the first calving, and the genotype of the sire. Simmental cows lived much longer in the Romanian population (7.57 years), and the main reason for their culling was fertility disorders [Cziszter et al. 2017].

According to PFCB&DF [2017], the average lifetime yield of Simmental cows culled in 2016 was 19,772 kg of milk with 4.13% fat and 3.44% protein, while the lifetime yield of culled Montbéliarde cows was 21,157 kg of milk containing on average 3.98% fat and 3.50% protein. Table 2 contains data on the yield of milk and its basic constituents in both breeds of cows during their productive lives and the average chemical composition of the milk obtained during this period. It was shown that MO cows produced 13% more milk (43,947 kg) than SIM cows (38,220 kg). This milk has significantly ( $P \leq 0.05$ ) higher protein content (3.50% vs. 3.44%), which together with the higher milk yield meant that cows of this breed produced 231 kg more protein over their productive lives. On the other hand, milk from Simmental cows contained more fat (4.13%) and dry matter (13.03%) than milk from

Montbéliarde cows. The average lactose content in milk of the two breeds was identical, at 4.78%.

The average milk yield per lactation for MO cows was 7516 kg, which was 1681 kg higher than for SIM cows (Table 3). This means that during one lactation Montbéliarde cows produced 22% more milk than Simmental cows. As in the case of lifetime yield, the milk of Simmental cows had higher content of fat (4.09%) and dry matter (12.98%) than that of Montbéliarde cows. However, the protein concentration in their milk was lower (3.40% vs. 3.47%). In a study by Bujko et al. [2013], the yield of Simmental cows per lactation ranged from 5553.95 to 5764.63 kg of milk, from 223.08 to 235.26 kg of fat and from 186.38 to 193.90 kg of protein. Cziszter et al. [2016] found that in 305 days cows of this breed produced from 5085.3 to 5531.4 kg of milk, in which the fat content ranged from 3.84% to 4.05% and protein content from 3.18% to 3.34%. Nistor et al. [2014] showed that in the first 305-day lactation, Simmental cows produced 4053 kg of milk containing 3.82% fat and 3.12% protein. Research conducted in a herd of Montbéliarde cattle showed that the cows produced on average 9565 kg of milk with a fat content of 4.04% and 3.49% protein [Januś and Borkowska 2011]. Calving between 824 and 915 days of age was conducive to higher milk yield in standard lactations, and fat yield increased with the age at first calving [Januś et al. 2016]. Neja et al. [2013] showed yield of 7125 kg of milk in Montbéliarde cows, with 4.12% fat and 3.49% protein.

Cows of both breeds culled for various reasons did not differ significantly in their age at first calving (Table 4). Both the earliest and the latest ages at first calving were noted in the group of cows culled due to old age, with the earliest calving observed in the Simmental breed (856 days), and the latest calving in the Montbéliarde breed (924 days). The Simmental cows culled for reasons other than old age were calved for the first time at a similar age, between 883 and 892 days. For Montbéliarde cows, these values were more diverse, ranging from 843 day in cows culled due to sterility and reproductive di-

**Table 2.** Lifetime yield and chemical composition of the milk of culled Simmental and Montbéliarde cows

**Tabela 2.** Życiowa wydajność i skład chemiczny mleka brakowanych krów rasy simentalskiej i montbéliarde

Characteristics Cechy		Breed – Rasa		Razem – Total (n = 812)
		SIM (n = 635)	MO (n = 177)	
Milk yield, kg	$\bar{x}$	38.220 <sup>a</sup>	43,947 <sup>b</sup>	39.468
Wydajność mleka, kg	SD	11.701	15,513	12.840
Fat, kg	$\bar{x}$	1576 <sup>a</sup>	1743 <sup>b</sup>	1613
Thuszcz, kg	SD	489	637	529
Fat, %	$\bar{x}$	4.13 <sup>a</sup>	3.96 <sup>b</sup>	4.09
Thuszcz, %	SD	0.37	0.42	0.39
Protein, kg	$\bar{x}$	1315 <sup>a</sup>	1546 <sup>b</sup>	1366
Białko, kg	SD	411	565	458
Protein, %	$\bar{x}$	3.44 <sup>a</sup>	3.50 <sup>b</sup>	3.45
Białko, %	SD	0.19	0.18	0.19
Lactose, kg	$\bar{x}$	1831 <sup>a</sup>	2108 <sup>b</sup>	1892
Laktoza, kg	SD	565	747	619
Lactose, %	$\bar{x}$	4.78	4.78	4.78
Laktoza, %	SD	0.14	0.12	0.14
Dry matter, kg	$\bar{x}$	4985 <sup>a</sup>	5692 <sup>b</sup>	5139
Sucha masa, kg	SD	1527	2023	1672
Dry matter, %	$\bar{x}$	13.03 <sup>a</sup>	12.91 <sup>b</sup>	13.00
Sucha masa, %	SD	0.52	0.52	0.52

a,b – means in rows with different superscript letters differ significantly at  $P \leq 0.05$ .

a,b – średnie w wierszach oznaczone różnymi literami różnią się istotnie przy  $P \leq 0,05$ .

**Table 3.** Mean yield in 305-day lactation and chemical composition of the milk of culled Simmental and Montbéliarde cows

**Tabela 3.** Średnia wydajność za laktację 305-dniową i skład chemiczny mleka brakowanych krów rasy simentalskiej i montbéliarde

Characteristics Cechy		Breed – Rasa		Razem – Total (n = 812)
		SIM (n = 635)	MO (n = 177)	
Milk yield, kg	$\bar{x}$	5835 <sup>a</sup>	7516 <sup>b</sup>	6201
Wydajność mleka, kg	SD	1362	1701	1600
Fat, kg	$\bar{x}$	239 <sup>a</sup>	294 <sup>b</sup>	251
Thuszcz, kg	SD	58	64	63
Fat, %	$\bar{x}$	4.09 <sup>a</sup>	3.94 <sup>b</sup>	4.06
Thuszcz, %	SD	0.36	0.43	0.38
Protein, kg	$\bar{x}$	199 <sup>a</sup>	261 <sup>b</sup>	212
Białko, kg	SD	50	61	58
Protein, %	$\bar{x}$	3.40 <sup>a</sup>	3.47 <sup>b</sup>	3.41
Białko, %	SD	0.19	0.18	0.19
Lactose, kg	$\bar{x}$	281 <sup>a</sup>	362 <sup>b</sup>	298
Laktoza, kg	SD	68	84	79
Lactose, %	$\bar{x}$	4.80	4.81	4.80
Laktoza, %	SD	0.14	0.11	0.13
Dry matter, kg	$\bar{x}$	758 <sup>a</sup>	967 <sup>b</sup>	803
Sucha masa, kg	SD	180	213	207
Dry matter, %	$\bar{x}$	12.98	12.89	12.96
Sucha masa, %	SD	0.50	0.51	0.50

a,b – means in rows with different superscript letters differ significantly at  $P \leq 0.05$ .

a,b – średnie w wierszach oznaczone różnymi literami różnią się istotnie przy  $P \leq 0,05$ .

**Table 4.** Age at first calving and lifetime performance traits of cows depending on the reason for culling

**Tabela 4.** Wiek przy I wycieleniu i cechy użyteczności życiowej krów w zależności od przyczyny brakowania

Causes of culling Przyczyna brakowania	Breed Rasa	n	Age at first calving, days Wiek przy I wycieleniu, dni		Number of lactations Liczba laktacji		Length of life, days Długość życia, dni		Lifetime milk yield, kg Życiowa wydajność mleka, kg	
			$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
			Low yield and udder disease Niska wydajność i choroby wymienia	SIM	112	892	130	4.96 <sup>B</sup>	1.51	3007 <sup>B</sup>
Old age Starość	MO	54	869	97	4.50 <sup>B</sup>	1.30	2937 <sup>B</sup>	581	46.173 <sup>AC</sup>	17.060
Sterility and reproductive disease Jałowość i choroby układu rozrodczego	SIM	39	856	91	6.97 <sup>A</sup>	1.51	3891 <sup>A</sup>	508	50.107 <sup>A</sup>	10.861
	MO	5	924	120	5.20	1.92	3221	687	51.257 <sup>A</sup>	17.595
Limb diseases and metabolic diseases Choroby kończyn oraz choroby metaboliczne	SIM	222	886	143	4.73 <sup>B</sup>	1.83	3126 <sup>B</sup>	626	37.524 <sup>B</sup>	11.584
	MO	43	843	76	4.12 <sup>B</sup>	1.43	2859 <sup>B</sup>	523	44.099	18.452
Random causes and other causes Wypadki losowe i inne przyczyny	SIM	77	898	131	5.13 <sup>B</sup>	1.58	3100 <sup>B</sup>	600	38.663 <sup>BC</sup>	11.320
	MO	21	890	152	4.29 <sup>B</sup>	1.06	2713 <sup>B</sup>	378	40.006	9.921
Random causes and other causes Wypadki losowe i inne przyczyny	SIM	185	883	145	5.02 <sup>B</sup>	1.76	3108 <sup>B</sup>	654	37.245 <sup>B</sup>	10.854
	MO	54	906	121	4.20 <sup>B</sup>	1.09	2791 <sup>B</sup>	421	42.456	12.620

A, B, C – means in columns with different superscript letters differ significantly at  $P \leq 0.01$ .

A, B, C – średnie w kolumnach oznaczone różnymi literami różnią się istotnie przy  $P \leq 0,01$ .

sease to 906 days in those removed from herds due to random causes and other reasons.

Cows culled due to old age, as expected, had the longest average life spans. They also had more lactations and higher lifetime milk yield than cows that were removed from herds for reasons other than old age. This was observed in both the Simmental and the Montbéliarde cows. At the same time, Simmental cows culled due to old age lived 670 days longer than Montbéliarde cows culled for this reason (3891 vs. 3223 days) and had 1.77 more lactations, but lower lifetime milk yield.

It was also shown that among the Simmental cows, those that were culled due to low yield and udder diseases had the shortest lifespan (3007 days). They produced milk in 4.96 lactations, and their average lifetime yield was 36.766 kg of milk. This was nearly 9500 kg less than for the Montbéliarde cows culled for the same reason. According to research by Bogucki [2017], the least productive cows were used for 995 days, and their yield per day of productive life was 14.2 kg of milk. The lifetime yield of these cows was positively correlated with their age at first calving ( $r = 0.61$ ) and their yield in their first lactation ( $r = 0.64$ ).

In the case of the Montbéliarde breed, cows culled due to limb diseases and metabolic diseases had the shortest lifespan (2713 days), and those that were eliminated from herds as a result of random causes and other causes lived slightly longer (2791 days). These cows produced 40.006 and 42.456 kg of milk, respectively, during their productive lives; these were the two lowest values for cows of this breed.

## CONCLUSIONS

The research showed that the most common reasons for culling of Simmental cows were sterility and reproductive disease (35%), while in the Montbéliarde breed the most frequent reasons were low yield and udder disease (30.5%) and random causes and other causes (30.5%). Cows of both breeds were rarely culled due to old age (5.4%). The age at first calving of Simmental and Montbéliarde cows was similar (on average 884 days of age), while they differed significantly in length of life, number of lactations, and lifetime yield of milk and its constituents. Simmental cows were used on average for 6.04 lactations. During that time, they produced 38.220 kg of milk, 1576 kg of fat, 1315 kg of protein, 1831 kg of lactose and 4985 kg of dry matter. Montbéliarde cows had higher lifetime yield of milk and its constituents, but they had shorter lifespans and fewer lactations (5.31). The milk of Simmental cows had higher content of fat and dry matter than the milk of Montbéliarde cows, but a lower protein concentration. The highest averages for lifespan, number of lactations and lifetime milk yield were obtained by cows culled due to old age as compared to those removed from herds for other reasons.

## REFERENCES

- Adamczyk, K., Makulska, J., Jagusiak, W., Węglarz, A. (2017). Associations between strain, herd size, age at first calving, culling reason and lifetime performance characteristics in Holstein-Friesian cows. *Animal*, 11(2), 327–334.
- Archer, S.C., Mc Coy, F., Wapenaar, W., Green, M.J. (2014). Bayesian evaluation of budgets for endemic disease control: An example using management changes to reduce milk

- somatic cell count early in the first lactation of Irish dairy cows. *Prev. Vet. Med.*, 113(1), 80–87.
- Bogucki, M. (2017). Association between primiparous and lifetime performance of cows. *Acta Sci. Pol., Zootech.*, 16(2), 19–26.
- Bujko, J., Candrak, J., Strapak, P., Zitny, J., Hrnecar, C. (2013). The association between calving interval and milk production traits in population of dairy cows of Slovak Simmental cattle. *J. Anim. Sci. Biotechnol.*, 46(2), 53–57.
- Cziszter, L.T., Gavojdian, D., Neamt, R., Neciu, F., Kusza, S., Ilie, D.E. (2016). Effects of temperament on production and reproductive performances in Simmental dual-purpose cows. *J. Vet. Behav.*, 15, 50–55.
- Cziszter, L.T., Ilie, D.E., Neamt, R.I., Neciu, F.C., Saplacan, S.I., Gavojdian, D. (2017). Comparative study on production, reproduction and functional traits between Fleckvieh and Braunvieh cattle. *Asian-Australas. J. Anim. Sci.*, 30(5), 666–671.
- Gołębiewski, M. (2007). Porównanie wybranych parametrów użytkowych krów rasy montbeliarde oraz polskiej holsztyńsko-fryzyjskiej odmiany czarno-białej [Comparison of selected breeding parameters of Montbeliarde and Polish Holstein-Friesian cows of Black-and-White variety kept at the same environment conditions]. *Rocz. Nauk. PTZ*, 3(4), 141–148 [in Polish].
- Hoerning, B., Simantke, C., Aubel, E. (2005). Investigations on dairy welfare and performance on German organic farms. *Researching Sustainable Systems - International Scientific Conference on Organic Agriculture*. Adelaide, Australia, September 21-23, 2005.
- Januś, E., Borkowska, D. (2011). Zależności pomiędzy wydajnością pierwiastek rasy montbeliarde w pierwszym trymestrze laktacji a ich późniejszą użytkowością mleczną [Relationships between the milk yield of Montbéliarde primiparas in the first trimester of lactation and their further milk performance]. *Rocz. Nauk. PTZ*, 7(4), 9–19 [in Polish].
- Januś, E., Teter, W., Żółkiewski, P. (2016). Produktynność krów rasy cb i montbeliarde z uwzględnieniem sezonu urodzenia i wieku przy pierwszym wycieleniu [Productivity of the PHF HO and Montbéliarde cows with regard to the season of birth and age at first calving]. *Annales UMCS, sec. EE*, 34(4), 87–97 [in Polish].
- Jovanovac, S., Raguž, N. (2011). Analysis of the relationships between type traits and longevity in Croatian Simmental cattle using survival analysis. *Agric. Conspect. Sci.*, 76(3), 249–253.
- Krausslich, H. (2003). Grenzen der Leistungs Steigerung - Hat des Zweintutzungs system eine Zuknuft? *Zuchtwahl und Besamung*, 149, 26–29.
- Litwińczuk, Z., Barłowska, J. (2015). Populacja bydła mlecznego w Polsce i jej przydatność dla mleczarstwa [Population of dairy cattle in Poland and its usefulness for dairy farming]. *Prz. Hod.*, 4, 3–10 [in Polish].
- Lucy, M.C. (2007). Fertility in high-producing dairy cows: Reasons for decline and corrective strategies for sustainable improvement. *Soc. Reprod. Fertil. Suppl.*, 64(1), 237–54.
- Mohd Nor, N., Steeneveld, W., Hogeveen, H. (2014). The average culling rate of Dutch dairy herds over the years 2007 to 2010 and its association with herd reproduction, performance and health. *J. Dairy Res.*, 81, 1–8.
- Morek-Kopeć, M., Zarnecki, A. (2009). Przyczyny brakowania krów rasy polskiej holsztyńsko-fryzyjskiej odmiany czarno-białej [Culling reasons in the population of Polish Holstein-Friesian Black and White cows]. *Rocz. Nauk. PTZ*, 5(3), 9–17 [in Polish].
- Mostert, B.E., Theron, H.E., Kanfer, F.H.J. (2001). The effect of calving season and age at calving on production traits of South African dairy cattle. *South Afr. J. Anim. Sci.*, 31(3), 205–214.
- Neja, W., Jankowska, M., Sawa, A., Bogucki, M. (2013). Analysis of milk and reproductive performance of the active population of cows in Poland. *J. Centr. Eur. Agric.*, 14(1), 91–101.
- Nistor, E., Bampidis, V.A., Pentea, M. (2014). Production traits of Romanian Simmental cows at first lactation. *Slovak J. Anim. Sci.*, 47, 132–141.
- Novaković, Ž., Ostojić-Andrić, D., Pantelić, V., Beskorovajni, R., Popović, N., Lazarević, M., Nikšić, D. (2014). Lifetime production of high-yielding dairy cows. *Biotech. Animal Husb.*, 30(3), 399–406.
- Pawlina, E., Kaliciak, M., Wyrstek A. (2015). Długość użytkowania i przyczyny brakowania krów mlecznych w Polsce [Length of productive life of dairy cows in Poland and reasons for their culling]. *Prz. Hod.*, 1, 5–7 [in Polish].
- Polska Federacja Hodowców Bydła i Producentów Mleka [Polish Federation of Cattle Breeders and Dairy Farmers] (2017). Ocena i hodowla bydła mlecznego – dane za rok 2016 [Recording and breeding of dairy cattle – data for 2016]. Wydaw. PFHBiPM, Warszawa [in Polish].
- Pokorska, J., Kułaj, D., Ormian, M. (2012). Przyczyny brakowania krów polskiej holsztyńsko-fryzyjskiej odmiany czarno-białej użytkowanych w fermie wielkotowarowej [Reasons for culling of Polish HF Black-and-White cows, managed in a high production farm]. *Rocz. Nauk. PTZ*, 8(2), 17–24 [in Polish].
- Strapák, P., Juhás, P., Strapáková, E. (2011). The relationship between the length of productive life and the body conformation traits in cows. *J. Centr. Europ. Agric.*, 12(2), 239–254.
- Szewczuk, M., Chociłowicz, E., Bartosiewicz, R. (2015). Effect of age at first calving on the yield and composition of Simmental cows' milk. *Zesz. Nauk. Uniw. Przyr. we Wroc., Biol. Hod. Zwierząt*, LXXIX (613), 63–69.
- Zajac-Mazur, M. (2007). Stopień brakowania krów mlecznych jako miara efektywności pracy hodowlanej w stadzie [Culling level of dairy cows as a measure of breeding work efficiency in the herd]. *Wiad. Zootech.*, XLV(3), 15–17 [in Polish].
- Ziętara, W., Adamski, M., Mirkowska, Z. (2013). Rzeczywisty a optymalny okres użytkowania krów mlecznych [Actual vs. optimal period of the utility of dairy cows]. *Rocz. Nauk. Ekon. Rol. i Roz. Obsz. Wiej.*, 100 (3), 90–100 [in Polish].

## **PRODUKCYJNOŚĆ KRÓW RASY SIMENTALSKIEJ I MONTBELIARDE WYBRAKOWANYCH W LATACH 2005–2016 Z UWZGLĘDNIENIEM PRZYCZYN ICH BRAKOWANIA**

### **STRESZCZENIE**

Celem badań było porównanie niektórych cech życiowej produktywności i długowieczności krów rasy simentalskiej (SIM) i montbeliarde (MO) z uwzględnieniem przyczyn ich brakowania. Analizą objęto łącznie 812 krów (635 SIM i 177 MO) z regionu oceny Parzniew, wybrakowanych w latach 2005-2016, które ukończyły przynajmniej jedną 305-dniową laktację. Przeprowadzone badania wykazały, że użytkowanie mleczne krów simentalskich rozpoczęto nieznacznie później w porównaniu do rasy montbeliarde (886 vs. 878 dni). Były one jednocześnie dłużej użytkowane i dłużej żyły, jednak ustępowały krowom MO pod względem wydajności mleka i jego składników w przeliczeniu na laktację oraz za cały okres użytkowania. Stwierdzono także, że mleko krów SIM wyróżniało się większą zawartością tłuszczu i suchej masy. Analiza przyczyn brakowania wykazała, że krowy simentalskie brakowano najczęściej z powodu jałowości i chorób układu rozrodczego (35%), a u montbeliarde główną przyczyną były niska wydajność i choroby wymion oraz wypadki losowe i inne przyczyny (30,5%). W przypadku krów obydwu ras brakowania z powodu starości występowały najrzadziej (6,2% u SIM i 2,8% u MO).

**Słowa kluczowe:** brakowanie, długowieczność, życiowa wydajność, rasa bydła, skład mleka

