

Calving difficulty in cows and heifers of the Polish dairy cattle population in 2007-2008

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The relationships between calving difficulty scores (unassisted, easy pull, hard pull, surgical assistance/veterinary intervention, abortion, Caesarean section) and region (voivodeship), herd size, milk yield and age at calving of dairy and dual-purpose cows were studied in 2007-2008 in Polish cattle populations participating in the performance recording scheme. Perinatal calf mortality increased with increasing calving difficulty. Calf death loss at or shortly after calving (within the first 24 hours) due to dystocia, including hard pull, calvings requiring surgical assistance and Caesarean section, reached 21.09%, 46.57% and 43.28%, respectively. Perinatal mortality rates were low among unassisted and easy pull calvings. The percentage of hard pull calvings, calvings requiring veterinary intervention and complicated calvings increased along with a rise in productivity, proportionally to herd size. The share of unassisted and easy pull calvings as well as abortions increased with cows' age. The highest number of difficult and complicated calvings was noted in the group of heifers.

KEY WORDS: dairy cattle / calving ease / perinatal mortality

Calving ease is defined as the cow's ability to deliver a healthy calf easily. This functional trait has received considerable attention recently in dairy cattle breeding and improvement programs world-wide. Calving ease is an important consideration in both the economics of cattle production and the welfare of animals. Difficult or abnormal calving requiring assistance is referred to as dystocia [1]. The incidence of difficult calving and perinatal calf mortality are closely correlated [24]. Calving difficulties increase the risk of calf death at or shortly after calving 2.91-fold in primiparous cows and 4.67-fold in multiparous cows [17]. Apart from calf loss, difficult calving may result in milk yield decrease [4, 14], reduced fertility and increased disease susceptibility [4]. Difficult calving can also lead to problems with colostrum feeding in newborn calves, including decreased protein absorption [23].

The factors affecting calving ease can be divided into indirect, i.e. maternal (cow's age and body condition, the development of hard reproductive organs, hormonal control) and direct, related to sire effects (the weight, body conformation and sex of a calf). Ca-

iving ease scores vary widely between primiparous and multiparous cows. Complicated calvings occur more frequently in primiparous cows [16], what is reflected in a higher rate of stillbirths. The most common causes of dystocia are maternal/fetal disproportion in primiparous cows and abnormal fetus lie or presentation in multiparous cows [10]. According to some researchers, the frequency of difficult calving increases with an increase in the proportion of Holstein-Friesian genes [7, 24]. In Poland, the dual-purpose cattle population has evolved into a dairy type as a result of mating Black-and-White cows to Holstein bulls.

The objective of this study was to analyze the relationships between calving difficulty scores and region (voivodeship), herd size, milk yield and age at calving in Polish dairy cattle populations.

Material and methods

The study was conducted under production conditions, from 1 January 2007 to 31 December 2008. The analysis covered dairy and dual-purpose cows from Polish cattle herds participating in the performance recording scheme. 541 307 cows were analyzed in 2007 and 574 930 in 2008, which accounted for 20.22% and 21.32% of the total dairy cattle population in Poland, respectively. The studied cows represented the following breeds: Black-and-White, Red-and-White (Polish Holstein-Friesian), Simmental, Jersey, Polish Red, Montbeliarde, White Backed, Polish Black-and-White, Polish Red-and-White, Brown Swiss and other. In 2007 and 2008, Polish Holstein-Friesian Black-and-White cattle had a 93.56% [19] and 92.56% [20] share of the cattle population under the performance recording scheme, respectively. The average annual milk yield in the studied population reached 6688 kg in 2007 and 6817 kg in 2008. Calving difficulty was classified into the following six categories: unassisted, easy pull, hard pull, surgical assistance/veterinary intervention (injury to the cow or the calf, embryotomy), abortion, Caesarean section. Newborn calves were grouped into three categories based on their viability: born alive and healthy, born dead or died within 24 hours, congenital malformations. The data on calving ease and calf viability as well as variations in the above traits were provided by the Polish Federation of Cattle Breeders and Dairy Farmers. In the analyzed population, calving difficulty was evaluated in view of region (voivodeship), average number of milking cows per barn (up to 10, 11-20, 20-50, above 50 head), average milk yield (kg) per barn (up to 5000 kg, 5001-7000 kg, 7001-9000 kg, above 9000 kg) and cow's age. In the statistical analysis of results, frequency was determined using the χ^2 test.

Results and discussion

Hard pull calvings, calvings requiring veterinary intervention and Caesarean sections accounted for only 3.86% of all calvings (Table 1). Other authors investigating Polish cattle populations reported a higher proportion of calving requiring surgical assistance [5, 18]. Calving difficulty was correlated with the proportion of stillbirths in the total number of calvings ($P \leq 0.01$). Hard pull and complicated calvings are among the main causes of

Table 1 – Tabela 1

The effect of calving difficulty on stillbirth rates in 2007-2008
 Udział „martwych urodzeń” w zależności od rodzaju porodu w latach 2007-2008

Calving difficulty Rodzaj porodu	Year – Rok							
	2007				2008			
	calving wycielenia		stillbirths martwe		calving wycielenia		stillbirths martwe	
	heads sztuk	%	heads sztuk	%	heads sztuk	%	heads sztuk	%
No assistance Samodzielny	168693	33.03	6655	3.95	186165	33.93	7424	3.99
Easy pull Łatwy	315260	61.73	17575	5.57	336147	61.27	18792	5.59
Hard pull Trudny	19864	3.89	4120	20.74	19142	3.49	4107	21.46
Surgical assistance/veterinary intervention Ciężki	814	0.16	377	46.31	777	0.14	364	46.85
Abortion Poronienie	5977	1.17	0	0.00	6279	1.14	0	0.00
Caesarean section Cesarskie cięcie	124	0.02	58	46.77	144	0.03	58	40.28
Total Razem	510732	100.00	28785	5.64	548654	100.00	30745	5.60

2007: $\chi^2=16.86$, $P\leq 0.01$; 2008: $\chi^2=15.95$, $P\leq 0.01$

Year 2007: $\chi^2=16.86$, $P\leq 0.01$; Year 2008: $\chi^2=15.95$, $P\leq 0.01$

perinatal calf mortality [2, 3, 5, 8, 16, 17, 18]. The present results are optimistic, compared with the findings from the US and Western Europe. Only 5.62% of all calvings ended in calf death at or shortly after calving (within the first 24 hours). According to Roy [22], calf death loss at 5% can be considered normal. In the US, perinatal calf mortality oscillates around 8.2% [10], and in Sweden it reaches 10% among heifers and 4% among multiparous cows [24]. In the present study, only 1.16% pregnancies ended in abortion. The rate of stillbirths was lower in 2008 than in 2007, which could be due to a growing awareness among breeders and producers, and the availability of professional veterinary services.

In the majority of voivodeships, easy pull calvings were more frequent than unassisted calvings. An opposite trend was observed only in two voivodeships (Opole and Warmian-Mazurian) (Fig.). The total incidence of hard pull calvings, calvings requiring surgical assistance/veterinary intervention and Caesarean sections did not exceed 5% in most voivodeships, reaching the highest level in the Lubusz and Lublin Voivodeships (8.29% and 6.16%, respectively). The highest percentage of abortions (1.77%) was noted in the Lubusz Voivodeship.

The Holstein-Friesian breed has been intensely selected for milk production. Improvement focused on one particular trait may deteriorate the quality of the other traits, inc-

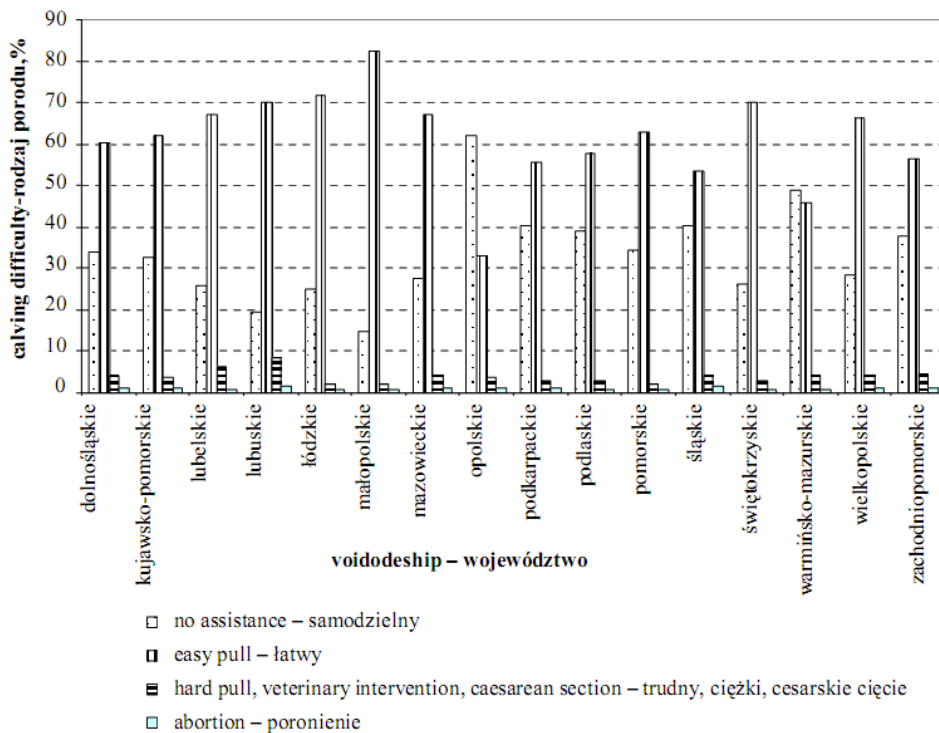


Fig. Percentage share of calving difficulty categories subject to voivodeship
 Rys. Procentowy udział różnych rodzajów porodu w poszczególnych województwach

cluding those affecting animal health. An increase in the proportion of HF genes in cattle populations contributes to improving productivity, but it also increases the incidence of calving difficulty and perinatal calf mortality rates [7, 24]. In our study, cows with a milk yield above 9000 kg were characterized by the highest percentage of hard pull calvings, calvings requiring surgical assistance, and abortions (Table 2). Calving ease is an important functional trait that should be improved together with milk production traits [11]. Meijering [15] demonstrated that the correlation between calving ease and milk yield traits approaches zero. Other researchers reported an increase in milk yield after unassisted and easy pull calvings, compared with hard pull and complicated calvings [4, 18]. An increase in cow productivity was accompanied by greater losses due to difficult calving [21]. The above relationships were not confirmed by Lucey et al. [12].

To prevent or reduce the negative effects of difficult calving, cows should receive prompt and adequate veterinary care. Therefore, cows and heifers should be watched carefully for the signs of approaching parturition, which are much easier to observe in small-sized herds than in large populations. Kausch [9] analyzed calving in 2 487 cows and heifers from several dairy cattle farms in Brandenburg. The cited author reported that in the group of heifers perinatal calf mortality was reduced by 60% by providing the necessary veterinary

Table 2 – Tabela 2

Relationship between calving difficulty (%) and average annual milk yield per barn (kg) in 2007-2008
 Rodzaj porodu (%) w zależności od przeciętnej rocznej wydajności (kg mleka) krów w oborze w latach 2007-2008

Calving difficulty Rodzaj porodu	Average annual milk yield per barn (kg) Przeciętna roczna wydajność krów w oborze (kg)			
	<5000	5000-7000	7001-9000	>9000
No assistance Samodzielny	33.55	32.83	34.11	31.40
Easy pull Łatwy	61.64	62.38	60.57	62.09
Hard pull Trudny	3.68	3.54	3.96	5.04
Surgical assistance/veterinary intervention Ciężki	0.20	0.20	0.21	0.26
Abortion Poronienie	0.91	1.04	1.12	1.20
Caesarean section Cesarskie cięcie	0.01	0.02	0.03	0.04

$\chi^2=2.23$; non-significant – nieistotne

assistance. In a study by Bicalho et al. [2], as many as 67.9% stillbirths resulted from the lack or inadequacy of veterinary care.

In the present study, the analyzed cattle population was divided into groups based on herd size (Table 3). Medium-sized and large herds (21-50 head and above 50 head, respectively) were predominant, accounting for 76.57% of all tested cows. The proportion

Table 3 – Tabela 3

Calving difficulty (%) subject to the average number of cows per barn in 2007-2008
 Rodzaj porodu (%) w zależności od przeciętnej liczby krów w oborze w latach 2007- 2008

Calving difficulty Rodzaj porodu	Przeciętna liczba krów w oborze (szt.) Average number of cows per barn (heads)			
	≤10	11-20	21-50	>50
No assistance Samodzielny	28.14	29.49	32.62	36.12
Easy pull Łatwy	67.99	65.56	62.76	58.12
Hard pull Trudny	2.83	3.75	3.41	4.32
Surgical assistance/veterinary intervention Ciężki	0.16	0.22	0.18	0.23
Abortion Poronienie	0.86	0.96	1.00	1.19
Caesarean section Cesarskie cięcie	0.01	0.02	0.03	0.03

$\chi^2=8.39$; $P<0.05$

Table 4 – Tabela 4

The effect of age at calving on calving difficulty
 Wpływ wieku wycielenia na rodzaj porodu

Rodzaj porodu Calving difficulty	Successive calvings – Numer wycielenia						
	1	2	3	4	5	6	>6
No assistance Samodzielny	23.74	37.02	38.11	38.33	37.79	37.52	37.00
Easy pull Łatwy	69.38	58.50	57.59	57.44	57.96	58.42	59.01
Hard pull Trudny	5.94	2.99	2.80	2.77	2.84	2.73	2.79
Surgical assistance/veterinary intervention Ciężki	0.32	0.17	0.15	0.16	0.14	0.14	0.16
Abortion Poronienie	0.58	1.32	1.34	1.29	1.26	1.17	1.03
Caesarean section Cesarskie cięcie	0.04	0.02	0.02	0.01	0.01	0.02	0.02

$\chi^2=2.95$; non-significant – nieistotne

of hard pull calvings, calvings requiring surgical assistance and abortions increased significantly ($P \leq 0.05$) and the percentage of Caesarean sections increased insignificantly along with an increase in herd size. Unassisted and easy pull calvings exceeded 90% of all calvings in each group, but their share decreased with herd size. This could result from the fact that supervision over pregnant cows is more difficult in large herds.

In the examined cattle population, the highest calving difficulty rates were noted in first-calf heifers (Table 4), which is consistent with the findings of other authors [6, 13, 17, 18]. The reasons for calving difficulty in heifers include an early age at first calving, inadequate development of the reproductive tract, excessively fat body condition, the disproportion between the size of the fetus and the pelvic opening of the dam [18]. Hard pull and complicated calvings had a relatively high share (6.30%) of first calvings, compared with successive calvings, but the noted value was lower than those reported by other authors [10, 16, 18, 24]. The percentage of unassisted and easy pull calvings increased with cows' age, with a growing proportion of the former.

In the Polish cattle population evaluated in 2007-2008, the incidence of hard pull calvings, calvings requiring surgical assistance/veterinary intervention and Caesarean sections did not exceed 6%, which is highly satisfactory in comparison with foreign cattle populations. The above could be due to effective breeding programs, proper selection of breeding bulls, and the involvement of breeders, producers and farmers in setting breeding priorities and goals. The highest percentage of difficult and complicated calvings was noted in the group of heifers and highest-yielding cows, and it was found to increase with herd size.

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Rodzaj porodu krów i jałówek w polskiej populacji bydła mlecznego w latach 2007-2008

Streszczenie

Dokonano analizy rodzaju porodu (samodzielny, łatwy, trudny, ciężki, poronienie, cesarskie cięcie), uwzględniając wpływ województwa, wielkość stada, poziom wydajności i wiek krów typu użytkowego mlecznego i mięsno-mlecznego, cielących się w latach 2007-2008 w stadach objętych oceną wartości użytkowej na terenie Polski. Stwierdzono, że wraz ze wzrostem stopnia trudności porodu wzrastała śmiertelność okołoporodowa cieląt. Wykazano, że 21,09% porodów trudnych, 46,57% porodów ciężkich oraz 43,28% porodów z udziałem cesarskiego cięcia kończyło się śmiercią cielęcia w czasie porodu lub w przeciągu 24 h po porodzie. Porody samodzielne i łatwe w niewielkim procencie kończyły się śmiercią cielęcia. Obserwowano zwiększający się procent trudnych, ciężkich i skomplikowanych porodów wraz ze wzrostem wydajności cielących się krów oraz liczby krów utrzymywanych w stadzie. Z wiekiem krów zwiększał się udział porodów samodzielnych i łatwych, niekorzystnie jednak kształtował się procent poronień. Najwięcej porodów trudnych i skomplikowanych odnotowano w przypadku jałówek.