

## **INFLUENCE OF SELECTED FACTORS ON MATERNAL NURSING PERFORMANCE OF ABERDEEN ANGUS CALVES**

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**Abstract.** We observed 75 Aberdeen Angus calves born in the years 2004–2007 and managed on pastures and wild areas of Karsibór, an island located in the northern part of the Szczecin Lagoon. An analysis was carried out on the results of maternal nursing of the calves in relation to subsequent calving, sex of the calf, and year of rearing. A significant ( $P \leq 0.01$ ,  $P \leq 0.05$ ) effect of subsequent calving on body weight of the calves being born was observed. The calves from the first calvings had significantly lower body weight at birth as compared to those born from the subsequent calving. On the other hand, there were no significant effects of the subsequent calving on body weight and daily weight gain of calves after weaning, even though the calves from the first calving were characterized by poorer performance in this respect. Significant differences between the data on calf nursing performance recorded in each individual year of the study result from the fact that the animals grazed on poorer quality pastures and unused land.

**Keywords:** beef cattle, body weight at birth and weaning, daily gains

### **INTRODUCTION**

Beef cattle breeding is regarded as one of the most prospective fields of animal production in Poland. Breeders who consider the possibility of undertaking this type of production encounter from the outset many problems, among which the choice of a breed is extremely significant. A small pure-bred female population of beef cattle in our country is represented by cows of 12 breeds. The predominant breeds are: Limousine, Charolaise and Hereford. Each of them has its advantages and disadvantages as well as different requirements concerning management conditions, feeding and labor intensity [Przysucha et al. 2007].

In Poland, Angus cattle are becoming increasingly popular. This is the fifth most numerous breed that constitutes 5% of the pure-bred population of cows. The cattle represent an extreme beef type. They have natural immunity and vigor, a very good ability to utilize sward on the large areas of poor pastures and high adaptability to changeable at-

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atmospheric and forage conditions. They exhibit high reproductive indices and very good nursing ability [Przysucha et al. 2002]. The Angus cattle are characterized by one of the highest dressing percentages in the world, of up to 70%, and their meat has good taste and a high culinary quality; it is delicate, juicy, fine-grained and coarse marbled. Due to the breeding work carried out in the USA and Canada, the later-maturing individuals of higher growth performance have been selected, which allows for fattening in an extensive system also to higher body weight (500–550 kg) without the risk of excessive carcass fatness [Szewczyk 2005].

Rearing of the largest possible number of calves per year is a significant factor influencing the profitability of beef cattle husbandry. Many factors affect the appropriate growth and rearing of calves; these are, among others, management conditions, genotype and age of dam, calving season, course of parturition and calf sex [Wróblewska et al. 2007].

The aim of this study was to analyze the effect of selected factors on the rearing results of Aberdeen Angus calves.

## MATERIAL AND METHODS

The study involved 75 Aberdeen Angus calves born between 2004 and 2007. From 2004 to 2005, cows and calves were grazed on meadows and pastures at Unin in the Kamień administrative district and since 2006 they have been grazed on pastures and wasteland (reed fields) located in Karsibór Island situated in the northern part of Szczecin Lagoon.

During the summer season, cows together with their calves were grazed on pastures and wasteland during the day, and at night they returned freely to the enclosure next to the barn, where there was a raised feeding place under the roof. They were given water before and after pasturing. Calves remained with their dams until the age of 7–8 months. In this period, they used the pasture and sucked their dams, and, additionally, were fed rolled cereal grain. During the winter, cows were kept in a loose barn on deep litter and fed hay and haylage.

We analyzed the rearing results of calves remaining with their dams in relation to calving number, calf sex and year of rearing. The collected results were subjected to statistical analysis using the Statistica PL software. The one-way analysis of variance was used and the significance of differences between the group means was determined with the Duncan's test.

## RESULTS AND DISCUSSION

The analysis of the calving pattern showed that most calves were born in May (30%) and March (23%). During the winter months, that is, from January to March, 44% of calves were born, whereas 56% were born from April to July, including 14% in June and July.

In the study by Stenzel et al. [2001], 76% of Angus cows calved in March and April, whereas 24% calved in May and remaining months. In the study by Przysucha et al. [2002], most Angus cows calved during spring months from March to May (50%) and 13.6%

of cows calved in January and February. The research conducted in the USA by Dargatz et al. [2004] showed that most cows calve in March (27.2%) and most calves (63.9%) were born in February, March and April.

The seasonality of calvings is of great significance for beef breeds. The appropriate calving date assures obtaining the best breeding and slaughter material, since pasture is the basis of feeding during the summer season. Numerous studies have shown that calving season has significant influence on the growth of calves being reared and economic effects of rearing [Litwińczuk et al. 1999, Miciński et al. 2000, Litwińczuk et al. 2001]. Under the 24-hour grazing system, beef cows should calve in winter, preferably in January and February. Calves born in winter or early spring are better prepared to utilize pasture, which manifests itself in higher body weight gains during the period of grazing. They also remain with their dams longer, since weaning takes place, in general, at the end of grazing season. These factors cause the weaning weight of such calves to be usually higher than that of calves born during late spring or summer. Consequently, the obtained meat gain is produced at the least cost [Litwińczuk et al. 1998]. Calves born just before the onset of grazing, or already during grazing, utilize the pasture to a low extent. Moreover, the period of their remaining with dams is much shorter. Summer calvings are the easiest organizationally, and do not require large expenditures, however, the growth and development of calves are not so intensive, since the use of pasture, when its quality is poorer, is much worse [Stenzel et al. 2001].

The rearing results of calves in relation to the number of calving, calf sex and year of rearing are presented in Table 1. The lightest calves were born to cows in first parity. Their body weight was significantly ( $P \leq 0.01$ ,  $P \leq 0.05$ ) lower (from 1.9 to 4.5 kg on average) than that of calves born to dams in greater parities. Calves from the 5th–7th calving were the heaviest (34.7 kg) and their body weight was also significantly ( $P \leq 0.05$ ) higher than that of calves from the third calving (32.1 kg).

The results of research show that older cows give birth to larger calves. Przysucha et al. [2002] found highly significant effect of calving number on the body weight of calves being born. In the study by Przysucha et al. [2007], primiparous cows as well as cows calving for the second, fifth and more times gave birth to calves considerably lighter than those born to cows in third or fourth parity. In the work by Krupa et al. [2005], beef calves born to 5–7-year-old cows had the highest birth weight and those born to 8-year-old and older cows had the lowest one.

Calves from the second and third calving had the highest body weight at 210 days of age and body weight gain from birth to 210 days, whereas calves born to primiparous cows and cows in eighth or greater parity had the lowest body weight and body weight gains. The obtained differences (15–20 kg body weight and 80–100 g body weight gain) were not, however, statistically significant.

Litwińczuk et al. [1998] showed a highly significant effect of the calving number of cows on the body weight gains of their calves during the grazing season. The mean daily body weight gains of calves from second calving were 60–120 g higher compared to calves born to primiparous dams. Calves from the oldest dams, from third and fourth calving, had 50–70 g higher body weight gains in comparison with calves from the second calving.

Table 1. Influence of calving number, calf sex and year of rearing on rearing results of Angus calves

Tabela 1. Wpływ kolejności wycielenia, płci cielęcia oraz roku na wyniki odchowu cieląt rasy angus

Trait Cecha	N	Birth weight, kg Masa ciała cieląt po urodzeniu, kg		Weight at 210 days, kg Masa ciała cieląt w 210. dniu, kg		Daily gains from birth to 210 days, g Przyrosty masy ciała cieląt od urodzenia do 210. dnia, g	
		mean średnia	SD s	mean średnia	SD s	mean średnia	SD s
Calving number – Kolejność wycielenia							
1	21	30.2 <sup>ABCa</sup>	2.34	218.8	25.94	879	120
2	10	33.6 <sup>A</sup>	2.63	237.1	23.9	967	119
3	14	32.1 <sup>b</sup>	2.62	233.9	18.19	963	81
4	14	33.1 <sup>a</sup>	2.51	225.3	27.94	904	130
5–7	9	34.7 <sup>Bb</sup>	2.18	224.2	23.32	909	110
≥ 8	7	33.7 <sup>C</sup>	2.63	214.5	23.33	863	115
Calf sex – Płeć cielęcia							
Heifers Jałówki	40	32.0	2.95	225.6	27.14	918	128
Bulls Buhajki	35	32.9	2.68	225.9	22.06	912	103
Year of rearing – Rok odchowu							
2004	18	32.7 <sup>a</sup>	2.44	262.3 <sup>ABC</sup>	9.43	1097 <sup>ABC</sup>	45
2005	9	35.1 <sup>Aab</sup>	1.54	245.3 <sup>AD</sup>	12.86	1011 <sup>ADa</sup>	61
2006	12	32.5 <sup>b</sup>	2.35	236.4 <sup>BE</sup>	14.45	943 <sup>BEa</sup>	53
2007	36	31.6 <sup>A</sup>	3.06	208.7 <sup>CDE</sup>	14.49	839 <sup>CDE</sup>	67
Total Razem	75	32.4	2.85	225.7	24.49	915	115

Means marked with identical letters differ significantly; large letters  $P \leq 0.01$ , small letters  $P \leq 0.05$ . Średnie oznaczone takimi samymi literami różnią się istotnie; duże litery  $P \leq 0,01$ , małe litery  $P \leq 0,05$ .

In the study by Krupa et al. [2005], the highest weaning weight and daily body weight gains from birth to 210 days were reached by calves born to 5–7-year-old cows. Somewhat lower body weight and the body weight gains lower by 30 g were observed in calves born to 8-year-old and older cows. The lowest body weight gains were reached by calves born to primiparous dams (by 118 g) compared with calves born to 5–7-year-old cows.

During the analyzed period, heifers and bull calves had very similar birth weights, body weight at 210 days of age and body weight gains from birth to 210 days. Heifers had even slightly higher body weight gains than did bull calves, which is a quite surprising result. The obtained small differences were not statistically significant.

In the study by Litwińczuk et al. [2002], Angus heifers and bull calves had lower body weight gains from birth to 210 days, amounting to 817 and 809 g, respectively. According to PABCBP [2007], the mean body weight gain from birth to 210 days for Angus heifer calves in 2006 in the Pomeranian region was 1027 g, and for bull calves it was lower and amounted to 968 g.

Gregory et al. [1992] reported that the birth weight of heifer calves is, on average, 7% lower than that of bull calves. In the study by Minick et al. [2001], bull calves were heavier than heifers in all months of life. Krupa et al. [2005] confirmed that beef bull calves have higher birth weights, weaning weights and body weight gains from birth to weaning than heifers do.

The significant effect of year on the birth weight of calves and their rearing results was found. The calves born in 2005 had the highest mean birth weight (35.1 kg) and were significantly ( $P \leq 0.01$ ) heavier than those born in 2007, which had the lowest body weight in the analyzed period (31.6 kg) and than calves born in 2004 and 2006 ( $P \leq 0.05$ ). The calves weaned in 2004 had the highest mean body weight at 210 days of age (262.3 kg) and mean daily body weight gains from birth to weaning, whereas calves weaned in 2007 achieved the worst results. The worse rearing results beginning from 2006 were caused by having started the grazing of the herd on pastures and wasteland of poorer quality, which had resulted in lower milk yield and poorer feed conversion.

## CONCLUSIONS

A significant ( $P \leq 0.01$ ,  $P \leq 0.05$ ) effect of calving number of cows on body weight of calves being born was found. Calves from the first calving had significantly lower birth weight than those from subsequent calvings. No significant effect of calving number on body weight of calves at 210 days of age and body weight gains from birth to 210 days was found, although calves from the first calving achieved worse results. The absence of the significant effect of calf sex on growth rate and weaning weight was also observed. The significant differences in the rearing results of calves in individual years resulted from the herd being grazed on pastures and wasteland of poorer quality.

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**WPLYW WYBRANYCH CZYNNIKÓW NA WYNIKI ODCHOWU CIELĄT RASY ABERDEEN ANGUS**

**Streszczenie.** Badaniami objęto 75 cieląt rasy aberdeen angus urodzonych w latach 2004–2007 i wypasanych na pastwiskach i nieużytkach znajdujących się na wyspie Karsibór, leżącej w północnej części Zalewu Szczecińskiego. Przeprowadzono analizę wyników odchowu cieląt przy matkach w zależności od kolejnego wycielenia krów, płci cieląt i roku ich odchowu. Stwierdzono istotny ( $P \leq 0,01$ ;  $P \leq 0,05$ ) wpływ kolejnego wycielenia krów na masę ciała rodzących się cieląt. Cielęta pochodzące z pierwszego wycielenia krów charakteryzowały się istotnie mniejszą masą ciała po urodzeniu od cieląt pochodzących z dalszych wycieleń. Nie stwierdzono natomiast istotnego wpływu kolejnego wycielenia krów na masę ciała po odsadzeniu i przyrosty dobowe masy ciała cieląt, mimo że cielęta pochodzące z pierwszego wycielenia charakteryzowały się gorszymi wynikami. Istotne zróżnicowanie wyników odchowu cieląt w poszczególnych latach było spowodowane wypasem stada na gorszej jakości pastwiskach i nieużytkach.

**Słowa kluczowe:** bydło mięsne, masa ciała po urodzeniu i odsadzeniu, przyrosty dobowe masy ciała

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