

# COMPARISON OF RED ANGUS AND HEREFORD PRIMIPAROUS COWS BASED ON THE PRODUCTION PARAMETERS

Ewa Czerniawska-Piątkowska, Ewa Chociłowicz, Małgorzata Szewczuk, Anna Wasiak

West Pomeranian University of Technology, Szczecin, Poland

Abstract. The aim of the study was to compare Red Angus and Hereford primiparous cows based on the age at first calving and body weight as well as to compare some indices of fertility, lactation yield and selected zoometrical measurements. The research was conducted on the farm located in the West Pomerania Province. The age at first calving (AFC) and the variability of body weight were similar for both breeds. The primiparous Hereford cows were characterized by significantly ( $P \le 0.01$ ) higher estimated lactation yield (2054.9 kg) compared with primiparous Angus cows (1992.8 kg) and significantly ( $P \le 0.01$ ) higher values of zoometrical parameters: hip height (suitably: 135.5 cm i 132.5 cm) and chest girth (suitably: 197.0 cm and 191.6 cm).

Keywords: age at first calving, Angus and Hereford, body weight, calving interval, zoometrical measurements

### INTRODUCTION

Initially, good reproduction results in a herd and then appropriate rearing results of calves are an element deciding on the success of beef cattle production.

According to Szewczyk [2005], meat is a second, besides milk, valuable foodstuff obtained from cattle. Specialized beef breeds are a basic source of the best quality beef. Beef cattle breeds are characterized by huge diversity of, among others, capacity, growth rate, age at puberty, calving ease, environmental and nutritional requirements, carcass fatness, dressing percentage and meat traits. Due to this diversity, beef cattle breeds can be found in almost all climatic zones and their farming as well as management conditions range from very intensive to extremely extensive.

By analyzing performance of individual breeds, breeder can acquire a lot of information on the usefulness of individual genotypes for fatte<sup>1</sup>ning. However, little is still known about reproductive performance of beef cows, course of parturition and vitality of

Corresponding author – Adres do korespondencji: dr hab. inż. Ewa Czerniawska-Piątkowska, West Pomeranian University of Technology, Szczecin, Department of Ruminant Science, Doktora Judyma 10, 71-460 Szczecin, Poland, e-mail: Ewa.Czerniawska-Piatkowska@zut.edu.pl

calves. Lack of data in this field is often the reason for a breeding failure [Choroszy and Choroszy 2004].

The aim of the study was to evaluate the age at first calving, body weight and some indices of fertility, lactation yield and selected zoometrical measurements of Red Angus and Hereford cows.

#### MATERIAL AND METHODS

The research was conducted in the West Pomerania Province at the Witkowo Agricultural Cooperative. The research material consisted of Red Angus (315 individuals) and Hereford (171 individuals) beef cattle. Cows together with their calves were kept in a chamber system. Only calving cows were driven to the barn, where they stayed with their calves for one week after calving. After this time, dams with their offspring were moved to the outside run. Breeding bulls stayed in the separate outside runs.

Summer feeding was entirely based on the good pasture. Cows with their calves started grazing in May and stayed on the pasture until the end of October. In winter, the diet consisted of maize and grass silage, haylage and hay supplemented with minerals and vitamins. Calving cows were additionally fed the B-1 concentrate mixture. The animals had permanent access to water, whereas feed was given directly on a raised feeding place.

The service period in beef cattle herds was based on the group mating (one bull were staying in 20–30 females in definite time) and artificial insemination and began between February 1 and June 15 in order to obtain seasonality of calvings. Calvings occurred from November to March each year. The calves were weaned at the age of 7.5–8 months. Cows and heifers underwent oestrus synchronization; artificial insemination was performed in approximately 50% of all animals in February and March each year. There were approximately 20 cows per one bull in a group mating system.

In the present study were evaluated reproductive features (the variability of age at first calving - AFC, calving interval - CI), type features (hip height, chest girth), body weight and lactation yield (DzU 47, 1999). The lactation yield of beef cows was calculated based on the following formula:

#### ELY=(ABW\*1700)/AAW (DzU 47, 1999),

where: ELY – estimated lactation yield of calving, ABW – actual body weight of calf at weaning, AAW – actual age of calf at weaning.

The data were analyzed using MS Office  $\text{Excel}^{\mathbb{R}}$  software. The obtained results are presented in tables and figures. Mean values ( $\overline{x}$ ), standard deviation (S), minimum (Min) and maximum (Max) values as well as coefficient of variation (V%) were calculated. The significance of differences was verified using one-way analysis of variance and Duncan's multiple range test by means of Statistica<sup>®</sup>9 PL software.

#### **RESULTS AND DISCUSSION**

The variability of body weight at first calving in a population of Red Angus and Hereford primiparous cows is presented in Fig. 1. The majority of Hereford animals had body weight ranging from 575 kg to 600 kg (approximately 33%). The proportion of primiparous cows of this breed having body weight of 525–550 kg was small and amounted to 8%, whereas the proportion of such cows weighing more than 600 kg was smaller and amounted to less than 3%. The mean body weight of animals at first calving was 570 kg.

Supera et al. [1997] reported that the primiparous Hereford cows imported from Denmark reached a mean body weight of 477 kg. A higher body weight (520 kg) in Hereford heifers was found by Pogorzelska et al. [1999], whereas much lower body weights (447 kg) of primiparous cows were reported by Trela et al. [1998].



Fig. 1. The variability of body weight of Hereford and Red Angus primiparous cows Rys. 1. Zmienność masy ciała pierwiastek rasy hereford i red angus

Approximately 42% of the population of Red Angus females reached body weight ranging from 575 to 600 kg, whereas little more than 7% of the evaluated animals had body weight of 525–550 kg. The proportion of primiparous cows of this breed weighing over 600 kg was 6%. The mean body weight of animals was 565.2 kg.

From the study by Wójcik et al. [2008] it appears that the primiparous Red Angus cows after first calving were characterized body weight about 544.2 kg. Szarek et al. [2008] reported that the body weight of animals of this breed ranged from 489 kg to 602 kg (570 kg on average).

The distribution of the age at first calving shown in Fig. 2 indicates that Hereford heifers calved most frequently at 31 months of age (almost 12% of the studied animal population) and from 33 to 38 months of age (18%). Extreme values, i.e. calving after 41 months of age accounted for only 6%. The mean age at first calving in the analyzed population of 171 Hereford heifers was 34.4 months. Different results were obtained by Stanek [2006]. The cited author reported 60% of heifers calving for the first time before 26 months of age

and over 14% of females of this breed calving before 23 months of age, whereas 10.5% of the studied animals calved after 36 months of age.

A somewhat different calving distribution was observed in a population of Angus heifers (Fig. 2). Most primiparous cows calved between 34 and 37 months of age (over 40%). Little more than 6% of heifers calved at 31 months of age and the percentage of calvings occurring after 41 months of age was similar to that in the Hereford breed (6%). The mean age at first calving in the studied population was 35.5 months.





Fig. 2. The variability of age at first calving in Hereford and Red Angus heifers Rys. 2. Zmienność wieku pierwszego wycielenia jałówek rasy hereford i red angus

The studies conducted by Przysucha and Grodzki [2007] showed that at the age of over 31 months, in early maturing breeds (Angus, Hereford) this percentage was 28.2% and 26.3%, respectively.

Comparing body weights and selected zoometrical measurements, a significantly ( $P \le 0.05$ ) higher mean body weight of Hereford cows (572 kg) was found compared with Angus individuals (565.2 kg). Significantly ( $P \le 0.01$ ) higher means for hip height and chest girth in Hereford breed (135.5 cm and 197 cm, respectively) were also shown compared with Angus breed (132.5 cm and 191.6 cm, respectively).

Przysucha et al. [2010] obtained the same values for hip height (135 cm) and chest girth (197 cm) for Hereford cows as those recorded in the present study (Table 1). However, body weight of these animals averaged 562 kg. In the study by Wójcik et al. [2008], Angus cows obtained similar results of zoometrical measurements (133.1 cm for hip height and 189.7 cm for chest girth) compared with those in the present study (Table 1). Kaps et al. [1999] noted higher values of the mean body weight of Angus cattle (593 kg) than those in the present work (Table 1), whereas Pilarczyk and Wójcik [2008] reported lower values (484 kg and 504.3 kg for Angus and Hereford breed, respectively).

 
 Table 1.
 The comparison of body weight and some zoometrical measurements in primiparous cows of Red Angus and Hereford breeds

Tabela 1. Porównanie masy ciała i niektórych pomiarów zoometrycznych pierwiastek ras red angus i hereford

Studied parameters Badane parametry	Red Angus						Hereford					
	n	$\overline{x}$	min.	max	S	V%	n	$\overline{x}$	min.	max	S	V%
Body weight, kg Masa zwierząt, kg		565.2 <sup>b</sup>	454.0	650.0	31.7	5.6		572.0 <sup>b</sup>	334.0	643.0	35.8	6.3
Hip height, cm Wysokość w krzyżu, cm	315	132.5 <sup>B</sup>	124.0	139.0	2.7	2.0	171	135.5 <sup>B</sup>	130.0	145.0	3.3	2.4
Chest girth, cm Obwód klatki piersiowej, cm		191.6 <sup>c</sup>	128.0	206.0	6.7	3.5	-	197.0 <sup>c</sup>	130.0	260.0	28.5	14.5

A, B, C – differences significant at  $P \le 0.01 - A$ , B, C – różnica istotna na poziomie  $P \le 0.01$ . a, b, c – differences significant at  $P \le 0.05 - a$ , b, c – różnica istotna na poziomie  $P \le 0.05$ .

Analyzing selected indices of fertility and lactation yield of Angus and Hereford primiparous cows, it was found that the mean age at first calving (AFC) was similar for both breeds and amounted to 35.5 months and 34.4 months for Angus and Hereford cattle, respectively.

Wójcik et al. [2008], in the studied population of beef cattle, obtained similar results for primiparous Hereford cows (35.3 months), whereas primiparous Angus cows had lower age at first calving (28.1 months). Dákay et al. [2006], in the analyzed herds, obtained different values of age at first calving for Angus heifers (2.76 years, that is, approx. 33.58 months) and for the herd of Hereford heifers (2.08 years, that is, approx. 25.3 months). Przysucha et al. [2002] reported the age at first calving amounting to 25 months for both breeds.

Calving interval (CI) was the next analyzed trait in the present study (Table 2). In the case of Hereford cows, CI was significantly ( $P \le 0.05$ ) longer (16.2 months) compared with Angus cows (14.4 months).

Przysucha et al. [2002] reported shorter calving intervals for both breeds: 397.9 days (approx. 13.26 months) and 392.6 days (approx. 13.1 months) for Hereford and Angus cattle, respectively. Stenzel et al. [1999] found the same CI (approx. 12 months) for both breeds (367.3 days and 370.1 days for Hereford and Angus cattle, respectively).

Studied parameters Badane parametry		Red Angus						Hereford						
	n	$\overline{x}$	min.	max	S	V%	n	$\overline{x}$	min.	max.	S	V%		
Age at first calving, months Wiek pierwszego wycielenia, miesiące	315	35.5	21.1	63.6	6.5	18.2	171	34.4	21.9	62.4	8.4	24.3		
Calving interval, months Okres między- wycieleniowy, miesiące		14.4ª	10.2	42.5	5.9	40.6	. 1/1	16.2ª	10.5	36.5	5.9	36.5		
Lactation yield, kg Mleczność, kg	•	1992.8 <sup>A</sup>	1325.0	2514.0	187.9	9.4	•	2054.9 <sup>A</sup>	1490.0	2512.0	229.2	11.2		

Table 2. The comparison of selected fertility indices and lactation yield of beef cows Tabela 2. Porównanie wybranych wskaźników płodności oraz mleczność krów mięsnych

A, B, C – differences significant at  $P \le 0.01 - A$ , B, C – różnica istotna na poziomie  $P \le 0.01$ . a, b, c – differences significant at  $P \le 0.05 - a$ , b, c – różnica istotna na poziomie  $P \le 0.05$ .

The present study showed that Hereford cows were characterized by significantly ( $P \le 0.01$ ) higher (2054.9 kg) mean estimated lactation yield compared with Angus cows (1992.8 kg) (Table 2). According to Pilarczyk and Wójcik [2007] the estimated lactation yield was 1921.5 kg and 2121.1 kg for Red Angus and Hereford breeds, respectively. Wójcik et al. [2008] also showed different results of lactation yield for Hereford (1901.9 kg) and Red Angus (1916.7 kg) cows.

#### CONCLUSIONS

Hereford animals were characterized by significantly ( $P \le 0.01$ ) higher estimated lactation yield and significantly ( $P \le 0.01$ ) higher values of zoometrical parameters (hip height and chest girth) compared with primiparous Angus cows.

The age at first calving (AFC) and the body weight in both compared breeds were at similar level. Whereas the average body weight was significantly higher (P $\leq$ 0.05) in the primiparous Hereford cows.

Calving interval (CI) was significantly (P≤0.05) shorter in Angus females.

Comparison of Red Angus and Hereford primiparous cows...

#### REFERENCES

- Choroszy Z., Choroszy B., 2004. Systemy odchowu bydła mięsnego oraz mieszańców na użytkach zielonych [Rearing systems of beef cattle and crossbreds on grassland]. Wiad. Zootech. XLII (3), 23–28 [in Polish].
- Dákay I., Márton D., Bene S., Kiss B., Zsuppán Z., Szabó F., 2006. The age at first calving and the longevity of beef cows in Hungary. Arch. Tierz., Dummerstorf 49 (5), 417–425.
- DzU 47, 1999. Rozporządzenie Ministra Rolnictwa i Gospodarki Żywnościowej w sprawie zakresu i metod prowadzenia oceny wartości użytkowej i hodowlanej zwierząt oraz sposobu oznakowania i identyfikacji zwierząt do celów hodowlanych [Ordinance of the Minister of Agriculture and Food Economy concerning the range and methods for evaluating production and breeding value of animals and the way of tagging and identification of animals for breeding purposes] [in Polish].
- Kaps M., Herling W.O., Lamberson W.R., 1999. Genetic and environmental parameters for mature weight in Angus cattle. J. Anim. Sci. 77, 569–574.
- Pilarczyk R., Wójcik J., 2007. Comparison of calf rearing results and nursing cow performance in various beef breeds managed under the same conditions in north-western Poland. Czech. J. Anim. Sci. 52 (10), 325–333.
- Pilarczyk R., Wójcik J., 2008. Comparison of body weight and reproduction performance in cows of various beef breeds managed under equal conditions in West Pomerania. Arch. Tierz. 51 (4), 318–328.
- Pogorzelska J., Kijak Z., Tarczyński R., 1999. Analiza użytkowania rozpłodowego i wyniki odchowu potomstwa rasy hereford importowanego z Danii [An analysis of reproductive use and rearing results of Hereford offspring imported from Denmark]. Zesz. Nauk. Prz. Hod. 44, 389–395 [in Polish].
- Przysucha T., Grodzki H., 2007. Zależność między wiekiem i rasą jałówek mięsnych a przebiegiem porodu [Influence of beef heifers' age on their calving course]. Med. Weter. 63 (12), 1576–1578 [in Polish].
- Przysucha T., Grodzki H., Czarnecki vel Sarnecki M., Slósarz J., 2002. Wpływ sezonu i kolejności ocielenia na wybrane wskaźniki płodności ras angus i hereford [An effect of season and number of calving on the selected fertility indices in Angus and Hereford breeds]. Zesz. Nauk. Prz. Hod. 62, 253–259 [in Polish].
- Przysucha T., Grodzki H., Slósarz J., 2010. Związek między indeksem powierzchni miednicy a masą ciała, wysokością w krzyżu i obwodem klatki piersiowej krów ras mięsnych [Correlation between pelvis area index and body weight, height in sacrum and chest circumference of beef breed cows]. Med. Weter. 66 (3), 210–212 [in Polish].
- Stanek P., 2006. Zmienność wieku pierwszego wycielenia, masy i wymiarów ciała krów rasy limousine i hereford [The variability of age at first calving, body weight and body size of Limousine and Hereford cows]. Ann. Univ. Mariae Curie-Skłodowska XXIV, 72–79 [in Polish].
- Stenzel R., Chabuz W., Jankowski P., Mroczek A., 1999. Wstępne wyniki badań dotyczące rozrodu oraz odchowu cieląt w stadach mięsnych [Preliminary results of reproduction and rearing of calves in beef herds]. Zesz. Nauk. Prz. Hod. 44, 221–227 [in Polish].
- Supera K., Pasierbski Z., Trela J., Malinowski E., 1997. Aklimatyzacja bydła rasy hereford z Danii

Zootechnica 11 (3) 2012

w warunkach Pomorza Zachodniego [Acclimatization of Hereford cattle from Denmark under conditions of West Pomerania]. Rocz. Nauk. Zootech. 24 (4), 23–34 [in Polish].

- Szarek J., Adamczyk K., Frelich J., 2008. Stan i perspektywy rozwoju hodowli bydła mięsnego w Polsce [The state and prospects of the development of beef cattle breeding in Poland]. Wiad. Zootech. XLVI (4), 23–36 [in Polish].
- Szewczyk A., 2005. Charakterystyka wybranych ras bydła mięsnego cz. I [Characterization of selected beef cattle breeds – part I]. Hodowca Bydła 2, 40–45 [in Polish].
- Trela J., Malinowski E., Supera K., Pasierbski Z., 1998. Aklimatyzacja bydła rasy Hereford w Zootechnicznym Zakładzie Doświadczalnym Kołbacz [Acclimatization of Hereford cattle at the Zootechnical Experimental Station in Kolbacz]. Zesz. Nauk. AR Wroc., Konf. XIX (336), 181–186 [in Polish].
- Wójcik J., Pilarczyk R., Jasiński A., Piłat D., 2008. Comparison of growth and development in cows of different meat breeds in the Western Pomerania area based on parameterized results. Ann. Anim. Sci. 8 (1), 13–22.

## PORÓWNANIE PARAMETRÓW UŻYTKOWYCH PIERWIASTEK RASY RED ANGUS I HEREFORD

**Streszczenie.** Celem pracy było porównanie pierwiastek rasy red angus i hereford na podstawie wieku pierwszego wycielenia, masy ciała oraz porównanie niektórych wskaźników płodności, mleczności i wybranych pomiarów zoometrycznych. Badania przeprowadzono w gospodarstwie zlokalizowanym w województwie zachodniopomorskim. Wiek pierwszego wycielenia (WPW) oraz zmienność masy ciała u obu ras kształtowały się na zbliżonym poziomie. Pierwiastki rasy hereford charakteryzowały się istotnie ( $P \le 0,01$ ) wyższą szacowaną mlecznością (2054,9 kg) w porównaniu z pierwiastkami rasy angus (1992,8 kg) oraz istotnie ( $P \le 0,01$ ) wyższymi wartościami parametrów zoometrycznych: wysokość w krzyżu (odpowiednio: 135,5 cm i 132,5 cm) i obwód klatki piersiowej (odpowiednio: 197,0 cm i 191,6 cm).

Slowa kluczowe: angus, hereford, masa ciała, okres międzywycieleniowy, pomiary zoometryczne, wiek pierwszego wycielenia

Accepted for print – Zaakceptowano do druku: 26.09.2012