

Analysis of Angus beef cattle recording results in Poland

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Abstract: *Analysis of Angus beef cattle recording results in Poland.* The aim of the study was to assess the utility of selected results of the British Angus breed with respect to their compliance with the goal of racial breeding and standards adopted by the Polish Association of Breeders and Producers of Beef Cattle (PABPBC). The subject of the analysis were recording results of the British Angus beef cattle breed in Poland. The study was based on data for the years 2002–2014 of PABPBC and the National Center of Animal Breeding (NCAB) for 1996–2001. The data set included: *N* – the number of animals tested, *min* – minimum values in the studied traits, *max* – maximum value of the selected features, *AVG* – average values of the analyzed traits, *SD* – standard deviation. Evaluated properties are: average weight of cows (kg), the average body weight of calves after birth (kg), the average milk yield (kg), the terms of cows and heifers calving aptitude, the distribution of the population according to the order of calving cows. Since 2001 there is a clear, steady decline in the share of population of the breed in the female population of beef cattle. This decrease concern both purebred and crossbred populations. Analysis of the results of evaluation shows that the average body weight of cows did not differ from weights assumed in the breeding goal. The mean body weight of purebred calves at birth did not change significantly in 15 years of assessment. Bulls have demonstrated higher birth weight reaching 37 kg. The difference between bulls and heifers was about 1–2 kg. Calves were characterized by a high average gains during rearing: 763–997 g for heifers and 718–1,032 g for bulls over all years of assessment. In

Polish Angus cattle herds 50–60% of cows was calving during the relevant period in recent years. It shows that about half of the calves born at other times of the year only to a small degree can take full advantage of the pasture. Despite a steady decrease in the population of Angus cows primiparous and cows calving for the second time constituted about 40% of the population. In 2001 only four cows was after seventh calving and in 2014 already 94 (22.5%).

Key words: beef cattle, Angus, beef cattle recording

INTRODUCTION

Twenty years of the Programme of Beef Cattle Breeding Development in Poland passed in 2014 (Jasiorowski et al. 1996). Due to the sparse pure-bred female population is difficult to talk about own national breeding program. Therefore, the maintenance of high standards of breed is the main task of the Polish Association of Breeders and Producers of Beef Cattle (PABPBC). Its implementation is, inter alia, usability evaluation conducted in beef cattle herds. The PABPBC breeding goal for Angus cows is maintaining body weight of adult cows on the level of approximately 550–600 kg, and in case of bulls around 900–1000 kg, ease of

calvings, a high level of maternal traits and maintenance of maturity class. Bulls should reach at adulthood the height at sacrum of about 135 cm and cows about 130 cm. In the national beef cattle breeding program there are set out, i.a. the following standards for breeding of Angus cows entered in the introductory part of the book: the minimum weight gain from birth to 210 days of age – 800 g, the minimum weight at first calving 460 kg.

The aim of the study was to assess the selected results of the British Angus with respect to their compliance with the breeding goal and standards adopted by the PABPBC.

MATERIAL AND METHODS

The subject of the analysis were beef cattle recording results for the British Angus breed in Poland, with respect to their compliance with the goal of racial breeding and standards adopted by the PABPBC. The subject of the analysis were recording results of the Angus beef cattle breed in Poland. The study was based on data for the years 2002–2014 of the PABPBC and the National Center of Animal Breeding (NCAB) for 1996–2001. The data set included: *N* – number of animals tested, *min* – minimum values in the studied traits, *max* – maximum value of the selected features, *AVG* – average values of the analyzed traits, *SD* – standard deviation. Evaluated properties are: average weight of cows (kg), average body weight of calves after birth (kg), average milk yield (kg), the terms of cows and heifers calving aptitude, the

distribution of the population according to the order of calving cows.

The calculation of standardized animal body weight for given day in its life was done according to the following formula:

$$MCS = [(MCB - MCU) / WW] \cdot WS + MCU$$

where:

MCS – standardized animal body weight (kg);

MCB – mean body weight of the animal on the actual weighing (kg);

MCU – actual body weight set for 48 h at birth (kg);

WW – mean age of the animal on the weighing (days);

WS – standardized age of the animal (s).

RESULTS AND DISCUSSION

Table 1 presents the quantitative changes of the female population of Angus cattle in Poland in the years 1996–2014. Since 2006 there is a clear, steady decline in the share of the female population of the breed in beef cattle. This decrease concerned both purebred and crossbred populations.

The average body weight of purebred cows are shown in Table 2. Optimum cow body weight and dimensions depend mainly on cattle production system (Morris and Wilton 1976, Andersen 1978, Dickerson 1978, Fitzhugh 1978, Nogalski et al. 2000). Genotype and weight of cows are always listed among the many factors responsible for normal growth and development of calves.

TABLE 1. Quantitative changes of the female population of Angus cattle in Poland (from 2007 the list includes only the cows)

Year	Beef breed female population			Angus breed (purebred)	Angus breed (crossbred)	Angus breed (purebred + crossbred)	Angus breed share in the population
	purebred	crossbred	total				
1996	3 939	4 952	8 891	156	245	401	4.5
1997	6 063	5 772	11 835	316	162	478	4.0
1998	7 227	7 601	14 828	455	129	584	3.9
1999	8 375	8 243	16 618	523	161	684	4.1
2000	9 085	9 468	18 553	483	320	803	4.3
2001	9 129	9 748	18 877	487	214	701	3.7
2002	9 735	8 968	18 703	673	136	809	4.3
2003	11 768	9 382	21 150	657	188	845	4.0
2004	13 884	10 925	24 809	742	579	1321	5.3
2005	17 130	11 710	28 840	888	137	1025	3.6
2006	19 597	13 100	32 697	1 001	189	1190	3.6
2007	14 541	11 676	26 217	314	113	427	1.6
2008	17 481	12 097	29 578	351	121	472	1.6
2009	15 435	7 711	23 146	328	94	422	1.8
2010	16 436	7 576	24 012	380	126	506	2.1
2011	16 216	7 459	23 675	291	140	431	1.8
2012	16 724	7 070	23 794	321	97	418	1.8
2013	17 481	6 633	24 114	380	95	475	2.0
2014	18 061	6 302	24 363	403	123	526	2.2

TABLE 2. Body weight of purebred Angus cows

Year	N	Cow body weight (kg)			
		min	max	AVG	SD
1999	47	400	660	528.3	83.3
2000	72	460	680	561.6	52.5
2001	79	380	750	551.2	71.0
2002	73	460	688	559.2	47.1
2003	112	470	770	552.9	46.7
2004	189	490	700	555.2	35.0
2005*	52	475	588	533.2	29.6
2006*	52	421	625	517.0	43.8

* Body weight after first calving.

Many studies have shown that the weight of the cow has a significant impact on calf birth weight, as well as daily gains during rearing (Przysucha et al. 2002). Cited authors showed that body weight of cows had highly significant impact on calf weight at birth. Cows with the lowest body weight delivered calves lighter by 6.3 kg than calves born to the heaviest cows. Body weight of cows had significant and highly significant influence on weight of calves aged 120 and 210 days. Highly significant effect of cow body weight on calves weight daily

gains for periods from first to 210th and 120th to 210th day of age. The highest daily gains in body weight during the whole period of rearing had calves delivered by cows with the highest weight. Therefore, the weight of a cow in adulthood is an important feature to be considered for breeding programs. According to the breeding goal of the PABPBC, cow body weight in adulthood should be 550–600 kg and for primiparous cows 460 kg. Analysis of the results of usability evaluation shows that the average body weight of cows did not differ from weights assumed to breeding.

Tables 3 and 4 illustrate the average body weight of purebred calves at birth which did not change significantly in 15 years of assessment. Higher birth weight have demonstrated the bulls reaching 37 kg. The difference between

TABLE 3. Average body weight of purebred heifers at birth

Year	N	Body weight (kg)			
		min	max	AVG	SD
2000	24	25	38	33.2	3.3
2001	41	20	38	29.4	4.3
2002	30	26	36	30.7	2.7
2003	46	22	45	31.0	5.1
2004	103	20	40	32.3	3.8
2005	115	20	40	29.8	5.1
2006	112	15	46	33.0	3.1
2007	75	18	47	33.6	5.4
2008	97	24	46	33.4	4.4
2009	116	18	47	32.6	5.0
2010	154	13	48	33.1	5.6
2011	132	19	41	30.8	3.9
2012	151	15	48	31.6	5.7
2013	135	22	40	31.5	3.7
2014	147	20	44	32.1	3.9

TABLE 4. Average body weight of purebred bulls at birth

Year	N	Body weight (kg)			
		min	max	AVG	SD
2000	36	25	50	34.0	5.1
2001	35	20	52	31.2	7.3
2002	35	28	41	33.0	3.2
2003	65	16	45	32.2	5.3
2004	84	25	50	33.5	3.9
2005	118	18	50	31.8	5.9
2006	121	19	45	34.0	2.9
2007	114	20	51	34.7	5.0
2008	90	25	51	34.9	4.7
2009	17	28	47	33.5	4.3
2010	133	20	56	37.0	6.1
2011	144	19	56	33.8	5.0
2012	123	18	50	33.9	5.0
2013	107	24	44	33.5	4.0
2014	128	16	44	34.2	4.6

bulls and heifers was usually 1–2 kg. Kamieniecki et al. (1998) reported an average birth weight of Angus heifers as 40.82 kg and bulls – 42.85 kg. These are higher weights than shown in the table and those reported by other authors, but they concern calves born to cows from imports. In studies of Trela et al. (1998) the figures were 34.7 and 37.4 kg, respectively. Many authors have shown a significant effect of body weight after giving birth to a calf body weight at weaning at the age of 210 days. The highest weight of calves at birth typically have also the highest body weight at the end of the rearing (Przysucha et al. 2002). Przysucha et al. (2002) showed highly significant influence of calf birth weight for its later body weight and the size of daily gains for periods of from first to 120th and 120th to 210th day of

age. The lightest calves at birth (<30 kg) resolved calves with higher birth weight in later periods of fattening and obtained lowest daily gains.

Table 5 shows the average milk yield of purebred cows in different years of assessment. As can be seen from the following statement, the minimum milk yield of cows of the breed was 1,518 kg

TABLE 5. The average milk yield of purebred cows

Year	N	Estimated milk yield of cows (kg)			
		min	max	AVG	SD
2000	51	1 643	2 049	1 881.0	93.1
2001	42	1 059	2 845	1 828.4	420.2
2002	28	1 156	2 079	1 517.9	177.1
2003	72	1 052	2 104	1 653.1	180.7
2004	139	991	2 677	1 935.6	251.0
2005	108	1 230	2 001	1 878.0	118.4
2006	198	1 231	2 345	1 893.6	115.3
2009	282	1 144	2 707	1 786.1	242.9

and the maximum 1,894 kg. The data presented should be approached with great caution because milk yield was calculated based on the weight gain of calves, and as we know in the herd calves can always be found that approach to other cows and choke or are additionally fed by the breeder. Przysucha et al. (2002) studied the relationship between milk yield of Angus cows and growth of calves. The highest weight and growth reached calves which mothers had the highest milk yield. The direct relation-

ship of mothers milk yield and calf rearing results indicate many authors, among others (Dobicki 1995, Jasiorowski et al. 1996, Kamieniecki et al. 1998).

Table 6 summarizes the terms of cows and heifers calving aptitude analyzed in the coming months in the years 1999–2014. Season of birth has a significant impact on the vitality and growth pace of reared calves which directly affects the economic effects of the rearing (Przysucha et al. 2005). In studies of Przysucha et al. (2002) Angus calves born in the winter season (November to April) showed a slight weight advantage in body weight in all studied periods of life compared to calves born in the summer, i.e. from May to October. Seasonality in calvings in breeding herds is very important because appropriate term of calving in the future allows to receive breeding material of a very good quality with the least amount of cost of rearing (maximum utilization of pastures). Many authors believe (Dobicki 1996, Jasiorowski 1999, Jasiorowski and Przysucha 2004) that the period of mating and the resulting of calving aptitude time should not be longer than 2–3 months. Beef cows maintained all year round in grazing system should make the best offspring in the winter. Calves born in the period after the completion of the first period of milk drinking are prepared to make full use of the pasture then their growth rate is fast. Calves are healthy and good developed and breeder bear the smallest rearing costs. It should also be noted that in the winter calvings weaning calves moment coincides with the

TABLE 6. Time of purebred cows and heifers calving

Year	Unit	Month												Total
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
1999	N	–	4	4	2	2	7	11	8	5	2	2	1	48
	%	–	8.3	8.3	4.2	4.2	14.6	22.9	16.7	10.4	4.2	4.2	2.1	100.0
2000	N	–	21	10	3	15	6	–	–	6	2	4	6	73
	%	–	28.8	13.7	4.1	20.5	8.2	–	–	8.2	2.7	5.5	8.2	100.0
2001	N	11	16	17	6	10	3	1	–	–	8	6	2	80
	%	13.8	20.0	21.3	7.5	12.5	3.8	1.3	–	–	10.0	7.5	2.5	100.0
2002	N	21	11	12	7	6	1	3	1	1	1	9	2	75
	%	28.0	14.7	16.0	9.3	8.0	1.3	4.0	1.3	1.3	1.3	12.0	2.7	100.0
2003	N	28	17	20	13	8	3	9	6	3	55	–	2	114
	%	24.6	14.9	17.5	11.4	7.0	2.6	7.9	5.3	2.6	4.4	–	1.8	100.0
2004	N	35	19	28	19	18	17	11	6	4	1	17	14	189
	%	18.5	10.1	14.8	10.1	9.5	9.0	5.8	3.2	2.1	0.5	9.0	7.4	100.0
2005	N	42	23	32	29	21	19	12	8	4	8	12	14	224
	%	18.8	10.3	14.3	12.9	9.4	8.5	5.4	3.6	1.8	3.6	5.4	6.3	100.0
2006	N	34	24	56	33	43	8	9	8	5	5	3	5	233
	%	14.6	10.3	24.0	14.2	18.5	3.4	3.9	3.4	2.1	2.1	1.3	2.1	100.0
2007	N	23	44	54	39	23	11	9	2	4	7	13	51	280
	%	8.2	15.7	19.3	13.9	8.2	3.9	3.2	0.7	1.4	2.5	4.6	18.2	100.0
2008	N	49	25	53	28	25	12	20	14	5	3	10	43	287
	%	17.1	8.7	18.5	9.8	8.7	4.2	7.0	4.9	1.7	1.0	3.5	15.0	100.0
2009	N	58	46	49	36	28	14	19	5	10	2	9	18	294
	%	19.7	15.6	16.7	12.2	9.5	4.8	6.5	1.7	3.4	0.7	3.1	6.1	100.0
2010	N	46	64	63	54	42	21	26	9	5	5	5	24	364
	%	12.6	17.6	17.3	14.8	11.5	5.8	7.1	2.5	1.4	1.4	1.4	6.6	100.0
2011	N	48	36	80	47	26	19	3	2	1	7	17	6	292
	%	16.4	12.3	27.4	16.1	8.9	6.5	1.0	0.7	0.3	2.4	5.8	2.1	100.0
2012	N	46	57	72	68	28	10	8	12	5	1	16	10	333
	%	13.8	17.1	21.6	20.4	8.4	3.0	2.4	3.6	1.5	0.3	4.8	3.0	100.0
2013	N	45	66	119	53	35	15	20	4	1	1	18	3	380
	%	11.8	17.4	31.3	13.9	9.2	3.9	5.3	1.1	0.3	0.3	4.7	0.8	100.0
2014	N	20	75	18	79	51	29	12	9	–	–	1	23	417
	%	4.8	18.0	28.3	18.9	12.2	7.0	2.9	2.2	–	–	0.2	0.5	100.0

impoverishment of pastures in autumn. The consequence is natural dry-off pregnant cows. With winter calvings cows mostly deliver in the barn so that it is easier to monitor deliveries and possible assistance in the event of complications.

Analyzing the obtained results and assuming that the most favorable period of cows calving aptitude is the period from December to March. It should be noted that about 35–60% of the Polish Angus cows delivered in recent years during the

relevant period cows. It follows that about half of the calves born at other times of the year only to a small degree can take full advantage of the pasture.

Table 7 shows the percentage distribution of calving aptitude of Angus cows calving order. It should be noted that despite a steady decrease in the population of Angus primiparous cows and cows calving for the second time constituted about 40% of the population. In 2001 there were only four cows after seventh calvings and in 2014 already

94 (22.5%). It proves that the life of the cow increases, which is of particular economic importance. Long life of cows in herds of beef cattle is one of the main factors allowing for reducing the cost so the breeders should try to use cows as long as possible.

CONCLUSIONS

Analysis of selected results of the evaluation of British Anguses with respect to their compliance with the breeding goal and standards adopted by PABPBC shows

TABLE 7. Distribution of the order of calving

Year	Unit	Number of months												Total
		1	2	3	4	5	6	7	8	9	10	11	≥12	
2000	N	29	13	12	9	6	4	–	–	–	–	–	–	73
	%	39.7	17.8	16.4	12.3	8.2	5.5	–	–	–	–	–	–	100.0
2001	N	21	37	7	3	3	5	3	1	–	–	–	–	80
	%	26.3	46.3	8.8	3.8	3.8	6.3	3.8	1.3	–	–	–	–	100.0
2002	N	14	15	31	7	3	2	2	1	–	–	–	–	75
	%	18.7	20.0	41.3	9.3	4.0	2.7	2.7	1.3	–	–	–	–	100.0
2003	N	37	10	20	31	7	3	2	3	1	–	–	–	114
	%	32.5	8.8	17.5	27.2	6.1	2.6	1.8	2.6	0.9	–	–	–	100.0
2004	N	64	46	16	19	24	9	6	1	3	1	–	–	189
	%	33.9	24.3	8.5	10.1	12.7	4.8	3.2	0.5	1.6	0.5	–	–	100.0
2005	N	52	59	32	26	26	17	8	3	–	1	–	–	224
	%	23.2	26.3	14.3	11.6	11.6	7.6	3.6	1.3	–	0.4	–	–	100.0
2006	N	52	23	15	34	25	43	23	15	3	–	–	–	233
	%	22.3	11.5	8.5	15.2	13.5	19.5	11.5	8.5	1.5	–	–	–	100.0
2010	N	94	32	57	47	41	27	40	8	5	9	4	–	364
	%	25.8	8.7	15.6	12.9	11.2	7.4	10.9	2.1	1.3	2.4	1.0	–	100.0
2011	N	19	75	28	50	37	27	15	28	3	2	5	3	292
	%	6.5	25.6	9.5	17.1	12.6	9.2	5.1	9.5	1.0	0.6	1.7	1.0	100.0
2012	N	62	38	59	29	58	31	27	12	16	6	1	4	333
	%	18.6	11.4	17.7	8.7	14.4	9.3	8.1	3.6	4.8	1.8	0.3	1.2	100.0
2013	N	98	47	42	55	24	39	28	23	10	12	2	–	380
	%	25.8	12.4	11.1	14.5	6.3	10.3	7.4	6.1	2.6	3.2	0.5	0.0	100.0
2014	N	63	98	40	41	54	27	35	26	17	7	8	1	417
	%	15.1	23.5	9.6	9.8	12.9	6.5	8.4	6.2	4.1	1.7	1.9	0.2	100.0

maintenance of high standards despite the systematic reduction of breeding domestic cattle population of the breed.

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Streszczenie: Analiza wyników oceny użytkowości brytyjskiej rasy angus w Polsce. Celem pracy była analiza wybranych wyników oceny użytkowości brytyjskiej rasy angus w odniesieniu do ich zgodności z celem hodowlanym i standardami rasowymi przyjętymi przez Polski Związek Hodowców i Producentów Bydła Mięsnego. Przedmiotem analiz były wyniki oceny użytkowości brytyjskiej rasy bydła mięsnego angus w Polsce. Opracowanie powstało na bazie danych PZHiPBM za lata 2002–2014 oraz Krajowego Centrum Hodowli Zwierząt (KCHZ) za lata 1996–2001. Zbiór danych obejmował: *N* – liczbę badanych zwierząt, *min.* – minimalne wartości w badanej cechy, *max.* – maksymalne wartości badanej cechy, *średnia* – uśrednione wartości badanej cech, *SD* – odchylenie standardowe. Oceniane cechy to: średnie masy ciała krów (kg), średnie masy ciała cieląt po urodzeniu (kg), średnia mleczność krów (kg), terminy ocieleni krów i jałowic, rozkład populacji krów według kolejności ocielenia. Od 2001 roku widać wyraźny, systematyczny spadek udziału tej rasy w żeńskiej populacji bydła mięsnego. Spadek ten dotyczy zarówno populacji czystorasowej, jak i mieszańców. Analiza wyników oceny użytkowości przedstawia, iż średnie masy ciała krów nie odbiegają od mas założonych w celu hodowlanym. Średnie masy ciała cieląt czystorasowych

po urodzeniu nie zmieniły się znacząco w ciągu 15 lat prowadzenia oceny. Większą masą urodzeniową wykazały się buhajki, osiągając wagę 357 kg. Różnicą między buhajkami a jałówkami wynosiła 1–2 kg. Cielęta charakteryzowały się dużymi i średnimi przyrostami w okresie odchowu: 763–997 g odpowiednio dla cieliczek i 718–1032 g dla buhajków w ciągu wszystkich lat prowadzenia oceny. W polskich stadach bydła angus cielęto się w ostatnich latach we właściwym okresie 50–60% krów. Wynika z tego, że około połowa cieląt urodzonych w innych okresach roku jedynie w nieznacznym stopniu może w pełni korzystać z pastwiska. Mimo systematycznego zmniejszania populacji krów rasy angus, pierwiastki i krowy cielące się po raz drugi

stanowią około 40% populacji. W 2001 roku tylko cztery krowy były po siódmym ocieleniu, a w 2014 roku było ich już 94 (22,5%).

Słowa kluczowe: bydło mięsne, rasa angus, ocena użytkowości bydła mięsnego

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