

## **BOER GOATS IN POLAND – ANALYSIS OF THE STATUS OF BREEDING AND CHARACTERISTICS OF THE SELECTED PERFORMANCE PARAMETERS OVER THE LAST DECADE**

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### **Abstract**

*The Boer goats represent the meat direction of use and are the second, after the Carpathian goat, in Poland in terms of their share in the active population. The aim of this study was to analyze the status of breeding and selected functional traits of Boer goats in 2009-2018. Data analysis showed a decrease in the number of Boer goats entered in the books, as well as a decrease in the number of their offspring. Nevertheless, favorable upward trends were noted for the meat performance index of kids, such as daily gains. This indicates the possibility of improving the efficiency of goat production, which is an opportunity for Boer goat breeders, especially in the era of today's consumers searching for high-quality food.*

*Keywords: Boer goat, meat, breeding value, performance*

The increase in the number of goats in Poland after World War II continued until the 1960s, when the population was about 700,000. pieces. Goats were kept mainly on small farms and backyard farms, where they produced milk. In the following years, the lack of interest in this direction of production led to the elimination of goat's breeding herds and mating points, and as a consequence to a decline in the number of animals and the deletion of

goats from the list of farm animal species. In 1980, the number of goats in Poland was 40,000. and the number of livestock was slowly increasing. In 2018, the goat population in Poland increased to approx. 44 thousand (FAO, 2020). There were 33 herds, including 335 goats, under the evaluation of utility value, while 196 goats were entered in the herd books. The number of breeding goats was 68. Carpathian goats (almost 50%) had the largest share in the active population, while Boer goats, being the only typical meat breed in Poland, were in the second position (17% of the evaluated goats) (PZO, 2019).

The increased interest in a healthy lifestyle, healthy eating and organic farming undoubtedly contributed to the increase in the number of goats in Poland. The health benefits of goat's milk were also noticed. The milk products have gained popularity - both delicious cheeses and cosmetics with the addition of goat's milk (Bagnicka et al., 2004; Niżnikowski et al., 2015; Sikora and Kawęcka, 2015).

In Poland, the majority of the goat population are single-purpose animals. Multi-purpose breeds (milk, meat, leather), such as the native Carpathian goat, are gradually gaining in importance (Sikora and Kawęcka, 2015). The population of meat goats is small, which translates into a small number of farms specializing in the production of goats for slaughter. The goat meat market in Poland is practically non-existent, and the demand for goat meat is negligible, which is mainly due to the habits of Poles. Goat meat is an unfairly underestimated product: it is lean, contains a relatively high amount of protein rich in amino acids (leucine, isoleucine, methionine, phenylalanine, tyrosine, lysine, cystine and tryptophan), mineral salts, and is also low in saturated fatty acids and cholesterol ( Ivanovic et al., 2014). The level of intramuscular fat in goat meat is low and increases with the age of the kids and their slaughter weight - it can range from 0.5 to 5.0% (Niedziółka et al., 2008). Attention should also be paid to the high level of unsaturated fatty acids EFA in goat meat and the favorable (1: 4) ratio of n-3 to n-6 (Bernacka et al., 2016). The nutritional and dietary values of goat meat make this product fully meet the current needs of modern consumers, looking for food that is not only tasty, but also healthy.

The Boer goats (Boer - Dutch farmer) (Fig. 1 and 2) come from South Africa. Local goats were crossed there with Indian and European breeds and selected for meat use (Lu and Potcoiba, 1988; Lu, 2019). Due to its origin, the Boer breed is resistant to high temperature fluctuations and has low feed requirements. Boer goats were imported to Poland both for keeping the breed clean and for crossing with dairy breeds, which serves to improve the muscles of the kids. The breed standard was determined by the establishment of the Boar Goat Breeders Association in South Africa in 1959. By the end of the 20th century, this breed

became very popular all over the world, and as a result of the difficulties of importing animals from Africa, the price for livestock was high. Over time, the market situation has stabilized (Campbell, 2003; Lu, 2019).

The Boer goat population in Poland comes from goats brought to the Federal Republic of Germany in the 1970s (Wójtowski, 2016). In Poland, breeding books for Boer goats have been operating since 2006. They are kept separately for goats and bucks and are divided into main and introductory books, while the main book contains animals that come from at least two generations from the ancestors of the Boer breed entered in Polish or foreign book (PZO, 2006). Boer goats mature early, are characterized by good muscularity and high fertility, as well as high daily gains and very good slaughter efficiency (Wójtowski, 2016; Bagnicka et al., 2017).



Fot. 1 i 2. Boer goats (<http://www.kolbacz.pl/>; A. Kawęcka)

Boer goats are characterized by a stocky and compact body, short and well-muscled limbs, as well as a well-developed rump and long, hanging ears. The shape of the log should fit into the rectangle. Both the goats and the bucks are horned and have a characteristic coat colour: red-red head and neck with a white arrow on the head, the rest of the body is coloured white. The coat is short and shiny. The line of the bridge of the nose has a characteristic arched, gibbous profile. Red spots on the body and limbs are allowed (<http://www.pzow.pl/rasy-koz.html>, 2020; Nowicki et al., 1995). The body weight of adults is 80-100 kg for goats and 90-135 kg for goats, while the height at the withers is 65-75 cm for goats and 75-90 cm for goats. These goats are also characterized by high fertility, up to 200% (in Poland about 170%), and the breeding performance is about 140% (Kaba and Bagnicka, 2009). They are asseasonal animals and it is possible to get 3 litters from them within 2 years

(Greyling, 1990). Often twins are born in one litter. The birth weight of kids is 3-4 kg and may vary by 0.5 kg depending on their sex (Lu and Potcoiba, 1988). Milk production covers the nutritional needs of kids, and the duration of lactation is shorter than in dairy breeds. In the first 12 weeks of lactation, the daily milk yield is 1.8-2.5 kg. With good conditions, Boer goats achieve high daily gains, especially in the first year of life - at the level of 200-300 g (Raats et al., 1983; Malan, 2000).

Boer goat's meat is tender, juicy and tasty, and also devoid of a characteristic smell. The carcasses are low-fat, the cuts are larger than that obtained from dairy goats, and the slaughter yield is about 47% for purebred individuals and 49-53% for cross of Boer goat with a white enhanced breed (Webb et al., 2005; Stanisiz et al., 2009; Pophiwa et al., 2017).

The aim of this study was to analyze the status of breeding and selected performance characteristics of the Boer goats in Poland in 2009-2018.

## **Material and methods**

The experimental material consisted of data on the population of Boer goats in Poland and their performance results, derived from the annual reports published by the Polish Sheep Breeders Association (PZO, 2010-2019) for the years 2009-2018. The features related to the reproduction of goats (fertility, prolificacy, percentage of born kids) and the results of meat performance assessment (body weight of goats after birth and at 50 days of age and weight gain in this period) were analyzed. The results were statistically processed using the STATISICA version 10 package (StatSoft Inc., 2011) using one-way analysis of variance. In order to find significant differences between the means, Duncan's test was used, with the level of  $p \leq 0.05$  and  $p \leq 0.01$ .

## **Results**

The number of herds and the number of animals entered in the herd books in the analyzed years are shown in Figure 1. The largest number of Boer goats entered in the books was recorded in Poland in 2011-2014; it amounted to over 100 animals, and the highest was in 2014 (116 individuals). In 2015, there was a decrease in the number of goats entered in the books to 69, but since 2016 it has increased again. The number of goats was the highest in 2014 and 2017, 24 and 25, respectively. The number of herds of Boer goats increased from

2009 to 2014 and more than doubled then, from 4 to 10. In 2018, the number of herds was 7 (Fig. 1).

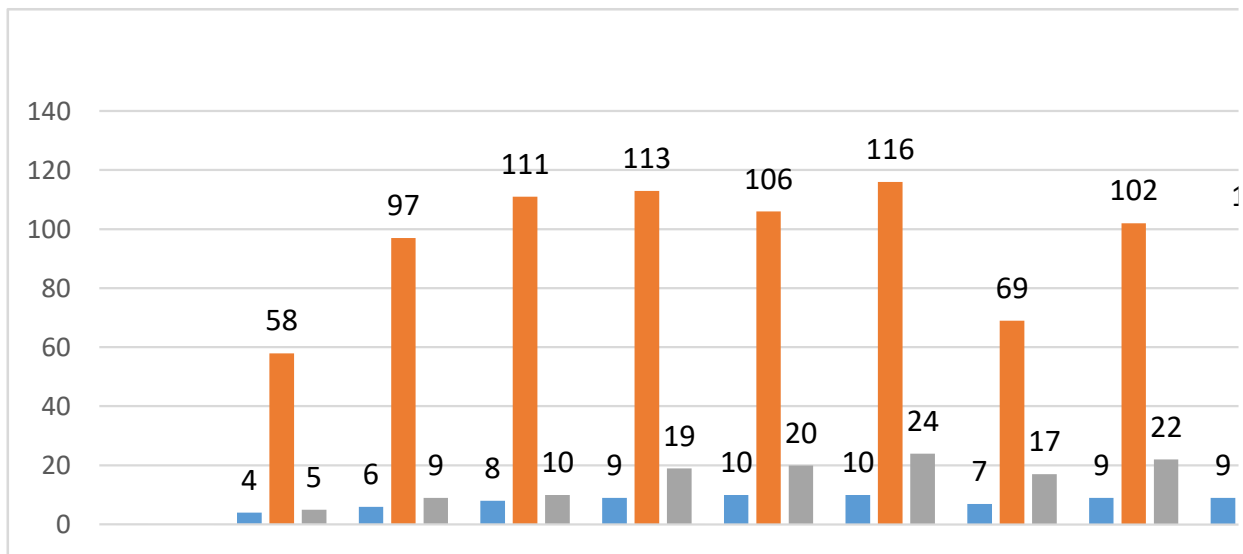


Fig.1. The number of herds and the population of Boer goats entered in the studbooks in Poland in 2009-2018.

Figure 2 shows the number of assessed offspring in years 2009-2018, broken down by gender. The largest number of Boer goat offspring was assessed in 2012 - 59 goats and 74 goats (133 heads in total) (Fig. 2). In the following years, these values decreased slightly. The lowest total number of offspring was observed in the last analyzed year - a total of 69. The highest number of males assessed in 2014 (60), and the lowest in 2017 (32). In turn, the most females were included in the assessment in 2012 (74), and the least in 2018 (27). Boer goat litters are often twinned. The analysis of the data concerning the sex distribution of the born kids showed a slight numerical advantage in favor of the goats. The average for the examined period of 10 years was 51.68% for male goats and 48.32% for female goats. The biggest difference can be noticed in 2018, when this value was 60.46% for males and 39.54% for females. In turn, the most similar proportions were observed in 2011 - 49.02% for male and 50.98% for female kids. The highest percentage of born female kids was recorded in 2010 (55.17%).

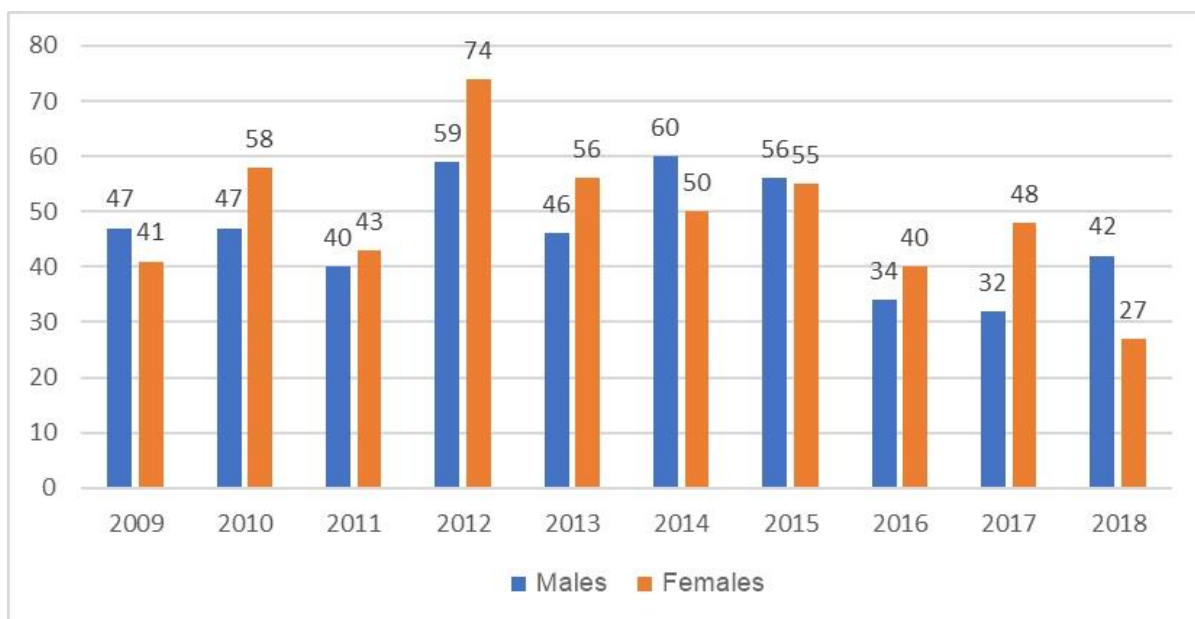


Fig. 2. Number of offspring of Boer goats in 2009-2018

The results of the breeding performance of Boer goats in 2009-2018 are presented in Figure 3. The highest fertility in Boer goats, amounting to 93.94%, was recorded in 2017. In general, the value of this index ranged between 64-94%, with an average value of 80.6%. The average prolificacy was 181.03%. Its lowest value was recorded in 2011 - 143.67%, and the highest in 2014 - as much as 257%. The values of both discussed indicators were arranged randomly and no upward or downward trend was observed with the passing years.

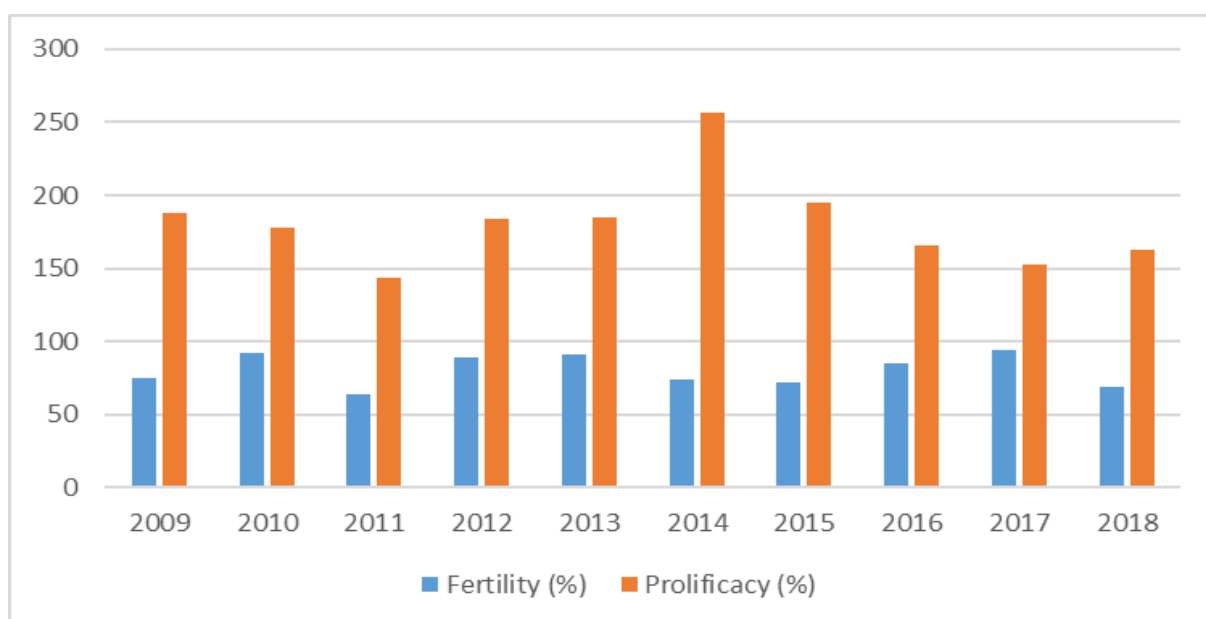


Fig. 3. Results of the breeding performance of Boer goats in 2009-2018.

In order to assess the meat performance of the offspring, data on body weight and daily gains of 463 male goats and 492 female goats were analyzed, the results of which are presented in Table 1. The mean body weight of male goats at birth (3.58 kg) was higher than that of female goats (3.23 kg), and this difference was statistically significant ( $P \leq 0.01$ ). The average weight of all kids was 3.41 kg. The body weight on day 50 was on average 14.06 kg for male goats and 13.07 kg for female goats. The value of daily gains was typical for Boer goats and, depending on the sex, on average was 212.14 g for male goats and 191.65 g for female goats. There were no statistically significant differences between the sexes.

Table 1. Body weight and weight gain of Boer kids in 2009-2018.

Parameter	Males n=463	SD	Females n=492	SD
Body weight at birth (kg)	3,58 <sup>A</sup>	0,18	3,23 <sup>B</sup>	0,21
Body weight at day 50 (kg)	14,06	1,49	13,07	1,15
Daily gains (g)	212,14	24,42	191,65	21,56

A, B -  $P \leq 0.01$  - mean values marked with different letters in the lines differ statistically significantly.

A, B -  $P \leq 0.01$  - mean values with different letters in rows differ significantly.

Analyzing the gains of kids over the last 10 years, it was also found that since 2013 the values for the average daily gains have been systematically increasing (Fig. 4) from 182.5 g for male goats and 165.16 g for female goats, up to 258 g and 234 g, respectively (in 2018), It shows almost the 30 % of increase.



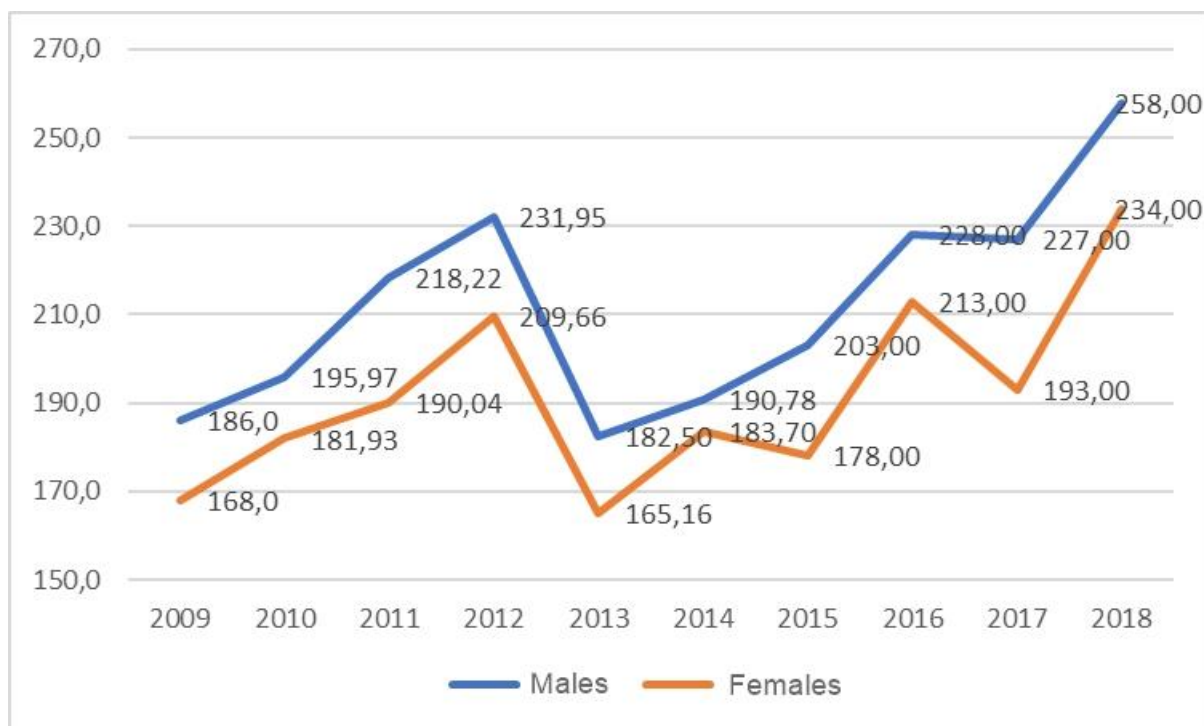


Fig. 4. The average gains of kids in the analyzed period

## Discussion

The analyzes showed a decrease in the number of Boer goats entered in the books and a decrease in the number of assessed offspring. It should be noted, however, that in general, according to the data provided by Bagnicka et al. (2017), Boer goats until recently were the breed most frequently assessed for performance. Their percentage in the active population in Poland was 50.3% in 2010 and 34.5% in 2015, which is the highest value among all assessed breeds and proves its importance (Bagnicka et al., 2017). The situation has changed in recent years, when the Carpathian goat has gained popularity - a native local breed that has been included in the genetic resources conservation programme since 2015. According to the latest data, in 2018 goats of the Carpathian breed accounted for 49.85% of goats assessed in Poland (167 out of 335 assessed goats). In the same year, Boer goats were the second most frequently evaluated breed and accounted for 17.01% of the evaluated population (57 out of 335 goats). Carpathian goat herds can be found rather in the southern part of the country, while the Boer goat herds came from northern, eastern and central Poland - one herd from RZHOiK from Białystok, Lublin and Łask and two herds from Olsztyn and Malbork (PZO, 2019).



The mean values of the breeding performance indexes of Boer goats in the analyzed period amounted to: 80.6% - fertility and 181.03% - prolificacy. They fall within the range provided by Bernacka et al. (2017), describing the values for various breeds of goats bred in Poland: fertility 80-100%, and prolificacy reaching 200%. Kaba and Bagnicka in 2009 reported that the prolificacy of Boer goats in Poland was at the level of 160%. This means that although the value presented in this paper fluctuated depending on the year, in general, the average level of prolificacy of Boer goats increased with subsequent years of breeding work. The highest prolificacy among the breeds assessed in Poland in 2018 was characterized by Anglonubian goats (210.35%), Colored goats enriched and white enriched goats (200%) (PZO, 2019).

On the basis of the obtained results, differences in body weight at birth due to sex were found. These results are comparable to the values described by Đuričić et al. (2012), according to which the average weight of kids was 3.48 kg, and the weight of males at birth was also significantly higher than the weight of females.

Boer goats are characterized by a fast growth rate compared to other breeds of goats. According to Lu (2019), the growth rate for the first 12 months in good pasture conditions may be 200 g / day. The value of the daily gain of Boer goats kept in Poland was therefore typical for this meat breed of goats and varied depending on the sex. The average daily gains were 240, 238, and 218 g / day for single, twins and triplets, respectively, for kids born in Africa, and 257, 193 and 182 g / day for kids kept in Germany (Barry and Godke, 1997). Under extremely favorable conditions, gains after weaning may exceed 250 g / day for goats (Lu and Potchoiba, 1988). The value of registered increases over the years was variable, but with a clear upward trend. It proves that breeding programme in Poland is carried out correctly, thanks to which better and better Boer goats with the desired characteristics are obtained.

## **Conclusions**

Despite the decline in the adult Boer goats population and kids, favorable growth tendencies were observed for the meat performance index of that breed. High daily gain and high prolificacy of Boer goats make it possible to produce a valuable breeding animals. The growing interest in high-quality food creates an opportunity for the development of this niche

market. Goat meat can be an interesting culinary offer in agritourism farms keeping goats, and thus increase their economic efficiency.

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## **Kozy burskie w Polsce - analiza stanu hodowli i charakterystyka wybranych parametrów użytkowości w ciągu ostatniej dekady**

### **Streszczenie**

Kozy rasy burskiej reprezentują mięsny kierunek użytkowania i stanowią drugą po kozie karpackiej rasę kóz w Polsce pod względem udziału w populacji aktywnej. Celem niniejszej pracy była analiza stanu hodowli oraz wybranych cech użytkowych kóz burskich w latach 2009-2018. Analiza danych wykazała spadek liczby kóz burskich wpisanych do ksiąg, a także zmniejszanie się liczby ocenianego potomstwa. Pomimo to, odnotowano korzystne tendencje wzrostowe dla wskaźników użytkowości mięsnej koźląt, takich jak przyrosty dzienne. Wskazuje to na możliwość poprawy efektywności produkcji koźlęciny, co stanowi szansę dla hodowców kóz tej rasy, szczególnie w dobie poszukiwania przez konsumentów żywności wysokiej jakości.

Słowa kluczowe: koza burska, mięso, wartość hodowlana, użytkowość