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**The analysis of changes in the profitability of pig production
of Polish Landrace breed and the Pulawska breed
on a family farm in the years 2010–2012**

Analiza zmian opłacalności produkcji świń rasy polskiej białej zwisłouchej
oraz puławskiej w gospodarstwie rodzinnym w latach 2010–2012

Summary. The aim of the study was to compare the profitability of pig production of two breeds: the Polish Landrace (PWL) and the Pulawska kept at a family farm. The analysis included indicators of reproductive performance of sows and the parameters of fattening and slaughter value. The data included the production of fattening pigs at the farm in the years 2010–2012. The analysis performed indicate that profitability of fattening pigs of the Polish Landrace breed compared to the Pulawska breed was variable. It has been shown that regardless of the period of the production of porkers a lower profit was obtained from the sows of the Pulawska breed as compared to the Polish Landrace. This result was influenced by lower ratios of reproduction sows of the Pulawska breed, and higher feed consumption, lower weight gains and lower meat content in the carcass of porkers raised from them.

Key words: pigs, the family farm, Polish Landrace breed, Pulawska breed, productivity

INTRODUCTION

According to the Central Statistical Office, the number of pigs in November 2013, had a population of 10 994.4 thousand pieces, showing compared with the same period

of the previous year, a decrease of 1.2%. Decreased number of most groups of structure of the pig herd, the most (by 5.7%) the population of pigs for breeding to weight of 50 kg and more. While there has been a 1.5% increase in the number of pigs for slaughter on weight of 50 kg and more [GUS 2014].

The most important factor affecting the size of population is the level of profitability. Most common reason given the lack of profitability of slaughter pigs production is unfavorable relation of prices fattening pigs to grain prices. It is assumed, that if the price of livestock to feed grain prices is relation below 1 : 8, the rearing of pigs is unprofitable and is observed the decrease of its population [Seremak-Bulge 2006, Radwan and Wadoń 2009].

Reduction of pig population is also posited with a significant negligence on the part of economic activities, a high fragmentation of production, high consumption of feed to weight gain and low productivity of sows [Pepliński *et al.* 2013]. Pejsak [2012] states that the low number of piglets born alive is the result of unused potential of reproductive and genetic of herd.

Income received by the producer of pigs is the result of the difference in costs incurred for the maintenance of sow, piglet rearing, fattening pig production and the price obtained for the final product.

Profitability of pig production in the closed cycle to a large extent results from the a fertility of sows. Higher fertility leads to an increase profitability of the farm. There are two types of a fertility: physiological and economic. For economic reasons of production more important is the economic fertility i.e. the number of piglets grown up till 21st day of life by the sow during the year. Factors which influence economic fertility are: sow fertility, mortality and the frequency of piglets births [Bogdzińska 2010].

Particular care should be given to the selection of animals for breeding. Numerous, well-grown-litters can be expected from sows with a genetic predisposition to that. This should be animals of the breeds considered as a maternal. In Polish breeding the most important are now Polish Landrace breed (PL) and Polish Large White breed (PLW). The criteria for standard component of maternal breeding also meet pigs of the Pulawska breed [Szyndler-Nędza 2006]. They exhibit a high milkiness and have good maternal qualities.

Other factors influencing the profitability of production is the cost of feed and rational nutrition fattening pigs [Dowgiałło and Mandecki 1983]. Crucial for the a profitable pig production is also a knowledge of the health status of herd, without it you cannot determine prevention program, through which you can reduce the cost of prevention program to a minimum.

The aim of the study was to analyze the size of the basic indicators of production fattening pigs in the closed cycle with the use of sows the Pulawska breed and Polish Landrace breed in a private farm in years 2010–2012.

MATERIAL AND METHODS

The analysis included a production herd of pigs the Pulawska breed and Polish Landrace breed held on a family farm in the Lublin region. Data for the analysis were taken from the records of zootechnical checks, direct observations and measurements.

Number of sows of basic herd of the Pulawska breed in years 2010–2012 contained in the limit from 14 to 15 units, while the the Polish Landrace between 25 to 28. The pigs of individual production groups were maintained in accordance with the principles of animal welfare. Nutrition of piglets (protein 18%, energy 2540 kcal) and fattening pigs (16% protein, energy 2350 kcal) based on a mixture of complete originating from purchase. In the feeding of sows farm uses its own feed in the form of cereals (sow in pig: protein 13%, energy 2150 kcal; farrowing sow: protein 17.5%; energy 2360 kcal).

In the basic economic calculation determining the production profitability of fattening pigs of the Pulawska and Polish Landrace breed on an annual basis is entered the following elements: the number of piglets in the litter grown up to the 21st day of life (items), frequency of births, losses during the period from weaning piglets for sale fattening pigs (%), daily weight gains during the fattening period (g/day), feed intake (kg), purchase cost complete of mixture (zł) class of fattening pigs meatiness ranked by slaughter classification system SEUROP.

The average prices of carcasses classes of SEUROP were adopted in accordance with the data contained in the „Integrated Agricultural Market Information System. The market Pigmeat” bulletin published by the Department of Agricultural Markets of The Ministry of Agriculture and Rural Development [Rynek Wieprzowiny 2013]. Due to the location of farm prices to characterize the region „middle-eastern”. The average annual rates of complete mixtures for pigs calculated on the basis of the bulletin „Market Feed” [Rynek Pasz 2011, 2012].

The obtained values of production costs of the Pulawska breed and Polish Landrace breed are summarized in tabular-descriptive form.

RESULTS AND DISCUSSION

Income accruing by producer of pigs is the result of the difference in costs incurred for fattening pigs production and the price obtained for the final product.

Interestingly is the situation in 2011, the total difference of sale compared to Polish Landrace fattening pigs to the Pulawska breed (from 1 sow) was 4.52 zł. This resulted from the higher frequency of births in sows Pulawska breed (2.2) compared to PL sows (1.5), which allowed production 5.39 more fattening pigs of native breed. Noteworthy is the fact that the reproductive performance of sows is one of the main factors determining the profitability of production in the closed cycle Gajewczyk *et al.* [2010].

As demonstrated in our study comparable parameters of fattening generate higher purchase cost of feed mixture for fattening pigs of Pulawska breed (2259.24 zł). Slaughter values and distribution of prices of carcasses different classes SEUROP, allowed almost complete coverage of the difference in the cost of purchase of feed mixture for fattening pigs Pulawska breed relative to PWL, which eventually equalized profitability of these two races.

In 2012 the farm was kept 25 pieces sows of Polish Landrace breed and 15 pieces of the Pulawska breed. The average number of piglets in a litter reared for 21st day in individual races was significantly different and reached 11.8 pieces in the case of Polish Landrace breed, and 10.8 pieces for the Pulawska breed. In case of the average frequency of births, PL breed throughout the year given birth an average of 2 litters, and Pulawska

breed 1.6 litters, which means a higher number of piglets from the sow grown up Polish Landrace. A larger number of fattening pigs Polish Landrace breed translates into higher costs of buying feed (1964.89 zł) (Tab. 1a). At the same time more fattening pigs breed PL, also generate higher profits from their sale (12,733.59 zł). The final statement this profit and the costs incurred for the purchase of feed showed that higher profitability was characterized by the production of fattening pigs Polish Landrace breed (Tab. 1b).

Table 1a. The detailed results of production and running costs of two breeds: the Polish Landrace breed (PL) and the Puławska breed maintained on a family farm in 2010–2012

Tabela 1a. Szczegółowe wyniki produkcyjne i koszty użytkowania dwóch ras: polskiej białej zwisłouchiej (pbz) oraz puławskiej, utrzymywanych w gospodarstwie rodzinnym w latach 2010–2012

| Specification/Wyszczególnienie | 2010 | | 2011 | | 2012 | |
|--|-----------|-------------------------|----------|-------------------------|----------|-------------------------|
| | PL pbz | Puławska breed Puławska | PL pbz | Puławska breed Puławska | PL pbz | Puławska breed Puławska |
| Number of sows in the herd (pcs) Liczba loch w stadzie (szt.) | 28 | 14 | 28 | 14 | 25 | 15 |
| The average number of piglets in the litter reared to 21 st day (pcs) Średnia liczba prosiąt w miocie odchowanych do 21. dnia (szt.) | 11.1 | 10.8 | 11.7 | 10.5 | 11.8 | 10.8 |
| The average frequency of births in the one year Średnia częstotliwość oproszeń w 1 roku | 2.0 | 1.5 | 1.5 | 2.2 | 2.0 | 1.6 |
| The average number of piglets from the sow grown up to 21 st day a year (pcs)/Średnia liczba prosiąt od lochy odchowanych do 21. dnia w roku (szt.) | 22.2 | 16.2 | 17.55 | 23.1 | 23.6 | 17.28 |
| The average number of fattening pigs from one sow per year (pcs) Średnia liczba tuczników od jednej lochy w roku (szt.) | 21.53 | 15.71 | 17.02 | 22.41 | 22.89 | 16.76 |
| The average daily gains during the fattening period (g/day) Średnie przyrosty dzienne w okresie tuczu (g/dzień) | 749.7 | 139.49 | 726.4 | 740.2 | 758.6 | 699.15 |
| The length of fattening from birth up to 100 kg (days) Długość okresu tuczu od urodzenia do 100 kg (dni) | 133.38 | 139.49 | 137.66 | 135.10 | 131.82 | 143.03 |
| The total feed consumption by fattening pigs during the fattening period Łączne zużycie paszy przez tuczniaki w okresie tuczu (kg) | 8615.01 | 6318.90 | 7028.92 | 9082.77 | 9052.08 | 7414.67 |
| The average price of complete feed mixture for fattening pigs Średnia cena mieszanki paszowej pełnoporcjowej dla tuczników (zł/kg) | 0.84 | | 1.1 | | 1.2 | |
| The difference in the cost of purchase of feed for Puławska breed fattening pigs and PL fattening pigs Różnica kosztów zakupu paszy tuczników rasy puławskiej i tuczników rasy pbz (zł) | - 1714.31 | | 2259.24. | | -1964.89 | |

Profitability production in 2010, 2011 and 2012 (Tables 1a and 1b) was calculated analogously to the calculations presented in Tables 2a and 2b. In the Table 2a and Table 2b were presented the main elements determining the profitability of fattening pigs in the closed cycle of Polish Landrace and the Pulawska breed in 2010. As follows from obtained values of the average number of piglets grown up till 21st day in a litter remained at a similar level and reached 11.1 pieces of the Polish Landrace breed and 10.8 pieces for the Pulawska breed (Tab. 2a). Based on the number of piglets grown up to 21st day, and the frequency of births calculated the number of piglets grown up to 21st day within a year from one sow. Taking into account that falls from 21st day of life piglets to fattening pig sale amounted to 3% of the calculated final number of fattening pigs sold during the year, coming from one sow. This value for sow of Polish Landrace breed was 21,53 pieces and for the Pulawska breed 15,71 pieces.

Table 1b. The detailed results of production and running costs of two breeds: the Polish Landrace breed (PL) and the Pulawska breed maintained on a family farm in 2010–2012

Tabela 1b. Szczegółowe wyniki produkcyjne i koszty użytkowania dwóch ras: polskiej białej zwisłouchej oraz puławskiej utrzymywanych w gospodarstwie rodzinnym w latach 2010–2012

| Specification/Wyszczególnienie | | 2010 | | 2011 | | 2012 | |
|--|---|---------|-------------------------|---------|-------------------------|-----------|-------------------------|
| | | PL pbz | Pulawska breed Puławska | PL pbz | Pulawska breed Puławska | PL pbz | Pulawska breed Puławska |
| The share of carcasses in the classification of SEUROP Udział tusz w klasyfikacji SEUROP (%) | S | 12 | 10 | 10 | 7 | 10 | 5 |
| | E | 82 | 75 | 80 | 63 | 80 | 70 |
| | U | 6 | 10 | 8 | 23 | 10 | 20 |
| | R | 0 | 5 | 2 | 7 | 0 | 5 |
| The average prices of carcasses of different classes SEUROP (mass slaughter of heat) Średnie ceny tusz różnych klas SEUROP (masa poubojowej ciepla) (zł/kg) | S | 5.4 | | 6.27 | | 7.26 | |
| | E | 5.25 | | 6.11 | | 7.16 | |
| | U | 4.96 | | 5.79 | | 6.78 | |
| | R | 4.6 | | 5.44 | | 6.37 | |
| Profit from the sale of fattening pigs Zysk ze sprzedaży tuczników (zł) | | 8813.46 | 6376.04 | 8234.43 | 10 489.15 | 12 733.59 | 9226.94 |
| The total difference from the sale of PL fattening pigs in relation to the Pulawska breed (from 1 sow) Łączna różnica ze sprzedaży tuczników pbz w stosunku do tuczników puławskich (od 1 lochy) (zł) | | 723.11 | | 4.52 | | 1541.76 | |

The second part of the analysis was the daily increase. Its size was shaped in turn, the length of fattening to 100 kg of body weight and size of feed consumption. The average daily gains of fattening pigs PL breed were 749.7 g. The fattening pigs of the Pulawska breed grew fast breed on average 716.9 g per day, which translated into their longer fattening (about 6 days). A similar relationship i.e. longer fattening pigs breed the Pulawska for pigs for fattening breed Polish Landrace, has observed in his studies Tyra [2012]. Assuming a consumption of 3 kg feed/day/pcs., Polish Landrace breed fattening pigs produced during the year worn out about 2,040.85 kg of complete feed mixtures more compared to the Pulawska breed. Price of complete feed mixtures for fattening pigs in 2010 amounted an average of 0.84 kg [Rynek Pasz 2011], hence purchase cost feed for fattening pigs Polish Landrace breed was of 1714.31 zł higher than for purchase cost feed for fattening pigs of the Pulawska breed (Tab. 2a)

Table 2a. Economic calculation determining the profitability of fattening pigs in a closed cycle of the Polish Landrace breed (PL) and the Pulawska breed in 2010
 Tabela 2a. Rachunek ekonomiczny określający opłacalność produkcji tuczników w cyklu zamkniętym rasy polskiej białej zwiślouchej i rasy puławskiej w 2010 r.

| Specification/Wyszczególnienie | Polish Landrace breed Rasa polska biała zwiśloucha | Pulawska breed Rasa puławska |
|--|--|--|
| The average number of piglets in the litter grown-up to day 21 (pcs) Średnia liczba prosiąt w miocie odchowanych do 21. dnia (szt.) | 11.1 | 10.8 |
| The average frequency of birds during the year Średnia częstotliwość oprosień w okresie roku | 2.0 | 1.5 |
| The average number of piglets grown-day 21 in a year (pcs) Średnia liczba prosiąt odchowanych do 21. dnia w roku (szt.) | 22.2 | 16.2 |
| Number of fattening pigs (including loss of 3%) (pcs) Liczba tuczników (z uwzględnieniem strat 3%) (szt.) | 21.53 | 15.71 |
| Daily gain during the fattening period (g/day) Przyrost dzienny w okresie tuczu (g/dzień) | 749.7 | 716.9 |
| The length of fattening up to 100kg (days) Długość tuczu do 100 kg (dni) | 133.38 | 139.49 |
| The feed consumption by fattening pigs (kg) Zużycie paszy przez tuczniaki (kg) | 21.53 pcs × 3 kg/day/pcs × 133.38 days = 8615.01 | 15.71 pcs × 3 kg/day/pcs × 139.49 days = 6574.16 |
| The difference in consumption of feed in fattening pigs of the Pulawska breed: 2040.85 Różnica w zużyciu paszy przez tuczniaki rasy puławskiej | | |
| The difference in cost of purchase of complete feed mixture for Pulawska breed fattening pigs: 2040.85 kg × 0.84 zł/kg = 1714.31 zł Różnica w kosztach zakupu mieszanki paszowej pełnoporcjowej dla tuczników puławskich | | |

The final element of the calculation was to compare the profitability of the profit from the sale of carcasses Polish Landrace and the Pulawska breed (Tab. 2b). Percentage of carcasses the fattening pigs of Pulawska breed were as follows: Class S – 10%, Class E – 75%, Class U – 10%, Class R – 5%. In the case of Polish Landrace breed these values were 12%, 82%, 6%, 0%. Taking into account that the percentage of carcasses in classes SEU, the average prices of carcasses in each classes of SEUROP as well as the average slaughter performance amounting 0.78 was calculated profit from the sale of fattening pigs. In the case of fattening pigs Polish Landrace profit was 8,813.46 zł, while for the Pulawska breed was lower of 2437.42 zł, and amounted 6,376.04 zł. Taking into account the higher purchase cost of feed for fattening pigs breed Polish Landrace (1714,31 zł) and the difference in the profit from the sale of fattening both races

(2437.02) was calculated that the profitability of fattening pigs PL breed (produced by one sow per year) was about 723,11 zł higher than the profitability of fattening pigs of the Pulawska breed.

Table 2b. Economic calculation determining the profitability of fattening pigs in a closed cycle of the Polish Landrace breed and the Pulawska breed in 2010

Tabela 2b. Rachunek ekonomiczny określający opłacalność produkcji tuczników w cyklu zamkniętym rasy polskiej białej zwislouchej i rasy puławskiej w 2010 r.

| Specification/Wyszczególnienie | Polish Landrace breed Rasa polska biała zwisloucha | Pulawska breed Rasa puławska |
|---|--|---|
| The percentage share of carcasses in SEUROP Procentowy udział tusz w klasyfikacji SEUROP | 21.53 pcs – 100%: S (12%), E (82%), U (6%) | 15.71 pcs – 100%: S (10%), E (75%), U (10%), R (5%) |
| Profit from the sale of fattening pigs Zysk ze sprzedaży tuczników (zł) | S (12%) = 2.58 pcs × 5.40 zł × 100 kg × 0.78 = 1086.70 E (82%) = 17.65 pcs × 5.25 zł × 100 kg × 0.78 = 7227.68 U (6%) = 1.29 pcs × 4.96 zł × 100 kg × 0.78 = 499.08 SUM/SUMA: 8813.46 | S (10%) = 1.57 pcs × 5.40 zł × 100 kg × 0.78 = 661.28 E (75%) = 11.78 pcs × 5.25 zł × 100 kg × 0.78 = 4823.91 U (10%) = 1.57 pcs × 4.96 zł × 100 kg × 0.78 = 607.40 R (5%) = 0.79 pcs × 4.6 zł × 100 kg × 0.78 = 283.45 SUM/SUMA: 6376.04 |
| The total difference from the sale of PL fattening pigs in relation to the Pulawska breed (from 1 sow) Łączna różnica ze sprzedaży tuczników pbz w stosunku do tuczników puławskich (od 1 lochy) The cost of feed × (feed consumption by fattening pigs Polish Landrace – feed consumption by fattening pigs Pulawska breed) + (profit from the sale of fattening pigs Polish Landrace – the profit from the sale of fattening of Pulawska breed) Koszt paszy × (zużycie paszy przez tuczniiki pbz – zużycie paszy przez tuczniiki puławskie) + (zysk ze sprzedaży tuczników pbz – zysk ze sprzedaży tuczników puławskich) | -1714.31 + (8813.46 – 6376.04) = 723.11 zł | |

CONCLUSION

1. The profitability of production pigs of Polish Landrace breed compared to the Pulawska breed maintained on a family farm in the years 2010–2012 was variable. More preferred values were observed in case of production of fattening pigs of Polish Landrace.

2. The main factors production, which contributed to the diversity of the profitability of fattening are: the number of piglets grown-up to 21 day, daily gains, the percentage of carcasses according to the classification SEUROF and the price paid for livestock.

3. The highest difference in profitability was recorded in 2012. Profit from one sow of Polish Landrace breed was higher by 1541.76 zł compared to sow the Puławska breed.

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Streszczenie. Celem pracy było porównanie opłacalności produkcji świń dwóch ras – polskiej białej zwislouchej oraz puławskiej – utrzymywanych w gospodarstwie rodzinnym. W analizie uwzględniono wskaźniki użytkowości rozplodowej loch, parametry wartości tucznej i rzeźnej. Dane obejmowały produkcję tuczników w gospodarstwie w latach 2010–2012. Przeprowadzone analizy wskazują, że opłacalność produkcji tuczników pbz względem tuczników rasy puławskiej była zmienna. Wykazano, że niezależnie od okresu produkcji tuczników uzyskano niższy dochód od loch rasy puławskiej niż od loch rasy polskiej białej zwislouchej. Na taki wynik miały wpływ m.in. niższe wskaźniki rozrodu loch rasy puławskiej oraz większe zużycie paszy, mniejsze przyrosty i mniejsza zawartość mięsa w tuszy tuczników od nich pozyskanych.

Słowa kluczowe: świnie, gospodarstwo rodzinne, rasa polska biała zwisloucha, rasa puławska, produktywność