
ANNALES
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA
LUBLIN – POLONIA

VOL. XXX (1)

SECTIO EE

2012

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**Comparative analysis of reproduction, fattening,
and slaughter values of selected hybrid swine breeds**

Analiza porównawcza wartości rozplodowej, tucznej i rzeźnej mieszańców
wybranych ras świń

Summary. The reproduction and fattening performance, as well as fleshiness of PL × PLW × D and PIC line hybrids were subject to evaluation. It was found that from PIC sows more piglets per litter were weaned as compared to PL × PLW hybrid sows. Hybrid offspring born were characterized by higher daily gains, which affected the piglet's live weight on 28th day and fattener's live weight on 170th fattening day. Considering the meatiness, hybrids after Camborough 46 sows mated with PIC 408 boar appeared to be the best.

Key words: crossbreeding, reproduction, fattening, and meatiness

INTRODUCTION

The swine production should be profitable, but making a profit is very difficult, namely due to low prices for a carcass at the purchase centers and relatively high prices for feeds. In order to make the swine breeding, animals should be characterized by optimum values of reproduction, fattening, and slaughter features, including: number of live born, number of piglets reared by a sow, weight of reared piglets, number of litters produced by a sow annually, daily gains, feed utilization per 1 kg of live weight gain, and meat content in carcass at maintaining its desired quality. Breeding and production programs of many countries as well as commercial genetic enterprises (PIC, Pen Ar Lan, Hypor, JSR) assume that fattener production is based on a crossbreeding of various breeds and lines with particular performance traits. Prolific female lines and high-meaty male lines are most often applied [Grzeškowiak *et al.* 2001, Gajewczyk *et al.* 2010, Knecht *et al.* 2009]. Skillful breeder's use of that information assures achieving satisfactory production effects and guarantees maximum income at reduced level of costs.

Performed study aimed at evaluating the selected variants of swine crossbreeding using PL × PLW × D as well as PIC line hybrids in reference to reproduction performance features and fleshiness of fatteners.

MATERIAL AND METHODS

The experiment included 15 sows kept in three farms (5 sows in each) localized in Lublin province. Group I consisted of hybrid Polish Landrace (PL) × Polish Large White (PLW) sows that were mated with Duroc (D) boar, while Camborough 46 sows from group II were mated with PIC 408 boar, and Camborough 22 sows were mated with PIC 337 boar in group III. The offspring originating from multiparous sows, that entered the parturition sector at the same time, was the experimental material in all farms. Time interval between parturition of the 1st and the 5th sow in a single farm, where progeny was included into the experiment, was not longer than 4 days. Farrowing occurred in a nursery of all 3 farms, offspring was weaned at the 28th day and carried to pig rearing building, and when live weight reached about 40 kg – to fattening building. Nursery, rearing house, and fattening building in all experimental farms were separated and equipped with devices making possible to control and adjust particular microclimate parameters. Swine (22 to 30 animals) was maintained on slotted floor, in group pens under the same microclimate conditions. Comparable number of drinkers and feeders was present in every farm, and similar pen floor area per a single piglet was assigned.

All experimental animals were fed with the same mixture. Piglets were fed starting from their 3rd day of life. At the beginning, it was granulated full-dose mixture of pre-starter type, then granulated full-dose mixture of starter type (De Heus). Weaners and fatteners were fed with full-dose mixtures based on own cereal components as well as complete mixtures (De Heus). The composition of mixtures corresponded to the assumptions included in Swine Feeding Norms [Normy żywienia świń 1993]. All animals were fed by means of *ad libitum* system. Following indices were considered during the evaluation: number of live-born piglets, piglet falls by 28th day of life, piglet's live weight at the birth, piglet's live weight at the 28th day of life, fattener's live weight before the slaughter, daily gain till the 28th day of life, daily gain since the 28th till 170th day of life, and feed utilization per 1 kg of body weight gain. After slaughter, fattener's carcasses were subject to the assessment according to EUROP classification. Collected material was statistically processed (Statistica ver. 6.0).

RESULTS

Mean number of live-born piglets was the highest in group III, while slightly worse results were achieved in groups II and I (Tab. 1).

The birth weight of piglets from every group was very similar and amounted to about 1.3 kg. However, when the weight of particular piglets within a given litter is taken into consideration, those from groups II and III were characterized by lower body weight diversity. Piglet's falls in most cases resulted from crushing by the sow.

Table 1. Sow's reproduction performance and offspring rearing indices
Tabela 1. Użytkowość rozplodowa loch i wskaźniki odchowu prosiąt

Specification – Wyszczególnienie	Group Grupa		
	I	II	III
	X ±SD	X ±SD	X ±SD
Mean number of live born piglets (number) Średnia liczba prosiąt żywo urodzonych (szt.)	13.2 ±1.30	13.2 ±0.84	13.4 ±0.90
Number of live born piglets (number) Liczba prosiąt żywo urodzonych (szt.)	66	66	67
Piglet's weight at the birth (kg) Masa prosięcia po urodzeniu (kg)	1.30 ±0.17	1.35 ±0.14	1.33 ±0.15
Mean falls till the 28 th day of life (%) Średnie upadki prosiąt do 28 dnia (%)	10.61	7.58	8.96
Number of weaned piglets (number) Liczba prosiąt odsadzonych (szt.)	59	61	61

Table 2. Fattening value of experimental swine
Tabela 2. Wartość tuczna zwierząt objętych doświadczeniem

Specification – Wyszczególnienie	Group Grupa		
	I	II	III
	X ±SD	X ±SD	X ±SD
Live weight at the 28 th day of life (kg) Masa ciała w 28 dniu (kg)	7.21 ^A ±0.26	7.92 ^B ±0.32	7.85 ^B ±0.39
Daily gain till the 28 th day of life (g) Przyrost dzienny do 28 dnia (g)	211 ^A ±5.53	235 ^B ±6.36	233 ^B ±9.02
Daily gain since the 28 th till 170 th day of life (g) Przyrost dzienny od 28 do 170 dnia życia (g)	699 ^A ±23.15	720 ^B ±22.52	743 ^C ±25.30
Live weight at the 170 th day of life (kg) Masa ciała w 170 dniu życia (kg)	106.5 ^A ±3.24	110.1 ^B ±3.60	113.4 ^C ±3.98
Feed utilization per 1 kg of gain (kg) Zużycie paszy na 1 kg przyrostu (kg)	2.99	2.69	2.74

A, B – differences significant at $P \leq 0.01$

A, B – różnice istotne przy $P \leq 0,01$

Higher daily gains since birth till the 28th day of life were recorded in groups II and III – 235 g and 233 g respectively (Tab. 2). Mean weight of a piglet within these groups was 7.89 kg, whereas piglets maintained in group I were characterized by lower body weight and worse daily gains ($P \leq 0.01$).

Fatteners originated from PIC 337 boar were distinguished by the highest daily gains during the fattening ($P \leq 0.01$). Body weight of fatteners just before the slaughter at 170 day of life was prominently diverse. In group I, average weight of the fattener was 106.5 kg, while in group III, it was 113.4 kg ($P \leq 0.01$). Fodder utilization per one kilogram of body weight gain was much lower in groups II and III, which amounted to about 2.72 kg of the full-dose mixture per 1 kg of gain, whereas in group I, the fodder utilization was at the level of 2.99 kg.

Table 3. Fleshiness of experimental fatteners
Tabela 3. Mięsność tuczników objętych doświadczeniem

Specification – Wyszczególnienie	Group Grupa		
	I	II	III
	X ±SD	X ±SD	X ±SD
Number of fatteners Liczba tuczników	58	60	60
Content of the meat in carcass (%) Zawartość mięsa w tuszy (%)	55.71 ^A ±3.41	58.86 ^B ±2.93	58.22 ^B ±3.10
Percentage of grades: Procentowy udział klas:			
S	13.79	38.33	35.00
E	48.28	51.67	48.34
U	22.41	8.33	13.33
R	13.80	1.67	3.33
O	1.72	0	0
P	0	0	0

A, B – differences significant at $P \leq 0.01$

A, B – różnice istotne przy $P \leq 0,01$

Higher carcass fleshiness was recorded at fatteners maintained in groups II and III (Tab. 3). Mean lean content in swine carcass of these groups was 58.54% ($P \leq 0.01$). The two groups appeared to include the largest number of fatteners qualified to S and E classes, while no fattener was not classified to O and P classes. Lower number of carcasses from group I were qualified to S and E classes.

DISCUSSION

Camborough 22 sows mated with PIC 337 boars produced more numerous litters as compared to other groups. Gajewczyk *et al.* [2010] reported that considering the majority of studied indices, the Polish Large White × Polish Landrace hybrids were prominently worse than Naima sows. Statistically significant differences were present between mean values of live-born and reared piglets numbers as well as between litter weight at the 1st and 28th day of the offspring's life. Hybrid fatteners originating from group III were also characterized by the highest daily weight gains during the fattening.

Referring to meatiness, hybrid fatteners originating from Camborough 46 sows mated with PIC 408 boars appeared to be the most profitably – 58.86% meat in carcass, as well as hybrids after Camborough 22 sows mated with PIC 337 boar – 58.22% meat in carcass.

Rybarczyk *et al.* [2010] reported that fatteners originating from the crossbreeding of Camborough 22 sows with PIC 337 boars contained 56.85% meat in carcass, on average. Borzuta *et al.* [2007] found that four-breed hybrids (Polish Large White × Polish Landrace) × (Hampshire × Duroc) maintained in two farms were distinguished by following meatiness values: 58.3 and 58.8% at mean carcass weight of 92.9 and 84.5 kg, respectively.

Ninety per cent of hybrid carcasses in group II and over 83% in group III were qualified to S and E classes. Chwastowska and Śmiecińska [2006] reported that among the total number of 343 carcasses of qualified hybrid fatteners by PIC, over 77% was classified into grade E.

Some authors [Meller *et al.* 1998, Różycki and Żak 2001, Rybarczyk *et al.* 2005] confirmed very good daily gains as well as high meatiness at PIC fatteners in their studies.

CONCLUSIONS

1. Sows from group III were characterized by the highest fertility, while equinumerous litters with larger variability within group I were produced by sows from groups I and II.

2. Higher daily gains were achieved for hybrid offspring and fatteners, which affected the piglet's live weight at the 28th day of life and fattener's weight at the 170th day of fattening.

3. Hybrid PIC fatteners were characterized by better feed utilization per 1 kg of gain as well as higher meatiness as compared to PL × PLW × D hybrid fatteners.

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Streszczenie. Ocenie poddano cechy użytkowości rozplodowej, tucznej oraz mięsność mieszańców: pbz × wbp × duroc i mieszańców linii PIC. Stwierdzono, że lochy PIC odchowały więcej prosiąt w miocie w porównaniu z lochami mieszańców pbz × wbp. Uzyskane od nich mieszańce charakteryzowały się większymi przyrostami dobowymi, co miało wpływ na masę ciała prosiąt w 28 dniu i masę tuczników w 170 dniu tuczu. Najkorzystniej pod względem mięsności wypadły mieszańce pochodzące od loch Camborough 46 kryte knurem PIC 408.

Słowa kluczowe: krzyżowanie, wartość rozplodowa, mięsność