# Comparative analysis of pig lineages: impact on pre-slaughter weight and carcass traits

Julia D. Gomes<sup>1\*</sup>, Bruna P. M. Silva<sup>1</sup>, Stefano F. P. Duarte<sup>1</sup>, Soraia V. Ferreira<sup>2</sup>, Fernanda

N. Ciconello<sup>1</sup>, Laura W. Pian<sup>1,</sup> Aline S. M. Cesar<sup>1</sup>

<sup>1</sup> University of São Paulo, Piracicaba, Brazil.

<sup>2</sup> Danbred Brasil, Patos de Minas, Brazil

\*Corresponding author email: alinecesar@usp.br

## I. INTRODUCTION

The implementation of genetic improvement programs has become essential to effectively combine the yield of carcass and meat quality in pig production (MIAR et al., 2014). One of the strategies that can be applied in genetic programs to enhance desirable traits in the offspring to introduce the genetic diversity through crossbreeding systems (KIM et al., 2020). Male pigs from specific lineages can be utilized to introduce beneficial genetic variation into the breeding population, leading to improved economic and quality traits in production. Crossbreeding can help produce pigs that are better suited to local environments, which can indirectly influence pork quality by promoting healthier, more resilient animals. Different pig breeds may have varying degrees of adaptation to specific environmental conditions such as climate, feed availability, or disease resistance (WILLSON et al., 2020). In addition, crossbreeding can help produce pigs that are better suited to stress conditionslocal environments, which can indirectly by promoting healthier, more resilient animals. Based on this, the main goal of this study was to evaluate the carcass traits of finishing pigs from three different terminal sire lines, such as Duroc, Hybrid (Duroc x Pietrain), and Pietrain.

## II. MATERIALS AND METHODS

The experimental procedure on animal care and use was approved by Ethics Committee on the Use of Animals of the Escola Superior de Agricultura Luiz de Queiroz (University of São Paulo, Piracicaba, Brazil), CEUA nº 7416051222. A total of 600 DanBred Hybrid (DB90) males and female piglets sired by three different terminal lines (Duroc; Duroc x Pietrain (Hybrid); Pietrain) were allocated in 12 different pens with 25 pigs in each (four pens for each terminal sire line). All pigs were raised in the same management and nutritional system in the same fattening pig farm. At 169-day-raising period, the pigs were slaughtered, and the yield and quality carcass traits were evaluated on the left half carcasses. The initial and final body, cold and hot carcass weight, loin depth, and backfat thickness were measured and the hot carcass yield was calculated. To assess the effects of different crossbreeding systems on pork quality traits, we conducted an analysis of variance (ANOVA) with terminal sire line and housing age as a fixed effect and covariate, respectively, followed by Tukey test. All statistical analyses were performed using the R program, and significance was assessed at *p*-value  $\leq 0.05$ .

# III. RESULTS AND DISCUSSION

The initial and final body weight, yield and quality carcass traits are shown in Table 1. In this study, there was no difference (p > 0.05) in initial and final body weight among the terminal sire lines groups. The hot carcass weight (kg) was statistically different between the Hybrid and Pietrain groups (p=0.03), on the other hand, the hot carcass yield (%) was statistically different between Duroc and Pietrain and Duroc and Hybrid (p=0.002). The cold carcass weight (kg) and loin depth (mm) were not statistically different between Duroc and Hybrid groups, however, they showed a lower value compared with Pietrain group (p=0.018 and p=0.0139, respectively). The Pietrain group showed a lower cold carcass weight (kg), loin depth (mm), and higher backfat thickness (mm) compared with the other two groups. Herein, we observed that the applied crossbreeding strategy allowed the improvement in traits such

as hot and cold carcass weight, loin depth and backfat thickness for the Hybrid group. In other words, the Hybrid group showed higher muscle deposition and, consequently lower fat deposition when compared with the Pietrain group. These results are consistent with previous studies that highlighted the benefits of crossbreeding for improving productivity and carcass quality (KOWALSKI et al., 2020; MORALES et al., 2013). However, in this study, we observed contrary findings (GISPERT et al., 2007; KIM et al., 2020) concerning the higher backfat thickness deposition compared with the Duroc group.

Lineages							
	Duroc		Hybrid		Pietrain		n-value
	Mean <sup>1</sup>	SE <sup>1</sup>	Mean	SE	Mean	SE	p-value
Initial weight (kg)	20.581	0.950	20.315	0.950	19.90	0.950	0.878
Final weight (kg)	133.461	3.043	134.597	3.043	128.134	3.043	0.297
Hot carcass weight (kg)	97.990 <sup>AB</sup>	0.877	98.446 <sup>A</sup>	0.899	95.243 <sup>B</sup>	0.923	0.030*
Cold carcass weight (kg)	94.824 <sup>A</sup>	0.843	94.915 <sup>A</sup>	0.876	91.802 <sup>B</sup>	0.876	0.018*
Hot carcass yield (%)	73.490 <sup>A</sup>	0.313	72.496 <sup>B</sup>	0.326	71.897 <sup>B</sup>	1.790	0.002*
Loin depth (mm)	82.389 <sup>A</sup>	0.982	82.872 <sup>A</sup>	1.008	79.000 <sup>B</sup>	0.995	0.014*
Backfat thickness (mm)	12.239 <sup>B</sup>	0.634	13.241 <sup>B</sup>	0.651	17.600 <sup>A</sup>	0.660	<0.001***

Table 1 – Effect of Duroc, Hybrid and Pietrain finisher breeds on on carcass characteristics..

<sup>1</sup> The values were expressed as means and standard error (SE).

<sup>A,B</sup> Within the same line, different letters indicate significant differences among the mean values at \*\*\*  $p \le 0.001$ ; \*  $p \le 0.05$ .

#### IV. CONCLUSION

The crossbreeding strategy using different terminal sire lines in this study showed an important findings in relation to carcass yield. Our results suggest that the Hybrid pigs may be more advantageous for the production yields in pork industry. Further studies are necessary to better understanding the pork quality.

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