



## Relationship Between Carcass Weight, Muscle, Fat, and Predicted Lean Yield for Commercial Pigs in Ontario

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**Keywords:** commercial pork, correlation, fat depth, muscle depth, pork carcass weight  
Meat and Muscle Biology 3(2):107

### Objectives

Greater knowledge of variance and relationships of pork carcass parameters could be used to improve performance, efficiency, and profitability of the pork industry. Previous research has investigated the correlation between pork carcass parameters; however, there are still many misunderstandings, particularly in commercially representative pigs. Thus, the purpose of this study was to examine the correlation and variance of carcass weight, fat depth, muscle depth, and predicted lean yield in commercial pigs.

### Materials and Methods

The second largest commercial pig slaughter facility in Ontario slaughtered approximately 1.5 million pigs in 2018. Carcass data (hot carcass weight, fat depth, muscle depth, and predicted lean yield) from 1025,572 pigs was used for this study with pigs slaughtered on each production day of 2018 (between January 2, 2018 and December 31, 2018). Hot carcass weight was reported immediately following slaughter as a head-on weight, and fat depth and muscle depth were measured with a Destron PG-100 probe (International Destron Technologies, Markham, Ontario). The equation used for predicted lean yield was the Canadian Lean Yield equation (CLY (%) =  $68.1863 - (0.7833 \times \text{fat depth}) + (0.0689 \times \text{muscle depth}) + (0.0080 \times \text{fat depth}^2) - (0.0002 \times \text{muscle depth}^2) + (0.0006 \times \text{fat depth} \times \text{muscle depth})$ ). Pearson product moment correlation coefficients were calculated among all parameters using RStudio version 1.1.456 and R version 3.5.1 statistical software. Correlation coefficients were considered significantly different from 0 at  $P < 0.05$ . Correlations were considered weak (in absolute value)

for  $r < 0.35$ , moderate for  $0.36 \leq r \leq 0.67$ , and strong for  $r \geq 0.68$ . Linear regression models were created between parameters that had meaningful relationships using the RStudio statistical software. Gnuplot version 5.2 was used to create scatter plots to allow for better visualization of the correlation between meaningful parameters.

### Results

The mean  $\pm$  standard deviation for fat depth, muscle depth, hot carcass weight, and predicted lean yield were  $18.27 \pm 4.12$  mm,  $65.69 \pm 9.06$  mm,  $105.93 \pm 8.39$  kg, and  $61.03 \pm 1.91\%$ , respectively. We observed weak positive correlations between fat depth and hot carcass weight ( $r = 0.27$ ;  $P < 0.0001$ ), and between muscle depth and hot carcass weight ( $r = 0.17$ ;  $P < 0.0001$ ). We obtained a weak negative correlation between predicted lean yield and hot carcass weight ( $r = -0.21$ ;  $P < 0.0001$ ). The predicted lean yield equation used for this set of pigs included measurements for fat depth and muscle depth, so strong correlation between these parameters was expected. We obtained a moderate positive correlation between muscle depth and predicted lean yield ( $r = 0.39$ ;  $P < 0.0001$ ) and a strong negative correlation between fat depth and predicted lean yield ( $r = -0.96$ ;  $P < 0.0001$ ).

### Conclusion

Results from this dataset revealed that hot carcass weight was generally not correlated with fat depth, muscle depth, or predicted lean yield. The conclusion of this study based on the current dataset is that pigs do not reach a weight threshold where they consistently become fatter or heavier muscled.