# Evaluation of sorting accuracy for market pigs

## Impact of Sorting Errors on Sort Loss and Optimal Market Weight for Market Pigs

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## Introduction

Pork processors have established marketing grids that discount the value of carcasses heavier or lighter than a specified weight range. To avoid these discounts, most commercial producers visually evaluate the body weight of pigs and try to identify the heaviest pigs at two to four marketing days spread out over a period of 17 to 28 d.

Pork producers usually target a specific number of heavy pigs in each pen to be marketed each marketing day. Marketing errors occur when the heaviest pigs in the pen are not marketed, resulting in sort loss, which is the amount each carcass is discounted for being too light or too heavy. Two types of pig marketing errors exist.

- The obvious error associated with the estimation of body weight for pigs that are visually evaluated (body weight estimation error; BWEE).

- Marketing error arises from the fact that some pigs are not visually evaluated (pigs not visually evaluated; PNVE). This occurs when the target number of heavy pigs are marked for marketing prior to visually evaluating all of the pigs in the pen.

We recently conducted a study to measure the impact of these marketing errors on sort loss and optimal market weight for market pigs. Simulation data for 4,000-head wean-to-finish barns were used. A conventional marketing strategy was assumed in which 25% of the pigs were targeted to be marketed at 169 d of age, 25% at 179 d of age, and the remaining 50% marketed at 193 days of age. Then the timing of marketing was shifted in 7-d intervals with mean marketing ages of 155.5 to 211.5 d with mean carcass weights of 167 to 240 lbs.

Body weight estimation error rates were simulated to represent a range of visual assessment accuracy (standard deviations of 0 to 8% of each pig's actual body weight). The percentage of pigs with their body weights not visually evaluated (PNVE) ranged from 0 to 24%.

## Results and Discussion

The relationships between sort loss per pig and carcass weight for four levels of sorting accuracy are shown in Figure 1. Average sort loss per pig was minimized at average carcass weights of around 205 lbs., depending on sorting accuracy. Average sort loss increased as BWEE and PNVE increased. The average sort loss per pig increased more rapidly with less accurate sorting. For example, as the average carcass weight increases above 207 lbs. (184 d), the additional amount the pigs are discounted is greater for higher levels of BWEE or

**Figure 1.** *The mean sort loss ($/pig) relative to carcass weight (lb.) for four levels of sorting errors. (BWEE, PNVE = 0, 0; 8, 0; 0, 24; or 8, 24)*
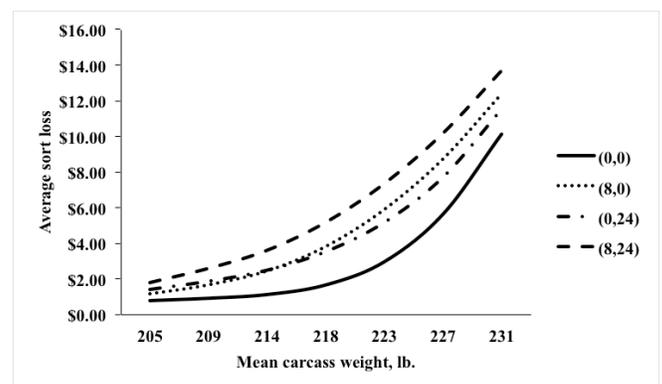
PNVE. With the least accurate sorting (BWEE = 8%, PNVE = 24%) from 216 to 225 lbs. average carcass weight, the sort loss per pig was $2.50 to $4.55 per pig greater than with accurate sorting.

**Figure 2.** *Relationship of average profit per pig ($/pig) to carcass weight (lb.) for four levels of sorting errors*
*(BWEE, PNVE = 0, 0; 8, 0; 0, 24; 8, 24)*
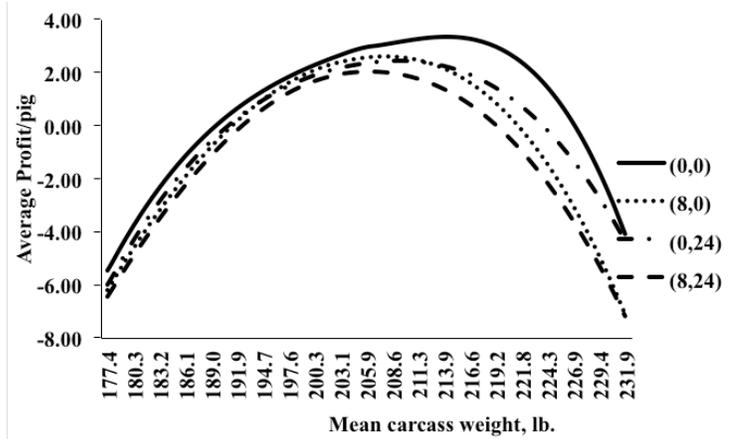


The relationships of average profit per pig to average carcass weight is shown in Figure 2. At carcass weights below 201 lbs., the impact of any of the three levels of inaccurate sorting on profit per pig, or profit per pig per day, are small. As average carcass weight increases with increased marketing age, the impact of inaccurate sorting increases and is maximized at a range of 214 to 229 lbs. carcass weight. With accurate sorting, the profit per pig continues to increase above 205 lbs. average carcass weight. As a result, the optimal carcass weights with accurate sorting, 214 to 218 lbs., are greater than the optimal average carcass weights with less accurate sorting. In addition, the response for accurate sorting is flat near its optimum, indicating that profitability for less accurate sorting is more sensitive to achieving the optimal market carcass weights. The targeting of the average carcass weight without regard to the level of sorting accuracy has substantial economic cost.

## Summary

Currently, statistics have been developed to evaluate the accuracy of sorting, including: (1) the estimated number of pigs sold correctly each marketing day and overall; (2) the increased standard deviation for carcass weight overall and especially for the second day; and (3) the distribution and magnitude of the estimated sorting errors. With new procedures to estimate the accuracy of sorting market pigs, pork producers could adjust their marketing strategy for their estimated level of sorting accuracy.

Pork producers with less accurate sorting of pigs for market must target carcass weights at or just above the middle of the pork processors' acceptable range of carcass weight. Only those with more accurate sorting of pigs should target market weights closer to pork processors' upper acceptable carcass weight.

Pork producers should consider methods that result in more accurate sorting of market hogs to maximize their daily returns and to minimize the variation of carcass weight for the pork processor. Methods to increase the accuracy of sorting include: (1) taking more time in the evaluation of body weight for each pig; (2) weighing and marking a few sentinel pigs as a comparison to other pigs; (3) measuring some of the pigs with a heart girth tape (BWEE of approximately 5%); (4) using 3-D cameras with software to estimate each pig's body weight; (5) using technologies in which pigs are run across a scale and automatically marked based on their current body weight; and (6) the use of auto-sort barns that sort pigs in marketing pens based on their current bodyweight. Further research is needed to estimate the relative increases in accuracy and costs of each alternative method to improve the accuracy of sorting pigs for market.

## Acknowledgements

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