Characterizing the differences between barrow and gilt growth performance, carcass composition, and meat quality

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Key Point Summary

- Gilts are associated with 5.9% lower average daily gain, 11.4% lower average daily feed intake and 4.3% better feed efficiency compared to barrows.
- Gilts typically have 11.7% less backfat, 15.2% less marbling, 2-3 points higher iodine value, and 4.5% increased lean percentage.
- The reduced growth performance and carcass weight and poorer meat quality results in an estimated loss of $3.60 per gilt in live performance value or approximately $5.00 per gilt in lost value associated carcass and meat quality characteristics compared to barrows.

Differences in growth performance, carcass composition, and meat quality exist when comparing barrows to gilts. While no one would disagree with this observation, few in the U.S. swine industry manage gilts differently than barrows in order to minimize losses in system profitability due to these gender differences. The purpose of this review is to characterize the differences in barrow and gilt performance in order to build awareness and create incentive to define ways to capture lost value for the U.S. pork industry.

Live Animal Performance

Growth Performance

Differences in growth performance between barrows and gilts are easily seen by anyone who works with grow-finish pigs. A summary of 34 different peer-reviewed papers published since 2000 and representing almost 16,000 pigs suggests that gilts have 5.9% lower ADG, 11.4% lower ADFI, and 4.3% better F/G compared to barrows.

Final Body Weight

The same review of 34 publications indicates that gilts average about 2.3% lighter final body weight than barrows. Assuming barrows have an average final body weight of 285 lb, this is an average of 6.5 lb lighter ending body weight for gilts.

Sort Loss

Marketing strategies that incorporate a series of marketing events (cuts) prior to a final barn dump for barns stocked with both barrows and gilts will market a higher percentage of barrows first because of the higher ADG associated with barrows. This means an increased number of gilts will be marketed in the final barn dump which also means a higher sort loss associated with gilts compared to barrows. Cornelison et al. (2017) showed in one study where barns were marketed at an average of 286 lb, 3.9% of barrows were labeled as light culls whereas 5.6% of gilts were classified as light culls. Assuming a 1,000-hd barn split equally with barrows and gilts and with 10% CV of final weight, there will be, on average, 10 more gilts weighing less than 230 lb than barrows, which will dramatically increase the sort loss for gilts compared to barrows.

Final Body Weight Variability

The data is mixed regarding final body weight variation when comparing barrows and gilts.

Shull (2013) found the body weight CV was greater for gilts compared to barrows in one study, but in another trial found the opposite. Other data (Peterson, 2012; Cornelison et al., 2017) also showed mixed results or no difference when comparing final body weight variation of barrows and gilts.

Mortality

Larriestra et al. (2006) suggested that barrows were 1.75 times more likely to die during the nursery phase than gilts. While many industry professionals believe anecdotal data from commercial systems support a similar finding in grow-finish pigs, a recent review by Gebhardt et al. (2021) suggested there is little published data to support differences between barrow and gilt mortality rates in grow-finish pigs.

Estrous Development

Selection for earlier maturing gilts in the breeding herd creates the possibility for development of estrous in terminal gilts. Rodrigues et al. (2018) showed that gilts showing estrus had 5.5 times heavier ovaries and 13.9 times heavier uteri compared to non-cycling gilts, which will be associated with less nutrients available for growth and lean deposition. Additionally, development of estrous will be related to increased activity and riding behavior that could lead to injury, but there is a lack of published information to help quantify if early estrous development in commercial gilts is a real concern and to what degree it is associated with lost growth performance.

Live Performance Economic Differences

From a live performance perspective, economic differences associated with barrows and gilts are driven primarily by differences in final body weight. Assuming a lean carcass value of $75/cwt, 75% yield, final diet cost of $285/ton, and yardage of $0.12/day, in a fixed-time system with barrows finishing on average at 285 lb, a 6.5 lb final body weight disadvantage for gilts compared to barrows is equivalent to $3.66 of lost value. In a fixed weight system using the same assumptions and final barrow ADG and F/G of 1.90 and 2.85, respectively, the extra cost associated with carrying a gilt to the same final body weight is $2.96.

Carcass Composition and Meat Quality

Hot Carcass Weight

There are no data to suggest that carcass yield will differ between barrows and gilts (Boler et al., 2014). Consequently, changes in HCW will be reflective of differences in final live body weight. Using the same data set as mentioned above and a 75% yield estimate, gilts would be expected to have approximately 4.8 lb less carcass weight compared to barrows when marketed at the same days of age.

Carcass Composition

The same summary of 34 different peer-reviewed papers published since 2000 suggests that gilts have 11.7% less backfat and 4.5% increased lean percentage compared to barrows.

Primal Weight and Yield

Published data are lacking to understand if there is a primal yield difference when comparing barrows and gilts. Consequently, differences in primal weights will be reflective of differences in HCW.

Color

Overholt et al. (2016) used almost 7,500 carcasses to determine the differences in meat color of barrows compared to gilts. While minor instrumental differences in color were observed, meaningful differences in loin and ham color were absent between barrows and gilts, which agrees with Peterson (2004).

Marbling

Loin marbling, or intramuscular fat (IMF), is a key determinant in meeting the criteria for premium markets and tends to be correlated with overall carcass fatness. Overholt et al. (2016) showed that barrows had increased marbling (2.36 vs. 1.87 NPPC quality standard units) compared to gilts. Similarly, using the 34 trial comparison with 16,000 pigs, marbling was reduced by an average of 15.2% in gilts compared to barrows.

Iodine Value

Iodine value (IV) is a measure of fat quality, with a higher value representing a fat that is more unsaturated and less firm and a lower value representing fat that is more saturated and firmer. Lower IV is related to improved bacon slicing yield, which is increasingly important for U.S. packers. Additionally, lower IV is thought to be related to the desirable fat quality sought after by some international customers (*i.e.*, bright white and firm fat). Overholt et al. (2016) observed a 1.9 IV unit increase in gilts compared to barrows when comparing 7,500 carcasses. Reviewing other research that determined the impact of gender on IV suggests that gilts will have, on average, an increase of 2 to 3 IV units compared to barrows.

Export Acceptance Rates

In order for pork to meet the standards required for premium export markets, color, marbling, and fat quality must meet minimum standards. Reduced marbling and greater IV values in gilts compared to barrows means a lower percentage of gilt carcasses will be suitable for meeting premium-priced export markets.

Carcass and Meat Quality Economic Differences

When comparing the carcass and meat quality-associated economics of barrows vs. gilts, the differences in both primal weights and meat quality must be considered. Assuming a 2.2% lighter carcass, a market price of $75/cwt with primal prices falling within this same proportional price range, gilt carcasses yield 1.06 lb lighter trimmed loins, 0.42 lb lighter butts, 0.50 lb lighter picnics, 0.17 lb lighter spareribs, 1.19 lb lighter hams, 0.77 lb lighter bellies, and 0.74 lb less weight of other pieces. Before factoring in differences in primal quality pass rates (*i.e.*, achieving quality thresholds required by premium markets), gilt carcasses are $3.80 less valuable to the processor than barrow carcasses (the sum of $0.80 less for trimmed loins, $0.32 less for butts, $0.26 less for picnics, $0.16 less for spareribs, $0.68 less for hams, $1.07 less for bellies, and $0.51 less for other carcass pieces). If gilts are assumed to have a 10-percentage unit reduction in pass rates of loins and bellies (due to less marbling and higher IV) and a 15% premium above base prices is assumed for loins and bellies, an additional $1.32 is lost with gilt carcasses compared with barrow carcasses ($0.57 less for the loin and $0.75 less for the belly). Overall, gilt carcasses should be considered less valuable to the processor than barrow carcasses, with the lost value being approximately $5.00 per gilt. It should be noted that this value does not account for profitability associated with fabrication beyond primal pieces, or the fixed cost absorption models that most packers operate under.

Authors

Dr. Jason Woodworth-Kansas State University
Dr. Ben Bohrer-The Ohio State University
Dr. Jamil Faccin-Kansas State University

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