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Practice tip

Fact sheets – considerations regarding marketing heavy-weight pigs, and high-fiber ingredient withdrawal strategy before slaughter in finishing pigs

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This practice tip includes fact sheets on marketing heavy-weight pigs and withdrawal of high-fiber ingredients before slaughter

Keywords: swine, market weight, market pig, fibrous ingredients

Received: July 24, 2015
Accepted: April 28, 2016

Conflict of interest

None reported.

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This article was published as part of Dr Gonçalves' PhD thesis, Kansas State University, Manhattan, Kansas; 2015.

This article is available online at http://www.aasv.org/shap.html.

Gonçalves MAD, Dritz SS, Tokach MD, et al. Fact sheets – considerations regarding marketing heavy-weight pigs, and high-fiber ingredient withdrawal strategy before slaughter in finishing pigs. *J Swine Health Prod*. 2017;25(1):29–33. https://doi.org/10.54846/jshap/962

FACT Sheet: Considerations regarding marketing heavy-weight pigs

Market weight has linearly increased by 5.8 kg every 10 years during the last four decades.[1] This trend is driven by the dilution of fixed costs over more weight per pig and improvement in genetics and nutrition that result in more efficient and leaner pigs at heavier body weights than in previous years.[1] Because market weight has been increasing linearly, the definition of "heavy" market weight is dynamic. Currently, heavy market weight could be defined as a group average of above 130 kg.

Average daily gain (ADG) is expected to be 0.5% to 1.5% lower in pigs fed to 145 kg body weight (BW), compared to those fed to 125 kg BW.[2,3] Space allowance is one of the main factors that will limit gain when pigs get heavier. Similarly, feed efficiency is expected to worsen by 4% to 9% when average final weight increases from approximately 125 to 145 kg.[2-5] Also, as body weight increases, a slight increase in carcass yield has been reported.[6,7]

Genetic considerations

Different genetic lines will perform differently when raised to heavier market weights, probably due to differences in lean and fat deposition.[2,4,8] For instance, a Spanish study[8] has shown that market pigs sired by three different terminal boar lines showed up to a 3.6% difference in performance for ADG and a 4.0% difference in feed-to-gain (F:G) at the time of marketing (130 kg).

Nutritional considerations

More nutrient requirement information is needed. Factorial approaches have been used to estimate amino-acid requirements for heavy-weight pigs.[3] As an example, the estimates for the standardized ileal digestible (SID) lysine (Lys) requirements for pigs fed from 125 to 140 kg[3] and from 140 to 160 kg[9] were 0.56% and 0.51%, respectively. However, there is no body of empirical studies in these weight ranges to increase confidence in these modeled estimates. Other examples include the nutrient requirements when feeding ractopamine. Hot carcass weight was higher in pigs fed ractopamine up to 130 kg BW,[10] suggesting that ractopamine is still effective at higher market weights. The National Research Council (NRC) model[3] estimates the SID Lys requirement from 125 to 140 kg BW is 0.77% when using 10 g of ractopamine per ton; however, again, there is a need for empirical studies to confirm this estimate.

Health considerations

Assuming the same rate per day in mortality, a longer feeding period will incur a slight increase in mortality. In addition, increased risk for lateral infections and loss of additional heavy-weight pigs will increase the overall F:G of a barn due to the amount of feed consumed.[11] Additionally, depending on the time during the finishing period when diseases are occurring, and the duration of vaccine immunity, adding 2 to 4 weeks until harvest, may require altered vaccination strategies.[12]

Fast facts

Adequate pen space and marketing strategies are crucial to maximize the value of heavier market-weight pigs.

New facilities and equipment (feeder space, drinker height, gate height, alley width, loading ramp) must account for heavier market weight.

There is a need for more empirical data on nutrient requirements of heavier-weight pigs.

Management considerations

Pen space and marketing strategy are key factors when marketing heavy-weight pigs. If pen space is limited, feed intake, and thus growth, will decrease. Compared to a market weight of 120 kg, space allowance requirements increase 5% per pig for 130 kg BW or 11% for 140 kg BW.[13] A 136-kg market weight requires 0.90 m^2 per pig for maximum ADG, while 0.77 m^2 per pig causes a 5% reduction in ADG.[13] Strategies that market pigs at regular intervals before closing out a barn provide more space for remaining pigs and allows them to increase their growth. For example, removing pigs to increase space allowance from 0.65 to 0.84 m^2 per pig over the last 3 weeks before reaching market weight (140 kg) increased growth rate by 4.8%.[14]

Heat production and ventilation will be affected when marketing heavy-weight pigs.[15] Pigs produce approximately 8% more heat for each 10-kg increase in BW.[15] It is estimated that from 110 to 132 kg BW, there is approximately a 15% increase in heat production per pig.[1] The recommended air flow in the barn is 19.9 m^3 per hour per 115-kg pig, 22.1 m^3 per hour per 127-kg pig, and 24.3 m^3 per hour per 138-kg pig. Thus, ventilation rate increases with increased market weight on a per-pig basis; however, at the barn level, ventilation may not change dramatically if the production system is marketing pigs at regular intervals before closing out the barn.

Adding 4 extra weeks of growth (ie, 125 to 145 kg) could potentially increase the proportion of gilts that would present with pubertal estrus.[16] This could have a modest impact on feed intake and ease of handling market gilts.

Transportation is another factor to be taken into consideration when marketing heavy-weight pigs. Heavier pigs require more space during transport to maintain welfare and reduce transport losses.[17] Thus, the recommended space allowance on trucks for pigs marketed in the summer is 0.46 m^2 per pig at 114 kg BW, 0.55 m^2 per pig at 136 kg BW, or 0.65 m^2 per pig at 182 kg BW.[17] Therefore, fewer pigs will be marketed in each load as pig body weight increases.

Facility and equipment design considerations

Due to continued trends for increased body weight of pigs at marketing, building designs should account for this change. Heavier pigs are wider and taller; thus, feeder space, drinker height, gate height, and alley width must be carefully considered.

The amount of feeder space needed is normally 1.1 times shoulder width.[1] Because shoulder width increases from 31.5 to 32.7 cm when pigs grow from 125 to 140 kg BW,[18] the requirement for width of a feeder space increases from 34.7 to 36.0 cm.

For a 140-kg BW pig, drinker height should be approximately 77 cm for a 90-degree nipple drinker and 92 cm for a downward-mounted nipple drinker.[19] However, the drinker height should be adjusted to the shoulder height of the smallest pig in the pen.[19] Shoulder height increases by 2.8 cm when pigs grow from 125 to 140 kg BW;[19] therefore, gate height might be a factor to be taken into consideration when building new facilities. Finally, for pigs heavier than 125 kg, 15 degrees or less is the recommended loading-ramp angle, compared to 20 degrees for lighter pigs.[17]

Packing plant considerations

Factors associated with marketing heavy-weight pigs that can have an impact in the packing plant are rail capacity, rail height, primal cut size, and cooling capacity. Pigs could be heavier than the facility is designed for; thus, the amount of weight that rails support may be a limiting factor. Increased length of the carcass could pose a challenge for food safety if the rail is not high enough. Increased primal cut size will require adjustment of cut sizes from the retail market perspective. Similarly, increased weight will require an extra amount of cooling time for the carcass; thus, a different cooling-time strategy may be required.

Acknowledgement

Contribution no. 16-008-J from the Kansas Agricultural Experiment Station, Manhattan, KS 66506-0210.

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FACT Sheet: High-fiber ingredient withdrawal strategy before slaughter in finishing pigs

It is often economically viable to use high-fiber ingredients such as distillers dried grains with solubles (DDGS) and wheat middlings in finishing pig diets. Because most swine producers are paid on a carcass basis, it is important to understand the impact of high-fiber ingredient diets on carcass characteristics and economics. Feeding high-fiber ingredient diets up to market has been shown to reduce carcass yield due to increased gut fill and visceral weight.[1] Many high-fiber ingredients contain unsaturated fatty acids, which also increases iodine value (IV).[1]

What is high-fiber ingredient withdrawal?

High-fiber ingredient withdrawal is the replacement of the high-fiber ingredients in finishing diets by low-fiber ingredient(s) (eg, a diet based on corn and soybean meal) for a specific time before market.

Impact of high-fiber ingredient withdrawal on carcass yield and carcass weight

Carcass yield is lower in pigs fed high-fiber ingredient diets until market than in pigs fed a diet based on corn and soybean meal.[2,3] Carcass yield is restored after 15 to 51 days withdrawal of the high-fiber ingredients, becoming comparable to carcass yield when a corn-soybean meal diet is fed.[2-6] The lower carcass yield is a result of increased large intestine weight and fecal volume when pigs are fed a diet high in insoluble fiber.[7,8] Because yield is the ratio between carcass and live weight, an increase in live weight without a change in carcass weight leads to a lower yield. A descriptive summary of eight experiments[8] in which high-fiber ingredient diets were fed for periods of varying durations suggests an increase of 0.16% in carcass yield for each 1% reduction in neutral detergent fiber. The negative impact on carcass yield of feeding high-fiber ingredient diets until market is reported to be greater in immunocastrated than in physically castrated pigs.[5]

Impact of high-fiber ingredient withdrawal on carcass fat quality

Iodine value is a practical means of measuring unsaturated ("soft") fat, by measuring the relative number of double bonds in the fatty acids. More unsaturated dietary fat is associated with a higher carcass fat IV. From a dietary fat perspective, linoleic acid (C18:2n-6) and α-linoleic acid (C18:3n-3) are the main drivers of higher IV.[9] Therefore, withdrawing feeding ingredients such as DDGS and wheat middlings, which have higher levels of unsaturated fatty acids (ie, linoleic acid) will reduce the amount of unsaturated fat in the carcass and consequently reduce IV. Iodine value was linearly improved with up to 20 days withdrawal of the high-fiber ingredients, but this was not long enough to fully restore IV.[8] However, IV value was fully restored by using a 9-week withdrawal of high-fiber ingredients.[10] Conversely, withdrawal of high-fiber ingredients that contain no unsaturated fatty acids is not expected to influence IV value.

Fast facts

High-fiber diets fed until market reduce carcass yield.

Many high-fiber ingredients also contain high concentrations of unsaturated fatty acids which can increase carcass fat iodine value.

High-fiber ingredient withdrawal of approximately 15 to 20 days is able to restore carcass yield and reduce impact on iodine value.

If high-fiber ingredient diets are economical, a high-fiber ingredient withdrawal of 15 to 20 days prior to market maximizes income over feed cost across different market scenarios.

High-fiber-ingredient withdrawal time to mitigate negative yield effects

Two recent studies evaluated withdrawal of high-fiber ingredients in diets with 30% DDGS and 19% wheat middlings for 5, 10, 15, and 20 days (Experiment 1) and 9, 14, 19, and 24 days (Experiment 2) before market.[8] In Experiment 1, carcass yield of pigs marketed on the same day was restored in a quadratic manner with increase in high-fiber ingredient withdrawal time, being fully restored at 15 days. In Experiment 2, hot carcass weight of pigs marketed on the same day was linearly increased when high-fiber ingredient withdrawal time was increased. The data suggested a high-fiber ingredient withdrawal time of approximately 15 to 20 days is needed to fully restore carcass yield.[8]

Impact of high-fiber ingredient withdrawal on economic performance

Economic calculations have demonstrated[8] that when feeding high-fiber diets, a high-fiber ingredient withdrawal period of approximately 15 to 20 days maximized income over feed cost across widely variable ingredient and pork market prices. In those scenarios, the benefits ranged from $2.20 to $2.90 per pig (all currency in $US).[8] High-fiber ingredient withdrawal was modeled to be more economical independent of the production flow (ie, fixed weight or fixed time basis).[8] The economics are driven by pigs fed a low-fiber ingredient diet maintaining feed intake while consuming a more calorie-dense diet, which leads to improved carcass weight relative to live weight.

Acknowledgement

Contribution no. 16-006-J from the Kansas Agricultural Experimental Station, Manhattan, KS 66506-0210.

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