

Nutritional strategies to improve the growth performance of pigs marketed in summer

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Summary

To improve the growth performance of growing-finishing pigs and maximize economic returns for summer marketing, producers can feed increased dietary energy while pigs are still in their energy dependent growth phase. Removal of high-fiber ingredients such as dried distillers' grains with solubles can increase dietary energy and improve gain. During the summer when feed intake is low, formulating diets at or slightly above amino acid requirements may be beneficial. Feed additives that increase growth rate should be considered to improve market weight. Market prices and optimal market weights should drive formulation decisions to maximize income over feed costs.

Keywords: swine, growth performance, growing-finishing pig, summer diets

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Resumen - Estrategias nutricionales para mejorar el rendimiento de crecimiento de los cerdos comercializados en verano

Para mejorar el rendimiento de crecimiento de los cerdos en desarrollo y finalización y maximizar los beneficios económicos para la comercialización de verano, los productores pueden aumentar la energía dietética mientras los cerdos aún se encuentran en su fase de crecimiento dependiente de energía. La eliminación de ingredientes ricos en fibra, como los granos secos de destilería con solubles, puede aumentar la energía dietética y mejorar la ganancia. Durante el verano, cuando el consumo de alimento es bajo, puede ser beneficioso formular dietas con, o ligeramente por encima de los requisitos de aminoácidos. Se deben considerar los aditivos para alimento que aumentan la tasa de crecimiento para mejorar el peso a mercado. Los precios de mercado y los pesos de mercado óptimos deben encauzar las decisiones de formulación para maximizar los ingresos sobre los costos de alimentación.

Résumé - Stratégies nutritionnelles pour améliorer les performances de croissance des porcs commercialisés en été

Pour améliorer les performances de croissance des porcs en croissance-engraissement et maximiser les rendements économiques pour la commercialisation estivale, les producteurs peuvent fournir une énergie alimentaire accrue pendant que les porcs sont encore dans leur phase de croissance dépendante de l'énergie. L'élimination des ingrédients riches en fibres tels que les drêches de distillerie séchées avec des solubles peut augmenter l'énergie alimentaire et améliorer le gain. Pendant l'été, lorsque la consommation d'aliments est faible, il peut être bénéfique de formuler des régimes égaux ou légèrement supérieurs aux besoins en acides aminés. Les additifs alimentaires qui augmentent le taux de croissance doivent être envisagés pour améliorer le poids du marché. Les prix du marché et les pondérations optimales du marché devraient guider les décisions de formulation afin de maximiser les revenus par rapport aux coûts d'alimentation.

In the summer months when environmental temperatures increase, a pig's voluntary feed intake (VFI) will typically decrease resulting in reductions in body weight gain.¹ Summer market weights can decrease up to 4.5 kg, which also happens to be at a time when market prices are typically at their yearly high.² Furthermore, pigs housed under heat stress conditions exhibit decreased caloric efficiency, reduced carcass lean, and in some cases poorer carcass fat quality compared to pigs housed under cooler ambient temperatures.³⁻⁵ Consequently, there can be significant

economic loss associated with decreased market weights. This creates an opportunity to develop feeding programs specifically targeting pigs marketed in North America between May and August to maximize growth performance and economic return. To capture full value, diet formulation changes should begin in February for late nursery or early finishing pigs and continue through July. This provides producers with the maximum opportunity to increase gain leading into summer, whereas late nursery or early finishing pigs placed in July are less of a concern because they will not be

marketed until late fall. This practice tip will focus on feeding and management strategies to increase the gain of pigs marketed during the summer months.

Nutritional strategies to maximize growth

Increased energy density

The most common method to improve the growth performance of growing-finishing pigs for summer markets is to increase dietary energy through the

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inclusion of fat or oil. Typically, adding 1% to 5% fat in diets for growing-finishing pigs will increase gain by approximately 1% for every 1% of added fat.⁶ Likewise, feed efficiency is generally improved by approximately 2% for every 1% of added fat.⁷ Kellner et al⁵ observed that heat stress does not affect the ability of pigs to digest fat, therefore a similar response can be expected under high temperature conditions. When considering fat inclusion in the diet, the response is often greater in growing pigs that have not reached maximum protein deposition. Hence, it may be more economical to feed increased fat levels while pigs are still in their energy dependent phase of growth when capacity for feed intake inhibits maximum gain. This typically occurs in the growing period (up to approximately 80 kg),⁸ but also can be later in finishing depending on genetic selection and other environmental, health, or management scenarios. The response to dietary energy is also largely dependent on the lysine:calorie ratio. As energy density of the diet increases, the magnitude of improvement in gain will be limited if dietary lysine is not also increased.⁸ When making the decision to increase dietary energy density through fat inclusion, it is important to evaluate income over feed cost (IOFC) to ensure that the value of additional gain is greater than the associated costs to change diet formulation. Alternative byproduct ingredients that have high energy content, such as bakery meal, could be an option to increase the energy density of the diet. However, variability between batches or sources and other intrinsic factors associated with the alternative ingredient must be considered.

Removal of fibrous ingredients

Another way to increase dietary energy would be to reduce or remove the inclusion of high-fiber ingredients such as dried distillers' grains with solubles (DDGS), wheat middlings, or soybean hulls. In contrast to fats, fibrous ingredients have a high heat increment of digestion. Specifically, DDGS have 3 times the level of fiber than corn, which can have a negative effect on feed intake and subsequent growth of pigs.⁹ Dried distillers' grains with solubles can also have a negative effect on carcass yield and fat quality. Thus, implementing DDGS withdrawal strategies can be an important component of feeding programs to improve gain and carcass quality. Data by Coble et al¹⁰ suggests that removing

DDGS from the diet up to approximately 24 days prior to market can improve hot carcass weights and carcass yield by approximately 1.0% and 1.8%, respectively, with improvements beginning as soon as a 5 days post withdrawal. Withdrawal strategies should allow producers to feed more fibrous diets at a lower cost for an extended amount of time while still capturing carcass gain value to maximize IOFC. As with any feeding strategy, the optimal duration of feeding high-fiber ingredients will depend on the economic situation. Likewise, variation in nutrient values across ingredient sources can have significant impacts on growth performance and economic outcomes. This is particularly important when feeding high levels of DDGS. Hence, analyzing the nutrient composition of the DDGS source will ensure the best economic return.

Increased amino acid levels

Increasing the gain of growing-finishing pigs can potentially be achieved through increasing amino acid (AA) intake if diets are not already formulated for maximal growth. As environmental temperatures increase, pigs typically decrease their VFI resulting in reduced AA intake. Heat stress has also been shown to alter AA metabolism and decrease the efficiency of lysine utilization.^{11,12} Thus, if diets are formulated at or marginally below requirements, low VFI could result in AA deficiencies and subsequent reductions in body weight gain, protein deposition, and carcass lean. For this reason, increasing AA concentrations in the diet during the summer may be necessary to improve growth performance.¹³ Increasing AA can be achieved through the inclusion of intact protein sources or feed-grade AA. Although, in the summer it may be more beneficial to use feed-grade AA to prevent increases in the heat increment of digestion.^{13,14} Successful implementation of this feeding strategy begins with having a clear understanding of the lysine requirements of the genetic source of the pigs being fed and the requirements for maximum growth versus economic return. While targets to maximize IOFC are often lower than the pig's biological requirement for maximal growth performance in the growing and early finishing phase, late finishing maximum economic return is often achieved at a similar level as maximum growth.¹⁵ As the inclusion of DDGS in diets has increased, tryptophan typically becomes the second limiting AA. Research shows that increasing the standardized

ileal digestible tryptophan:lysine ratio above National Research Council (NRC) requirements can improve the gain of growing-finishing pigs.¹⁶⁻¹⁸ This implies that feeding pigs at or above their AA requirements is not only important in late finishing, but may be of particular importance for pigs reared in the summer months when feed intake is low.

Phosphorus and copper levels

Ensuring that diets are formulated with adequate levels of standardized total tract digestible phosphorus is another way to potentially improve the gain of growing-finishing pigs (24-130 kg). According to Vier et al,¹⁹ average daily gain (ADG) was maximized (increased by approximately 3%) when feeding 122% of the NRC¹⁶ requirement estimate compared to 100% of the estimate. However, phosphorus levels that achieve maximum growth should be evaluated for economic return to ensure that increased supplementation results in additional revenue above the added cost.²⁰ Copper from copper sulfate, tribasic copper chloride, or other copper sources may provide additional opportunities to improve the growth performance and hot carcass weights of finishing pigs when provided between 125 and 250 ppm in the diet.^{21,22} Data by Coble et al¹⁰ showed that feeding 170 ppm of copper from 25 kg to market resulted in an increase of 3.5 kg in hot carcass weight at processing.

Feed additives

The inclusion of feed additives specifically designed to improve gain is another nutritional strategy that can be implemented. There are several different categories of additives that can be used in diets including growth promoting antibiotics, exogenous enzymes, ionophores, minerals, phytogens, probiotics, and more. When selecting feed additives for pigs marketed in the summer, focus should be on those that improve gain versus those that only improve feed efficiency. For a more complete evaluation on feed additives and their effects on the growth performance of growing-finishing pigs, please refer to the review by Rao et al.²³

Diet form

Feeding pelleted diets has also been shown to improve the gain of finishing pigs by up to 6.0%.^{24,25} During pelleting, the use of heat, steam, and pressure increases starch gelatinization and protein

denaturation, therefore increasing the energy and protein digestibility of cereal grains.²⁶ Despite these benefits, feeding pellets for an extended period (ie, ≥ 58 days) can increase the incidence of ulcers, thereby increasing herd removal rates.²⁷ Either rotating between pelleted and meal diets or feeding pelleted diets for a shorter time duration (ie, in late finishing) can help ameliorate these challenges.

Management strategies to maximize growth

In addition to nutritional strategies, there are several management opportunities for pigs marketed in the summer. These strategies should focus on increasing days in the barn or improving gain by leveraging available space. Increasing days in the barn is often the most economical option to increase market weight; however, this may not be feasible because of facility constraints or the need to meet packer marketing contracts. If this is an option, the decision will need to be made early about how to successfully manage pig flow to increase days. For example, double stocking nursery or wean-to-finish barns that are placed in early to mid-summer and leaving them double stocked for slightly longer will allow pigs downstream extra days on feed. If this approach is not an option, stocking density and marketing strategies can be opportunities to optimize the utilization of space. Hence, moving into summer when gain is most valuable, stocking finishing pigs with more square footage is an option to improve gain and carcass quality,⁴ whereas pigs marketed in winter can be stocked with less square footage. White et al⁴ showed that increasing the space allowance of growing-finishing pigs from 0.66 m² to 0.93 m² under high temperature (32.2°C) conditions, increased ADG by 27%.

Marketing strategies should also be evaluated to ensure that pigs are removed from pens when space begins to limit growth to prevent prolonged reductions in ADG.²⁸ However, it is also important to keep in mind that marketing or topping barns too early, particularly when pigs are growing slower, can have negative implications on IOFC if pigs are marketed lighter than optimal. Other management strategies that should be part of daily animal care include, making sure feeder adjustments are not too tight, barn temperatures and ventilation

setpoints are in line with pig needs, and that cooling systems (ie, sprinklers and extra air movement) are being used when available.

Economic considerations

Increasing nutrient density or including dietary feed additives comes with increased cost. Therefore, evaluating diet formulation strategies to improve the growth of pigs marketed in the summer needs to begin with having a clear understanding of seasonal growth and market trends. Knowing the pig flow, genetics, and optimal market weights based on packer grids of the production system is key. This information will help make informed decisions based on the inputs and outputs of different nutritional or management strategies to maximize IOFC. This is not only important for summer marketing but is necessary year-round to develop successful growing-finishing pig feeding programs. Examples of economic calculations in swine nutrition can be found in the Kansas State University Swine Nutrition Guide.²⁹

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Conflict of interest

None reported.

Disclaimer

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