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Managing feed efficiency in a production system

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The production of pork is essentially converting grains and other ingredients to a tasty, wholesome protein source. The more efficiently ingredients are converted to pork the more environmentally friendly and profitable producers become. Managing feed utilization in a production system is not much different than a single farm in terms of components needing to be considered. Moving from managing a single farm to several sites in various geographies requires development of processes to facilitate, implement, and execute the core components associated with optimum feed utilization.

This paper will address areas to consider when managing feed utilization of a production system. Many systems are different in design and management. As such, different approaches are implemented to capture opportunity based on these inherent differences. However, some key components to successful feed utilization are common across systems. The conference presentation will highlight the approach Christensen Farms has taken to address these areas of focused control.

Setting the system

Feed, air, and water are essential to life and performance of the pig. Disruption of any of these factors affects well-being and performance. Beyond those critical needs lies improvement in efficiency in feed utilization. Selection of genetics, health, pig care, and nutrition need to work collaboratively to produce optimum feed efficiency. This section will review a few of the main points with this next level of optimizing efficient pork production.

Successful genetic potential involves selecting genetics with an inherit ability to consume a high levels of feed intake to drive average daily gain through lean deposition to a heavy bodyweight. Furthermore, balancing the selection for robustness to handle less than perfect conditions and growth performance is a substantial part of decision making process when selecting genetics. Many times individuals will compare terminal lines for live performance and carcass merits because it is typically the quickest and fastest to modify. Often the maternal portion of the commercial pig receives less attention although provides half the genetic composition. Balancing reproductive performance and terminal value is a point to consider in a comprehensive approach to feed utilization. Regardless of the genetics being used it is important to establish some baseline performance measurements for genetic potential and progress to the genetic potential within a system.

Undoubtedly health plays a key role in growth and feed utilization. It is a rather simple concept that less energy spent activating and mounting an immune response the more that energy can be used to deposit protein. Added days to market are added cost to maintenance energy resulting in poorer feed efficiency. Vaccines have been developed and are currently being improved upon to assist with this energy intake limitation and increased maintenance cost. Staying abreast of advancements in these areas is critical to minimizing the effects of health. Nutritionists need to work hand in hand to support veterinarians and vice versa. A supportive, collaborative team approach to providing service and support to production is required to obtain optimum feed utilization results.

Feed form is another system based decision that needs to be made and can be limited by genetics and/or health conditions. Pelleting is a useful tool as long as the robustness of genetics, health and limited feed disruptions are favorable. Pelleting can consistently reflect a 4 to 6% improvement in feed utilization in research settings. However, in some field scenarios the improvement in feed utilization is offset by the appearance of ulcers and resulting death. Although pelleting can achieve better feed efficiency than meal feed it is possible to compete with a very well made, low micron meal diet when all economics are considered. Liquid feeding may be an alternative to incorporate the best of both scenarios and may be a viable option in the near future for some but not all systems.

Charting the course

Dietary energy level has one of most predictable and dramatic impacts on feed utilization. Several factors go into selecting the desired dietary energy feeding level including but not limited to corn and dietary fat costs, pig space availability, feed intake constraints, and season. Demand for feeding energy is high. The production of ethanol and biodiesel is increasing the cost of our primary

and supplemental energy sources in the U.S. As a result, less supplemental fat is being used in the Midwest than a decade or two ago. Depending on several factors it may be advantageous to add some dietary fat to achieve an acceptable total daily energy intake to support desirable growth. Regardless of the amount of added fat it is important to relate it back to an energy level especially when comparing or benchmarking with other farms, systems, or countries. Just because a producer has a lower number of pounds of feed per pound of bodyweight gain does not necessarily mean the producer is performing worse than another producer with a higher number. That stated, sometimes it is more difficult to justify higher pound of feed per pound of gain in finishing is a better economic decision when the number is closer to 3.0 than 2.7 for finishing pigs even with substantial energy differences. Each farm or system will weigh each factor differently to decide their desired energy level.

Whether dietary energy level remains constant over time or the level is modified in response to market conditions, predictable performance is a valuable commodity in a pork production system. This point should not be overlooked or taken lightly. If expected performance does not match with predicted performance on a dietary change then investigation into the variance should occur. Otherwise, potential opportunity is lost on the nutrient supply side or through other factors that need to be reviewed and modified. Ideally production leadership, management and veterinary staff should be involved in the decision making process and proper communication to the proper level should be completed prior to change. An accounting method comparing planned to actual results relative to feed changes can be effectively used to determine when something else unrelated to the nutrient change is occurring. Otherwise deterioration in true performance may be hidden in the change and perpetuate too long before addressed.

Following the course

It is important to maintain the expected level for reliable performance regardless of desired energy level at any particular time. Ingredient selection, ingredient moisture, micron size of grains, supplemental fat inclusion, and feed form all have impacts on the final energy feeding level. Maintenance and monitoring these key factors is critical to effectively managing feed efficiency.

Predicting the energy values of major ingredients is critical to overall maintenance of formulation and predictable feed efficiency. Predicting value can be accomplished through internal laboratory or external resources using technology such as wet chemistry or near infrared spectrometry. Consistent and routine monitoring and subsequent adjusting is required to properly manage dietary energy levels to predicable level and make appropriate formulation decisions. Two major factors affecting energy and nutrient values include moisture of incoming commodity ingredient energy value and fat concentration in distiller's dried grains with solubles. Keeping up with the energy components of the diet are critical to overall success and predictability of performance.

Once incoming ingredients are evaluated for overall initial quality, further processing can influence the feeding value. Reducing micron size of ingredients can have a significant impact on nutrient utilization. A goal is to get as much nutrient value as possible out of the ingredients that have been purchased rather than spending money on more ingredients. Reducing the micron size in meal feed to a point to where it is able to flow through the feed delivery system, the feeder, and ultimately to the pig without feed distribution is typically a solid economical approach whenever pelleting is not a viable option. If feeding meal diets, monitoring corn micron size is extremely critical to achieve this balance. Statistical process control is a very useful tool that can be utilized to monitor the quality of corn grind. Monitoring pelleting corn grind is important as well to ensure equipment is being maintained properly and does not need replacing.

Once a systematic approach of determining and accurately assigning nutrient loadings of ingredients is established, the proper formulation to optimize the use of the ingredients begins. Saving cents per ton on a nutrient specification can quickly add up to dollars on efficiency. One approach is to ensure proper supporting nutrients are available to support the utilization of the increasing expensive energy within the diet composition. The more nutrient specifications which are closer to the known or expected limit the more risk to waste energy. Producers have to measure the risk reward scenario for themselves when presented with the options.

Delivering on the plan

Once formulated another key component is mixing of ingredients. Actual versus expected nutrient levels are important to validate the right amount of ingredients is being delivered into the mixer. Inventory discrepancies should be investigated when out of expected tolerances. Assuming improper counting or poor accounting is a potentially costly error. If the process is broken, fix it. Mixer profiles are also helpful. Many times mixer profiles are performed with a cheap analytic such as salt for a determination of proper mixing of solid ingredients and perhaps fat as a predictor of all liquid mixability. In many cases it is a predictor of how other ingredients mix. However, if feed efficiency is not where desired it may be worth checking mixing more than these components, especially

those ingredients that are important to protein deposition and added in small amounts. However, this may not be as important in late finish when pigs are eating more.

Just because the diet is formulated and manufactured to optimize pig performance does not mean the job is done. Proper execution of the feed budget is critical to managing feed utilization and cost. Both under and overfeeding are very possible if not tightly controlled. It should go without saying that monitoring while pigs are still on feed and action can be taken to rectify an issue is preferred over reviewing a closeout and poor result.

Once in the feed bin there are a few more critical steps to ensure optimum feed efficiency performance. In addition to air, water, and pig care, optimum feed utilization can be ensured if pigs have a consistent supply of fresh feed, feed bin maintenance and cleanout to reduce moldy feed, and feeder settings. Feeder settings can account for substantial feed waste. There are many different types of feeders. Each feeder type has advantages and disadvantages. Nevertheless, feed waste can and should be controlled regardless of type. The key in feeder setting selection is the balance between optimum growth and feed efficiency. A given producer's goal feeder setting or pan coverage is dependent on economic value of each trait. It is difficult for a larger system to change this based on varying economics within the year. Thus, typically feeder settings are a longer term direction than a short term goal. Regardless, this is best accomplished by daily adjustments as herdspersons walk the pens. Drastic feeder adjustments tend to lead to a perpetual cycle of too tight to too loose feeder settings achieving neither feed efficiency nor growth performance goals.

Delivering results

Reviewing results of quality measurements combined with closeout reporting are important. Routine reviews are important for maintenance of past improvements and striving for continuous improvements into the future.
Feed efficiency is typically reviewed by phase of production whether it be pounds of feed per gain (bodyweight or carcass), caloric feed efficiency, and/or cost per pound of gain. Becoming increasingly popular is the concept of whole herd feed efficiency which includes gestation and lactation feed and resulting performance. Regardless of the measurement parameter it is important to have a benchmark internally and externally to know where in relation current performance ranks relative to others in the industry and ultimately percentage relative to genetic potential.

Conclusion

At the end of the day, quality air, feed, water, and pig care should provide good feed utilization as well as other production results. Management to ensure these are right every day should the focus of any producer or production system. Components of these approaches to manage feed utilization can be implemented regardless of size or scale of operation.