

Immunological castration and ethanol co-products studied to improve pork production

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Global competitiveness for grains commonly fed to pigs, such as corn and soybeans, continues to grow. By utilizing alternative feed ingredients such as distillers dried grains with solubles (DDGS) and reducing the amount of resources (feed, water, and land) needed to produce lean, high quality pork, production systems can remain competitive while helping to keep pork affordable for consumers. Historically, pork producers have surgically castrated male pigs (barrows) within the first few days of life. Barrows eat more feed, grow slower, and are fatter than uncastrated male pigs (boars). Thus, barrows require more feed and utilize feed less efficiently compared to boars. It would be economically advantageous for pork producers to raise boars instead of barrows. However, boars naturally produce compounds, as part of their reproductive system, that cause unpleasant, off-odors in the meat which consumers find unpalatable and unacceptable. Castration eliminates these off-odors.

Recently the swine research group at the University of Minnesota has been evaluating the use of a new, FDA-approved product called Improvest, at the West Central Research and Outreach Center (WCROC) in Morris, MN. Improvest works like any vaccine by using the pig's own natural immune system to produce antibodies. In the case of Improvest, the reproductive system is temporarily turned off to give the body time to remove the compounds that cause off-odors before pigs are harvested. Improvest replaces traditional surgical castration in the first few days of life, and replaces it with immunological castration which occurs later, between 3 to 10 weeks before harvest. Immunologically castrated pigs remain as boars for a longer period of time during which they consume less feed, are leaner, and grow faster than surgically-castrated pigs. Additionally, since these pigs consume less feed and are leaner, nitrogen and phosphorus excretion in manure and urine is reduced which benefits the environment.

Several countries around the world are moving away from surgical castration of pigs. In 2018, the European Union will begin a voluntary ban of surgical castration. In the U.S., use of Improvest by producers at this time is limited, but widespread use of Improvest would reduce the amount of feed consumed and improve efficiency compared to surgically castrated pigs. The increased leanness of immunologically castrated pigs would also provide additional value to pork producers while still minimizing off-odors in pork products that are unpalatable to consumers.

At the WCROC, researchers have evaluated the growth performance, pork quality, and pork fat quality of immunologically-castrated pigs fed DDGS. DDGS is a co-product of ethanol production from corn. The fiber and fat content of DDGS are greater than traditional ingredients fed to pigs, such as corn and soybean meal. Fat of pigs, especially immunocastrated pigs which are leaner than barrows, reflects the fat the pig consumes. The type of fat in DDGS is high in polyunsaturated fatty acids, which makes pork fat softer. So, feeding DDGS to immunocastrated pigs could create problems with softer pork fat. This is especially evident in pork products that have a higher fat content such as bacon. Soft fat in bacon can

reduce slicing yield for meat processors, decrease shelf life of the bacon, and create an overall 'greasy' appearance that is unappealing to consumers.

Research at the WCROC determined that the combination of DDGS feeding strategies and timing of Improvest did not impact growth performance of pigs. Therefore, selection of DDGS feeding strategy and timing of Improvest can be made independently. Regardless of Improvest, pigs fed no DDGS or fed decreasing amounts of DDGS during growth had greater growth rate and improved gain efficiency compared to pigs fed 40% DDGS. Dressing percentage (percentage of liveweight that results in carcass weight) determines carcass value to pork producers. Results from this research study showed that pigs fed 40% DDGS had reduced dressing percentage compared to pigs fed diets with no DDGS. However, dressing percentage of pigs fed decreasing amounts of DDGS, or pigs fed 40% DDGS but no DDGS during the last 5 weeks, was not different compared to pigs fed no DDGS. Regardless of the amount of DDGS in the diet, timing of the second Improvest dose did not affect growth rate, but pigs receiving the second Improvest dose 5 weeks before harvest had improved gain efficiency, less backfat and reduced dressing percentage compared to pigs receiving the second dose at 9 or 7 weeks before harvest. While less fat is desirable to both pork producers and consumers, reduced dressing percentage decreases the value producers receive. Effects of Improvest and DDGS feeding on pork quality and pork fat quality in this study are currently being evaluated.