

Dextrin

In a separate presentation to AASV, another research group affiliated with the University of Missouri presented work on prebiotic dextrins fed to grow-finish swine.

Buddy Hinson, Gary Allee and Monty Kerley of the University of Missouri and Hong Yang of ADM Alliance Nutrition noted that prebiotics are non-digestible carbohydrates that may have a positive influence on the colonic microbial population of the host animal. Dextrins are believed to serve as a prebiotic when added to swine diets.

Dextrins are starch hydrolysis products produced via a dry roasting process using starch alone or with trace amounts of an acid catalyst. They are delivered to the large intestine to serve as food for beneficial bacteria such as *Bifidobacteria* and *Lactobacilli*, Hinson et al. explained.

The objective of the study was to determine whether wheat dextrin affected the growth performance and fecal microbial population of grow-finish pigs.

Methods. Two experiments were conducted to determine the efficacy of wheat dextrin (PremiDex from Archer Daniels Midland Co.), with the first experiment performed at the ADM Alliance Nutrition Swine Research Center and the second at the University of Missouri.

In experiment 1, 140 pigs (initial weight = 20.7 kg) were randomly allotted to four dietary treatments with seven pens per treatment and five pigs per pen.

Treatments consisted of (1) control without tylosin (Tylan) or dextrin, (2) control plus dextrin at 0.25%, (3) control plus tylosin at 40 g per ton and (4) control plus dextrin plus tylosin at the above levels. Diets were typical corn/soybean meal diets and were fed in five dietary phases.

Pig weights and feed disappearance were measured at days 1, 17, 38, 59, 80 and 101 in order to determine growth performance.

In experiment 2, 736 pigs (initial weight = 49.5 kg) were randomly allotted to four dietary treatments with eight pens per treatment and 23 pigs per pen.

Treatments consisted of (1) control without tylosin or dextrin, (2) control plus dextrin at 0.1%, (3) control plus

Research

with
TIM LUNDEEN



dextrin at 0.2% and (4) control plus tylosin at 40 g per ton. Diets were typical corn/soybean meal diets and were fed in four dietary phases.

Pen weights and feed disappearance were measured at days 1, 21, 42, 63 and 84 in order to determine growth performance. On day 84, intact pens were marketed in order to determine carcass characteristics.

Results and discussion. In experiment 1, pigs fed tylosin (treatment 3) had better feed efficiency at the end of the grower stage (2.15 versus 2.22; $P < 0.05$) and at the end of the entire study (2.55 versus 2.62; $P < 0.10$) than pigs fed the control diets, but there were no significant differences ($P > 0.10$) between these two treatments for daily gain or feed intake, Hinson et al. reported.

Adding wheat dextrin to the control diets improved daily gain at the end of the grower stage (0.92 kg versus 0.87 kg per day; $P < 0.10$) and at the end of entire study (0.94 kg versus 0.88 kg; $P < 0.05$), they said. As a result, pigs fed wheat dextrin (treatment 2) were 3.8 kg heavier than pigs fed the control diets at the end of the study. Furthermore, Hinson et al. noted that pigs fed wheat dextrin had better overall feed efficiency (2.56 versus 2.62; $P < 0.10$) than pigs fed the control

diets.

When both wheat dextrin and tylosin were added to the control diets, no feed efficiency improvement from adding them separately was observed, which Hinson et al. said suggests that there was a negative interaction between these two additives.

In experiment 2, adding tylosin did not significantly affect daily gain or feed intake throughout the study. However, the researchers noted that tylosin improved feed efficiency ($P < 0.05$) during the grower stage compared to the other three dietary treatments.

According to Hinson et al., increasing dietary dextrin inclusion levels tended to linearly increase bodyweight ($P = 0.09$). Pigs fed 0.2% wheat dextrin were 2.7 kg heavier ($P < 0.10$) than pigs fed no dextrin, and the weight improvement was 2.2 kg for pigs fed 0.1% dextrin. However, dextrin did not have significant effects on feed intake or feed efficiency, they noted.

In experiment 1, Hinson et al. said dextrin numerically improved *Lactobacilli* and reduced *Escherichia coli* in fecal samples collected at the end of the 101-day study (data not presented). In experiment 2, tylosin increased fecal *Lactobacilli* and decreased fecal *E. coli* on day 40 ($P < 0.05$) but did not affect either on day 82 (Table 2).

They noted that increasing the dietary addition of wheat dextrin increased the fecal *Lactobacilli* count on day 40, with pigs fed 0.2% wheat dextrin having more *Lactobacilli* than pigs fed the 0% wheat dextrin control ($P < 0.05$).

Hinson et al. noted that the fecal

2. Effect of wheat dextrin and antibiotic on fecal microbial count of grow-finish pigs (experiment 2)*

	-----Dextrin, %-----				Standard error of means
	0	0.1	0.2	0	
	-----Antibiotic-----				
	No	No	No	Yes	
<i>Lactobacilli</i>					
Day 40	8.02 ^a	8.16 ^{ab}	8.34 ^b	8.30 ^b	0.092
Day 82	7.82	7.64	7.80	7.80	0.118
<i>E. coli</i>					
Day 40	6.09 ^a	5.56 ^{ab}	6.17 ^a	4.62 ^b	0.30
Day 82	6.61	6.10	6.22	5.90	0.31

*Eight replicate fecal samples per treatment. Unit: log₁₀ colony-forming units per gram of wet feces. Day 40 and day 82 were two days before the end of grower stage and market time, respectively.

^{a,b}Means within a row without a common superscript differ ($P < 0.05$).

microflora response has been used to assess colonic health in swine, rats and horses. In the current set of experiments, they noted that the increased fecal *Lactobacilli* count suggested that wheat dextrin served as a food to feed the growth of *Lactobacilli* and perhaps other colonic microflora that can hydrolyze non-digestible carbohydrates.

This result may also indicate that more volatile fatty acids were produced in the large intestine, Hinson et al. said, noting that growing swine can obtain as much as 12% of their metabolizable

energy requirement from volatile fatty acids. Therefore, they theorized that the performance improvement from feeding wheat dextrin may be related to its effect on *Lactobacilli* growth and colonic health.

Implications. According to Hinson et al., tylosin at 40 g per ton had positive effects on feed efficiency in the two grow-finish studies, while wheat dextrin improved daily gain and/or feed efficiency.

The minimal level of wheat dextrin that generated positive effects on performance of grow-finish pigs was 0.1%.

Both tylosin and dextrin increased fecal *Lactobacilli* concentrations at the end of the grower stage in the second study.

Hinson et al. concluded that feeding wheat dextrin helped establish a stable microbial community more rapidly than feeding tylosin or no dextrin. More beneficial bacteria and earlier establishment of a stable microbial community in the large intestine were theorized to have resulted in positive effects of feeding wheat dextrin on growth performance of grow-finish pigs in these studies. ■