Evaluation of Cellulose in Diets with and Without Added ZnO on Nursery Pig Performance.

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A total of 1,296 pigs (PIC L337×1050; initially 4.8 kg) were used in a 42-d study to evaluate cellulose in diets with and without pharmacological levels of Zn on nursery pig performance. Our hypothesis was that added fiber (cellulose) may provide more benefit in diets without ZnO. Pens were assigned to 1 of 4 dietary treatments in a RCBD by BW with 27 pigs/pen and 12 pens/treatment. Dietary treatments were arranged in a 2×2 factorial with main effects of cellulose (0 vs 1%; J. Rettenmaier USA, Schoolcraft, MI) and Zn (200 vs. 3,000 mg/kg in phase 1 and 110 vs. 2,000 mg/kg in phase 2). Treatment diets were formulated in two phases fed from d 0 to 7 and 7 to 21 with a common diet fed from d 21 to 42 post-weaning. Pig weights and feed disappearance were collected weekly to determine ADG, ADFI, and G:F. On d 16 or 17, fecal samples were collected from 3 pigs/pen to determine fecal DM, and all pens were visually evaluated for fecal consistency. There were no Zn×cellulose interactions. For the experimental and overall period, pigs fed diets containing added Zn had increased (P < 0.001) ADG, ADFI, G:F and BW while those that were fed cellulose had decreased (P < 0.05) ADG. For fecal dry matter, there was no evidence for difference (P >0.10) between any of the treatments but those fed added ZnO had visually firmer feces as evidenced by lower (P < 0.001) fecal scores. When fed a common diet from d 21 to 42, pigs previously fed added ZnO had increased (P < 0.001) ADG (502 vs. 523 g/d) and ADFI (697 vs. 734 g/d). In conclusion, there were no interactive effects between added cellulose and Zn; however, cellulose reduced ADG while the inclusion of pharmacological levels of Zn improved all growth criteria.

Table 1. Interactive effects of cellulose and added ZnO on nursery pig performance

| Item                        | No ZnO | No ZnO + Cellulose | ZnO | ZnO + Cellulose | Probability, P* |
|-----------------------------|--------|---------------------|-----|----------------|-----------------|
| ADG, g                      | 159    | 201                 | 160 | 215            | 5.29            | <0.001          |
| ADFI, g                     | 286    | 324                 | 308 | 329            | 5.52            | <0.001          |
| Gain-feed                   | 0.507  | 0.623               | 0.520| 0.634          | 0.017           | <0.001          |
| Feed dry matter, %          | 20.72  | 19.01               | 20.10| 19.91          | 0.901           | <0.001          |
| Fecal score, avg.           | 3.46   | 3.06                | 3.78 | 3.03           | 0.190           | <0.001          |

*P values are indicated for each treatment at the end of the experimental period (d 21) according to a 4 x 3 model: (1) feed treatments, (2) feed ingredients, (3) feed amino acids, (4) feed energy levels.

**Keywords:** cellulose, growth, nursery

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| Measure of oxidation | Treatment1 | Statistic2 |
|----------------------|------------|------------|
|                      | 0% | 6% | 12% | SEM| P-value |
| Blood Plasma |
| PC, mmol/mL         | 59.6b | 43.1b | 96.6b | 13.6 | 0.02 |
| 8-OH-DG, pg/mL      | 2987.9 | 2066.8 | 2513.3 | 334.2 | 0.28 |
| Liver               |
| PC, mmol/mg         | 194.3b | 111.3b | 179.5b | 23.4  | 0.04 |
| 8-OH-DG, pg/mg      | 472.3  | 434.3  | 471.1  | 44.9  | 0.80 |

1 Difference in dietary treatments were created by the inclusion of 10% TP-SDEW (20°C), 6% TP-SDEW (10°C for 120 h) plus 6% SDEW or 12% TP-SDEW.
2 Difference in superscript indicate significant difference (P ≤ 0.05).

Abbreviations: PC=protein carbonyls, 8-OH-DG=8-OH-2’-deoxyguanosine, ISP-F=isoprostanes

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