LOW TEST WEIGHT CORN FOR SWINE

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Introduction

The concentration of protein, fiber and minerals usually increases and concentrations of starch and fat decrease as test weight of corn declines. This results in a higher protein, lower energy grain compared with corn of normal test weight (54-56 lb/bushel). Research conducted with chickens has demonstrated that reductions in test weight did result in a slight reduction in the true metabolizable energy content of corn (Dale and Williams, 1993). Since corn's primary contribution to swine diets is energy, we generally think that low test weight corn is of lower feeding value than normal test weight corn. The cool growing season and harvest challenges of 2009 have created increased concerns over test weight of corn. This is not the first time we have had this concern. In the early 1990's, several research groups evaluated the effects of low test weight corn on pig performance. So, it seems wise to review what we know about this issue.

Research Results

At the West Central Research and Outreach Center, we compared corn harvested in one year having a test weight of 57 lb/bu with corn harvested the next year dried to three moisture levels. Test weight of the second-year corn ranged from 47.5 to 49.5 lb/bu. Standard grower and finisher diets were formulated to contain 0.78 and 0.63% total lysine, respectively. The old corn contained 0.25% lysine while the low test weight corn contained between 0.25 and 0.26% lysine. Pigs began the experiment at an average weight of 77 lb and ended the experiment at 229 lb. There was no statistically significant difference in daily gain, feed intake or feed efficiency between normal and low test weight corn (Table 1).

Researchers at Michigan State University (Rozeboom et al., 1993) studied the effects of corn test weight on performance of growing pigs. Test weights evaluated ranged from 42 to 59 lbs/bu. Pigs began the 4-week trial weighing 29 lb. They reported no effect of test weight on growth performance of pigs (Table 2). The diet containing corn with a test weight of 47 lb/bu did significantly reduce growth rate and daily feed intake. However, retrospective analysis of corn revealed vomitoxin contamination of 2 ppm which probably was responsible for the depression in feed intake and growth performance associated with this diet.

Others workers in South Dakota using growing-finishing pigs (Rudolph, 1993; Table 3) and Canada using nursery pigs (Patterson et al., 1993; Table 4) could not demonstrate any consistently negative or positive effects of low test weight corn on pig performance. Researchers at South Dakota State University (Iverson and Thaler, 1996) found that adding fat in the form of extruded soybeans or soy oil to corn-based diets containing very low test weight corn (36 or 44 lb/bushel) had no effect on daily gain but did improve daily feed intake and feed

efficiency of growing-finishing pigs (Table 5). Fortunately, reports of low test weight corn in 2009 have not reached the severity of that reported in this South Dakota study.

Conclusion

Assuming corn is not contaminated with mycotoxins, and other factors are not compromising quality of the corn, low test weight corn seems to be comparable in feeding quality to normal test weight corn for pigs. It appears that corn with test weight as low as 45 lb/bushel, and maybe as low as 40 lb/bushel, can support pig performance similar to corn with test weights of 56 to 59 lb/bushel.

References

Dale, N. and W.P. Williams. 1993. Research provides insight into value of low test weight corn. Feedstuffs, April 12, pg. 17.

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Rozeboom, D.W., D.A. Nelson and E.R. Miller. 1993. Influence of corn test weight (lb/bushel) on the performance of growing pigs. Michigan State Univ. Anim. Sci. Newsletter, pg. 6.

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Table 1. Effect of test weight of corn on performance of growing-finishing pigs.

		1992 corn % moisture			
Trait	1991 corn	10	13	16	SE
No. of pens	4	4	4	4	
Test wt., lb/bu	57	49.5	47.5	48.5	
Feed moisture, %	9.1	9.7	12.1	14.4	
Gain, lb/d	1.65	1.58	1.63	1.49	.02
Feed intake, lb/d	5.69	5.50[b]	5.81[b]	5.47[b]	.10
Feed/Gain	3.46	3.48	3.57	3.69	.08

[a]Different from 1991 corn ($P < .01$).

[b]Quadratic effect within 1992 corn ($P < .10$).

Johnston, 1993.

Table 2. Performance of growing pigs fed corn of varying test weights – Michigan

	Test weight, lb/bu			
Trait	42	47	51	59
Gain, lb/d	1.43	1.32*	1.41	1.41
Feed intake, lb/d	2.91	2.69*	2.87	2.84
Gain/feed	.49	.50	.49	.49

Rozeboom et al., 1993

Table 3. Performance of growing-finishing pigs fed corn of varying test weight – GTA Feeds, South Dakota

	Test weight, lb/bu			
Trait	40	45	50	55
Gain, lb/d	1.76	1.76	1.71	1.77
Gain/feed	.33	.32	.33	.34

Initial pig weight = 43 lb; final weight = 252 lb
Rudolph, 1993

Table 4. Performance of nursery pigs fed corn of varying test weights – Ontario

Test weight, lb/bu.	Gain, lb/d	Gain/feed
58.7	1.26	.40
57.4	1.21	.42
50.6	1.30	.42
45.7	1.12	.42
43.7	1.32	.43
43.6	1.06	.39

Initial pig weight = 18.5 lb; 3 week trial
Patterson et al., 1993

Table 5. Effects of corn test weight and fat additions on pig performance – South Dakota[a]

		36 lb/bu			44 lb/bu		
Trait	Corn, (56 lb/bu)	Corn + SBM	Corn + Extr. SB	Corn + Soy oil	Corn + SBM	Corn + Extr. SB	Corn + Soy oil
Gain, lb/d	1.81	1.75	1.70	1.74	1.65	1.71	1.77
Feed intake, lb/d	5.00[b]	5.87[d]	5.06[b]	5.26[bc]	5.74[cd]	5.05[b]	5.36[bcd]
Gain:Feed	0.36	0.30[d]	0.34[bc]	0.33[c]	0.29[d]	0.34[bc]	0.33[bc]

[a]Iverson and Thaler, 1996.
[b,c,d]Means within rows with unlike superscripts differ (P<0.05).