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EFFECTS OF EXPANDERS (HIGH SHEAR CONDITIONING) ON GROWTH PERFORMANCE IN FINISHING PIGS

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Summary

Diets that had been processed using standard, long-term, and expander (high shear) conditioning tended to support greater ADG than an unconditioned meal control diet. Pelleting was necessary to maximize efficiency of growth, but only with standard and long-term conditioning. Indeed, the best efficiencies of gain were for pigs fed the expander processed diets, with no additional benefits from pelleting the expanded mash.

(Key Words: Expander, Pellet, Ulcers, Finishing Pigs.)

Introduction

Expansion (high shear conditioning) is a technology that is entering the U.S. from Europe and has been embraced by many U.S. poultry producers. However, little research has been conducted to determine the effects of expanding swine diets. Thus, the objective of the experiment reported herein was to compare growth performance among pigs fed diets hydrothermally processed with a standard steam conditioner, a long-term steam conditioner, and an expander.

Procedures

A total of 70 (avg initial wt of 119 lb) terminal-cross barrows (PIC line 326 boars × C15 sows) was allotted by weight and ancestry to 35 pens in an environmentally controlled building. Each treatment had two pigs per pen (5-ft by 5-ft) and five pens. The experiment was arranged in a 2 × 3 factorial plus a meal control. Main effects were feed form (mash vs pellets) and conditioner type (standard steam conditioner, long-term steam conditioner, and expander conditioner).

All diets were corn-soybean meal-based and formulated to .9 % lysine, .65 % Ca, and .55 % P. However, because of anticipated loss of vitamin stability, the expanded diets were formulated to 125% of the normal KSU vitamin additions. The diets for the standard conditioner (California Pellet Mill) were processed at a temperature of 175°F with a retention time of 10 seconds. The long-term (California Pellet Mill, two-pass) conditioner had a retention time of 2 min 40 sec and a conditioning temperature of 175°F. The expander (Amandus-Kahl, high-shear) conditioner had a cone pressure of 200 psi and a conditioning temperature of 170°F. The conditioned diets were fed as a mash or after pelleting through a 3/16 in. × 1 ½ in. die.

Each pen had a self-feeder and a nipple waterer to allow ad libitum consumption of food and water. The pigs and feeders were weighed at initiation and conclusion of the growth assay to allow calculation of ADG, ADFI, and F/G. Pigs were slaughtered, and stomachs were collected and scored for keratosis and ulceration. Response criteria were ADG, ADFI, F/G, and scores for keratosis and ulceration. All data were

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analyzed using the GLM procedure of SAS with pen as the experimental unit.

Results and Discussion

A trend ($P < .07$) was observed for greater ADG in pigs fed diets that had been thermally conditioned vs the unconditioned meal control. Also, a general advantage in F/G occurred with pelleting ($P < .04$), but this advantage was pronounced only with standard conditioning (conditioned mash vs pellet × standard vs advanced conditioning interaction, $P < .02$). Indeed, the lowest F/G was observed for pigs fed the expander treatments ($P < .03$), and the expander mash was used as efficiently as the expander pellets. Finally, as is often the case with advanced feed processing technologies, the more extreme the processing technique (i.e., expander > long-term conditioner > standard conditioner > unconditioned meal), the greater the incidence and severity of stomach lesions ($P < .04$).

In conclusion, our results suggest marked improvements in efficiency of growth with pelleting after standard steam conditioning or simply feeding an expanded mash, compared to an unconditioned meal. Thus, the decision of which technology to adopt will depend on cost of processing, capital available to purchase the different equipment, and the time and degree of expertise available to operate the equipment.

Roger Anderson (L), Farrowing House Manager and Robert Beckley (R), Breeding Barn Manager, and Student Workers Load a Feeder on a Tractor.

Table 1. Effects of Feed Conditioning on Growth Performance in Finishing Pigs[a]

Item	Meal	Standard Conditioning		Long-Term Conditioning		Expander Conditioning		CV	Contrasts[b]					
		Mash	Pellet	Mash	Pellet	Mash	Pellet		1	2	3	4	5	6
ADG, lb	1.99	2.01	2.20	2.05	2.19	2.17	2.12	6.6	.06	.08	---[c]	---	---	.12
ADFI, lb	6.03	6.53	6.23	6.27	6.57	6.13	5.98	8.7	---	---	---	.13	---	---
F/G	3.03	3.25	2.83	3.06	3.00	2.82	2.82	6.6	---	.03	.14	.03	.01	---

[a]A total of 70 pigs (avg initial wt of 119 lb) two pigs/pen with five replications/treatment was used.
[b]Contrasts were: 1) meal vs thermal conditioning; 2) conditioned mash vs pellets; 3) standard vs advanced conditioning; 4) long-term vs expander conditioning; 5) conditioned mash vs pellet × standard vs advanced conditioning; 6) mash vs pellet × long-term vs expander conditioning.
[c]Dashes indicate $P > .15$.

Table 2. Effects of Feed Conditioning on Stomach Lesions in Finishing Pigs

Item	Meal	Standard Conditioning		Long-Term Conditioning		Expander Conditioning		CV	Contrasts[a]					
		Mash	Pellet	Mash	Pellet	Mash	Pellet		1	2	3	4	5	6
Stomach keratinization[b]														
Total observations	10	9	10	10	9	10	10							
Normal	6	3	2	4	0	0	0							
Mild	1	3	3	4	3	4	4							
Moderate	3	2	4	2	6	1	5							
Severe	0	1	1	0	0	5	1							
Mean score	.70	1.11	1.40	.80	1.73	2.10	1.70	56	.005	---[d]	---	.002	---	.008
Stomach ulcerations[c]														
Total observation	10	9	10	10	9	10	10							
Normal	10	8	7	9	6	2	5							
Mild	0	1	2	0	2	5	1							
Moderate	0	0	0	1	1	2	2							
Severe	0	0	1	0	0	1	2							
Mean score	0	.13	.50	.20	.46	1.20	1.10	160	.04	---	.08	.003	---	---

[a]Contrasts were: 1) meal vs thermal conditioning; 2) conditioned mash vs pellets; 3) standard vs advanced conditioning; 4) long-term vs expander conditioning; 5) conditioned mash vs pellet × standard vs advanced conditioning; 6) mash vs pellet × long-term vs expander conditioning.
[b]The scoring system was: 0 = normal; 1 = mild keratinization; 2 = moderate keratinization; and 3 = severe keratosis.
[c]The scoring system was: 0 = normal; 1 = erosion; 2 = ulcers; and 3 = severe ulcers.
[d]Dashes indicate $P > .15$.