

Effects of feeding a multi-enzyme and probiotic bacteria blend (CORE) on performance of nursery pigs fed a highly digestible diet

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ABSTRACT

The objective of this study was to evaluate whether performance of nursery pigs could be improved by using high levels of a multi-enzyme blend consisting of xylanase, phytase, cellulase, beta-glucanase, alpha-amylase and protease and a probiotic bacteria blend consisting of *Bacillus subtilis* and *Bacillus licheniformis* (CORE). For d 0 to 21, 0.3% CORE was added to two phases of a highly digestible basal diet (corn, soybean meal, fish meal, plasma and phytase; NC1) and when CORE was added to NC1, the supplemental phytase was removed (CORE1). For d 21-42, the third phase was a corn-soy basal diet that included phytase and 3.5% added fat (NC2), and 0.3% CORE replaced the phytase and 2.5% added fat (CORE2). There were 462 weaned pigs used with an average BW of 5.2 kg with 22 pigs/pen and 10 to 11 replications/treatment in a commercial scale nursery research facility. At the beginning of the trial pigs were randomly assigned to their dietary treatment. Pens of pigs were weighed and feed disappearance was measured to calculate ADG, ADFI, and F:G for d 0, 21, and 42. Data were analyzed as a randomized complete block design using GLM procedure in Minitab with Fisher's LSD test to determine differences between dietary treatments. For d 0-21, the pigs fed CORE1 had a 7.7% higher ADG ($P=0.024$) compared to pigs fed NC1. There was a tendency ($P=0.090$) for pigs fed CORE1 to have a 5.9% higher ADFI than NC1. For d 21-42, where 0.3% CORE replaced both supplemental phytase and 2.5% added fat, ADG tended to increase by 5.1%. In conclusion, the addition of CORE to a highly digestible nursery diet, replacing supplemental phytase, resulted in improved ADG and ADFI, and, in late nursery, CORE successfully replaced supplemental phytase and 2.5% of added fat with no loss of performance.

BACKGROUND

CORE contains multiple enzymes including phytase, xylanase, beta-glucanase and protease plus probiotics, *Bacillus subtilis* and *Bacillus licheniformis* and has been shown in previous trials to improve ADG.

OBJECTIVES

The first objective was to evaluate the effects of feed high levels of CORE, replacing phytase, in a highly digestible nursery diet on performance of nursery pigs. The second objective was to evaluate feeding high levels of CORE in a corn-soy diet on growth performance of nursery pigs with CORE replacing 2% fat in the diet.

MATERIALS & METHODS

Experimental Design

- 462 weaned, commercial nursery pigs (avg. 5.2 kg & 21 d of age)
- Blocked by BW
- Housed in a commercial wean to finish barn
- 42-d study
- 4 dietary treatments (10-11 reps/trt)
- Diets met or exceeded 2012 NRC requirements

Performance

- Pens of pigs weighed on d 0, 21, and 42
- Feed disappearance measured
- ADG, ADFI, and FCR calculated

Morbidity, Mortality, & Treatments

- Medical treatments recorded daily
 - Pigs unresponsive to injectable treatments
 - Tagged & moved to sick pens
- Morbidity – tagged pigs that remained as viable pigs
- Mortality – pigs that died

Statistical Analysis

- RCBD
- Minitab
 - GLM procedure
 - Tukey's test to determine differences
- Experimental Unit = pen
- Means reported as Adjusted Means

DIETARY TREATMENTS

D0-21 Treatments

- NC1 – a highly digestible basal diet
 - Contained corn, soybean meal, fish meal, plasma, & phytase
- CORE1 – 0.3% CORE; replaced phytase

D21-42 Treatments

- NC2 – a corn-soy basal diet that included 3.5% fat
- CORE2 – 0.3% CORE replaced 2.0% fat

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DIETS

Table 1.

Composition of Phase 1 (5.4-6.8kg)

Ingredient	NC1	CORE1
Corn	43.33	43.25
Lactose Product, 80%	22.00	22.00
Soybean Meal	20.00	20.00
Plasma	5.00	5.00
Fish Meal	5.00	5.00
Choice White Grease	1.72	1.72
Limestone	0.89	0.68
Dicalcium Phosphate	0.42	0.42
Zinc Oxide	0.40	0.40
Salt	0.25	0.25
L-Lysine HCl	0.22	0.22
Aureo 100	0.20	0.20
Liquid Methionine	0.18	0.18
Denagard 10	0.18	0.18
VTM	0.15	0.15
L-Threonine	0.08	0.08
Optiphos 2000	0.01	-
CORE	-	0.30
TOTAL	100.00	100.00

Table 2.

Composition of Phase 2 (6.8-11.3kg)

Ingredient	NC1	CORE1
Corn	50.84	50.72
Lactose Product, 80%	11.00	11.00
Soybean Meal	25.30	25.30
Plasma	2.50	2.50
Fish Meal	5.00	5.00
Choice White Grease	2.00	2.02
Limestone	0.93	0.70
Zinc Oxide	0.40	0.40
Salt	0.40	0.40
L-Lysine HCl	0.29	0.30
Aureo 100	0.20	0.20
Liquid Methionine	0.19	0.20
Denagard 10	0.18	0.18
VTM	0.15	0.15
L-Threonine	0.11	0.11
Monocalcium Phosphate	0.52	0.53
Optiphos 2000	0.01	-
CORE	-	0.30
TOTAL	100.00	100.00

Table 3.

Composition of Phase 3 (11.3-22.7kg)

Ingredient	NC1	CORE2
Corn	57.13	59.93
Soybean Meal	36.25	36.25
Choice White Grease	3.50	1.00
Limestone	0.85	0.65
Salt	0.50	.050
L-Lysine HCl	0.32	0.32
Liquid Methionine	0.19	0.19
Denagard 10	0.18	0.18
VTM	0.15	0.15
L-Threonine	0.12	0.12
Monocalcium Phosphate	0.83	0.83
CORE	-	0.30
TOTAL	100.00	100.00

RESULTS

Table 4. Summary of Growth Performance

	D0-21			
	NC1	CORE1	SE	P-value
D 21 BW, kg	11.3 ^a	11.8 ^b	0.4	0.015
ADG, g	291 ^a	313 ^b	19	0.024
ADFI, g	337 ^y	357 ^z	24	0.090
F:G	1.16	1.14	0.04	0.648
	D21-42			
	NC2	CORE2	SE	P-value
D 42 BW, kg	22.4 ^a	23.3 ^b	0.8	0.035
ADG, g	527 ^y	554 ^z	31	0.083
ADFI, g	746 ^a	817 ^b	53	0.015
F:G	1.42 ^a	1.48 ^b	0.03	0.003

^{a,b} Means with different superscripts in the same row differ at $P < 0.05$.

^{y,z} Means with different superscripts in the same row differ at $0.05 < P > 0.10$.

CONCLUSIONS

During the first 21 days,
CORE™ improved ADG by 7.6% & ADFI by 5.9%
in nursery pigs fed a highly-digestible diets
as well as replaced phytase.

CORE™, replacing 2.5% of fat from day 21-42,
resulted in no loss of performance.