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# Impact of Spray-Dried Plasma (Appetein™) and Colistin in Weanling Pigs Challenged with *Escherichia coli*

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## Introduction

Alternatives to sub-therapeutic antibiotics are becoming increasingly important in all phases of animal agriculture. Research has demonstrated positive performance responses using spray-dried plasma as an alternative to antimicrobials in weanling pigs (Gatnau et al., 2000; Conde et al., 2000). However, the research was conducted without deliberate challenge. Under challenge conditions, the efficacy of spray-dried plasma has been demonstrated (Borg et al., 1999; Bosi et al., 1999). The objective of the current study was to evaluate the efficacy of spray-dried plasma and antibiotic under a pathogenic *Escherichia coli* (*E. coli*) challenge.

## Materials and Methods

Sixty weanling pigs (6.5 kg initial weight, 21 d of age) were blocked by initial weight and assigned randomly to treatment. One piglet from each block was initially sacrificed for determination of intestinal microflora concentration. Experimental treatments consisted of: 1) control diet (fishmeal, Con), 2) 7% spray-dried plasma (Appetein, APP), 3) control diet with 300 ppm Colistin (Col), and 4) 7% Appetein with 300 ppm Colistin (APP+Col). Diets were formulated to contain 1.5% lysine and 23% crude protein with Appetein replacing fishmeal. On day 0, all piglets were challenged with 5 mL ( $10^7$  bacteria/mL) of *E. coli* K99. Body weight and feed intake were determined weekly.

## Results

On d 7 and 14, body weight was greater ( $P < 0.05$ ) in pigs fed APP, Col, or APP+Col compared to pigs fed Con. Average daily gain was improved ( $P < 0.05$ ) on d 0-7 and 0-14 in pigs fed APP, Col, or APP+Col compared to pigs fed Con (Table 1). Average daily feed intake from d 0-7 was increased ( $P < 0.05$ ) in pigs fed APP+Col compared to pigs fed Con, while from d 0-14, pigs fed Col had greater ( $P < 0.05$ ) feed intake compared to pigs fed Con. Gain/Feed ratio (G:F) was improved ( $P < 0.05$ ) from d 0-7 when pigs were fed APP compared to Con, while G:F was intermediate in pigs fed Col or APP+Col. From d 0-14, G:F was improved ( $P < 0.05$ ) in pigs fed APP, Col, or APP+Col compared to pigs fed Con. Intestinal microflora concentrations were determined in the cecum and ileum. Colony forming units (CFU) of *Lactobacillus* were increased ( $P < 0.05$ ) in the cecum when pigs were fed APP, Col, or APP+Col compared to pigs fed Con. No effects ( $P > 0.05$ ) of treatment were observed in ileal *Lactobacillus* concentration. *Enterococcus* was unaffected ( $P > 0.05$ ) by dietary treatment. Concentration of *E. coli* in the cecum and ileum were lower ( $P < 0.05$ ) when pigs were fed Col

or APP+Col compared to pigs fed Con, while feeding APP reduced ( $P < 0.10$ ) *E. coli* in the ileum compared to feeding Con. Concentration of cecal *Clostridium* was reduced ( $P < 0.10$ ) when pigs were fed APP or Col compared to pigs fed Con, while no differences ( $P > 0.10$ ) due to dietary treatment were noted in ileal *Clostridium* concentration.

Table 1. Performance of weanling pigs.

Trt	Control	Appetein	Colistin	APP+Col
D 0-7				
ADG, g	23 <sup>a</sup>	141 <sup>b</sup>	122 <sup>b</sup>	140 <sup>b</sup>
ADFI, g	164 <sup>a</sup>	212 <sup>ab</sup>	198 <sup>ab</sup>	232 <sup>b</sup>
Gain:Feed	0.22 <sup>a</sup>	0.67 <sup>b</sup>	0.60 <sup>ab</sup>	0.56 <sup>ab</sup>
D 0-14				
ADG, g	111 <sup>a</sup>	201 <sup>b</sup>	209 <sup>b</sup>	218 <sup>b</sup>
ADFI, g	231 <sup>a</sup>	280 <sup>ab</sup>	286 <sup>b</sup>	271 <sup>ab</sup>
Gain:Feed	0.41 <sup>a</sup>	0.72 <sup>b</sup>	0.72 <sup>b</sup>	0.81 <sup>b</sup>

ab =  $P < 0.05$ .

## Conclusions

The results indicate that APP may be utilized as an alternative to Col in pigs challenged with *E. coli*.

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