

Efficacy of a combination of eubiotics in *Escherichia coli* K88 challenged piglets

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Introduction

Weaning is critical for piglets as they are undergoing several stressful changes at a time their immune system is far from fully developed: separation from the mother, change from milk to solid feed, new housing environment... Major consequences are decreased feed intake and impaired digestion. During this period, enterotoxigenic *E. coli* strains often cause colibacillosis. Treatments with antibiotic or high level of zinc oxide are usually prescribed to prevent or cure such diseases leading to the selection of resistant bacteria potentially affecting animal and public health. In this context, two studies were conducted to evaluate the efficacy of VevoStart[®], a combination of eubiotics, in piglets challenged with *Escherichia coli* K88.

Materials and Methods

- **Trial location:** IRTA, Monogastric Nutrition, Spain
- **Animals:** 140 hybrid piglets used per study with weaning at 26 days
- **Trial duration:** 4 weeks
- **Trial Design:** Piglets divided into 28 pens, with 5 animals per pen
- **Basal diet:** Pelleted feed for *ad libitum* intake based on barley (40.6%), wheat (30.0%), soybean meal (8.0%) and dried milk whey (10.0%)
- **Challenge procedure:** All animals were inoculated with an oral dose of 5×10^8 CFU of *Escherichia coli* K88 at day 4 post-weaning.
- **Test product:** Vevostart premix containing benzoic acid (Vevovital[®]), a blend of essential oils (CRINA[®] Piglet), and a Enterococcus faecium probiotic (Cylactin[®])
- **Treatments:**
 - T1: Negative Control (basal diet without medication)
 - T2: Basal diet containing VevoStart[®] premix at 2%;
 - T3: Basal diet medicated with colistin
 - T4: Basal diet medicated with Zn-oxide
 - Study 2: T1, T3 and T4 containing also a blend of lactic, formic, citric, propionic and orthophosphoric acids at 0.75%
- **Parameters & analyses:**
 - Body weight of piglets, daily weight gain, daily feed intake and feed/gain ratio monitored each week and overall.
 - Severity of diarrhoea at days 0, 1, 4, 5, 7, 11, 13, 18, 21, 25 and 28 for each piglet by faecal scoring system
 - Fresh faeces collected from each pen at same time points for faecal shedding of *Escherichia coli* measured by traditional culture methods

Results

Performance Week 1 – 4 (Study N°1)

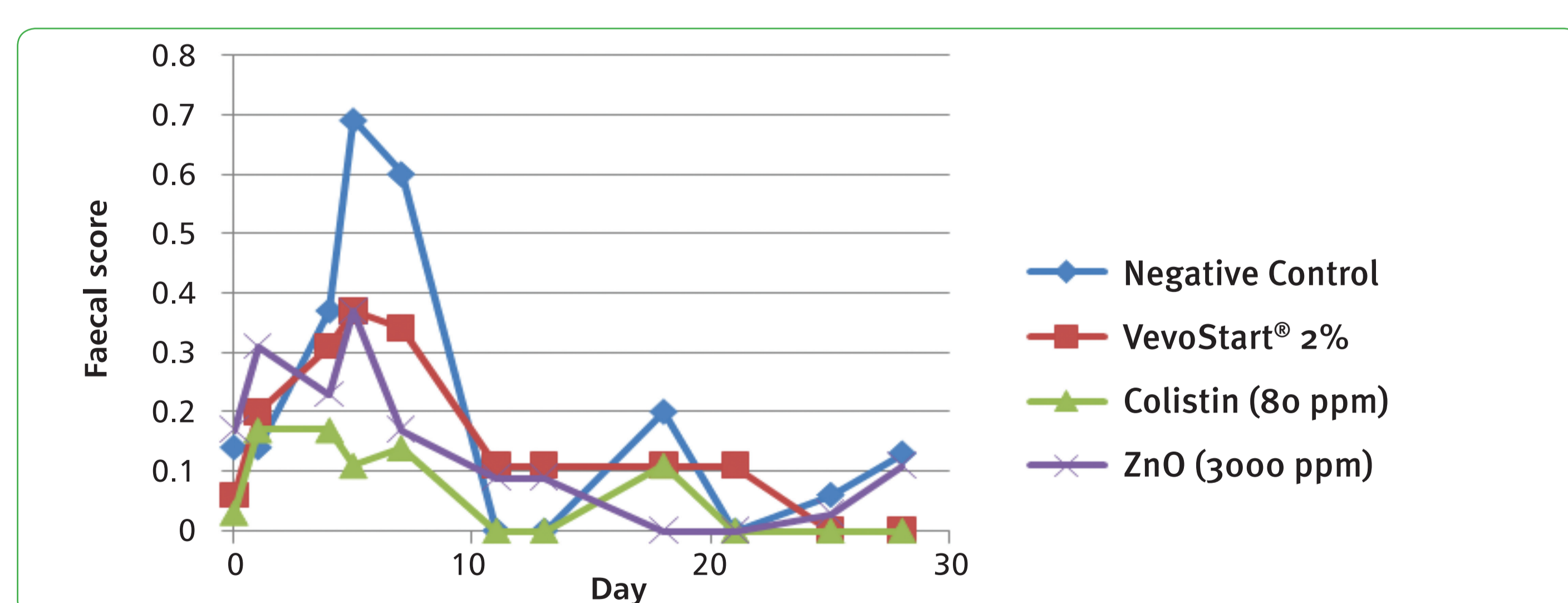
Treatment	T-1	T-2	T-3	T-4
Test product	Neg. control	VevoStart	Colistin	Zn-oxide
Inclusion level (%)	0	2 %	80 ppm	3000 ppm
Initial live weight (kg)	7.53	7.55	7.55	7.53
Final live weight (kg)	16.01 b	17.80 a	16.11 b	15.68 b
Daily weight gain (g)	303 b	366 a	306 b	291 b
Index (%)	100.0	120.8	101.0	96.0
Daily feed intake (g)	440	482	442	413
Feed/gain ratio	1.45 b	1.31 a	1.44 b	1.44 b
Index (%)	100.0	90.3	99.3	99.3

Performance Week 1 – 4 (Study N°2)

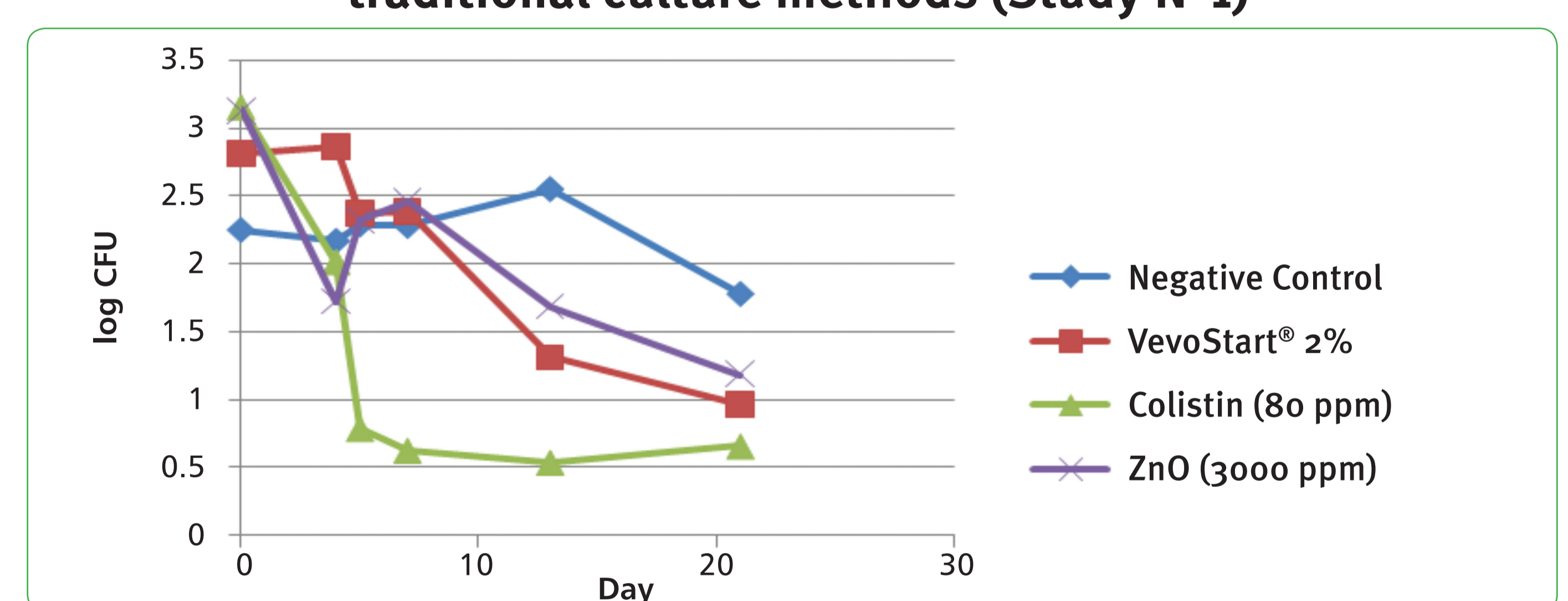
Treatment	T-1	T-2	T-3	T-4
Test product	Neg. control	VevoStart	Colistin	Zn-oxide
Inclusion level (%)	0	2 %	66.7 ppm (until D14)	3000 ppm (until D14)
Initial live weight (kg)	8.33	8.32	8.32	8.32
Final live weight (kg)	18.04 a	18.36 a	18.26 a	17.07 b
Daily weight gain (g)	388 a	402 a	398 a	350 b
Index (%)	100.0	103.6	102.6	90.2
Daily feed intake (g)	505 a	520 a	507 a	439 b
Feed/gain ratio	1.30	1.29	1.27	1.25
Index (%)	100.0	99.2	97.7	96.2

a, b, means without a common letter are significantly different (P<0.05)

Faecal score of piglets (Study N°1)



Faecal shedding of *Escherichia coli* measured with traditional culture methods (Study N°1)



Conclusions

- The 1st experiment showed VevoStart[®] significantly increased the daily weight gain and significantly improved the feed conversion ratio. *E. coli* faecal shedding was significantly reduced in piglets fed the colistin diet.
- In the 2nd experiment where an organic acid blend was also included in the control, colistin and zinc oxide treatments (T1, T3, T4), no significant differences in daily weight gain between the Control, VevoStart[®] and Colistin were observed while medication with Zinc oxide significantly decreased feed intake and growth.
- In conclusion, specific nutritional solutions integrating synergistic and complementary products can enable piglets to undergo the weaning period without using antimicrobial treatments and compromising zootechnical performance.