

NUMBER 12

MULTIPLE STUDIES SHOW ECONOR® PREVENTS, CONTROLS PORCINE COLONIC SPIROCHAETOSIS

INTRODUCTION *Brachyspira pilosicoli* (formerly *Serpulina pilosicoli*) is a weakly β -haemolytic spirochaete that affects weaned pigs in major swine producing areas around the world. It causes porcine colonic spirochaetosis (PCS), a colitis characterized by diarrhoea, decreased weight gain and feed efficiency. *B. pilosicoli* differs biochemically and antigenically from *B. hyodysenteriae*, which causes swine dysentery, and often occurs in association with ileitis.

Econor® (valnemulin) is a pleuromutilin antimicrobial used exclusively in animals. In several countries, Econor is approved for preventing and treating swine dysentery and recently was approved in Europe for preventing colitis and treating ileitis.

Danish Field Trial

In a controlled, double-blind study, 96 pigs were divided equally among six pens.¹ At the start of the trial, weakly-haemolytic spirochaetes were isolated from three pigs in the Econor group and from four in the placebo group. The pigs received either Econor in feed at a rate of 25 ppm or a placebo mix.

Results

> After treatment, weakly-haemolytic spirochaetes were isolated from none of the samples taken from the Econor group but were isolated from 19 samples taken from pigs in the placebo group.

> Significant improvement in weight gain and food conversion efficiency (FCE) were obtained in this trial with Econor.

Researchers' observation: "The shedding of *B. pilosicoli* was completely suppressed by Econor."

Danish Challenge Study

Investigators challenged two groups of 10 pigs with oral *B. pilosicoli* cultures.² One of the groups received Econor in feed at a concentration of 25 ppm starting 4 days before the challenge and the other group was not medicated. A third group received the culture medium only and served as an additional control.

Pigs were evaluated for clinical signs daily and, 14 days after challenge, were examined on necropsy for inflammatory lesions in the intestine, caecum and colon.

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KEY POINTS

- > In controlled field studies conducted in two countries, pigs infected with *B. pilosicoli* showed significantly better weight gain and feed conversion when treated with Econor®.
- > In a Danish challenge study, no lesions of colitis or evidence of spirochaetal bacteria were seen in any pigs that received Econor.
- > In a UK challenge study, Econor-treated animals had far less diarrhoea than controls.
- > In a US study, the overall prevalence, severity and duration of diarrhoea was significantly reduced in pigs fed Econor compared to controls.

Results

> No lesions of colitis or evidence of spirochaetal bacteria were seen in any pigs in the Econor-treated group.

> In pigs that were challenged and unmedicated, mild clinical disease was seen in one pig 7 days after challenge and on necropsy, gross lesions of colitis were seen in two pigs; moderate to severe infiltration of the colonic mucosa by mononuclear cells was seen in six and spirochaetes were seen in silver-stained sections of one pig.

> In the unchallenged, non-infected control group, spirochaetes were seen in one pig and colitis was evident histologically in four.

regularly observed when weaner pigs were moved from outside to inside at about 8 weeks of age.

In this field trial, the heaviest and lightest pigs were excluded, then the 120 remaining animals were matched for weight and paired. One in each pair received Econor 1% premix at a rate of 25 ppm (1.25 mg/kg bodyweight) and the other received a placebo premix. The animals were housed in six pens with 20 pigs each. The presence of *B. pilosicoli* was confirmed at the start of the trial.

Feed consumption was recorded daily, and every 2 to 4 pigs were individually examined and rated for general appearance, general condition and faecal state using scores of 0 to 3, with 0 representing normal. Medication continued for 28 consecutive days.

Faecal samples were taken at the beginning and end of the medication period from pigs selected at random and when moderate or severe diarrhoea was observed. Sporadic cases of mild to moderate diarrhoea were recorded within a few days of the start of the trial.

Results

> Weight gain during the medication period was statistically significantly higher ($p < 0.02$) in the Econor group compared to controls (Table 1) and there was a corresponding increase in feed intake and improved feed conversion.

> The mean cumulative general condition score was 1.5 in the Econor group compared to 3.1 in the placebo group, a highly significant difference.

> The mean cumulative faecal score was 3.0 in the Econor group and 6.5 in the placebo group, a highly significant difference.

> Diarrhoea was successfully controlled by Econor.

Table 1

UK Field Prevention Study:
Weight Gain, Clinical Scores
and Feed Conversion

	Placebo (n = 59)	Econor (n = 60)	P-value
Mean daily weight gain day 0-28 (g)	365	429	0.0178
Mean cumulative general condition score (day 0-28)	3.1	1.5	0.0036
Mean cumulative faeces score (day 0-28)	6.5	3.0	0.0001
Feed conversion ratio (day 0-28)	2.167	2.026	

Researchers' observations: "The very high susceptibility of this organism to [Econor] and its complete suppression at the low dose of 25 ppm in feed (1 to 1.25 mg/kg bodyweight) is demonstrated in these studies. Benefits in terms of optimisation of weight gain and feed conversion efficiency may be expected in infected medicated animals."

UK Field-Prevention Study

Investigators in the UK evaluated the efficacy of Econor for preventing naturally occurring colitis uncomplicated by other enteric diseases.³ The trial farm was a specific-pathogen-free, or SPF, unit where swine dysentery or ileitis had not been isolated, but where clinical signs of colitis were

"Econor was highly effective in preventing clinical signs and weight gain impo

Researchers' observations: "Econor was highly effective in preventing clinical signs and weight gain impairment associated with porcine colonic spirochaetosis under field conditions."

UK Control Study

These investigators sought to demonstrate the efficacy of Econor for controlling of PCS with an experimental model of colonic spirochaetosis utilizing dietary alterations and artificial infection with a strain of *B. pilosicoli* taken from a PCS outbreak in the UK.⁴

First they demonstrated in recently weaned pigs that a diet high in soya and wheat provided the clearest difference between infected and uninfected animals in terms of disease severity. Mild chronic colitis was detected by histopathology. *B. pilosicoli* spread to unchallenged pigs, but colonisation occurred at a lower level.

In their efficacy study, pigs from 4 to 6 weeks of age from a minimum-disease herd were first acclimatised for one week on a soya/wheat diet. All pigs were artificially infected. One group of pigs received Econor 1% premix in feed at 25 ppm to achieve a dose rate of 1.25 mg/kg bodyweight starting two days after challenge and continuing for 27 days. The other group of pigs was unmedicated. Pigs were monitored for 29 days after challenge by faecal culture and clinical observation.

Results

> Only 1 of 36 animals in the Econor group excreted *B. pilosicoli*, compared to 32 of 35 in the unmedicated group (Table 2).

> Medicated pigs had much milder diarrhoea that lasted a mean of only 31 days, which was significantly less than the more severe diarrhoea in unmedicated animals that lasted a mean of 111 days.

Researchers' observations: "Medication with Econor at 25 ppm (1.25 mg/kg bodyweight of valnemulin) protected pigs from the effects of experimental infection with *B. pilosicoli*.

Medication reduced the severity of clinical signs by 65% and excretion by 97%, and resulted in improvements in average daily gain (ADG = 30% increase) and FCE (18% increase)."

US Study of PCS Control

Investigators in the US studied the ability of Econor to control *B. pilosicoli* using a pure culture challenge model.⁵ They began with 65 pigs 4 weeks of age that were selected based on uniform weight and health. One group was not challenged or medicated, one was challenged and nonmedicated and one group was challenged and received Econor.

Table 2

Econor Efficiency in Artificial Infection Study

	Econor	Unmedicated Control
Colonisation	1/36*	32/35
No. with diarrhoea	10/36	11/35
Days with diarrhoea	31	111
Diarrhoea score	0.19	0.54
ADG (kg/day)	0.61	0.47
FCE	0.67	0.57

*Number of pigs affected/total number of pigs

The pigs were kept in 13 pens and all were examined daily for diarrhoea, attitude, dehydration, weekly bodyweight and detection of spirochaetes in the faeces. Feed consumption was recorded by pen. Test diets were administered on day 13 after challenge, when the incidence of diarrhoea and positive cultures was 15% or greater.

The assayed level of Econor was 23.9 ppm, resulting in a calculated dosage of 1.32 mg/kg bodyweight. Medication continued for 14 days; the pigs were euthanised and examined for PCS lesions.

Results

> The overall prevalence, severity and duration of diarrhoea was significantly reduced in pigs fed Econor when compared with infected pigs fed a nonmedicated diet.

> The prevalence of infection in the Econor group was 0% on days 20 and 27 post-challenge, compared with 20% and 41.4%, respectively, in the challenged nonmedicated group.

> In pigs fed Econor, reduced clinical signs and elimination of spirochaetes as demonstrated by culture and immunohistochemical staining correlated with significantly lower lesion scores and less widespread colitis.

Researchers' observations: "The present study demonstrates that *B. pilosicoli* infection can be eliminated from pigs fed a diet containing Econor (valnemulin) for 14 days. The results of the present study strongly support the therapeutic use of Econor for control of porcine colonic spirochaetosis."

For more information on these studies, please contact your local Novartis Animal Health representative or Dr. Ulrich Klein at Ulrich.klein@ah.novartis.com.

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