

Denagard/Tiamutin Performance

Issue 8: Ileitis/Efficacy

Studies show Denagard®/Tiamutin® is highly effective against Ileitis in swine

KEY POINTS

- Porcine proliferative enteropathy (ileitis) is a serious disease of swine around the world, causing huge economic losses for pork producers.
- Denagard/Tiamutin (tiamulin), a pleuromutilin antibiotic, has been shown to be highly effective for the treatment and prevention of ileitis.
- Denagard/Tiamutin (tiamulin) also minimizes production losses due to ileitis.

Introduction

Ileitis, also known as porcine proliferative enteropathy, remains a widespread, serious and costly disease for pork producers around the world. One report estimates that the prevalence on swine farms is 100% in Taiwan, 96% in the United States and Czech Republic and 95% in Great Britain and Canada¹. Economic losses annually due to ileitis may be as high as €250 million in Western Europe alone².

The cause of ileitis, *Lawsonia intracellularis*, is an intracellular bacterium. It can affect pigs in various types of production schemes, including all-in/all-out systems and high-health herds.

Finishing pigs tend to be affected by an acute ileitis, which can cause severe, bloody diarrhoea and, sometimes, sudden death. Chronic ileitis usually affects pigs from 6 to 20 weeks old. The chronic form may or may not cause diarrhoea, but eats away at profits by impairing feed efficiency and daily gain.

Controlled trials show that the clinical signs of ileitis as well as production losses resulting from the disease can be controlled with administration of Denagard®/Tiamutin® (tiamulin) either in feed or in water.



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The right choice

High susceptibility to tiamulin

McOrist and Gebhart assessed the sensitivity of *L. intracellularis* isolates by determining minimum inhibitory concentration (MICs) for several antibiotics. They also determined the minimum bactericidal concentration (MBC) for selected antibiotics³. The MIC was defined as the lowest concentration that prevented multiplication of 99% of *L. intracellularis* isolates. The MBC was the lowest concentration where use of a 'pulse' antibiotic treatment stopped the growth of *L. intracellularis*.

Up to three isolates of *L. intracellularis* were used to test each antibiotic and both intracellular and extracellular testing was conducted. Tiamulin, the active ingredient in Denagard/Tiamutin, had a low MIC of 4 mcg/ml. Tiamulin also had a MBC of <2 mcg/ml, compared to 4 mcg/ml for tylosin.

McOrist and colleagues subsequently reported on additional in vitro testing of tiamulin, which confirmed the drug's MIC was again a low 4 mcg /ml when tested against *L. intracellularis*⁴.

In one report, McOrist and colleagues explain that pleuromutilins such as tiamulin are a type of antibiotic that act by selectively blocking ribosome protein synthesis. The drugs are thought to localize in the cytosolic compartment of exposed cells, where *L. intracellularis* is found⁵.

Further evidence that Denagard/Tiamutin penetrates the necessary cells to control infection is apparent from yet another report issued in 2002⁶. In the study, tiamulin uptake was evaluated and compared to that of norfloxacin, which is known to penetrate human polymorphonuclear leukocytes (PMN) and to produce intracellular concentrations several times higher than extracellular concentrations. Nielsen concluded that once accumulated, "tiamulin remains intracellularly active and participates in the protection of bacterial infection."

British field trials

Denagard/Tiamutin has been shown to be effective in the field as well as in the lab. McOrist and colleagues reported on an ileitis control program conducted on British farms⁷. Faeces samples were monitored monthly for 6 consecutive months with an *L. intracellularis*-specific polymerase chain reaction (PCR). "On one farm with 150 sows, an outbreak of acute proliferative enteropathy in boars and gilts was controlled clinically by the use of tiamulin and chlortetracycline," the investigators say.

The field trial corroborated experimental work published by McOrist and colleagues, who showed that in weaner pigs artificially infected with *L. intracellularis*, treatment with Denagard/Tiamutin in feed was effective for both treatment and prevention of ileitis⁸.

"It was found that continuous oral medication with 50 ppm tiamulin in the feed could prevent pigs challenged with pathogenic *L. intracellularis* from developing ileitis. A therapeutic effect was also evident when 150 ppm tiamulin was given orally to pigs 7 days after the challenge, indicating that tiamulin could treat the disease," the investigators write.

They also say that the markedly higher growth rate of pigs receiving 50 ppm tiamulin for 2 days before challenge could indicate a useful economic benefit from the use of this antibiotic.

US In-feed trial

The effectiveness of in-feed Denagard/Tiamutin was evaluated by Walter and colleagues in a US study of 48 healthy pigs that were 5 weeks of age and weighed approximately 22 kg⁹. All pigs were challenged with *L. intracellularis*, then once the symptoms of ileitis became evident, they received either Denagard/Tiamutin at the rate of 38.5 ppm for 4 weeks or they served as controls and received no treatment. All pigs were monitored for 28 days and were examined upon necropsy at 37 days after infection.

Among pigs treated with Denagard/Tiamutin, evidence of gross lesions were found in only 4%, evidence of microscopic lesions were found in only 9% and 0% had *L. intracellularis* shedding. In contrast, 33% of the untreated controls had gross lesions, 33% had microscopic lesions and 17% had shedding of *L. intracellularis*.

In addition, average daily gain and feed consumption were significantly improved in the Denagard/Tiamutin treatment group, as shown in Table 1.

Table 1. Body weight and feed consumption was better in the Denagard/Tiamutin-treated groups compared to untreated controls.

	Control	Denagard/Tiamutin	p-value
Daily gain (g)	409	528 (+29%)	0.007
Feed intake (kg)	0.760	0.840	0.029
Gain/Feed	0.540	0.631 (+17%)	0.010

The investigators concluded that Denagard/Tiamutin administered in feed effectively controls the clinical, pathological and negative productivity effects of ileitis in weaned pigs at a dose level of 38.5 ppm.

US In-water trial

In a similar study conducted by Walter and colleagues to test the effectiveness of Denagard/Tiamutin administered in water for controlling ileitis, 48 healthy pigs age 6 weeks and all weighing about 22 kg were challenged with *L. intracellularis*¹⁰.

After the symptoms of ileitis became apparent, the pigs received either Denagard/Tiamutin at the rate of 60 ppm for 5 consecutive days or they received no medication and served as controls. All pigs were monitored for 15 days and were examined upon necropsy at 23 days after infection.

In the treated pigs, only 12% had evidence of gross lesions, 21% had evidence of microscopic lesions and 12% had evidence of *L. intracellularis* shedding. Among the control group, 58% had evidence of gross lesions, 92% had microscopic lesions and 71% had shedding of the organism.

As shown in Table 2, average individual body weight and average feed consumption was better in the pigs that were treated with Denagard/Tiamutin compared to controls.

The investigators concluded that Denagard/Tiamutin administered in water effectively controls the clinical, pathological and negative productivity effects of ileitis in growers at a dose level of 60.0 ppm.

Table 2. Pigs treated with Denagard/Tiamutin had better average daily gain and better feed consumption than untreated pigs.

	Controls	Denagard/Tiamutin	p-value
Daily gain (g)	510	641 (+26%)	0.007
Gain/Feed	0.528	0.633 (+19.9%)	0.010

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Conclusion

Detailed experimental studies as well as field trials demonstrate that Denagard/Tiamutin is highly effective for the control of ileitis, a serious and costly problem in swine around the world.

Denagard/Tiamutin not only controls the clinical signs of ileitis, it minimizes the adverse effects on productivity due to ileitis.

References

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