Document summary:

Campylobacter hepaticus and Spotty Liver Disease

Spotty Liver Disease (SLD) is a serious condition that leads to an increase in mortality and reduced egg production in longer-lived egg laying hens and meat chicken breeders. The disease is caused by the bacteria *Campylobacter hepaticus* (*C. hepaticus*) and, although hens are able to recover from the disease with antibiotic treatment, the prevention or minimisation of the impacts of SLD in laying hens is a priority to reducing the associated mortality and productivity losses. It is hypothesised that changes in the intestinal health/microbiota balance of hens allow a multiplication of *C. hepaticus* and the production of a toxin that causes the symptoms of the disease, such as liver lesions. Therefore, it is possible that some feed additives may have an impact on the incidence and severity of the disease through activity on the microbiota or via direct antibacterial properties in the case of plant extracts.

Under controlled conditions, none of the feed additives were able to significantly reduce disease

The outcomes of the controlled challenge studies are listed in Table 1, which describes the number of hens with (positive) and without (negative) SLD lesions in the liver. It also includes a "Disease Reduction Index" (DRI), which compares the incidence of disease for a particular feed additive treatment group compared with the disease incidence in the positive control group used for that study. The DRI is a percentage of the difference between the treated and control group so can be a negative value. No statistically significant differences were observed between the positive controls and feed additive groups. All liver sections from lesion positive birds had histological evidence of SLD.

Table 1. Grossly visible SLD lesions in the study birds#

Treatment	% SLD lesions in treated group	% SLD lesions in control group	Disease Reduction Index*
Organic acid/MCFA	100.0	91.7	-9.1
Novel botanical 1**	50.0	75.0	33.3
Oregano product	93.8	87.5	-7.1
Novel botanical 2**	50.0	75.0	33.3
Yeast based prebiotic	93.8	87.5	-7.1
Oregano plus prebiotic##	81.25	87.5	7.1

No differences were significantly different (P>0.05).

* Disease Reduction Index represents the difference between the treated and the positive control groups.

** These ingredients are not available commercially in Australia but are based on traditional Chinese herbal extracts from *Phellodendron chinense* and *Eriobotrya japonica.*

A combination of an extract of the genus *Origanum*, and a *Saccharomyces* spp.

Some effect (considered equivalent to antibiotic treatment) was demonstrated on-farm

Two field studies were conducted to assess the impact that antibiotic-alternatives have on reducing the severity of SLD outbreak.

A shed with a history of SLD was chosen to compare the impact of the disease on production and mortality rates between previous years when antibiotic treatment and prevention were required, and the use of an oregano and sanguinarine combination in-feed in the most recent flock performed during this study. Overall, the weekly % mortality between weeks 22 and 35 averaged 0.148, 0.062 and 0.061% for years 1, 2 and 3 respectively. There was a statistically significant difference between the first year and all subsequent years analysed ($P<0.05$).

In the second study as retrospective analysis was undertaken. The occurrence of SLD was confirmed on a farm with four sheds that had flocks of similar ages and were treated with two different additives. The two sheds treated with a *Bacillus* based probiotic experienced outbreaks of SLD, whereas the sheds that had been treated with medium chain fatty acids and monosaccharides progressed throughout the batch with no clinical signs of SLD.

Prevention is more cost effective than treatment

Prevention or minimisation of the severity of SLD is a priority to reducing the associated mortality and productivity losses, rather than treating with antibiotics after the disease outbreak has already caused mortality and productivity losses. The advantage of feed additives include, a reduction in the necessity to treat or to prevent SLD with antibiotics, a reduction in overall mortality caused by an outbreak during the most common period of disease (up to 35 weeks), and a trend towards reducing the negative production impact of SLD. Usually, the benefits of most feed additives are considered to be greatest when an animals' health is suffering, which means that these additives may also have positive impacts in relation to minimising the severity of gut diseases and improving the general health of the hen.

This project found that under controlled, laboratory conditions, none of the feed additives were able to significantly reduce the occurrence of SLD. However, under on-farm conditions, some effect equivalent to antibiotic treatment was observed when using oregano and sanguinarine based products, such as reductions in the necessity to treat with antibiotics, overall mortality during the disease outbreak and impact on production. The results of this study suggest that more work is required to better understand SLD and the benefits that some feed additives may have in reducing the impact of disease.

Further information

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