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Attempt to Reduce Salmonella Contamination in a Commercial Turkey Flock with Feed Additive Premixes

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Summary

A water-soluble probiotic preparation with vitamin feed additive premix (Bactovit P) and a feed additive premix containing volatile oils (Turkey premix 10'), effective in vitro against *Salmonella*, were tested for reducing or preventing *Salmonella* contamination during the growing period of turkey production. Twenty thousand day-old turkey poults (sex ratio of 1: 1) being free from *Salmonella* were randomly assigned to a control (untreated) group and a treated group that received 1 kg Turkey Premix 10' per ton ration for 42 days plus 0.15 g Bactovit P per kg BW in the drinking water on arrival and then at seven-day intervals. Composite faecal samples were taken from both groups per sex at weekly intervals and the population of *Salmonella* spp. enumerated using the Most Probable Number (MPN) method. The flock management data (number of animals, body weights, mortality and medications) were recorded by the farm. The feed additive premixes delayed initially the development of *Salmonella* infection of poults and reduced its level compared to the controls' till week 4 to 5 in females and males, respectively. Thenceforward this effect discontinued. Of l4 faecal samples from the control and treated group each, 14 vs. 10 samples were *Salmonella* positive. The most frequent serovars was *S. Bredney.* The mortality rate was lower for the treated turkeys compared to the controls'. No appreciable improving or worsening was found between the control and experimental groups in the growth rate.

Additional improvement of the products and their application seems reasonable to increase the persistency of their effect through the entire 6-week growing period.

Introduction

Salmonellosis is one of the most important food-born diseases and causes substantial medical and economical burdens worldwide. The main food sources of infections by *Salmonella* are poultry meat and eggs. Thus, a number of actions have been taken to reduce the prevalence of *Salmonella* serovars with public health significance in food-producing animals. Since 2003, all members of the European Union have to put into practice monitoring programs to control these pathogens (European Parliament and European Council, 2003).

Salmonellae are carried within the gut of the birds and contaminate the environment by shedding from infected birds through the faeces, feather dust and eye secretions. In the past, antibiotics seemed an effective way of preventing *Salmonella* contamination. Antibiotic growth promoters have improved the performance and health status of poultry via their action on the intestinal micro-flora. However the ban on animal feed antibiotics in 2005 has led to a demand for alternatives to antibiotics. Possible non-therapeutic alternatives to antibiotics for poultry may be the ones which work via similar mechanisms, promoting growth while enhancing the efficacy of feed conversion Hughes P. and Heritage J. (2003). Such as are organic acids – exerting antimicrobial action through bowel pH depression; enzymes – improving ileac digestibility thereby indirectly overloading the mikroflora; probiotics – improving health and growth by altering intestinal microbial balance; prebiotics – selectively stimulating the growth or metabolic activity of a limited number of intestinal mikroflora; herbs & ether oils – antimicrobial agents by stimulating the endogenous digestive enzymes and immunostimulants – improving the immune system of the bird and enhancing the

resistance to disease (Reddy, 2004). The other method of Salmonella control is litter amendment with inorganic acidifiers.
The purpose of this study was to evaluate the efficacy of two candidate feed additives for reducing *Salmonella* contamination in a turkey flock being free of Salmonella at the early age.

Materials and Methods

Feed additives tested
Bactovit P (Pharmatéka Bt.): It is a water soluble probiotic (Lactic acid bacteria) preparation with vitamin feed additive premix. The application of the probiotic relives stress, enhances the immune system and inhibits the proliferation of harmful bacteria. It is used for preventive purposes.
Dosage: 0.15 g per kg BW, dissolved in daily amount and given drinking water, once a week.
Turkey Premix No.10 (Pharmatéka Bt.): It is a feed additive premix containing a mixture of volatile oils (Origanum vulgare, Thyme oil and Castanea sativa mill). Technological additive: Emulsion (E484), Carbovet. Dosage: mixed in the feed at a rate of 1 kg per ton feed (i.e. in a concentration of 0.1%)

Experimental design
The feeding trial was conducted in a partner farm of Pharmatéka Bt. in 2012. Twenty thousand day-old turkey poults (sex ratio = 1:1) were randomly assigned to a control (untreated) group and a treated group and housed separately in two henneries partitioned into two for isolating the sexes. The bedding material was fresh straw spread daily over the deep litter. Poults received the same turkey starter feed and drinking water *ad libitum*. The experimental group received 1 kg Turkey Premix No.10 per ton feed for 42 days plus 0.15 g Bactovit P per kg BW in the drinking water on arrival and then at seven-day intervals.

Samplings and data collection
Fresh faecal samples were collected across the entire hennery at weekly intervals, placed in 200 ml sterile plastic cups and covered. Two-two cups of composite faecal samples were prepared by treatment and sex, totalling 7 cups on each occasion. The faecal samples were examined for *Salmonella* prevalence in an accredited Laboratory.
Flock management data (number of animals, body weights, mortality and medications) were recorded by the farm.

Results and discussion

Faecal samples from control poults were positive for *Salmonella* already at the of the first week, whilst the samples from treated poults became positive by the end of the first (females) to third week (males), but the level of infections was just above the minimum detectable level and it remained low by the end till week 4 to 5 in females and males, respectively, compared to the controls. However this between-group difference disappeared by the end of the sixth week. All the 14 faecal samples collected from the control group were positive for *Salmonella* spp.; while of 14 faecal samples from the treated group four (28.6%) were negative and ten (71.4%) were positive (Table 1). The most frequent serovars were *S. Bredney*, and in one or two samples *S. Tenesse* and *S. Newport.*

Table 1.

MPN and prevalence of *Salmonella* species in faecal samples collected from treated and control groups

Sampling (Date)	Sample	Salmonella			
		Present/absent	Serotype	MPN cell/g	Serotype
Week 1 (08.05)	Control male	Positive	S. Bredney*	<3.0	
	Treated male	Negative		<3.0	
	Control female	Positive	S. Bredney	200.0	S. Newport
	Treated female	Negative		<3.0	
Week 2 (15.05)	Control male	Positive	S.O:4(B) serogroup	90.0	S. Bredney
	Treated male	Negative		<3.0	
	Control female	Positive	S. Bredney	<3.0	
	Treated female	Positive	S. Bredney	<3.0	
Week 3 (22.05)	Control male	Positive	S. Bredney	200.0	S. Bredney
	Treated male	Negative		<3.0	
	Control female	Positive	S. Bredney	21.0	S. Bredney
	Treated female	Positive	S. Bredney	<3.0	
Week 45 (29.05)	Control male	Positive	S. Bredney	4.0	S. Bredney
	Treated male	Positive	S. Bredney	<3.0	
	Control female	Positive	S.O:4(B) serogroup	40.0	S.O:4(B) serogroup
	Treated female	Positive	S. Bredney	<3.0	
Week 5 (05.06)	Control male	Positive	S. Bredney	1 100.0	S. Newport
	Treated male	Positive	S. Newport	<3.0	
	Control female	Positive	S.O:4(B) serogroup	>11000	S.O:4(B) serogroup H1,7 mono-phase
	Treated female	Positive	S.O:4(B) serogroup	>11000	S.O:4(B) serogroup H1,7 mono-phase
Week 6 (12.06)	Control male	Positive	S. Bredney	1 100.0	S. Newport
	Treated male	Positive	S.O:4(B) serogroup	1 100.0	S. Bredney
	Control female	Positive	S. Tenesse	200.0	S. Tenesse
	Treated female	Positive	S. Bredney	90.0	S. Bredney

The mortality rate for treated male and female poults was lower compared to the controls' (Figs. 1-3).

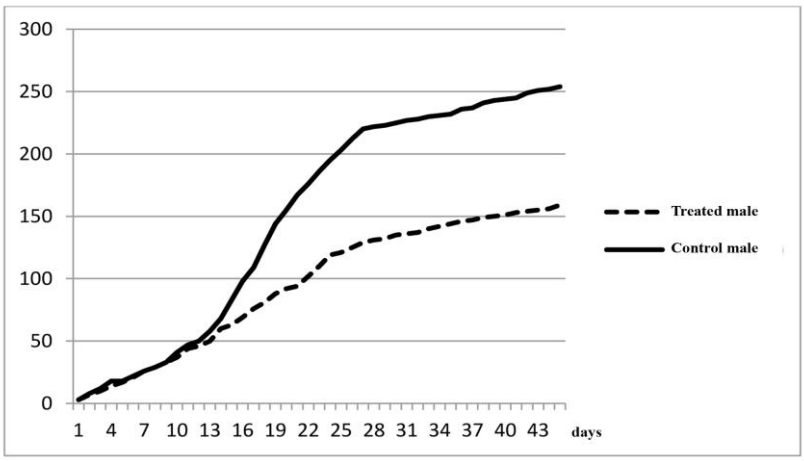

Fig.1.

Mortality rate for males in the treated and control groups

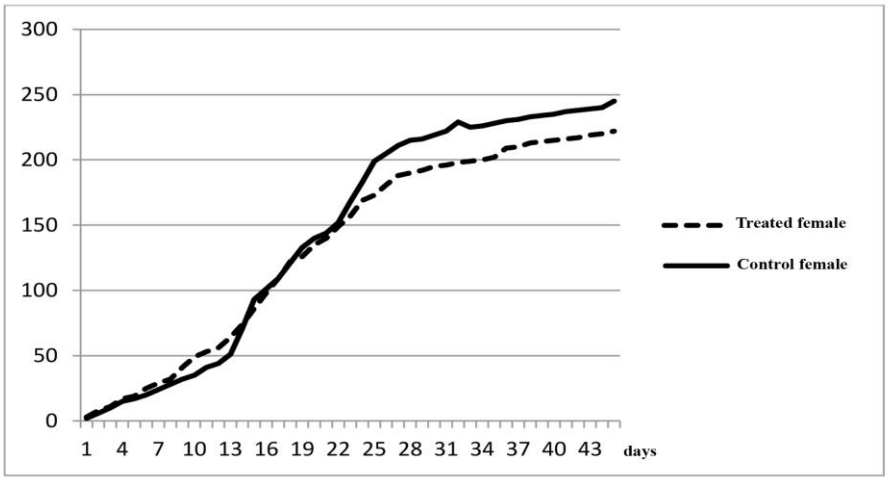

Fig. 2.

Mortality rate for females in the treated and control groups

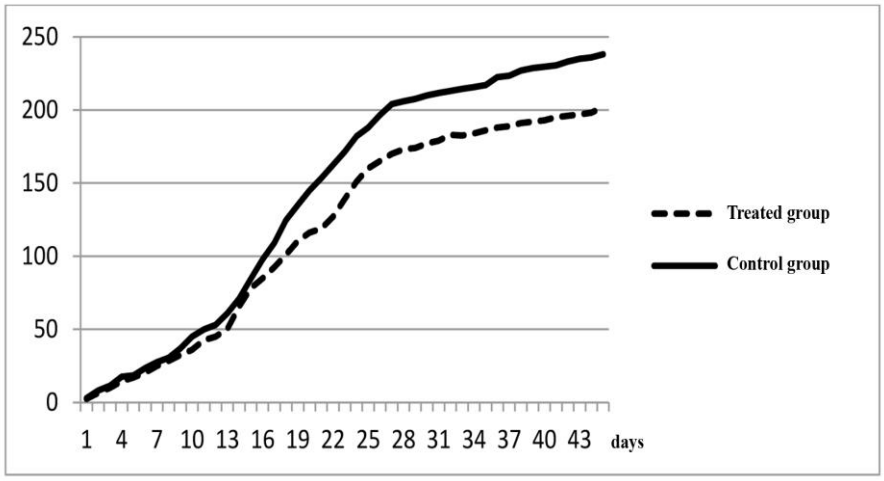

Fig. 3.

Average of mortality rates for the treated and control groups

The growth rate of poults was unaffected by the feed additives, the body weight curves for the control and Treated groups differed little (Figs. 4-6).

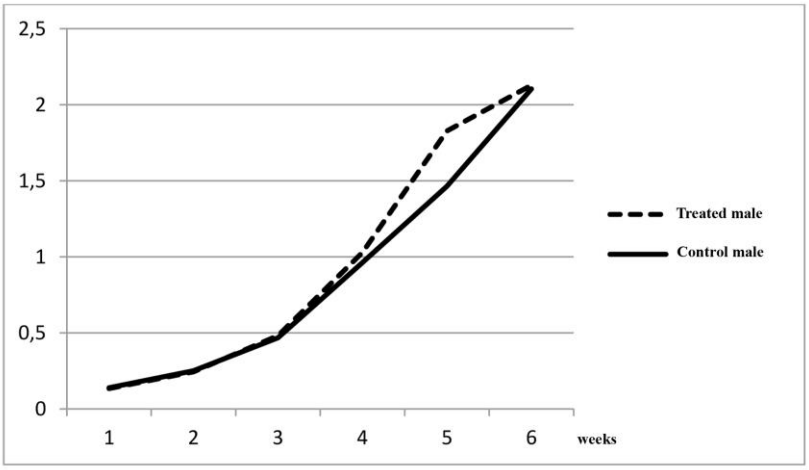

Fig. 4.

Body weight curves for males in the treated and control groups

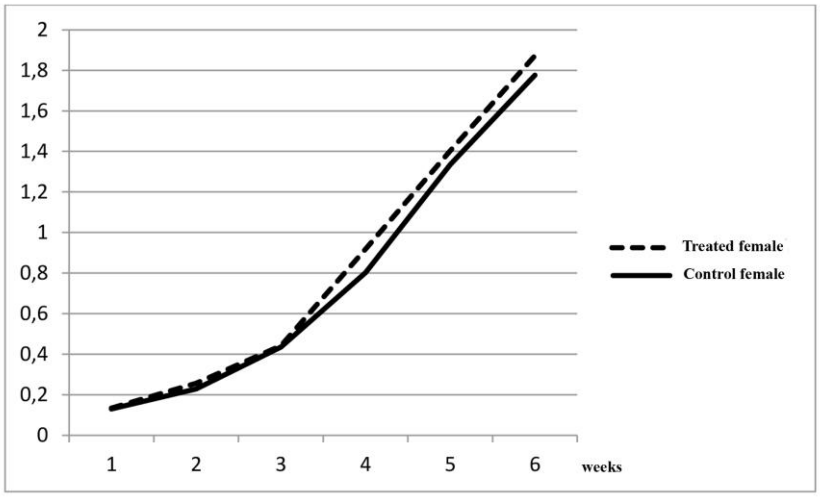

Fig. 5.

Body weight curves for females in the treated and control groups

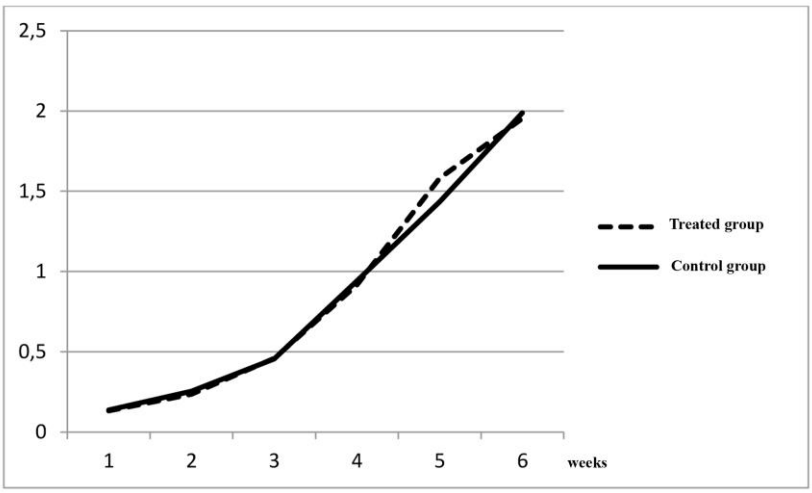

Fig. 6.

Average body weight curves for the treated and control groups

Conclusion

Many candidate feed additives have been described in literature but there is still much uncertainty about their effect *in vivo*, about the persistency of their effect, and the potential interaction between different additives (Wageningen UR, 2012). This is true for our experiment presented here. In light of the results, the dietary inclusion of the two feed additive premixes appears a promising approach to reduce *Salmonella* contamination in turkey poults. However, additional improvement of the products and their application is desirable to increase the persistency of their effect through the entire growing period.

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Acknowledgements

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