

PREVENTATIVE TREATMENTS

EFFICIENCY OF PROBIOTICS, PREBIOTICS AND SYNBIOTICS ON WEIGHT INCREASE OF CHICKENS (*GALLUS DOMESTICUS*)

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Preventing *Salmonella* contamination of poultry and poultry products remains a major challenge. With increasing concerns regarding antibiotics use in animals, probiotics [also called competitive exclusion bacteria (CE) in animals], prebiotics and synbiotics, which are natural and environmental friendly, are attracting greater attention. The use of probiotics to reduce *Salmonella* infection of poultry was first applied in 1973. At that time, it was determined that in newly hatched chicks, the rapid establishment of an adult-type intestinal microflora, by administration of an undefined culture of cecal microorganisms via the oral route, was protective against colonization by *Salmonella*. Since then, the protective effect of indigenous intestinal microflora against *Salmonella* colonization in young chicks has been confirmed by many studies. In previous research, the effect of four suspensions of hen caecal content diets supplemented with 2.5% D-mannose, 2.5% mannose-oligosacchiride, 2.5% palm kernel meal or unsupplemented mash have been compared. Results revealed that feeding caecal content diets supplemented with 2.5% mannose-oligosacchiride or 2.5% palm kernel meal were more effective against *S. Enteritidis* colonization in chicks than feeding caecal content diets alone. In another study, it has been reported that addition of 4g fructooligosaccharide/kg to chick feed enhanced the growth of *Bifidobacterium* spp. and *Lactobacillus* spp., but inhibited *E. coli* in the small intestine and the cecum. Our previous research also revealed that probiotics were effective in reducing *Salmonella* colonization of chickens. The question remains, do probiotics, prebiotics and synbiotics affect body weight gains of chickens? The objective of this study was to determine the effect of feeding probiotic bacteria, prebiotics, and synbiotics on weight gain of chickens.

Three trials have been completed by now. In all trials, day-of-hatch Ross x Ross chicks was used. Each treatment had 20 chicks. Two probiotic bacteria (CE) cocktails were tested. CE 1 was composed of Salm-9, List40-18 and List40-41 (all *Lactobacillus salivarius*); CE 2 was CE1 plus List40-13 (*Streptococcus cristatus*). Two prebiotics [fructooligosaccharide (FOS) and lactose] were mixed into chicken feed at 2.5% throughout the entire trials for prebiotic and synbiotic treatments. Chicks at 3 days old were challenged perorally with *Salmonella* Typhimurium (resistant to nalidixic acid) at 10^6 CFU/chick. In Trials 1 and 2, probiotic bacteria were administered to day-of-hatch chicks at 10^8 CFU/chick perorally. Body weight was determined at 26 days (Trial 1), and 12 and 19 days (Trial 2). In Trial 3, probiotic bacteria were added to drinking water (final concentration 10^6 CFU/ml) for the first week except day 3. Body weight was determined at 9 and 15 days.

In Trial 1, probiotics treatments CE 1 and CE 2, synbiotics treatment CE 2 plus FOS, and prebiotics lactose significantly ($\alpha = 0.05$) increased body weight by 83.0 to 100.5 g/chick at 26 days compared to controls. Although other prebiotics and synbiotics treatments also increased chicken body weight by 32.6 g/chick or more, this was not statistically different from the control group.

In Trial 2, synbiotics CE 2 plus lactose and prebiotics CE 2 significantly ($\alpha = 0.05$) increased body weight by 25.6 to 27.7 g/chick at 12 days; whereas synbiotics CE 1 plus lactose significantly increased body weight by 42.3 g/chick at 19 days. All other treatments at both 12 and 19 days had slightly higher body weights than controls except for two treatments (lactose only and CE 2 plus FOS at 19 days), which were 1.69 and 0.84g/chick lighter than controls, respectively.

In Trial 3, at 9 days of age all treatments except for lactose only increased body weight significantly; however, there was no significant difference between treatments and control in body weight at 15 days, although chickens in all treatment groups except one had heavier body weights than controls.

In conclusion, some probiotics or synbiotics were effective in increasing the body weight of chickens. Prebiotics alone (FOS or lactose) did not consistently affect body weight gain of chickens. The probiotics and synbiotics studied could be used to increase weight gain of chickens. Additional studies are needed to determine the influence of these probiotics and synbiotics on weight gain of broilers in commercial operations throughout their growing cycle.