

Salmonella control in poultry housings with probiotics

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Salmonellosis is one of the most important foodborne illnesses. Although serovars that cause human disease are commonly found on all kinds of food products, poultry is still considered as the major source. Salmonella spp. are natural members of the chicken intestinal flora and can threaten food safety if they grow uncontrolled.

Methods

The habitats where Salmonella spp. grow are chicken intestine and bedding. With effective monitoring and control programs, the danger of Salmonella can be reduced. Prevalence studies in broiler have shown a reduction of Salmonella-positive values: EU: 2006-23.7% to 2016-2.6%; USA: 2008-15% to 2014-9%. Turkey: 2015-32.6% to 2017-34.7.

Several methods for the control of Salmonella are used: sanitization of feed with heat treatment (pelleting), vaccines, antibiotics, biocidal chemicals, prebiotics and probiotics. In this study, a probiotic Bacillus subtilis strain isolated by Simbiyotek A.Ş. was used. 1 L, at least 2×10^9 CFU / g Bacillus subtilis spore formulation was diluted with 10 L water and sprayed on approximately 500 m² area.

Samples taken from the bedding were divided into small pieces and put into a buffer solution. After mixing in shaker, appropriate dilutions were made and spread on media. For live cell counts the media PCA for bacteria, and PDA for fungi were used. Salmonella analysis in bedding samples and drag swabs. was carried out according to the method of BAM 2002, 2007. The acidity of 1 g sample added into 10 mL water was determined by titration with of 1 N NaOH, up to pH 8.5.

Results

Oxygen-free zones in the bedding provide a suitable environment for propagation of pathogens. Experiments were carried out with bedding material without litter. Control samples had fungi counts about 10-fold and bacterial counts 2-fold higher than B.subtilis-treated-samples. B.subtilis suppresses fungi and other bacteria in anaerobic environment.

Farm trials were carried out in Adapazarı region.

2008-December

B.subtilis sprayed on bedding only once before the chicks entered (day 0), control sprayed with water. Bedding samples taken on the 7th and 21st days after application.

B.subtilis-day-7-sample: bacteria and fungi counts are lower and Salmonella-negative. Day-7-control-sample: Salmonella-positive. On day 21 both samples Salmonella-positive.

B.subtilis can suppress other microorganisms, but because of continuous addition of fresh litter on to the bedding, the pathogens could dominate the environment again. So it will be

recommended to repeat spraying every 7-10 days.

In 2016, a 4 period trial was carried out on a farm with 3 poultry housings.

2016-13.week:

One of the three housings (28,900 broilers) is Salmonella positive (drag swab) after disinfection. *B.subtilis* sprayed on bedding at days 0, 7, 14, 21, 28 and 35. No antibiotics were used except the first week. Probiotics given with drinking water: 0- 2 days *Pediococcus acidilactici* and *B.subtilis* from day 21 up to slaughter.

RESULT: all samples of days 7, 14, 35 and 41 are Salmonella-negative

2016-22. week:

3 housings (12 9600 broilers) sprayed with *B. subtilis* on days 0, 7, 14, 21; *P.acidilactici* for 3 days with drinking water after antibiotic application in the first week.

Result: all 35th day and slaughterhouse samples Salmonella-negative.

2016-31. week:

Same application in 3 housings (131000 broilers). Result: all Salmonella-negative at the end of the period.

2016-41. week:

3 housings (125840 broilers) without any probiotic application. Although all of the chicks were Salmonella-negative at the beginning, all housings were found Salmonella-positive at the end of the period.

Discussion

Probiotic bacterium, *Bacillus subtilis*, applied on bedding can suppress *Salmonellae* so that drag swab samples are Salmonella-negative. With probiotic use in poultry breeding, Salmonella can be controlled, food safety can be ensured, a high quality and economical production can be achieved.

Keywords: Salmonella control, probiotics, *Bacillus subtilis*, bedding applications