

**A MICROBIOLOGICAL STUDY OF  
POULTRY FEEDS MARKETED IN SRI  
LANKA**

**BY**

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## ABSTRACT

A poultry feed is a ration designed to furnish the nutrients needed by poultry to grow and lay eggs that is for commercial broilers and layers respectively. According to literature the major problems associated with poultry feed are bacteria and fungi. In the case of bacteria special emphasis was given to *Salmonella*, which has a zoonotic importance. Fungi can cause diseases (e.g. Aspergillosis) and toxicoses (e.g. Aflatoxicosis) in poultry.

Five samples from each feed type of each feed brand were examined to detect the microbiological quality.

The overall objectives of the research project were a) enumeration and identification of bacteria present in poultry feed, b) identification of health hazards associated with poultry feed, especially *Salmonella*, c) identification of the types of fungi in poultry feed up to the species level and d) investigation of aflatoxin levels of the poultry feeds in the market to identify potential health hazards.

A total of 80 samples from the various brands of poultry feed were subjected to the total viable count and detection of *Salmonella* using the method specified in the Sri Lankan Standard. Hundred samples (A- 40, B-20, C-20, and D- 20) were analyzed for the presence of *Salmonella*. The isolates obtained were identified up to species level using the methods described in Bergey's manual. Isolates of *Salmonella* were confirmed by the agglutination tests in the *Salmonella* polyvalent antiserum. Yeast and mould count of all samples were detected using potato dextrose agar and identification of species were carried out by studying the morphology in slide cultures.

Ten samples of poultry feed (A- 4,B-2,C-2,D- 2) were analyzed for aflatoxin B<sub>1</sub>, B<sub>2</sub>, G<sub>1</sub> and G<sub>2</sub>, using Thin Layer Chromatography (TLC) according to the AOAC official method 993.17, Aflatoxins in corn and peanuts.

The mean total viable counts in broiler starter feeds A, B, C and D broiler starter feeds were  $51 \times 10^4$  cfu/g,  $61 \times 10^3$  cfu/g,  $88 \times 10^3$  cfu/g and  $75 \times 10^3$  cfu/g respectively. In broiler finisher it was  $38 \times 10^2$  cfu/g,  $62 \times 10^5$  cfu/g,  $22 \times 10^3$  cfu/g and  $51 \times 10^3$  cfu/g. For chick starter feed the mean counts were  $25 \times 10^3$  cfu/g,  $87 \times 10^2$  cfu/g,  $12 \times 10^4$  cfu/g and  $86 \times 10^2$  cfu/g whereas in layer crumbles the counts were  $70 \times 10^2$  cfu/g,  $13 \times 10^3$  cfu/g,  $55 \times 10^3$  cfu/g and  $13 \times 10^4$  cfu/g respectively.

The bacteria isolated and identified belonged to the genus *Bacillus*. Identification up to species level revealed that the bacterial species were *Bacillus laterosporus*, *Bacillus pumilus*, *Bacillus badius*, *Bacillus licheniformis*, *Bacillus megaterium* type B and *Bacillus megaterium* type D.

According to the literature these bacterial species do not have any clinical importance and are not causative organisms of any disease in poultry.

Only four samples (A-2, B-1, C-1) out of the total 100 samples were contaminated with *Salmonella*.

The mean yeast and mold counts in A, B, C and D broiler starter feeds were  $14 \times 10^3$  cfu/g,  $16 \times 10^4$  cfu/g,  $63 \times 10^3$  cfu/g and  $86 \times 10^2$  cfu/g respectively. In broiler finisher  $15 \times 10^3$  cfu/g,  $45 \times 10^3$  cfu/g,  $42 \times 10^3$  cfu/g and  $12 \times 10^3$  cfu/g. For chick starter feed the mean counts in A, B, C and D were  $24 \times 10^2$  cfu/g,  $15 \times 10^4$  cfu/g,  $20 \times 10^4$  cfu/g and  $22 \times 10^2$  cfu/g whereas in layer crumbles the counts were  $15 \times 10^4$  cfu/g,  $6 \times 10^1$  cfu/g,  $80 \times 10^4$  cfu/g and  $13 \times 10^4$  cfu/g respectively.

The isolated and identified moulds from the poultry feed were *Aspergillus fumigatus*, *Aspergillus flavus*, *Penicillium oxalicum*, *Penicillium funiculosum*, *Geotrichum candidum*, *Cladosporium herbarum* and *Mucor racemosus*.

There were 36 samples, (A-8, B-11, C-9 and D-8) which contained *Aspergillus fumigatus* and *Aspergillus flavus*. There were 6 samples, which contained *Aspergillus flavus*.

The 10 samples of feed tested for aflatoxins, were negative for aflatoxin B<sub>1</sub>, B<sub>2</sub>, G<sub>1</sub> and G<sub>2</sub>.

It is evident from the results of the present study that some types of feed contained very high bacterial and fungal counts. As for mean yeast and mould counts, almost all the feeds exceeded the specified levels of EU standards. The feeds contained *Aspergillus fumigatus* and *Aspergillus flavus*, which can be the causative organisms of Aspergillosis in poultry. Some samples contained *Aspergillus flavus*, which can probably be toxigenic.

According to the results the final conclusions of the study were, there is a risk due to contamination of feed by *Salmonella* and fungal species and subsequent infection of poultry flocks. Aflatoxins were not present in the 10 feed samples tested.