

# Influence of supplementation of *Lactobacillus* and *Saccharomyces* on growth performance, blood profile, cholesterol contents and metagenomic analysis in broilers



Subrota Hati<sup>1</sup>, Krupali Ramanuj\*<sup>1</sup>, Bethsheba Basaiawmoit<sup>2</sup>, Sreeja V<sup>1</sup>, B.K. Mishra<sup>2</sup>

<sup>1</sup>Dairy Microbiology Department, S.M.C. College of Dairy Science, Kamdhenu University, Anand-388 110, Gujarat, India.

<sup>2</sup>Department of Rural Development and Agricultural Production, North-Eastern Hill University, Tura Campus, Meghalaya- 794 001

\*Corresponding author: [krupali09@yahoo.com](mailto:krupali09@yahoo.com)

## Introduction

- Considering the worldwide pressure from consumers, the scientific community and international regulatory agencies, to remove or decrease the use of antibiotics as performance enhancers and the rational use of the therapeutic form in poultry production, maintenance and taking food safety into consideration has been a challenge (Bonato and Borges, 2019).
- The feed supplementing lactic acid bacteria with antimicrobial activity, non-toxic to the host and survival to the intestinal barrier and promoting the host could be an alternative to replace conventional antibiotics as growth promoting substances (Park and Kim, 2015).
- Lactobacillus* strains have a high ability to attach to the intestinal epithelium and are able to establish in the chicken intestine within a day after hatching, so they are considered to be normal bacterial flora of the gastrointestinal tract (GIT) of chickens (Shokryzdan et al., 2016).
- Use of LAB as feed additives to replace antibiotic-associated growth stimulator and their effect on the quality of the meat and eggs is the major area of research (Kizerwetter-Swida et al., 2005).
- Here, efficacy of two indigenous cultures: *L. fermentum* KGL4 and *S. cerevisiae* WBS2A as a growth stimulant and their cholesterol-lowering potential on broilers is studied.

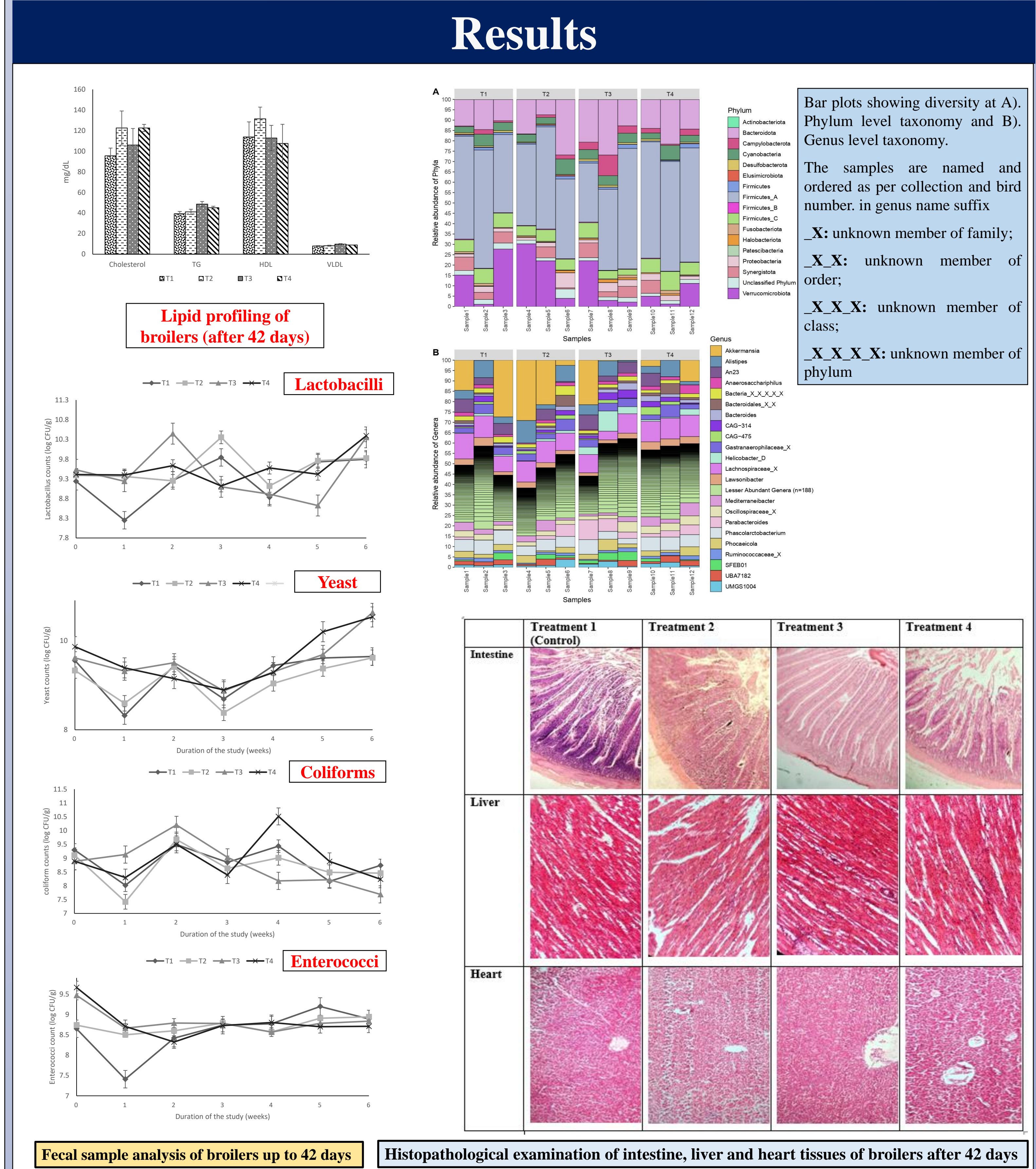
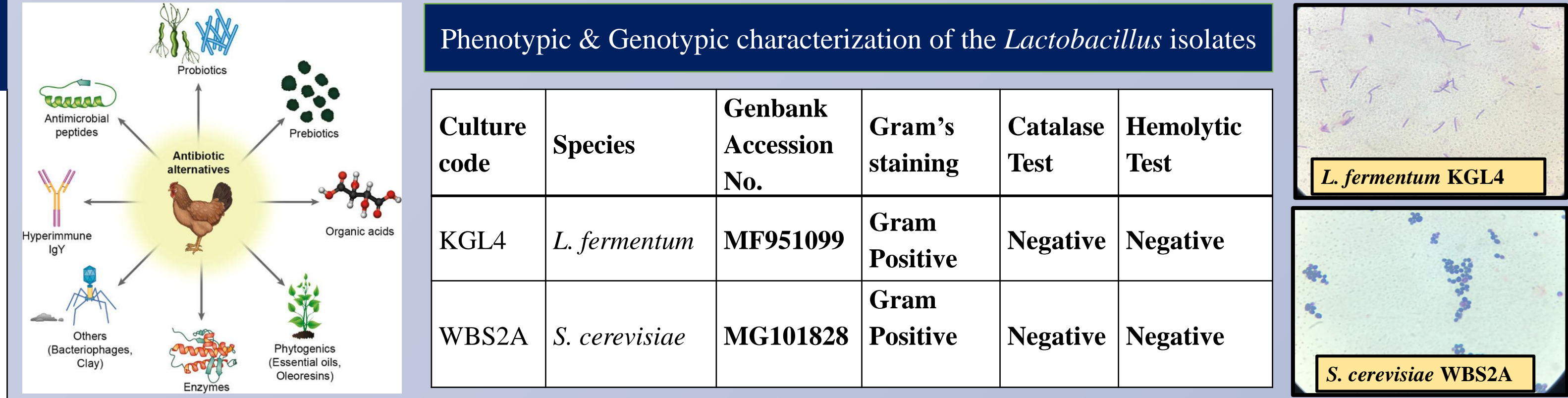
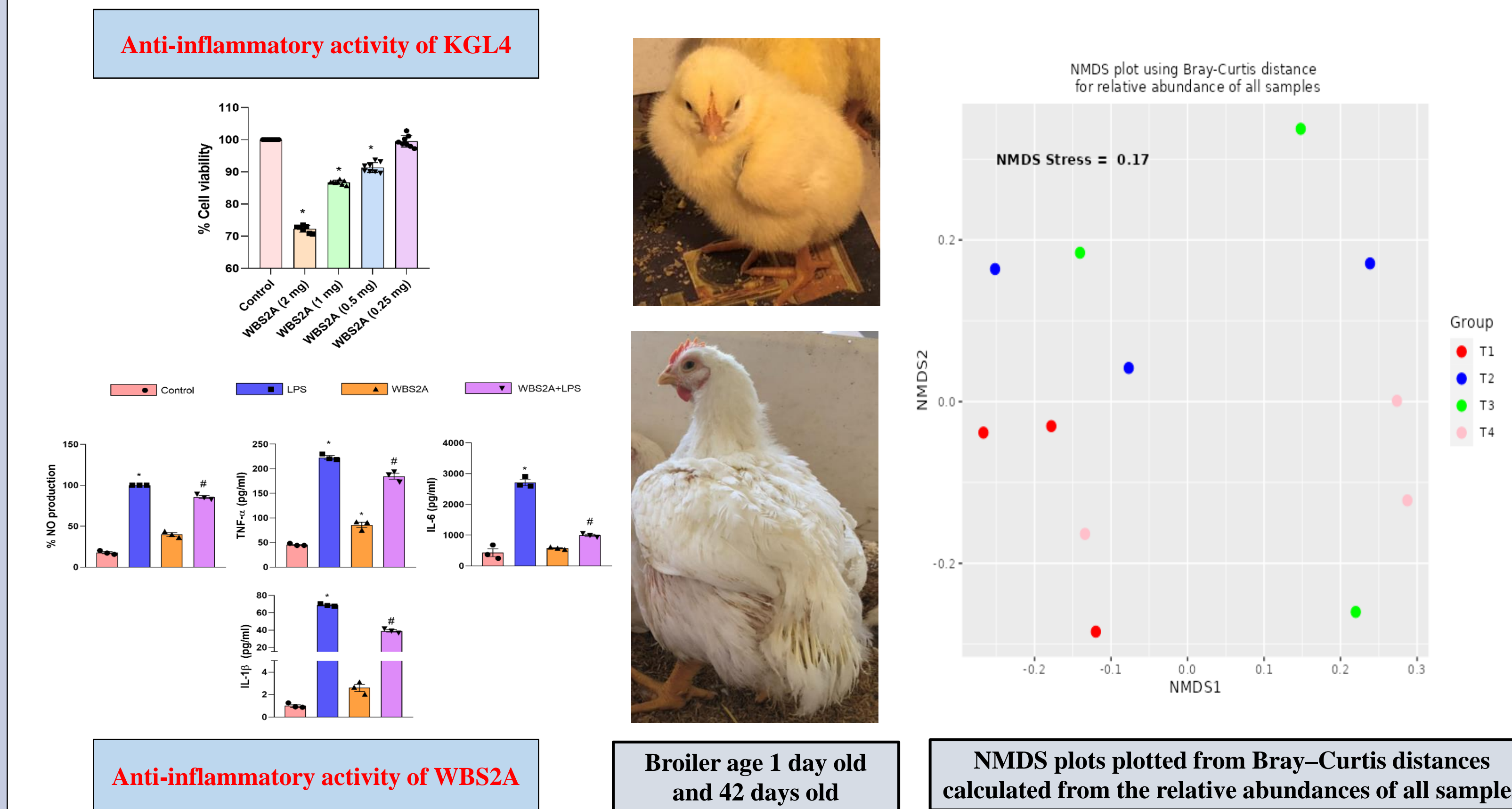
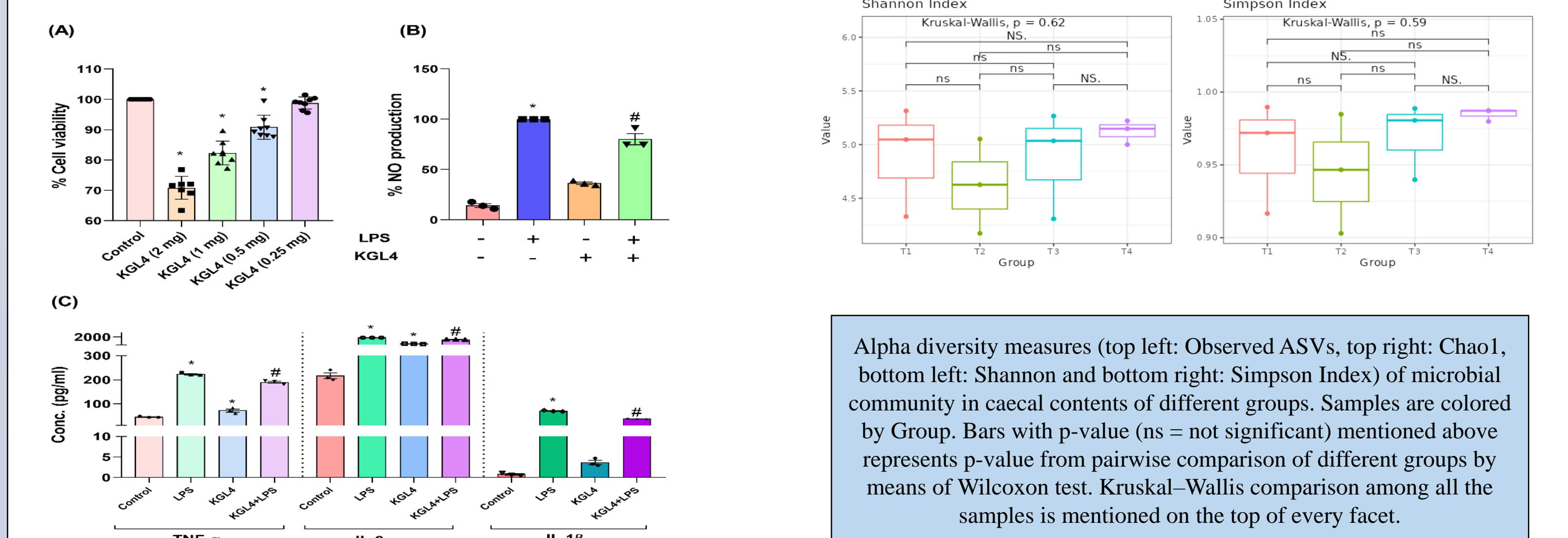
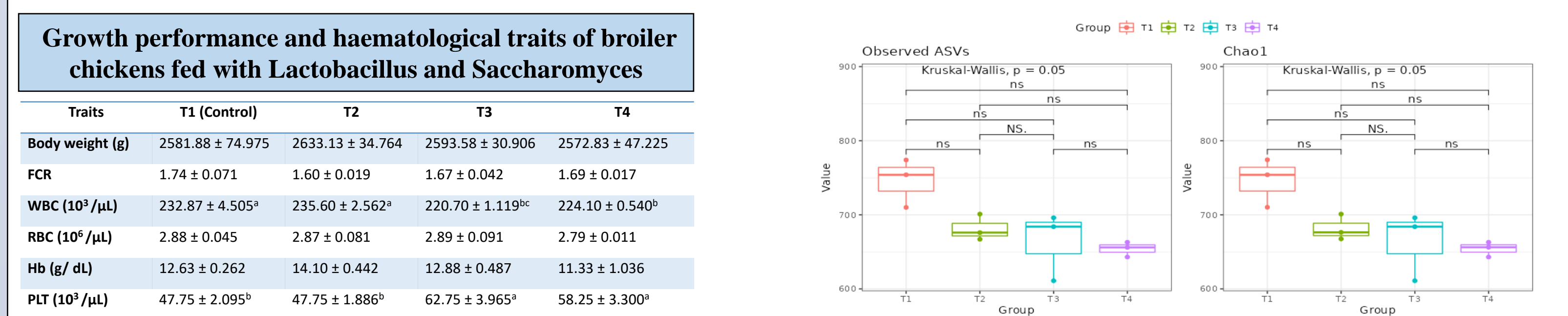
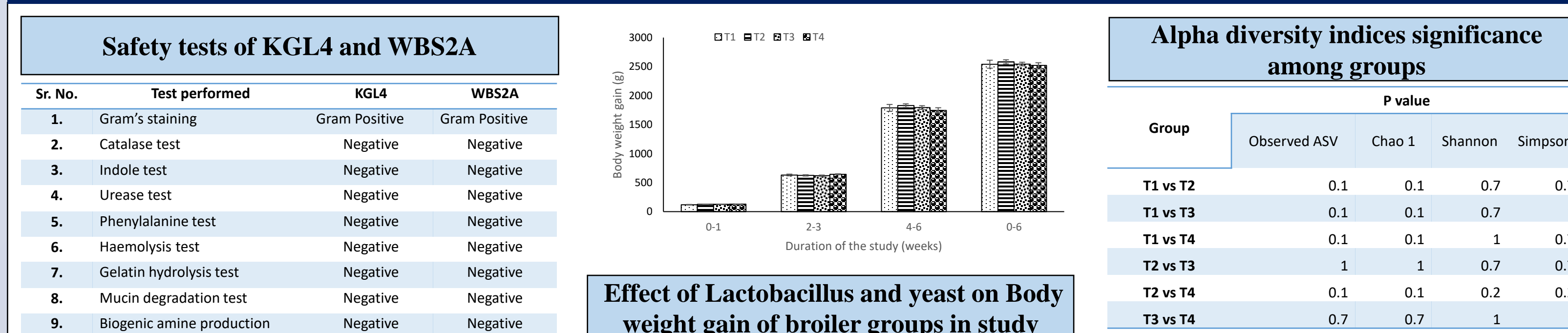
## Objectives

- To check the effect of *Lactobacillus* and *Saccharomyces* feeding on growth parameters of Broilers up to 42 days.
- To analyze the hematological parameters and lipid profiles of broilers after 42 days study.
- To study the histopathological status of intestine, heart and liver tissues of broilers after 42 days study.
- To determine the viable fecal lactobacilli, *Saccharomyces*, enterococcal and coliform counts in broilers after 42 days study.
- To analyze the metagenomic analysis of cecal sacs of the broilers after 42 days.

## Methods

- 96 Broilers** weighing 45-50g (Cobb 430Y, Venky's India Ltd.) were grouped into **four different treatments** (each having 24 broilers):
  - ❖ **T1** (control): basal diet + commercial probiotic + immunomodulator
  - ❖ **T2**: basal diet without having commercial probiotic and immunomodulator + *L. fermentum* KGL4 (10<sup>8</sup> CFU/ml)
  - ❖ **T3**: basal diet without having commercial probiotic and immunomodulator + *S. cerevisiae* WBS2A (10<sup>5</sup> CFU/ml)
  - ❖ **T4**: basal diet without having commercial probiotic and immunomodulator + combination of T2 and T3 cultures (1:1)
- Broiler performance including **body weight**, **daily feed consumption ratio**, and **mortality rate** were determined up to 42 days during the study (Timmerman et al., 2006).
- Hematological analysis and lipid profiling** of blood samples of broilers after 42 days were conducted (Timmerman et al., 2006).
- Histopathological examination** of intestine, liver and heart tissues of broilers after 42 days were also evaluated (Wang et al., 2019).
- Enumeration of fecal samples** (*Lactobacillus*, *Enterococcus*, coliforms and yeast count) of broilers after 42 days was done (Loh et al., 2010).
- Metagenomic study** of caecal content of broiler groups was done.

## Results



## Discussion

- During the entire study, higher bodyweight was observed among the *Lactobacillus* fed broilers group T2: 2633.13 ± 34.764 g followed by group fed with yeast T3: 2593.58 ± 30.906 g, T4: 2572.83 ± 47.225 g (P<0.05) as compared to control group (T1: 2581.88 ± 74.975 g)
- Lipid profile analysis further confirmed the significant decrease in low-density lipoprotein (LDL) content of T4 (19%) and T3 (16%) groups than the control group (T1) while more than 10% increase in high-density lipoprotein HDL content was observed in T4 and T3 groups than the control group (T1).
- The histopathological examinations of the fine macroscopically examined intestinal, liver and heart tissues suggested well-organized epithelial lining and villi structure, normal central vein and hepatic cords of liver tissue in *Lactobacillus* and yeast fed broiler groups (T2, T3, T4) and control group (T1).
- Further, the decrease in fecal coliforms and enterococcus counts and an increase in *Lactobacillus* counts in treatment groups compared to the control group were found after 42 days of study.

## Conclusion

- The supplementation of *Lactobacillus* culture viz. KGL4 & yeast culture viz. WBS2A as feed supplements to the broilers had overall positive effects on broilers growth performance in this study without providing commercial probiotic and immunomodulatory factor.
- Further, more studies are required to validate the claim for the two specific cultures (KGL4 & WBS2A).

## Key Message

✓ Lactic acid bacteria and yeast in combination could be considered as an alternative for antibiotic free meat and egg production in broilers in future.

