**PROJECT BACKGROUND**

Animal products including meat, protein and eggs are a crucial part of an individual’s daily diet. Due to faster urbanization and growing population, the global demand for meat protein has been increasing. As a result, Poultry sector is compelled to ramp up their production significantly. However, this system poses a greater risk of disease transmission and there can be substantial production and economic loss [1]. *Salmonella* spp. are the causative agent of zoonotic diseases and remain a major public health concern around the globe. It has a huge impact on farmers and livestock sector on a large scale. Among these diseases is fowl typhoid, an acute septicemic disease caused by *Salmonella* *enterica* serovar Gallinarum which infects poultry [2]. This disease results in drop in egg production, reduced growth rate, poor fertility, hatchability, and sometimes death. Moreover, chronic infections lead to anemia and liver necrosis. Lack of education, poor infrastructure, management, poor cleanness, water, food, and vectors such as rodents, human etc. contribute to cross infection resulting in higher morbidity and mortality in poultry farms. The spread is through respiratory route and fecal-oral contact. Without appropriate management, disease can be spread within days [3]. According to the World Organization of Animal Health (OIE), this disease has been listed among the most important diseases that leads to great economic loss to the poultry industry. Mostly bacterial diseases in poultry are controlled by using antibiotics but emergence of antimicrobial resistance and lack of discovery of new antibiotics is a growing concern for the industry. In addition to that, inappropriate use of antibiotics gives rise to antibiotic resistance and dysbiosis that affect chicken efficiency. Previous studies have shown importance of gut microbiota in host metabolism, digestion, and immune functions. With the rising frequency of antibiotic resistance, many countries banned antibiotics usage as growth promoters in food animals results in recurrent infections and economic loss. Phage therapy is considered as a potential source to control bacterial infections.

Bacteriophages are viruses that infect bacteria and are highly host specific. Phages replicate on targeted species and are self-limiting, thus minimal chances of imbalance commensal microbiota [4]. Moreover, narrow spectrum activity of phages makes it safe and effective therapeutic solution Recent studies have shown that phages can regulate microbiome and help in disease treatment. Huang et al prove that salmonella bacteriophage CKTI have positive impact on growth performance by regulating intestinal health without disruption of intestinal flora [5]. Besides this, phages supplementation in feed is a potential solution for modulation of gut microbiota and reduction of specific pathogens, thereby proliferating beneficial microbiota and improve gut health [6].

Bacteriophages have proven to be effective in reducing *Salmonella* Gallinarum concentrations in previous study [7]. But the effect of these phages on gut microbiota is still unknown. Thus, the objective of this study was to assess the impact of phage cocktail when administered at therapeutic dosage on gut microbiota of broiler chickens. Along with this, we also observed the difference of microbiota in challenged birds. For this, we targeted 16SrRNA gene sequencing to study microbial communities in cecal contents of broiler chicken at different time points. The development of microbial communities and differences were observed by richness, evenness of microbiota along with phylogenetic relationships and ASV’s differential abundance between different treatment groups. However, we hypothesized that phage treatment will not have significant impact on gut microbial community. The implication of these findings during phage treatment are crucial to establish a sustainable application.