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#### **Anti-inflammatory properties of Bacillus pumilus TS1 in LPS-induced inflammatory damage in broilers**

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**Abstract:**

**Background/Objective:** We investigated whether *Bacillus pumilus* TS1 improves growth performance and alleviates inflammatory damage in broilers and explored its feasibility as an antibiotic alternative.

**Methods:**We divided 240 one-day-old AA308 white-finned broilers into five groups (con, LPS, TS1L+LPS, TS1M+LPS, and TS1H+LPS). The TS1L+LPS, TS1M+LPS, and TS1H+LPS groups were fed TS1 for 15 days by gavage. The LPS, TS1L+LPS, TS1M+LPS, and TS1H+LPS groups were injected intraperitoneally with 1 mg/kg LPS for 3 days. We investigated the probiotic and anti-inflammatory activities by measuring body weight, sequencing the intestinal flora, and examining the structure of tissues by using pathological stain, real-time PCR, Western blotting, and immunohistochemical detection.

**Results:**TS1 could improve growth performance and intestinal flora composition, also reduced different organ damage and inflammatory cytokine expression in serum and organs. The mechanism may through several pathways including upregulating HSP60,70 expression, targeting and regulating Nrf2 and P38 MAPK and regulating NF-κB and HO-1 expression at the transcriptional level in different organs.

**Conclusion:** *Bacillus pumilus* TS1 alleviated Inflammatory injury caused by LPS and attenuated the inflammatory response in broilers, and these effects were achieved through MAPK and Nrf2 regulation of HSPs/HO-1 in different organs.

**Keywords:** *Bacillus pumilus*; HSPs; P38 MAPK; inflammatory