The effect of daily oral probiotic and postbiotic supplementation on the canine skin microbiota: insights from culture-dependent and long-read 16S rRNA gene sequencing methods

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1. Abstract

The effects of oral daily probiotic and postbiotic supplementation (ODPPS) on the skin microbiota of dogs have not been previously investigated. This prospective analytical cohort study describes the effect of ODPPS on the canine skin microbiota after 30 and 90 days of supplementation using culture-based and full-length 16S rRNA gene sequence analysis. Twelve client-owned golden retrievers were screened free of dermatological disease. All dogs cohabited in the same environment and had a mean age of 3.3 years (range: 1 – 7 years). Skin (axillae and inguinal) swab samples were collected on Day (D) 0. All dogs commenced ODPPS (Activ Daily Postbiotic & Probiotic Supplement 10 gram chew; Activ Dog Health), which contained the following probiotic bacteria: *Lactobacillus acidophilus* (ADH™-302), *Lactobacillus rhamnosus* (ADH™-301), *Enterococcus faecium* (ADH™-201), and *Bifidobacterium animalis* subspecies *lactis* (ADH™-401). Skin swab samples were taken from the same sites on D30 and D90. Swabs were cultured on sheep blood agar at 37°C for 24 hours, and bacterial colonies were identified. DNA was extracted to obtain full-length 16S ribosomal RNA gene for microbiota profiling. Culture-dependent methods demonstrated a reduced prevalence of *Staphylococcus pseudintermedius* in inguinal tissue following ODPPS ($p = 0.05$). In the axillae, microbiota compositional differences were demonstrated on D90 compared to D0. A notable increase in beneficial skin-associated bacteria was observed in the axillae on D90 compared to D0, including *Dubosiella newyorkensis* (FDR p=0.02) and *Lactobacillus acidophilus* (FDR p=0.02). Higher bacterial genera diversity was found after 90 days of ODPPS. This study provides a comprehensive analysis of the canine skin microbiota using advanced long-read sequencing. The findings suggest that ODPPS could be a promising strategy for improving skin health by modulating the microbiota and reducing the risk of skin infections.

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3. Conflict of Interest Statement:

The authors declare no conflicts of interest relevant to this article.