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Modulation of the Oral Microbiome in Domestic Cats (*Felis catus*) Through Diet

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Abstract: The oral microbiome of domestic cats is a complex microbial community crucial for periodontal and systemic health. Periodontal disease is highly prevalent in adult felines, and diet has emerged as a key factor influencing oral microbial composition. NGS studies reveal a diverse microbiota dominated by Proteobacteria, Bacteroidetes, and Firmicutes, with a relatively stable core microbiome under healthy conditions. Dietary patterns modulate microbial structure: dry diets increase diversity but may favor periodontal pathogens such as *Porphyromonas* and *Treponema*, while wet diets maintain a microbiome closer to physiological profiles yet lack mechanical cleaning benefits. Although current evidence is limited by a scarcity of large-scale controlled studies, available data highlight the diet-microbiome interaction as central to feline oral health and point toward new preventive strategies.

• Introduction

The feline oral microbiome plays a key role in maintaining oral and systemic health. In healthy cats, a balanced microbial community supports mucosal integrity and immune function, whereas dysbiosis is strongly associated with chronic inflammatory oral diseases such as feline chronic gingivostomatitis (FCGS). Shifts from commensal genera (e.g., *Streptococcus*) toward anaerobic, pro-inflammatory taxa (e.g., *Porphyromonas*, *Treponema*) characterize disease-associated profiles. Emerging evidence suggests that diet format (dry vs. wet) may influence oral microbial composition through both nutritional and mechanical effects, potentially contributing to microbial equilibrium or dysbiosis. Understanding these interactions provides valuable insights for preventive strategies and nutritional management in feline oral health.

• Material and methods

This work represents a literature-based review focused on the influence of diet on the oral microbiome of domestic cats (*Felis catus*). Scientific information was collected from major international databases, including PubMed, ScienceDirect, Google Scholar, Scopus, Web of Science, SpringerLink, and Wiley Online Library, using specific keywords such as cat oral microbiome, diet, nutrition, dry and wet food, oral bacterial diversity, and metagenomic analysis. Articles published between 2010 and 2025 in peer-reviewed scientific journals were considered. Inclusion criteria targeted studies providing experimental, clinical, or metagenomic data describing the effect of diet composition on the oral microbial community in domestic cats. Publications lacking primary data or focusing exclusively on other animal species were excluded. The analysis focused on identifying common findings, methodological differences, and emerging research trends, emphasizing the interaction between diet type (dry, wet, raw, or mixed) and oral bacterial diversity.

• Results and discussions

Analysing over 100 bibliographic sources on feline oral microbiota and nutrition—including more than 30 recent, highly relevant studies—allows us to synthesise the following key findings regarding the impact of diet and disease status on the oral microbiome in cats.

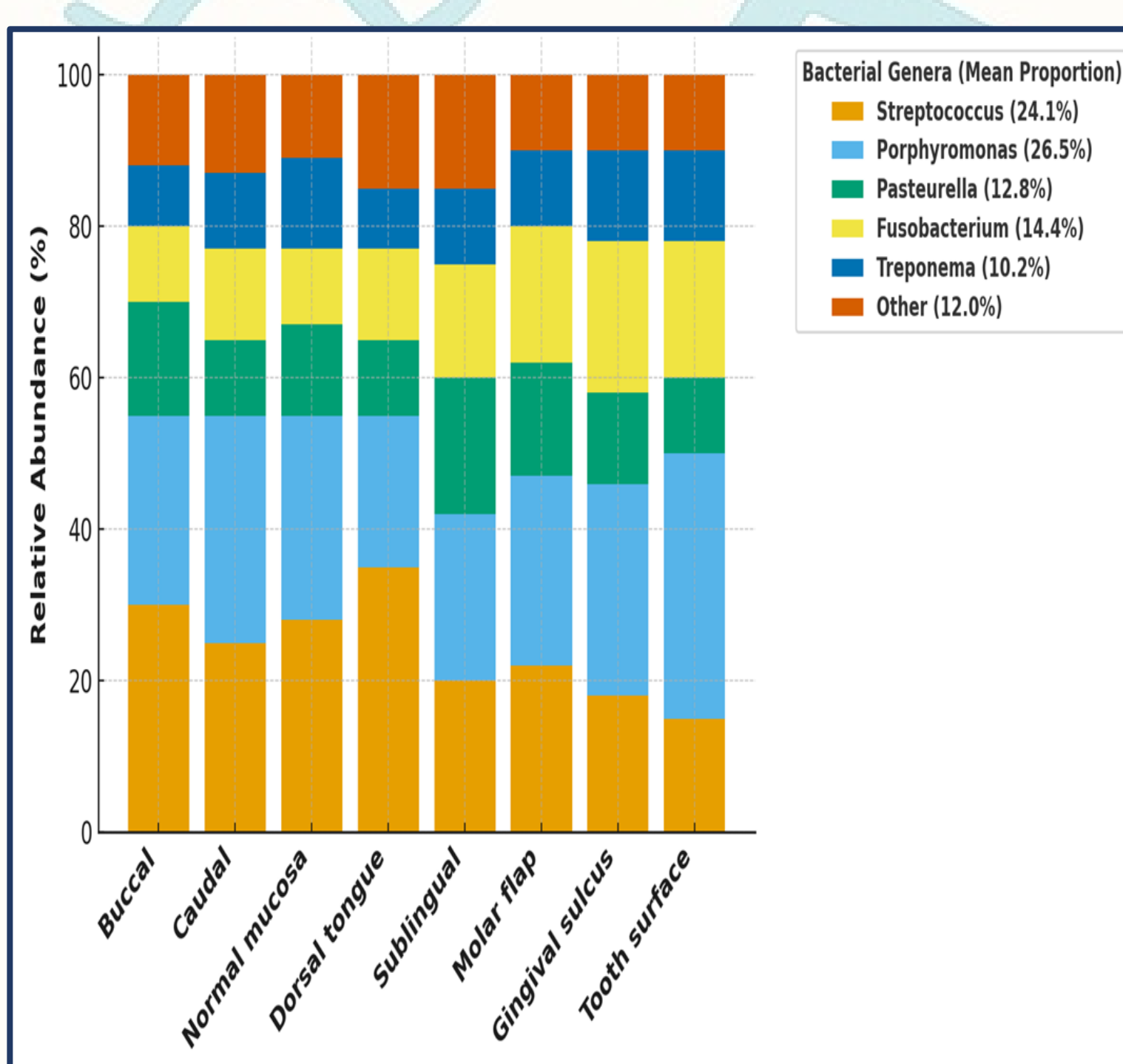


Figure 1. Simplified oral microbiome composition in healthy cats

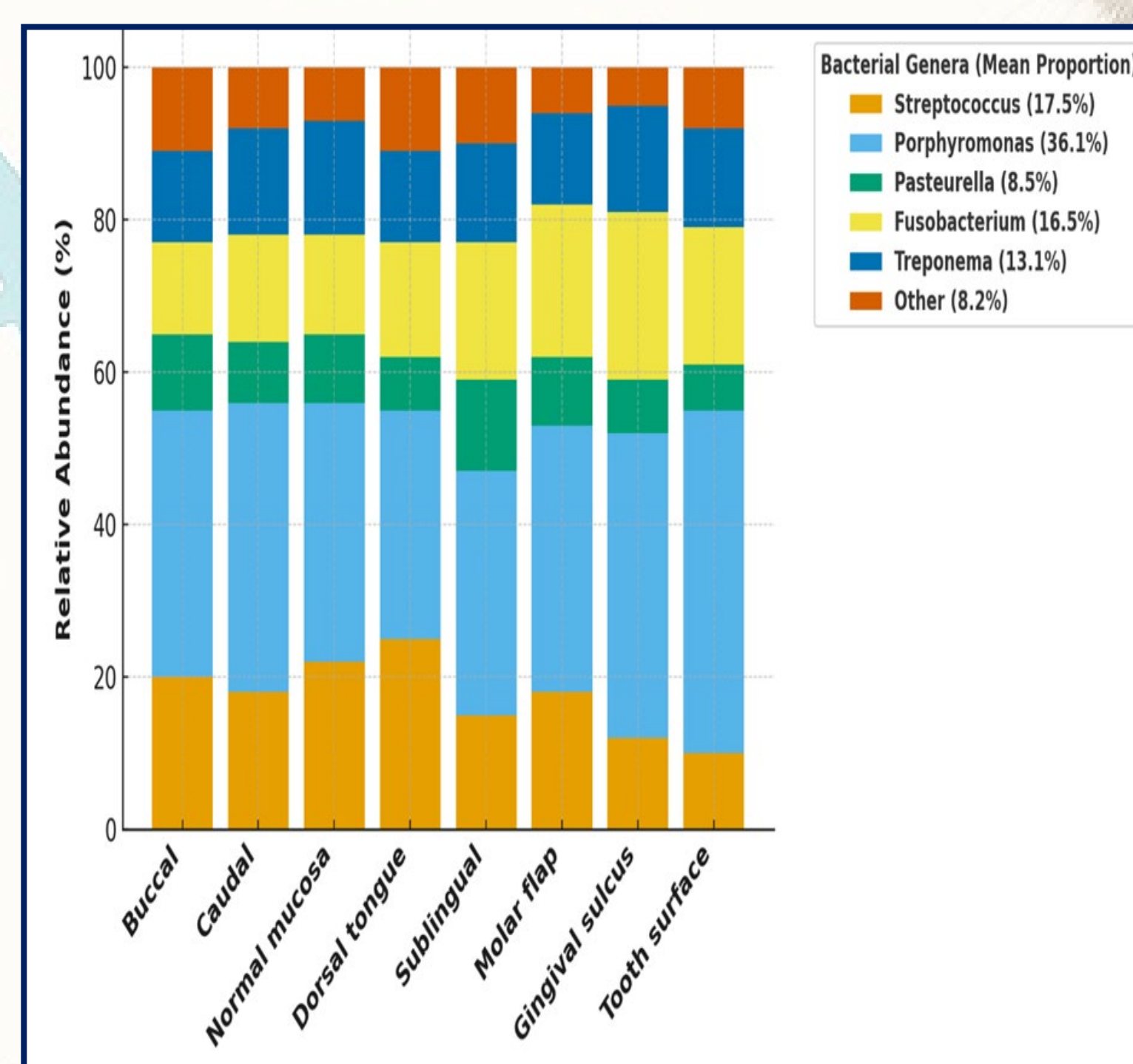


Figure 2. Simplified oral microbiome composition in cats with chronic oral disease

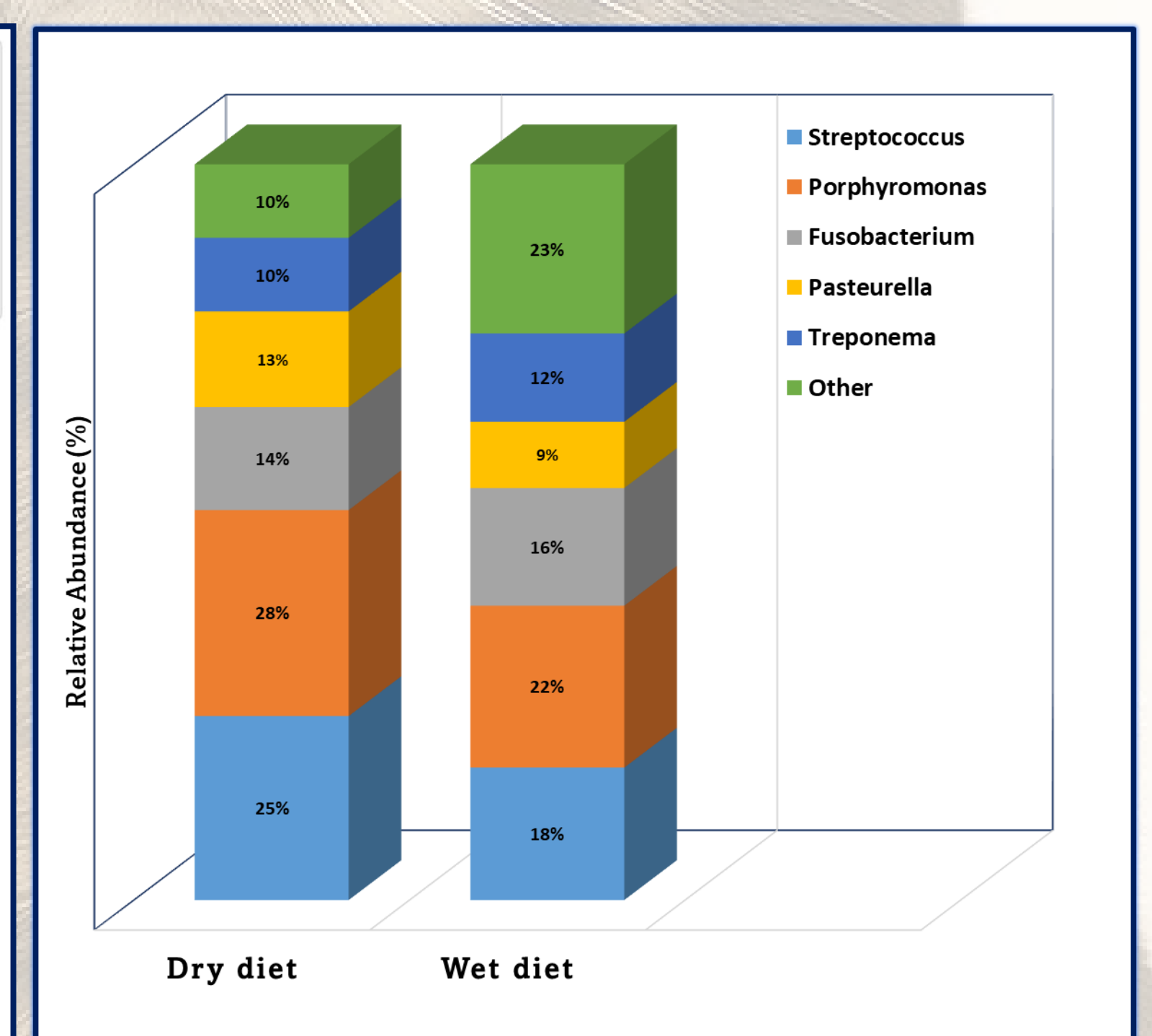


Figure 3. Oral microbiome composition in cats influence of diet type (dry vs wet food)

A comparative analysis of the feline oral microbiome demonstrates a clear pattern of dysbiosis in chronic oral inflammatory disease. In healthy cats, the dominant genera include *Streptococcus* ($\approx 24.1\%$), followed by *Porphyromonas* ($\approx 26.5\%$), *Fusobacterium* ($\approx 14.4\%$), *Pasteurella* ($\approx 12.8\%$), and *Treponema* ($\approx 10.2\%$), reflecting a balanced microbial community characteristic of a stable oral ecosystem.

Conversely, cats with chronic oral disease exhibit marked shifts in microbial composition, characterized by a reduction in *Streptococcus* to $\approx 17.5\%$ and *Pasteurella* to $\approx 8.5\%$, accompanied by a substantial increase in *Porphyromonas* to $\approx 36.1\%$, as well as elevated levels of *Fusobacterium* ($\approx 16.5\%$) and *Treponema* ($\approx 13.1\%$). This shift toward an overrepresentation of anaerobic, pro-inflammatory taxa is indicative of a dysbiotic microbiome, consistent with persistent mucosal inflammation, tissue degradation, and altered local immunoregulation.

Overall, the increased abundance of pathogenic anaerobes such as *Porphyromonas* and *Treponema*, alongside the reduction of beneficial commensals like *Streptococcus*, represents a microbial signature strongly associated with chronic oral disease in cats.

Dry-fed cats show higher *Streptococcus* abundance and a more balanced microbial profile, suggesting a role of diet texture in maintaining oral microbial stability. Wet-fed cats display increased anaerobic taxa, including *Treponema*, indicating a shift toward a more inflammatory microbiome pattern. Diet format may therefore influence oral microbial composition and oral health outcomes in cats.

• Conclusions

- ➔ Healthy cats show a balanced oral microbiome, whereas chronic oral disease is associated with dysbiosis and enrichment of anaerobic, pro-inflammatory taxa (e.g., *Porphyromonas*, *Treponema*).
- ➔ Diet format influences microbial profiles: dry-fed cats show greater microbial diversity and higher *Streptococcus*, while wet-fed cats exhibit increased anaerobes linked to soft-food retention.
- ➔ Nutritional management, oral hygiene, and regular monitoring are essential to support oral microbiome stability and feline oral health.