**Figure 1.** PCoA plots show clustering of dogs based on glucosamine supplementation in pre- and post-exercise groups. PCoA plots were created to visualize beta-diversity differences between dogs who did and did not receive glucosamine supplementation in **(A)** pre-exercise and **(B)** post-exercise groups. (Sami and Kesha are indicated in the post-exercise group by arrows)

Chart, scatter chart

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**Figure 2.** No variation was present in self-pairwise distances between no- and yes-glucosamine groups. No-glucosamine to yes-glucosamine pairwise distances were calculated for each dog (n=24) and then a t-test was performed between distance metrics and glucosamine supplementation status (yes n=6, no n=18).

Chart, box and whisker chart

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**Figure 3.** Interindividual pairwise distance analysis reveals variation in beta-diversity distances in pre-exercise, post-exercise, and glucosamine supplementation groups. Every pairwise Bray-Curtis beta-diversity distance was calculated in **(A)** pre-exercise samples, **(B)** post-exercise samples, **(C)** no glucosamine samples, and **(D)** glucosamine supplementation samples.

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**Figure 4.** *Lactobacillaceae* and *Anaerovoracaceae* taxa abundance plots reveals differences in relative abundance by population subgroups. Relative abundance analysis was performed in (**A**) *Lactobacillaceae* and (**B**) *Anaerovoracaceae* families for pre-exercise no-glucosamine, pre-exercise yes-glucosamine, post-exercise no-glucosamine, and post-exercise and yes-glucosamine population subgroups.

**Chart, box and whisker chart

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**Figure S1.** Taxa Bar Plot reveals differences in genera between different dogs and glucosamine supplementation status. A Taxa Bar plot was created for each dog without glucosamine supplementation (top) and with glucosamine supplementation (bottom).

