

# FECAL FAT IN COMMON MARMOSETS (*CALLITHRIX JACCHUS*) AS A MEASURE OF INTESTINAL HEALTH AND LIPID ABSORPTION ACROSS AGE GROUPS

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## Abstract

Captive common marmosets (*Callithrix jacchus*) are susceptible to digestive difficulties that can lead to malnutrition, failure to thrive, metabolic bone disease, and even death. Marmosets with poor digestive function often also have higher fecal fat, indicating lipid malabsorption. Poor digestion and high fecal fat have been linked to poor vitamin D status. Fecal fat under 5% is considered normal and healthy for marmosets. Marmosets with fecal fat between 5 and 10% are considered at increased risk for poor health. If fecal fat is consistently above 10% this is a cause for high concern and possible clinical intervention. For this project assessing digestive health in a colony of captive marmosets at the Southwest National Primate center (SNPRC), 158 fecal samples from 68 animals were collected and analyzed at Smithsonian's National Zoo and Conservation Biology Institute Nutrition Laboratory. Repeat samples approximately 4 to 6 months apart were collected for 59 of the marmosets. Six marmosets were represented by a single sample, 35 by two collections, 26 by three collections, and a single animal had four samples collected. Samples were dried overnight and ground using a Wiley Mill. Crude fat (CF%) content of the fecal samples was measured using an ANKOM Fat Extractor. For individuals with more than one collection date, average age was calculated over all collection times. 24 animals were between 2-8 years old, 24 were 8-10 years old, and 20 were 10-16 years old. Fecal fat ranged from under 1% to 31%. Most (45) of the marmosets were healthy (mean fecal fat less than 5%), 7 were at risk, and 16 were of high concern. The marmoset with 31% fecal fat was over 16 years old and went from 3.1% to 31% fecal fat over a five-month period (2 samples collected 4 months apart and then another one month later), and then died within a week of the last collection. To examine differences in CF% based on age, median and average CF% was calculated using all collections per individual (Table 1). There were no statistical differences between the age groups; however, marmosets in the 8–10 year-old group had the highest proportion of animals with fecal fat above 10% (33% versus 16.7% and 20% for age groups 2-8 years old and 10-16 years old, respectively). A possible explanation for the apparent decline in the proportion of marmosets with fecal fat above 10% after age 10 would be excess mortality in younger marmosets with high fecal fat. Marmosets living past 10 years of age may have been healthier as younger animals. We are investigating this possibility through colony records and continued data collection. For animals with 3 or more collections ( $n = 27$ ) the majority (22) had consistent fecal CF% and stayed within the same category (healthy, at risk, high concern). Three individuals improved (lower fecal CF%) and two got worse, including the animal that died. Animals with higher levels of fecal CF% (>10%) showed more variation than those with low (<5%) fecal CF%. We propose that fecal fat is a stable indicator of digestive health in marmosets, with fecal fat content above 5% indicative of compromised intestinal health.

However, this condition may be reversible as a few individuals with high fecal fat did have a decrease in fecal CF% to below 5% over the collection period.

**Table 1.** Mean (SEM), median, range and distribution of fecal crude fat (CF) in common marmosets by age groups.

| <b>Age</b> |                 | <b>Mean</b>      | <b>Median</b> | <b>Range</b> | <b>CF &lt;5%</b> | <b>CF 5-10%</b> | <b>CF &gt; 10%</b> |
|------------|-----------------|------------------|---------------|--------------|------------------|-----------------|--------------------|
| <b>yrs</b> | <b><i>n</i></b> | <b>CF% (SEM)</b> | <b>CF%</b>    | <b>CF%</b>   | <b><i>n</i></b>  | <b><i>n</i></b> | <b><i>n</i></b>    |
| 2 – 8      | 24              | 4.40 (0.87)      | 1.79          | 0.71 – 17.05 | 16               | 4               | 4                  |
| 8 – 10     | 24              | 6.85 (1.49)      | 2.49          | 0.40 – 25.03 | 15               | 1               | 8                  |
| 10 – 16    | 20              | 4.63 (1.27)      | 1.46          | 0.74 – 13.00 | 14               | 2               | 4                  |