

Moderate Coconut Oil Supplement Ameliorates Growth Performance and Ruminant Fermentation in Hainan Black Goat Kids

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Abstract: The study investigated amelioration effects of coconut oil (CO) on growth performance, nutrient digestibility, ruminal fermentation, and blood metabolites in Hainan Black goat kids. Twenty-four Hainan Black goat kids (10 days of age) were assigned randomly to four treatments for 90 days, including pre-weaning (10–70 d of age) and post-weaning (70-100 d of age) days. The treatment regimens were control (CON), low CO (LCO), medium CO (MCO), and high CO (HCO) with 0, 4, 6, 8 g CO per goat per day, respectively. During the pre-weaning period, the average daily gain (ADG) linearly and quadratically increased ($P < 0.05$), whereas the average daily feed intake (ADFI) linearly decreased, and the feed conversion ratio (FCR) also decreased linearly and quadratically by increasing CO supplementation ($P < 0.05$). During the post-weaning period, increasing CO supplementation linearly and quadratically increased the BW at 100 days and ADG ($P < 0.05$), but quadratically decreased the ADFI and FCR ($P < 0.05$). The digestibility of ether extract (EE) linearly and quadratically increased with increasing CO supplementation ($P < 0.05$). Supplementation of CO linearly increased ruminal pH ($P < 0.05$), but linearly decreased ($P < 0.05$) ammonia-N, total VFAs, molar proportions of acetate, ruminal microbial enzyme activity of carboxymethyl-cellulase, cellobiase, xylanase, pectinase and α -amylase, and number of total protozoa, the abundance of *Ruminococcus albus*, *Ruminococcus flavefaciens*, *Fibrobacter succinogenes*, *Butyrivibrio fibrisolvens*, *Prevotella ruminicola*, and *Ruminobacter amylophilus*. The estimated methane emission decreased linearly and quadratically with increasing CO addition ($P < 0.05$). The serum concentration of triglycerides (TG), non-esterified fatty acids (NEFA) and growth hormone (GH) linearly ($P < 0.05$) increased by raising the CO supplementation. The present results indicate that CO supplementation at 6 g/day per goats is optimum due to improved growth performance and decreased estimated methane emission. Supplementation CO up to 8 g/day depressed growth and feed conversion due to its suppression of growth performance,

rumen protozoa, cellulolytic bacteria and microbial enzyme activity, and reduced ADF and ADF digestibility.

Keywords: coconut oil, growth performance, nutrient digestibility, ruminal fermentation, blood metabolites