

Effects of Feeding Lauric, Stearic or Linoleic Acid on Rumen Protozoa Motility, Proportion of Living Cells, and Fatty Acid Uptake.

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Rumen protozoa play an important role in balancing the rumen microbiome along with regulating fiber digestion, microbial protein synthesis, and methane production in dairy cows. Lauric acid is known to inhibit rumen protozoa when bolus dosed, but the biological reason for this inhibition is unknown. The aim of this study was to determine the impact of lauric acid on protozoal health, motility, and fatty acid uptake. The study was conducted using a complete block design in 50-mL tubes fixed with one way gas valves maintained at 39°C. Rumen fluid was added to tubes with treatments and alfalfa substrate. Treatments of lauric (12:0), stearic (18:0) or linoleic (18:2) acid were dissolved in hexanes and dosed at 167, 333, 667 and 1333 (

□M) along with

vehicle without fat. Samples and videos were taken at inoculation, 3, 6 and 24 hours post-inoculation. Motility, proportion of living cells and average cell fluorescence, a proxy for fatty acid concentration using the fluorescent dye Nile Red, were measured and standardized as percentage of the control. 12:0 decreased motility (1.02, 0.89, 0.64, and 0.36), living cells (0.99, 0.77, 0.58, 0.32) and fluorescence (0.76, 0.74, 0.73, 0.43), respectively, with increasing dose. 18:0 slightly elevated motility (1.11, 1.10, 1.05, 1.10) and had normal living cell data (1.01, 0.98, 1.00, 1.05), but fluorescence for the 333 (0.80), 667 (0.87), and 1333 (0.95) dose increased. 18:0 167 (1.01) differed from this trend. 18:2 maintained motility (1.03, 1.05, 0.98, 0.88) and living cells (0.98, 1.03, 1.03, 0.91) close to the control; however, it decreased fluorescence (0.90, 0.84, 0.78, 0.55), respectively, with increasing dose. Results show that 12:0 adversely affected protozoal health by inhibiting motility. This could be explained by a disruption in cellular signaling pathways such that digestive vacuole maturation is blocked, thereby causing protozoa starvation.