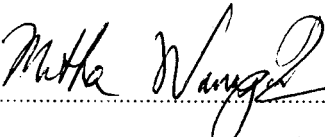
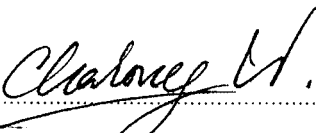


THESIS TITLE: EFFECTS OF PARTICLE SIZE OF FIBER ON FEED INTAKE,
DIGESTIBILITY, RATE OF PASSAGE, AND RUMINAL
FERMENTATION END-PRODUCTS IN DAIRY CATTLE

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ABSTRACT

The experiment was carried out to study effects of particle size of fiber on feed intake, digestibility, rate of passage and ruminal fermentation end-products in dairy cattle. Four castrated male dairy cattle fitted with ruminal cannulae with average weight of 350 ± 9.9 kg were arranged according to a 4 x 4 Latin square design. The treatments were as follows: Fiber A (size <0.5 cm), Fiber B (size 1 cm), Fiber C (size 3-4 cm) and Fiber D (longer than 15 cm). Cattle were offered roughage ad libitum and supplemented with concentrate at 0.3 percent of body weight. Roughage intake of cattle fed Fiber A was higher ($P < 0.05$) ($79.1 \text{ g/kgBW}^{0.75}$) than those fed Fiber B, Fiber C and Fiber D (56.0, 57.0 and $63.4 \text{ g/kgBW}^{0.75}$, respectively). Dry matter digestibility of cattle fed Fiber C and Fiber D were higher ($P < 0.05$) (57.1 and 58.0 %) than those in cattle fed Fiber A and Fiber B (52.8 and 53.0 %). Organic matter digestibility of cattle fed Fiber D was higher ($P < 0.05$) (61.3 %) than that in cattle fed Fiber A and Fiber B (56.2 and 57.1 %) but was not different ($P > 0.05$) when compared with that in cattle fed Fiber C (60.3 %). Neutral-detergent fiber digestibility in cattle fed Fiber C and Fiber D were higher ($P < 0.05$) (56.1 and 56.6 %) than those in cattle fed Fiber A and Fiber B (51.6 and 50.2 %), but crude protein (48.1, 52.3, 53.5 and 52.2 %, respectively) and acid-detergent fiber (46.3, 43.9, 49.6 and 52.4 %, respectively) digestibilities in cattle fed Fiber A, Fiber B, Fiber C and Fiber D were not different ($P > 0.05$). Ruminal ammonia-nitrogen concentration in cattle fed Fiber B, Fiber C and Fiber D were higher ($P < 0.05$).

(62.2, 61.0 and 59.2 mg/l, respectively) than those in cattle fed Fiber A (52.5 mg/l), but ruminal pH and total volatile fatty acid were not different ($P>0.05$) among treatments, averaging 6.7 and 63.4 mmol/l, respectively. Solid passage rate (3.9, 3.3, 3.0 and 3.6 %/hour, respectively) and nitrogen retention (25.5, 24.5, 22.5 and 26.4 g/day, respectively) in cattle fed Fiber A, Fiber B, Fiber C and Fiber D were not different ($P>0.05$). Based on this experiment, it could be concluded that reduction of particle size of fiber could significantly increase feed intake and rate of passage, consequently, decrease digestibilities of nutrients. The recommended size of fiber for total mixed ration should be 0.5 cm long.