

Effect of High-Oil Corn or Added Corn Oil on Ruminal and Total Tract Digestibility of Finishing Diets Fed to Beef Cattle

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Recent developments in corn breeding have resulted in varieties of corn with high oil content. High-oil corn has the potential of increasing the energy content of beef rations and could result in increased economic returns for the livestock producer. The objective of our study was to evaluate digestion characteristics of high-oil corn compared with typical corn in beef finishing diets.

Three Angus steers (511 kg) cannulated in the rumen and at the proximal duodenum were used in a replicated 3 x 3 Latin square design. Dietary treatments included: 1) typical corn (TC, 3.2% fatty acids, 79.2% of diet DM), 2) high-oil corn (HOC, 5.5% fatty acids, 79.2% of diet DM), and 3) typical corn plus corn oil (OIL, 5.1% fatty acids, 76.9% typical corn and 2.4% added corn oil). All diets contained 14% grass hay and 6.8% supplement. The typical and high-oil corn evaluated were isogenic. Following a 10-d diet adaptation period, ruminal, duodenal, and fecal samples were collected for 4 d for determination of digestibility using acid-insoluble ash as an internal digestibility marker.

Ruminal OM digestibility was greater ($P < .05$) for HOC and OIL diets than for the TC diet (66.2 and 70.9 versus 60.2%). Total tract OM digestibility was greater ($P < .05$) for TC and OIL diets than for the HOC diet (88.4, 89.2, and 86.9%, respectively). Treatment responses for ruminal and total tract DM digestibility were the same as those observed for OM digestibility. Ruminal starch digestibility was greater ($P < .05$) for OIL than TC or HOC (86.1, 75.5, and 78.9%, respectively). Total tract starch digestibility was greater for OIL and TC ($P < .05$) than HOC (97.1, 96.3, and 94.8%, respectively). No differences ($P < .05$) were observed between dietary treatments for ruminal or total tract digestibility of NDF or ADF. Total fatty acid digestibility was greater for HOC and OIL than TC (75.7, 75.2, and 68.8%, respectively). Similar to starch digestibility, ruminal digestibility of gross energy was greater ($P < .05$) for HOC and OIL diets than the TC diet (64.3 and 67.2% versus 54.9%); however, no treatment differences were observed for total tract gross energy digestibility. Due to higher fatty acid intake, steers fed HOC and OIL had greater ($P < .05$) intake of ME than steers fed TC (32.1, 32.6, and 30.6 Mcal/d, respectively). Diet ME (Mcal/kg DM) was greatest for OIL ($P < .05$), but did not differ between TC and HOC.

In summary, compared with its isogenic, typical corn counterpart, the high-oil corn evaluated in this study had greater ruminal OM, starch, fatty acid and gross energy digestibility; but lower total tract OM and starch digestibility. The combination of these effects resulted in no difference in the ME content of diets containing the two types of corn.