Effect of Supplementing of Protease, Phytase, and Carbohydrase Enzymes on Nutrient Digestibility of Canola Meal in Growing Pigs

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Solvent-extracted canola meal (CM) is an important feedstuff in Canada; however its nutritive value is limited by the presence of antinutritive factors including phytate, non-starch polysaccharides (NSP) along with erucic acid and glucosinolate. Supplementation of exogenous enzymes could increase nutrient digestibility of CM. The effects of supplementation of protease, phytase and carbohydrase on nutrient digestibility of CM based diets was evaluated in a 6 x 6 Latin square using six ileal-cannulated barrows.

Six corn starch-based diets that each contained 50% CM were prepared: 1. Control, without enzyme; 2. Protease (Ronozyme ProAct, 200 mg/kg); 3. High protease (Ronozyme ProAct, 2,000 mg/kg); 4. Phytase (Ronozyme HiPhos, 100 mg/kg (min 1000 U/kg); 5. Protease and phytase (Ronozyme ProAct, 200 mg/kg; Ronozyme HiPhos, 100 mg/kg); and 6. Protease, phytase and carbohydrase (Ronozyme ProAct, 200 mg/kg; Ronozyme HiPhos, 100 mg/kg; Ronozyme VP, 800 mg/kg). Barrows were fed test diets in six 9-d periods. Feces and ileal digesta were collected for 2 d each. Protease supplementation (diets 2 and 3) increased \((P < 0.05)\) apparent total tract digestibility (ATTD) of crude protein (CP) by 2.7%, but did not affect apparent ileal digestibility (AID) of CP. A 10x higher protease dose did not increase ATTD of CP further. Supplementation of phytase (diet 4, 5 and 6) increased \((P < 0.001)\) the ATTD of phosphorus (P) and calcium (Ca). Compared with the control, the ATTD of P and Ca was increased \((P < 0.001)\) by 17 and 25 %-units, respectively. Combining protease and phytase did not increase AID of energy, Met, and Thr compared to control, but increased \((P < 0.05)\) these AID compared to solely phytase. The combination of protease, phytase and carbohydrase did not increase digestibility of energy.

Implications: Nutrient digestibility of canola meal can be increased by supplementation of enzymes. Protease supplementation increased digestibility of crude protein, while phytase supplementation increased P and Ca digestibility.