

# Effects of mechanical treatment of whole canola seeds on carcass composition and blood lipids of lambs fed grass silage

S. Huard<sup>1</sup>, J. R. Seoane<sup>1,4</sup>, H. V. Petit<sup>2</sup>, M. H. Fahmy<sup>2</sup> and R. Rioux<sup>3</sup>

<sup>1</sup>Département des sciences animales, FSAA, Université Laval, Québec, Canada G1K 7P4; <sup>2</sup>Agriculture and Agri-Food Canada, Dairy and Swine Research and Development Centre, Lennoxville, Québec J1M 1Z3; <sup>3</sup>Ferme Expérimentale, Agriculture Canada, La Pocatière, Québec, Canada G0R 1Z0, Contribution no 582<sup>2</sup>. Received 10 December 1997, accepted 16 April 1998.

Huard, S., Seoane, J. R., Petit, H. V., Fahmy, M. H. and Rioux, R. 1998. Effects of mechanical treatment of whole canola seeds on carcass composition and blood lipids of lambs fed grass silage. *Can. J. Anim. Sci.* **78**: 665–671. Thirty-three lambs (25.2 ± 2.7 kg BW) were used to study if mechanical treatment of canola seeds can exert an effect on carcass quality, blood lipids, and fatty acid profile of depot fat. All lambs received a basal diet of 179 g d<sup>-1</sup> of a 16% CP commercial concentrate and grass silage fed ad libitum. The basal diet was supplemented with the following dietary treatments (dry matter basis): C, a control supplement supplying 182 g of a mixture of 66% canola meal and 34% canola oil; WCS, 187 g of whole canola seeds; RCS, 188 g of rolled canola seeds; and GCS, 189 g of ground canola seeds. Dressing percentage was higher ( $P < 0.05$ ) for diet C (45.6%) than for WCS (42.5%) and RCS (41.9%). The highest and lowest carcass grades were obtained with diets C and RCS, respectively ( $P < 0.05$ ). Blood lipid concentrations increased as the lambs grew older ( $P < 0.01$ ). Lambs fed the GCS diet had lower plasma concentrations of total cholesterol and high density lipoprotein cholesterol than lambs fed the WCS or RCS diets ( $P < 0.05$ ). Kidney fat of lambs on the C diet contained more *trans*-C<sub>18:1</sub> and less C<sub>18:0</sub> compared with the other diets ( $P < 0.01$ ). The utilization of untreated or rolled canola seeds as protein and fat supplements decreased carcass quality, increased blood triglycerides and changed fatty acid composition of depot fat.

**Key words:** Canola seeds, lambs, carcass composition, blood lipid

Huard, S., Seoane, J. R., Petit, H. V., Fahmy, M. H. et Rioux, R. 1998. Effets du traitement mécanique de la graine de canola entière sur la composition des carcasses et les lipides sanguins d'agneaux nourris à l'ensilage d'herbe. *Can. J. Anim. Sci.* **78**: 665–671. Trente-trois agneaux (25,2 ± kg 2,7 de poids vif) ont été utilisés afin de déterminer si le traitement mécanique de la graine de canola a un effet sur la qualité des carcasses, les lipides sanguins et le profil en acides gras du gras de réserve. Les agneaux ont reçu un régime de base de 179 g j<sup>-1</sup> d'une moulée commerciale à 16% PB et de l'ensilage à volonté. Le régime de base a été supplémenté avec les traitements alimentaires suivants (base de MS): 1) C, 182 g d'un mélange de 66% de tourteau de canola et 34% d'huile de canola; 2) WCS, 187 g de graines de canola entières; 3) RCS, 188 g de graines de canola roulées; et 4) GCS, 189 g de graines de canola moulues. Le rendement de carcasses a été supérieur ( $P < 0,05$ ) pour les agneaux recevant la ration C (45,6%) comparés à ceux recevant la ration WCS (42,5%) et la ration RCS (41,9%). Le classement des carcasses a été meilleur pour la ration C tandis que les agneaux recevant la ration RCS ont obtenu la moins bonne classification ( $P < 0,05$ ). La concentration de lipides sanguins a été plus élevée à la fin qu'au début de l'expérience ( $P < 0,01$ ). Les agneaux recevant GCS ont présenté des niveaux sanguins plus faibles de cholestérol total et de cholestérol associé aux HDL par rapport aux agneaux recevant les rations WCS ou RCS ( $P < 0,05$ ). Le gras périrénal des agneaux recevant la ration C a contenu plus d'acide *trans*-C<sub>18:1</sub> et moins d'acide C<sub>18:0</sub> comparativement aux autres traitements ( $P < 0,01$ ). Les résultats obtenus suggèrent que l'utilisation de la graine de canola non-traitée ou roulée comme supplément protéique-énergétique diminue la qualité des carcasses, augmente les triglycérides sanguins et change la composition en acides gras du gras périrénal.

**Mots clés:** Graine de canola, agneaux, composition des carcasses, lipides sanguins

Using full-fat oil seeds as supplements to high-roughage diets is becoming popular because of their high fat and protein contents. Since whole canola seeds contain about 42% fat and 23% protein, they could serve as both energy and protein sources for livestock (Kercher et al. 1990). In addition, the hard pericarp partially protects canola seed from rumen degradation but could allow digestion to occur in the lower gut.

Chemical and mechanical treatments that decrease rumen degradation of seeds have been used to change fatty acid

composition of animal fat. Ashes et al. (1993) used aldehyde-treated protein to protect canola seeds and observed that proportions of C<sub>14:0</sub> and C<sub>16:0</sub> decreased while those of

**Abbreviations:** ADG, average daily gain; C, control diet; CLY, carcass lean yield; CP, crude protein; DM, dry matter; FA, fatty acids; GCS, ground canola seeds; GR, grade reading; HDL, high density lipoproteins; HDLCh, HDL cholesterol; LDL, low density lipoproteins; LDLCh, LDL cholesterol; RCS, rolled canola seeds; TCh, total cholesterol; TG, triglycerides; TTD, total tissue depth; WCS, whole canola seeds; WCW, warm, carcass weight

<sup>4</sup>To whom correspondence should be addressed.