

Effects of dietary polyunsaturated fatty acid supplementation on fatty acid composition in muscle and subcutaneous adipose tissue of lambs

A. E. Radunz, L. A. Wickersham, S. C. Loerch, F. L. Fluharty, C. K. Reynolds and H. N. Zerby

Department of Animal Sciences, The Ohio State University, Wooster 44691

Abstract :

Lambs ($n = 48$) were used in a 2×2 factorial arrangement of treatments to evaluate effects of inclusion of oil containing PUFA in high-concentrate diets (with or without) and duration of oil supplementation (pre- vs. postweaning) on CLA concentration of muscle and adipose tissue. Lambs were fed preweaning creep diets (with or without oil) corresponding to the dietary lactation treatment diet (with or without oil) of the dam. Dams blocked by lambing date and rearing type were randomly assigned to 1 of 2 lactation dietary treatments with or without oil supplementation. Creep diets contained approximately 70% concentrate and 30% roughage and were provided to lambs for ad libitum intake. At weaning (58.7 ± 2.5 d of age), lambs ($n = 48$) were randomly assigned within preweaning treatment groups to 1 of 2 postweaning dietary treatments (with or without oil) and 16 pens in a randomized block design, blocked by sex and BW. Postweaning diets were formulated to contain approximately 80% concentrate and 20% roughage and were fed once daily for ad libitum intake. Soybean and linseed oil (2:1, respectively) replaced ground corn and provided 3% additional fat in pre- and postweaning diets. Lambs were slaughtered at 60.3 ± 4.2 kg of BW. A subcutaneous fat (SQ) sample was obtained within 1 h postmortem and a LM sample at the 12th rib was obtained 24 h postmortem, and both were analyzed for fatty acid profile. Feedlot performance and carcass measurements were not affected ($P \geq 0.26$) by oil supplementation. Total CLA content of LM and SQ was not affected ($P \geq 0.08$) by oil supplementation pre- or postweaning, but *trans*-10, *cis*-12 CLA was greater ($P = 0.02$) in SQ from lambs supplemented with oil postweaning. Total PUFA content in LM was greater ($P = 0.02$) in lambs supplemented with oil pre- or postweaning as a result of increased concentrations of 18:2 *cis*-9, *cis*-12 and longer chain PUFA. Conversely, pre- and postweaning oil supplementation resulted in less ($P = 0.04$) MUFA content in LM. Only postweaning oil supplementation increased ($P = 0.001$) SQ PUFA content. Feeding oils containing PUFA to lambs pre- and postweaning did not increase CLA content of muscle, whereas postweaning oil supplementation minimally increased CLA concentration of SQ fat. Inclusion of soybean and linseed oil in pre- and postweaning diets increased total PUFA content of SQ fat and muscle tissue without adversely affecting growth performance or carcass characteristics.

Key Word :

conjugated linoleic acid, fatty acid, lamb, polyunsaturated fatty acid

Volume 87, Number 12, December 2009