SUBSTITUTING CORN FOR BARLEY IN BEEF FINISHER DIETS HAS ONLY MINOR EFFECTS ON BACKFAT FATTY ACID COMPOSITION

P. Vahmani[1*], J. A. Johnson[2], B. D. Sutherland[2], G. B. Penner[2], N. Prieto[3], J. L. Aalhus[3], M. Juárez[3], O. López-Campos[3], and M. E. Dugan[4],

[1]*Department of Animal Science, University of California, Davis, CA, USA*,

[2]*Department of Animal and Poultry Science, University of Saskatchewan, Saskatoon, Canada*,

[3]*Agriculture and Agri-Food Canada, Lacombe Research and Development Centre, Lacombe, Canada*,

[4]*Agriculture and Agri-Food Canada, Lacombe Research and Development Centre, Lacombe, Canada*,

*pvahmani@ucdavis.edu

I. OBJECTIVES

Surveys of beef fatty acid composition in Canada where corn instead of barley are fed have shown instances of higher levels of *trans* (t) fatty acid isomers associated with unhealthy lipoprotein profiles. The objective of the present research was to examine direct effects of feeding corn, barley, or an equal mixture of corn and barley grain together with either corn or barley silage on the comprehensive fatty acid composition of backfat.

II. MATERIALS AND METHODS

Steers weighing 465 ± 28.0 kg were assigned to one of 24 pens (12 steers/pen) in a completely randomized design for an 89-d finishing study. Diets were arranged in a 2 × 3 factorial with either corn silage or barley silage included at 8% dry matter (DM). Within silage source, diets contained dry-rolled barley grain (86% of DM), dry-rolled corn grain (85% of DM), or an equal blend of barley and corn grain (85% of DM). Cattle were fed to a final body weight of 659 ± 4.9 kg and transported to a federally inspected slaughter plant. Bone-in ribeyes were collected from 4 steers per pen, and subcutaneous fat was sampled and subjected to base catalyzed methylation and fatty acid methyl ester analyzed by GC. Fatty acid proportions were subjected to two-way analysis of variance using the MIXED procedure in SAS version 9.2 (SAS Institute Inc., Cary, NC). Pen was the experimental unit, and the statistical model included forage and grain source as main effects, the forage by grain interaction, and pen as a random effect.

III. RESULTS

Silage source had minimal effects on the fatty acid composition of backfat. Feeding corn grain increased dietary fat and 18:2n-6 contents leading to small increases in 18:2n-6, total n-6 fatty acids, and n-6/n-3 ratios in backfat ($P < 0.05$). There were no changes in proportions of major *trans*-18:1 isomers (t10-18:1 or t11-18:1), the main natural isomer of conjugated linoleic acid (cis9,t11-18:2), or n-3 fatty acids. Substitution of corn grain for barley grain in finisher diets can therefore be done without substantially altering the fatty acid composition of beef fat, including polyunsaturated fatty acid (PUFA) biohydrogenation products.

IV. CONCLUSION

The slight increase in the n-6/n-3 PUFA ratio in beef backfat when feeding corn grain will likely have little influence on its nutritional/health value. Substitution of corn grain for barley grain did not lead to increases in total *trans* 18:1 in backfat and can be included in beef finisher diets without fear of promoting greater risk of cardiovascular disease. Likewise, the type of silage included in diets had very little effect on the fatty acid composition of beef fat. In all likelihood,

during surveys when higher levels of unhealthy *trans* fatty acids have been found, diets were supplemented with ingredients enriched with *trans* 18:1 precursors (i.e., PUFA), and investigations on limiting their inclusion levels are warranted.

Keywords: beef, backfat, *trans* fatty acid, vaccenic acid, rumenic acid