

P-01-29

Fatty acid composition of south african lamb from three production systems (#545)Stephani du Plessis³, Phillip Strydom^{1, 2}, Michelle Hope-Jones¹, Arno Hugo³¹ Agricultural Research Council of South Africa, Animal Production, Meat Science Section, Centurion, South Africa, South Africa; ² Stellenbosch University, Faculty of AgriSciences, Stellenbosch, South Africa; ³ Free State University, Department of Microbial, Biochemical and Food Biotechnology, Bloemfontein, South Africa**Introduction**

Different production systems (grain-fed vs forage/pastures) lead to different fatty acid profiles (FA) in the meat of ruminants. Diets containing low levels of saturated fatty acids (SFA), high levels of polyunsaturated fatty acids (PUFA) and a low omega 6:omega 3 PUFA ratio are considered favorable for human health [2]. Omega-3 PUFAs have anti-inflammatory and cardiovascular benefits, in particular the three long chain omega 3 PUFAs, eicosapentaenoic acid (EPA), docosahexanoic acid (DHA) and docosapentaenoic acid (DPA). Despite being a SFA, stearic acid's positive contribution to lowering low-density lipoprotein (LDL) cholesterol levels as well as lowering the ratio of the total and high-density lipoprotein (HDL) cholesterol has been reported. Conjugated linoleic acid is considered as the most important n-6 FA as it has demonstrated positive anti-diabetic, anti-cancer and anti-adipogenic effects. Variation in FA composition may also contribute to flavor differences. Globally, sheep production is dominated by low quality pastoral feeding systems. These diets produce meat with a characteristic "pastoral" flavour [2] as opposed to grain-based diets. The Karoo biome covers about 30% of South African land, and is semi-arid region consisting of grass, dwarf dry or succulent shrubs. Meat from this region is branded as "Karoo lamb" and has very distinct flavour profiles. This study investigates the effect of three production system, including the unique Karoo lamb system, used in lamb production in South Africa on fatty acid (FA) composition of the loin muscle in relation to possible health claims.

Methods

Twenty three products (lamb loin chops) were identified and collected from the shelves of five major retail outlets and twelve smaller butcheries on 14 different dates over 3 months (n=306). The products were grouped according to product claims/labels into Karoo lamb (Kar), Free range (Grass-fed; FR) and Grain-fed (GF). The *m.longissimus* was analysed for total chemical

fat and fatty acid composition. Data were subjected to a one way analyses of variance to compare the effect of production system on fatty acid composition. The Tukey-Kramer multiple comparison test ($\alpha = 0.05$) was carried out to identify significant differences between the treatment means.

Results

Total muscle fat was higher in GD ($P < 0.001$) loins than in FR or Kar loins, although the difference was small. Kar and FR recorded higher SFA levels than GF, mainly due to higher stearic acid. Palmitic acid did not differ among the three groups. MUFA was lower and PUFA higher in Kar and FR ($P < 0.001$). Lower MUFA was mainly due to lower oleic acid (C18:1c9) in Kar and FR loins. Arachidonic acid (n-6) content ($P < 0.001$) was higher in Kar and FR products. Interestingly linoleic acid (n-6)(LA) was lower and CLA (n-6) and alpha-linolenic acid (n-3) (ALA) higher ($P < 0.001$) only in Kar samples compared to GF samples but FR samples did not differ from GF for CLA or LA. As expected, total omega 3 (n-3) FAs were higher ($P < 0.001$) in Kar and FR loins but omega 6 (n-6) FAs were not different among the three treatments, mainly due to higher arachidonic acid in Kar and FR samples. EPA, DHA and DPA were higher ($P < 0.001$) in Kar and FR samples. PUFA:SFA did not differ across the three systems, because higher SFA in Kar and FR samples were countered by higher omega 3 PUFAs.

Conclusion

The FA composition of lamb produced from FR and Kar production systems are similar while the typical contrast in FA profile is evident between these two systems and the GF system. Small advantages with regards to health benefits, e.g. for CLA and ALA, may be claimed for Kar samples relative to FR samples. The unique flavor profile of Kar lamb can probably be contributed to other flavor components contained in the unique plant composition of this biome.

Notes