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**Presenter Information**

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## Fatty acid profile of subcutaneous fat in lambs finished on either olive oil cake-based rations on Mediterranean-like pastures in Chile

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**Key words:** lamb, fattening, Chile, fatty acids, olive-oil cake

**Introduction** Ruminant meat produced from grazing is generally rich in omega-3 fatty acids, and particularly conjugated linoleic acid. The undesirable saturated palmitic acid is also abundant (MacRae et al., 2005). Olive oil cake, a by-product of the extraction of olive oil has a high concentration of oleic acid, particularly if oil extraction has not been exhaustive. Fat lambs are the most important product of sheep grazing the Mediterranean-like native grasslands of Central Chile, and constitute the most important output of small sheep farms in the region. Production is extremely seasonal, constrained by the highly concentrated peak pasture yield in late spring and by the infrequent use of supplementary feeding. The objective of our work was to determine the extent to which olive oil cake could be used to modify the fatty acid profile of the subcutaneous fat, and by inference of meat, in an effort to transform lamb meat into a functional, value-added food.

**Materials and methods** The experiment was conducted from 20 October to 22 November 2006, at the Hidango Experiment Station of INIA, Chile, located in Central Chile, as described by Aguilar et al. (2008) at this Congress. Two treatments were compared in a completely randomized design using 12 Suffolk lambs per treatment. We determined the fatty acid profile of subcutaneous fat at slaughter of suckling, grazing lambs (GRAZING) versus weaned lambs stall fed a concentrate ration containing 33% (dry matter basis) of unexhausted, partially destoned olive oil cake (CAKE) obtained after a two-phase extraction of oil. The remainder of the diet was made up of ground maize, soybean meal, liquid molasses, sodium bicarbonate and a vitamin and mineral supplement. The CAKE ration had a crude fat content (ether extract) of 7.8% and was fed daily in excess of requirements, together with 200 g of chopped alfalfa hay of medium quality. The botanical composition of the native grassland is described by Aguilar et al. (this Congress). Lambs were fattened for 39 days, including an initial adaptation period of 8 days.

**Results and discussion** Individual animal performance was not influenced by the feeding treatment (Aguilar et al., 2008). Although slaughter and carcass weights did not differ between treatments, there were some differences in the weight of tissues and organs. CAKE lambs had significantly more pelvic and kidney fat ( $P < 0.002$ ), and heavier skin ( $P < 0.004$ ), liver ( $P < 0.001$ ) and kidneys, than GRAZING lambs. Somewhat unexpectedly, the thickness of subcutaneous fat on the 13<sup>th</sup> rib did not differ between treatments. The fatty acid composition of the latter was heavily influenced by the feeding treatment. The concentration of palmitic acid (C16:0) was 25% lower ( $P < 0.001$ ), stearic acid (C18:0) was slightly higher ( $< 0.05$ ), oleic acid (C18:1) was 32% higher ( $P < 0.0001$ ), linolenic acid (C18:2) was unchanged and linolenic acid (C18:3) was lower in the CAKE compared with the GRAZING lambs. The sum of saturated fatty acids was 16% lower in the CAKE lambs. Within each treatment there was a significant negative correlation between the concentration of oleic acid ( $r = -0.96$ ,  $P < 0.001$ ) and palmitic acid ( $r = -0.80$ ,  $P < 0.001$ ) with the total saturated fatty acid concentration. Nevertheless, the increase in oleic acid was negatively correlated with the total concentration of polyunsaturated fatty acids ( $r = -0.71$ ,  $P < 0.01$ ). Stearoyl-CoA desaturase indices (Kelsey et al., 2003) were not influenced by treatment ( $P < 0.05$ ), but the (C18:0+C18:1)/(C16:0) index (Bonanome and Grundy, 1988) increased from 2.1 in GRAZING to 3.5 in CAKE ( $P < 0.05$ ) lambs indicative of a more desirable balance from the point of view of human health. These results appear to be the first ones to be published regarding the effect of oil cake on the fatty acid profile of lamb carcasses.

**Conclusions** Feeding a concentrate ration containing unexhausted olive oil cake appears to be an excellent strategy to modify the fatty acid profile of fat lamb carcasses in a manner compatible with some aspects of human health meeting the requirements of a functional food. It remains to be established if supplementation of grazing lambs can combine the best characteristics of both systems.

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