Fat composition of meat has been studied given its implications for human health. Health professionals recommend reducing the intake of saturated fatty acids (SFA), and increasing polyunsaturated fatty acids (PUFA), especially n-3. Ruminant fats are not considered healthy for humans because of their high SFA and low PUFA content; however such fats are one of the major dietary sources of conjugated linoleic acid (CLA) which is assumed to be a healthy fatty acid. Animal feeding studies show that grass-based diets can improve the FA composition of ruminant fat depots by increasing CLA. To evaluate the effect of the geographic zone and diet supplementation on the fatty acids profile of lamb meat (legs, shoulders and T-bones), forty-eight individuals from independents owners were chosen for the study. To evaluate the geographical effect, one group was feeding in a foothill area and the other one in the central valley area. In every group two subgroups were made to evaluate diet supplementation (natural pasture and pasture supplemented with oat). The subjects were chosen according the date of birth, then transported to the experimental abattoir, slaughtered and carcasses chilled at 4°C during 24h. After that carcass were split, vacuum-packed and frozen (−20°C) until further analysis. In all meat cuts the CLA-isomer C18:2n9c,11t was found to be higher than C18:2n10t,12c. The highest total amount of CLA was in legs and T-bones samples obtained from the central valley and fed with natural pastures. The higher effect on CLA was due to geographic zone rather than diet supplementation.