Effect of the dietary supplementation with sunflower and fish oils on the rumen bacterial communities in dairy sheep

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In ruminants, the dietary addition of lipid sources rich in linoleic acid, such as sunflower oil (SO), and long-chain PUFA, such as fish oil (FO), has proved to increase the milk concentration of conjugated linoleic acid (CLA), which exerts important benefits to human health. Milk fatty acid (FA) profile is dependent on the ruminal FA biohydrogenation, the rumen microbial composition being therefore a key factor to increase the milk contents of beneficial FA. To study the effect of the dietary supplementation with SO and/or FO on the rumen bacterial communities of dairy sheep, thirty-two lactating ewes were divided in eight lots and offered a high concentrate diet, supplemented or not with lipids (2% SO, SO diet; 1% FO, FO diet; 2% SO + 1% FO, SOFO diet; and 0% oil, Control diet; 2 lots/diet), for 21 days. Rumen contents were sampled 3h after the morning feeding and approximately 10 ml from each lot mixed and immediately frozen at -80ºC for DNA analysis using the terminal restriction fragment length polymorphism technique (tRFLP). The SOFO diet altered the rumen bacterial communities compared with the other treatments. Remarkably, the combination of both oils gave a lower proportion of a fragment compatible with bacteria of the order Clostridiales, which includes some of the best known biohydrogenating bacteria, and a higher percentage of two other fragments that might be formed by bacteria belonging to the Clostridial cluster IX (e.g. Mitsuokella), some of which can metabolize unsaturated FA. Changes in the rumen microbiota due to the supplementation with SO+FO might be partially responsible for variations in the milk fatty acid profile, such as the reduction of the stearic acid content. Although some effects caused by the SO or FO diets were similar to those reported for SOFO, the lower oil content of the former diets might have prevented the changes to be significant.

Key words: CLA, lipid supplementation, rumen microbiota, t-RFLP
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