

## Influence of fish oil on ruminal biohydrogenation of C18 unsaturated fatty acids

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Dietary *cis*-9, *trans*-11-conjugated linoleic acid (CLA) is generally thought to be beneficial for human health. Fish oil added to ruminant diets increases the CLA concentration of milk and meat, an increase thought to arise from alterations in ruminal biohydrogenation of unsaturated fatty acids. To investigate the mechanism for this effect, *in vitro* incubations were carried out with ruminal digesta and the main biohydrogenating ruminal bacterium, *Butyrivibrio fibrisolvens*. Linoleic acid (LA) or  $\alpha$ -linolenic acid (LNA) was incubated (1.67 g/l) with strained ruminal digesta from sheep receiving a 50:50 grass hay–concentrate ration. Adding fish oil (up to 4.17 g/l) tended to decrease the initial rate of LA ( $P=0.025$ ) and LNA ( $P=0.137$ ) disappearance, decreased ( $P<0.05$ ) the transient accumulation of conjugated isomers of both fatty acids, and increased ( $P<0.05$ ) the accumulation of *trans*-11-18:1. Concentrations of EPA (20:5*n*-3) or DHA (22:6*n*-3), the major fatty acids in fish oil, were low (100 mg/l or less) after incubation of fish oil with ruminal digesta. Addition of EPA or DHA (50 mg/l) to pure cultures inhibited the growth and isomerase activity of *B. fibrisolvens*, while fish oil had no effect. In contrast, similar concentrations of EPA and DHA had no effect on biohydrogenation of LA by mixed digesta, while the addition of LA prevented metabolism of EPA and DHA. Neither EPA nor DHA was metabolised by *B. fibrisolvens* in pure culture. Thus, fish oil inhibits ruminal biohydrogenation by a mechanism which can be interpreted partly, but not entirely, in terms of its effects on *B. fibrisolvens*.

**Biohydrogenation: Conjugated linoleic acid: Fish oil: *Trans* fatty acids**

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**Abbreviations:** CLA, conjugated linoleic acid; DMOX, 4,4-dimethyloxazoline; FAME, fatty acid methyl ester; LA, linoleic acid; LNA,  $\alpha$ -linolenic acid; SRF, strained ruminal fluid; VA, vaccenic acid.

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