

Addition of uncentrifuged-autoclaved rumen fluid allows microbial biohydrogenation of 22:6*n*-3 in highly diluted rumen inoculum.

Biohydrogenation of polyunsaturated fatty acids is a process carried out by microorganisms in the rumen. Studies have shown that mixed rumen microorganisms are able to perform biohydrogenation of docosahexaenoic acid (DHA, 22:6*n*-3), however the bacterial species responsible for DHA biohydrogenation in the rumen remains unknown. Identification of the bacteria involved in DHA biohydrogenation is however important to be able to provide a more fundamental understanding of the mechanisms involved in DHA biohydrogenation in the rumen. The aim of this study was to select the simplest biological consortium that performs biohydrogenation of DHA by dilution-to-extinction technique. Sensitivity of biohydrogenating bacteria towards DHA required growth media adjustments. We hypothesize that addition of uncentrifuged-autoclaved rumen fluid (uRF) to the growth media stimulates biohydrogenation of DHA. Hence, we first evaluated the disappearance of DHA in mixed cultures with media containing or not uRF. Given the stimulating effect of uRF on metabolism of DHA, we included uRF in the media which we used in the dilution-to-extinction experiment. Metabolism of DHA was observed at low dilutions and the biohydrogenation capacity was still present at a 10⁶ dilution. At the 10⁸ dilution, metabolism of DHA was highly variable between replicate tubes. With further dilutions of the inoculum, no metabolism of DHA was observed. In conclusion, addition of uRF to the growth media allows microbial biohydrogenation of DHA in highly diluted rumen inoculum.