

Effects of longer term dietary supplementation with microalgae on milk and plasma fatty acid composition, plasma 13, 14-dihydro-15-keto PGF_{2α} concentration and inflammatory markers in dairy cows

Bethan E Till¹ James A Huntington¹ Kirsty E Kliem² Jules Taylor-Pickard³ and Liam A Sinclair^{1*}

¹Department of Animal Production, Welfare and Veterinary Sciences, Harper Adams University, Newport, Shropshire, TF10 8NB, UK.

²Division of Food Production and Quality, School of Agriculture, Policy and Development, University of Reading, Reading, RG6 6AR, UK.

³Alltech Biotechnology Centre, Summerhill Road, Dunboyne, Ireland.

Short title: Microalgae and milk fatty acids

***For correspondence; e-mail lsinclair@harper-adams.ac.uk**

This research study aimed to determine the longer-term effects of dietary supplementation with microalgae (ALG) on milk and blood fatty acid (FA) composition, reproductive hormones and inflammatory markers in early lactation dairy cows. Sixty Holstein-Friesian dairy cows (30 per treatment) were unsupplemented (Control) or supplemented with 100 g of ALG (*Schizochytrium imancinum* sp) per cow per day from 25 ± 0.5 days for 98 days. Intake and milk yield were recorded daily, with milk samples collected at weeks 0, 1, 2, 4, 8 and 14, and blood samples at weeks 0, 2, 4, 8, and 14. At 33 ± 0.9 days postpartum the oestrus cycle of 24 cows (12 per treatment) were synchronised and plasma 13,14-dihydro-15-keto $\text{PGF}_{2\alpha}$ (PGFM) concentrations determined following an oxytocin challenge. There was no effect of treatment on dry matter intake, milk yield or milk fat content, with mean values of 22.1 and 40.6 kg/d, and 37.2 g/kg respectively. Milk fat concentration of C22:6 n-3 increased rapidly in cows receiving ALG, reaching a maximum of 0.38 g/100 g FA by week 14. Similarly, blood concentrations of C22:6 n-3 increased to 1.6 g/100 g FA by week 14 in cows fed ALG. There was no effect of diet on milk somatic cell count, plasma interleukin 1β or serum amyloid A concentration. There was also no effect of treatment on peak plasma PGFM concentration or area under the curve. It is concluded that feeding ALG rapidly increases blood and milk concentrations of C22:6 n-3 which are maintained over time, but does not improve indicators of reproductive performance or inflammation in dairy cows.