The content of conjugated linoleic acid in milk fat in response to feeding a cereal grain-based supplement to dairy cows grazing pastures

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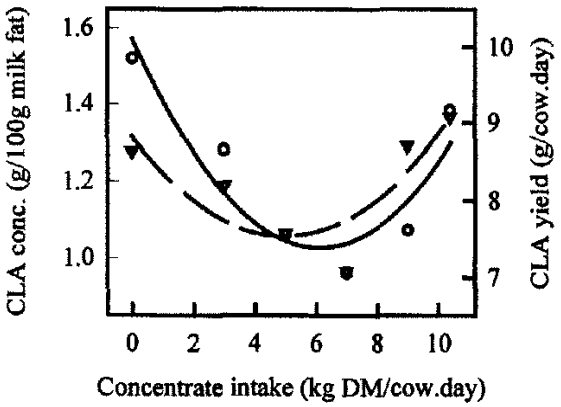
Conjugated linoleic acid (CLA), which is synthesised in the rumen from its dietary precursor (linoleic acid) and incorporated into milk fat and other lipids, confers protective effects against cancer, atherosclerosis and diabetes in laboratory animals and possibly humans (Parodi 1997). Management options that result in a high content of CLA in milk may lead to improved acceptance and consumption of dairy products by consumers.

A grazing experiment examined the CLA content of milk fat of dairy cows in response to supplementation with a cereal grain-based energy concentrate offered twice daily after milking at 0, 3, 5, 7, 9 or 11 kg DM/cow.day. All cows grazed irrigated perennial pasture at an allowance of 25 kg DM/cow.day in late summer and autumn and were in mid to late lactation.

Both the concentration and yield of CLA in milk fat varied quadratically with the amount of concentrate consumed by cows (see figure). Milk fat concentrations were 4.48, 4.09 and 3.25 g/100g, milk yields were 12.4, 18.3 and 21.9 kg/cow.day and herbage intakes were 12.1, 11.2 and 9.2 kg DM/cow.day at concentrate intakes of 0, 5 and 10.4 kg DM/cow.day, respectively. The condition score of cows increased ($P<0.05$) across all treatments.



The relationships between the concentration of conjugated linoleic acid (CLA) in milk fat (solid line, ○) and the yield of CLA (dashed line, ▽) and level of concentrate intake of dairy cows grazing irrigated perennial pasture. (CLA g/100g milk fat = 1.56 − 0.18 (± 0.035) CI + 0.015 (± 0.003) CI^2, $R^2 = 0.60$, $P<0.01$; CLA g/cow.day = 8.82 − 0.53 (± 0.185) CI + 0.05 (± 0.017) CI^2, $R^2 = 0.33$, $P<0.05$).

The contribution of long chain fatty acids (LCFA) from adipose tissue to milk fat production was likely to be small. We suggest the reduction in the CLA concentration in milk fat in response to increases in the amount of concentrate fed to cows, up to about 6 kg DM/day, was primarily due to reductions in the contribution of herbage to the diets and to increases in the de-novo synthesis of LCFA in the mammary gland relative to its uptake from plasma. However, at concentrate intakes higher than this, increases in CLA concentration in milk fat with increasing concentrate intake resulted from greater rates of outflow of CLA from the rumen and progressive reductions in the relative contribution of de-novo synthesis of LCFA to milk fat production. Importantly, supplementation practices commonly used by dairy farmers in northern Victoria significantly affected the CLA concentration of milk fat.

Parodi, PW. Cow's milk fat components as potential anticarcinogenic agents. J Nutr 1997; 127:1055-60.