

## FAT PROTEIN RATIO AS A TOOL TO MONITOR DAIRY COW METABOLISM

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### Abstract

Metabolic disorders and anomalies in ruminal fermentation can affect chemical characteristics of dairy cow milk. Fat to protein ratio (FPR) has been mentioned as a sensitive indicator of metabolic status of dairy cows, and of nutritional imbalances. Some authors indicated as optimal a FPR between 1.2 and 1.4 typical of a positive energy balance, with higher values relating to a metabolic shift towards ketosis, and values below 1.1 probably deriving from rumen acidosis. Moreover, several studies demonstrated the influence of rumen environment on milk fat fatty acid (FA) profile. Some studies showed as a decrease in rumen pH induce a change in the biohydrogenation of unsaturated FA resulting in the formation of C18:1*trans*10 and C18:2*trans*10 *cis*-12. Other researchers showed that feeding low fiber diet or inducing acidosis in cows lead to an increase in odd-chain FA from C7:0 to C17:0 including C10:0, C12:0 and C12:1*cis*9. Additionally, it has been speculated as C18:1*trans*-10 and the C18:1*trans*10/C18:1*trans*11 ratio could be good indicators for the diagnosis of SARA. The aim of the present work was to investigate the difference in milk FA profile between cows with low and normal FPR. The study was carried out on a total of 96 early lactating Italian Holstein dairy cows (60-80 DIM) from 3 different farms, fed total mixed rations typical of the northern Italy. For each farm, the milk of 16 animals with FPR <1 (LFPR) and 16 animals with FPR >1 and <1.4 were sampled and analyzed for protein and fat content by infrared spectroscopy and for FA profile by gas-chromatography. Cows with LFPR showed variations in FA concentration typical of subacute acidosis, such as the significant increase of odd chain FA (whose sum increased from 2.49 to 2.72 g/100g;  $P < 0.01$ ), C10:0, C12:0, C18:1*trans*10 (0.42 vs 0.59 g/100g;  $P < 0.01$ ) and the numerical decrease of C18:1*trans*11, observed by other authors feeding cows acidogenic diets. The same animals showed an increase of the C18:1*trans*10/C18:1 *trans*11 ratio found in acidotic cows. Based on these results, it appears that dairy cows showing LFPR are probably facing subacute acidosis-like metabolic variations, probably attributable to specific feeding behavior of these animal, such as sorting, lowering ruminal pH.