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Title: Evaluation of health benefits and organoleptic quality of dairy products made from milk sorted out by near-IR sensor based on fatty acid composition
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Background: Today, consumers are more aware of their food choices regarding health issues. High consumption of dairy products rich in saturated fatty acids (SFA) and cholesterol is related to the high occurrence of atherosclerosis and non-alcoholic fatty liver disease (NAFLD). As milk's SFA% naturally varies, using milk fat with low levels of SFA% could show health benefits, especially in high fat-content products such as cheese, without affecting their organoleptic quality.
Research Hypothesis: replacing regular milk-fat with naturally existing milk-fat with a lower SFA level attenuates mice's hypercholesterolemia, atherosclerosis, and NAFLD levels and influence the organoleptic properties of the dairy product such as cheese
Aims: 1. to validate the FTIR method for milk separation according to SFA%. 2. to evaluate the effect of descending dietary SFA% in attenuating age and diet-induced progression of atherosclerosis and NAFLD in the arteriosclerosis-prone apolipoprotein E knockout mouse (APOE); 3. to produce a cheese model product based on FA composition and evaluate the differences in its organoleptic properties.
Methods: The natural variation of SFA% in milk-fat was analyzed by FTIR, calibrated by GC-FID, to generate LFDs and WDs with declining SFA%. The effect of milk SFA% on hypercholesterolemia, atherosclerosis, and NAFLD development was examined in the APOE mice by metabolic and histological indices: blood lipids level, atherosclerotic plaques' formation, and the development of hepatic fibrosis. GC-MS and electronic nose analyzed volatile compounds from semi-hard cheese, and cheese properties were analyzed by texture analyzer and discrimination test.
Results: LFD that contained low SFA% resulted in a (small but significant) increase in HDL-cholesterol levels compared to baseline level, with no significant effect on the increase in total blood cholesterol. The progression of arteriosclerotic plaques was positively related to the dietary SFA% in LFD but not under WD. Hepatic fibrosis level was dose-related to SFA% under LFD and to some extent also under WD. Cheeses were prepared from the 'separated' milk streams, and texture seemed softer for more unsaturated FA, whereas no significant difference was observed for flavor.
Discussion: Replacing regular milk-fat with naturally existing milk-fat with a lower SFA% incorporated in LFD attenuates the development of age-induced NAFLD in a dose-dependent manner. Despite the fact that the composition in SFA% was changed from 70:30 in LS to 60:40 in HS, the flavor had not changed much, which implies that this change did not much influence the metabolic and ripening routes in %SFA.
Conclusions: Consumption of milk products in which regular milk fat was replaced with naturally existing milk fat with a lower SFA% may attenuate the progression of several metabolic diseases, at least while feeding on an LFD. The research findings also confirmed that 'health beneficial' dairy products like cheese can be produced from milks with favored FA composition, in particular CLA

and oleic acid. The influence on flavor is not significant and new products can be developed without changing the known organoleptic quality.

Key words (Up to 5): Fatty acid, APOE, organoleptic properties, health, dairy products
Publications associated with the project (PubMed Format):
None