Improving the fatty acid composition of animal originated food by nutrition

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There has been an increased interest in recent years in ways to manipulate the composition of animal products (meat, milk and egg) to meet with human demands.
Fat content and fatty acid composition of animal originated food have great importance in terms of human nutrition. A considerable number of studies proved the different fatty acids to have a number of effects on our health, based on their different physiological roles.
A part of our experiments were carried out with poultry (broiler and laying hen) to increase the conjugated linoleic acid (CLA) proportion of fat in broiler meat and egg.
It is well known that CLA - especially the c9t11 $C_{18:2}$ isomer - has anticarcinogenic effect in human body, but its antioxidant property is also remarkable.
The CLA source of our experiments was a CLA-product, which was produced by alkaline isomerisation of sunflower oil in our department. This product involved 49.2% from the c9t11 $C_{18:2}$ isomer, which has beneficial physiological properties. There was a good efficiency (87.3%) of the conversion of linoleic acid into conjugated linoleic acid. The 1 and 2% CLA product supplementation (0.49 and 0.98% CLA, respectively) resulted significant ($P<0.05$) improvement of c9t11 $C_{18:2}$ isomer in breast and thigh meat (dose of 1%: 1.84 and 1.85% and dose of 2%: 3.49 and 3.70%, respectively) compared to the control birds, because 0.088 and 0.111% were found in their breast and thigh. In addition, borilers' daily weight gain and feed conversation ratio improved in groups fed 1 and 2% CLA product in their diets.
The c9t11 CLA content of egg can also be enhanced similar to the broiler meat, that is 1% CLA product (0.49% CLA) supplementation increased the c9t11 $C_{18:2}$ proportion of egg fat to 1.18%.
In addition, it was investigated in our trial whether the c9t11 $C_{18:2}$ isomer content alter when broiler meat is fried in lard or in sunflower oil. The results proved - opposite to the public belief - that absolute CLA content of meat decreased slightly during frying.
The aim of another experiment was to improve the n-3 fatty acid content and n-6/n-3 ratio in lamb meat. Ten (2x5) male Merino lambs were used to determine the effect of calcium soap of linseed oil on the fatty acid profile. A rumen protected form of linseed oil was used because it is well known that the major part of unsaturated fatty acids saturate during ruminal biohydrogenation. Control lambs fed a basal diet and the experimental lambs consumed a diet supplemented with 3% calcium soap of linseed oil. As expected, the linolenic ($C_{18:3n3}$) and thus the n-3 content significantly ($P<0.05$) improved by linseed oil supplement both in the *longissmus dorsi* and the *biceps femoris muscles* ($C_{18:3n3}$: 0.81 and 0.80; n-3: 1.16 and 1.15, respectively) compared to control linolenic and n-3 values, which ranged around 0.5 and 0.85, respectively. Hereby, the n-6/n-3 ratio was narrower in the experimental group than in control samples (5.82-6.31:1 vs. 8.29-9.38:1, respectively).