

THE EFFECT OF FEEDING CALVES HYDROGENATED RAPE OIL ON THE COMPOSITION OF FATTY ACIDS IN KIDNEY FAT

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Background

A correlation between the consumption of saturated fatty acids and human heart disease (CHD) is generally known. This interdependence indicates the need for replacing saturated fatty acids in foods with unsaturated ones. A production of veal containing in its fatty tissue a reduced level of saturated fatty acids is one of prospective solutions. It was presumed that it could be achieved through replacing milk fat with plant fat in the feeding of calves.

Two experiments were carried out to evaluate the effects of feeding calves skim milk with hydrogenated rape oil '0' and '00' on the change in the composition of fatty acids in fat tissue in calf carcasses.

Materials and Methods

97 fattened calves from two feeding experiments were slaughtered at the body weight of appr. 180 kg. and at the age of up to six months. Experiment I was focused on examining the influence of varied hydrogenated rape oil '0' level in liquid feed on the level of fatty acids in kidney fat. In experiment II calves were given liquid feed of skim milk with a supplement of hydrogenated rape oil '00' and with, in the final stage of fattening, ground wheat (**Group A**), ground barley (**Group B**), and dried beet (**Group C**). The control group consisted of calves which were given liquid feed made of skim milk and margarine for 28 days, and then corn feedstuffs.

Kidney fat was sampled from chilled carcasses and its composition of fatty acids was determined with a gas chromatography method

Results

The results showed that, with the exception of the control group, the composition of fatty acids in kidney fat from calves was very similar in both experiments. The differences were observed only in the amount of erucic acid. In experiment I it approximated 1%. In experiment II erucic acid was not found in kidney fat although it was present in a small amount in hydrogenated rape oil that was put in the liquid feed. In comparison with the calves in the control group, the chromatographic examinations indicated that unsaturated fats prevailed over the saturated fat in experimental calves. It was nearly twice as much as in the control group. Also, in the fat of those calves that were fed milk replacers, containing milk fat, the level of saturated acids was high, similarly to the examined control group (Dzierżyńska - Cebulko, 1984). The obtained results confirm the influence of feeding on the composition of fatty acids in calves. The changes regard a general increase in the level of oleic acid (C 18:1), and a reduction in the level of palmitic acid (C 16:1) in fat tissue of the animals fed hydrogenated rape oil supplement. The differentiated level of fat in the liquid feed in experiment I did not have a substantial influence on the change in the composition of fatty acids in kidney fat. It also referred to calves in experiment II where the supplements of corn feedstuffs did not change the composition of fatty acids either. Hence, it can be said that the composition of fatty acids in calves was determined, most of all, by the composition of fat in liquid feed. Various additional feedstuffs which did not constitute the main feeding basis did not exert an impact on the change in the composition of fatty acids in kidney fat.

The obtained results implied a partial increase in the saturation of fatty acids in living animals, because there was only 10% of palmitic acid in the used hydrogenated rape oil, and about 15% in veal fat.

The undertaken study showed that there is a chance to considerably change the composition of fatty acids in fatty tissue of calves through changing the components of feeding stuffs. Additionally, the health quality of meat can be improved in this way, due to an increase in the level of monounsaturated acids.

Conclusions

1. The type of fat used for the fattening of calves had a serious effect on the composition of fatty acids in kidney fat. Hydrogenated rape oil used in liquid feed caused an increase in the level of unsaturated fatty acids and a reduction in the level of saturated acids in comparison with milk fat.
2. In the calves fed on hydrogenated rape oil '0', containing appr. 13% of erucic acid, the content of this acid in kidney fat was appr. 1%.
3. The level of oleic acid was very similar in kidney fat and in hydrogenated rape oil which was used in liquid feed.

Tab.1. Fatty acids composition of kidney fat from heavy calves fed hydrogenated rape oil and the composition of hydrogenated rape oil and milk fat - Experiment I

Fatty acids	Control group (corn feedstuffs)	Experimental group A (4% of fat in liquid feed)	Experimental group B (2% of fat in liquid feed)	Composition of	
				hydrog. rape oil	milk fat
C 8 : 0	0.01	-	-	-	-
C 10 : 0	0.05	0.07	-	0.05	4.4
C 12 : 0	0.29	0.17	0.08	0.15	5.1
C 14 : 0	2.82	2.45	2.81	0.90	13.2
C 14 : 1	0.45	0.38	0.34	-	1.6
C 15 : 0	0.58	0.13	0.13	0.10	1.9
C 15 : 1	0.52	0.08	0.06	-	0.9
C 16 : 0	24.32	14.23	15.43	6.95	30.4
C 16 : 1	2.53	2.48	2.58	1.05	2.1
C 16 : 2	0.97	0.48	0.56	-	-
C 17 : 0	2.11	0.48	0.48	0.15	1.9
C 17 : 1	1.11	0.22	0.23	-	0.8
C 18 : 0	25.89	15.14	13.68	7.45	8.4
C 18 : 1	32.67	50.21	50.16	51.25	24.2
C 18 : 2	3.77	6.22	4.98	2.30	2.5
C 18 : 3	0.34	1.60	0.61	1.10	0.2
C 20 : 0	0.26	0.89	0.69	4.15	0.5
C 20 : 1	0.58	2.13	2.23	2.60	0.7
C 20 : 2	0.16	0.33	0.26	0.75	0.2
C 21 : 0	0.14	0.24	-	1.20	-
C 21 : 1	0.12	0.14	-	4.8	-
C 22 : 0	0.16	0.15	0.18	1.1	0.1
C 22 : 1	0.29	1.39	1.08	13.35	0.8
Saturated fatty acids - average	56.63	33.95	33.30	22.20	65.9
Unsaturated fatty acids - average	43.51	65.66	63.27	77.20	34.0

Tab.2. Fatty acids composition of kidney fat from calves and hydrogenated rape oil, /%/ - Experiment II

Fatty acids	Experimental groups			Composition of hydrogenated rape oil '00'
	Group A wheat bruised grain supplement	Group B barley bruised grain supplement	Group C dried beet supplement	
C 15 : 0	0.05	0.05	0.15	-
C 15 : 1	0.03	-	-	-
C 16 : 0	15.00	14.65	14.25	10.0
C 16 : 1	2.50	1.85	2.45	0.60
C 17 : 0	0.25	0.25	0.35	0.1
C 17 : 1	0.20	0.10	0.15	0.03
C 18 : 0	11.55	11.50	11.00	9.7
C 18 : 1	49.80	48.90	49.35	48.40
C 18 : 2	8.35	8.50	8.00	10.1
C 18 : 3	1.25	1.40	1.35	2.5
C 20 : 0	0.15	0.10	0.20	0.9
C 20 : 1	0.80	0.60	0.85	1.7
C 22 : 0	-	-	-	0.2
C 22 : 1	-	-	-	1.0
Total saturated fatty acids	29.95	29.45	29.00	22.10
Total unsaturated fatty acids	63.13	61.55	62.35	64.33