

Effect of dietary lipid supplementation on pre- and post-weaning growth and fat deposition in kids

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Low subcutaneous adipose deposits on kid carcasses reduce their commercial value. Thus, two experiments were conducted to determine how lipid supplementation can increase fattening in Alpine male kids.

In experiment 1, 12 kids received individually, *ad libitum* a milk replacer (15 % W/V) containing 15.9 (group 1) or 27.0 % (group 2) of fat (especially tallow fat)/DM, from 1 week of age until slaughtering at 7 weeks. In experiment 2, 14 kids were given the same milk replacer (21.5 % fat/DM) until weaning at 6 weeks and from 4 weeks until slaughtering at 14 weeks of age, water, lucerne hay and concentrate were offered *ad lib*. Concentrate pellets were based on cereals and soyabean-oilmeal in group 3 and on the previous milk replacer powder in group 4.

In experiment 1, the level of dry matter intake was higher (6 % : NS) in group 1 than in group 2, but the growth rate was not affected, 213 and 221 g/d (respectively for groups 1 and 2). Body fat of group 1 was the least developed in offals (163 vs 224 g P : NS, 89 vs 161 g P < 0.05, 147 vs 184 g P < 0.10, 13.1 vs 19.7 g P < 0.05 respectively for omental, perirenal, mesenteric and pericardic adipose tissues) and in intermuscular leg adipose tissue (55.8 vs 69.4 g P < 0.10) but there were no differences in the two groups for subcutaneous leg and sternal adipose tissues.

During the first 3-week-post weaning period of experiment 2, the level of dry matter intake was lower in group 3 than in group 4 on account of the concentrate intake. In the next period, until slaughtering, the intake of concentrate was similar in the two groups but the hay intake was higher in group 3 than in group 4. Overall growth rate of this post-weaning period was lower in group 3 (185 vs 218 g/d P < 0.10). As for experiment 1, kids receiving fat supplementation had more developed adipose tissues in offals (632 vs 301 g P < 0.01, 424 vs 136 g P < 0.01, 494 vs 220 g P < 0.01, 35.4 vs 20.7 P < 0.10 respectively for omental, perirenal, mesenteric and pericardic adipose tissue of groups 4 and 3) but not in sternal subcutaneous adipose tissue.

Dietary fat supplies resulted in an improvement of postweaning but not preweaning growth rate in Alpine kids. Offals and intermuscular adipose deposits were increased especially in weaned kids, but subcutaneous adipose tissue was not affected.

Key words : Adipose tissue, kid, weaning, lipid.

Effect of diet on the fatty acid profile of adipose tissues and muscle fat of kids

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The purpose of the present work was to study whether the composition of the food affects the fatty acid profile of adipose tissues and muscle fat and whether changes in the fatty acid profile are reflected in sensory quality.

Saanen kids were divided into 4 groups of 6 kids each. The kids were fed 1) milk replacer only, 2) milk replacer containing 30 % heat treated starch and soyabean protein concentrate mixture, 3) milk replacer and elevated amounts (up to 60 %) of raw starch and soyabean protein mixture or 4) milk replacer until the age of 28 days and had free access to dry concentrate

throughout the experimental period. The milk replacer was a commercial product containing 24 % total protein (19 % casein) and 18 % fat (the fatty acid profile is shown in table 1). The dry concentrate was composed of soyabean meal, corn, barley, minerals and vitamins and contained 17.5 % crude protein. The starch-soyabean concentrate was prepared from 63 % either raw or heat treated corn starch, 32 % soyabean protein concentrate (64 % protein), minerals and vitamins. The mixture was dissolved in warm water and mixed with the milk replacer.

Body weight at slaughter was 19.6, 19.3, 19.5 and 18.2 kg and average age 64.7, 64.7, 72.6 and 76 days in groups 1, 2, 3 and 4 respectively. The weight of the perirenal fat was 293, 264, 176 and 82 g and the mesenterial fat 693, 495, 444 and 216 g in groups 1, 2, 3 and 4 respectively. The fat percent in the leg muscle was about 2.5 % in all the groups. The amount of fat deposition was related to the amount of milk replacer consumed.

TABLE 1
*Fatty acid profile of adipose tissues and leg muscle fat of kids fed different diets
(% of total fatty acids).*

Fatty acids										
	12 : 0	14 : 0	16 : 0	16 : 1	17 : 0	17 : 1	18 : 0	18 : 1	18 : 2	20 : 4
<i>Perirenal fat</i>										
Diet										
1	6.5	16.0	22.7	3.8	0.85	0.72	12.6	31.6	4.4	—
2	3.9	14.1	22.3	4.4	0.79	0.62	11.8	37.0	3.9	—
3	3.9	14.5	23.9	4.2	0.76	0.34	12.7	34.4	4.5	—
4	—	4.2	18.5	3.7	1.85	0.45	28.0	36.1	5.6	—
<i>Mesenterial fat</i>										
1	6.2	14.4	21.1	4.6	0.65	0.73	9.9	38.6	2.5	—
2	2.9	12.6	21.4	7.9	0.17	0.42	10.5	40.4	2.8	—
3	2.9	10.6	18.8	5.0	0.74	0.89	9.9	43.1	6.3	—
4	—	3.9	16.1	5.8	0.68	0.77	18.0	46.8	6.1	—
<i>Leg muscle fat</i>										
1	—	6.8	16.5	9.0	4.63	—	4.8	45.2	9.9	3.3
2	—	4.1	14.2	7.4	3.01	—	5.5	53.4	10.5	2.0
3	—	4.2	14.4	7.5	2.20	—	5.0	51.5	12.9	2.3
4	—	4.3	17.3	5.2	1.41	—	8.4	52.0	10.9	0.6
<i>Milk replacer *</i>										
	34.1	13.3	13.6	1.4	0.49	0.31	7.9	15.9	2.5	—
<i>Concentrate **</i>										
	0.4	1.6	20.1	0.8	—	—	4.9	22.8	45.0	—

* Contained also 5.5 % 8 : 0 and 4.8 % 10 : 0 fatty acids.

** Contained also 3.2 % 18 : 3 fatty acid.

There was a consistent difference in the profile of fatty acids between the groups fed milk replacer only (group 1) and the group fed dry concentrate (group 4) (tabl. 1). The main difference was that the kids fed milk replacer only had higher concentration of 12 : 0, 14 : 0 and 16 : 0 fatty acids and less 18 : 0 and 18 : 1 in the adipose tissues assayed than the kids fed dry concentrate. The kids fed the liquid diets containing starch-soy mixtures were intermediate in this respect. A similar trend was observed in the leg muscle fat : in the kids fed milk replacer only the concentration of the fatty acids 14 : 0, 16 : 0, 17 : 0 and 20 : 4 was higher than in the other groups, while 18 : 0 and 18 : 1 was higher in the kids fed dry concentrate. In the kids fed liquid diets containing starch-soya mixtures, the concentration of most of the fatty acids was intermediate between those fed milk replacer only and those fed dry concentrate.

The different feeding treatments, which affected the fatty acids profile, did not affect the sensory quality of the meat as found by tasting panels. The tasting panels rated samples of meat from 1-7 for aroma, flavor, hardness and juiciness. There were no statistically significant differences between the groups in neither of the above parameters.

It may be concluded that in the present study changes obtained in the fatty acid profile of adipose tissues and leg muscle fat, due to variation in food composition, were not reflected in the sensory quality of the meat.

Key words : Kid, adipose tissue, muscle fat, fatty acids, diet.

Growth, efficiency of conversion and carcass composition of castrate male Saanen and Saanen × Angora kids on a concentrate diet

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The British Saanen (S) is the dominant breed in the small milk goat industry in the U.K. At present few male kids are reared commercially. It has been suggested that Angora (A) goats, which were introduced for fibre production, have better growth and carcass characteristics than pure Saanen. An experiment was designed to assess the potential growth rate and conversion efficiency of these kids and define suitable slaughter weights.

Castrate male kids (34 S and 12 A × S), that had been reared on a milk replacer to 8 weeks of age, were placed in individual pens and fed a concentrate diet *ad libitum* together with 150 g/week of hay. At 10 weeks of age eight S kids were slaughtered at mean live weight of 21 kg (range 16-26 kg). The remaining S kids were allocated to treatments and slaughtered as each individual reached 29, 37 or 45 kg liveweight. Six A × S kids were slaughtered at 29 and at 37 kg.

Liveweight interval (kg)	21-29		29-37		37-45
	S	A × S	S	A × S	S
Breed	S	A × S	S	A × S	S
Concentrate DM intake (g/kg/day) . .	34.0	28.4	32.0	25.6	27.6
Growth rate (g/day)	209	128	204	127	201
Conversion (g lwt gain/kg conc)	251	181	197	154	181

Intake of concentrates by S kids increased from a mean 850 g/day during gain from 21-29 kg to 1 130 g/day in the interval from 37-45 kg but intake relative to liveweight decreased from 35 to 28 g/kg, a little lower than those of lambs on a similar diet. The growth rate only declined very slightly over the three growth intervals but conversion efficiency decreased by 28 %. The A × S kids had lower intakes, growth rates and efficiencies of conversion than S kids.

Breed	S	S	A × S	S	A × S	S
Liveweight at slaughter (kg)	21.0	29.9	29.5	37.6	37.0	45.5
Carcass weight	9.1	14.3	14.9	18.8	20.5	24.0
Percentage in carcass of :						
Bone	24.1	19.1	16.4	18.6	14.6	15.5
Muscle	63.0	61.6	59.1	59.8	56.0	59.8
Subcutaneous fat	4.0	6.1	9.5	6.8	12.5	8.6
Intermuscular fat	8.9	13.2	15.0	14.7	17.0	16.0