

# EFFECT OF RAPESEED OIL ON FATTENING PERFORMANCE, CARCASS YIELD, NUTRIENT AND SENSORIC PARAMETERS OF MEAT OF GROWING RABBITS

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**Abstract** - The effects of different amounts of rapeseed oil added to a rabbit diet on growth performance, carcass yield as well as fat content, fatty acid composition and sensoric parameters of meat were studied. It became clear that the rapeseed oil decreased the daily feed intake but not the live weight of the rabbits. Therefore the feed conversion efficiency has been improved. The dressing percentage was not effected by oil addition, however the kidney fat content of the carcass increased. Also content of crude fat and fatty acid composition of the meat were effected by feeding. The crude fat content of the meat of hindleg and intermediate part raised; a higher fat content was found at the hindleg. The saturated fatty acids, especially myristic acid and palmitic acid, decreased, whilst the content of the unsaturated fatty acids oleic acid and linolenic acid increased. The amount of polyunsaturated fatty acids was the same in all groups. Sensoric parameters of the meat were not impaired significantly by fat addition.

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## INTRODUCTION

By means of addition of fats it is possible to raise the energy content of the feed mixture and moreover the digestibility and the palatableness of the feed and also the resorption of fatty soluble vitamins (CHEEKE, 1987). By using vegetable oils it's also possible to enrich the unsaturated fatty acids of the meat, similar the fatty acid composition of the feed (COBOS et al., 1993).

The aim of this study was to examine, to what extend the addition of different amounts of rapeseed oil has an influence the growth performance of growing rabbits as well as on their carcass yield and quality including sensoric parameters of the meat.

## MATERIALS AND METHODS

192 ZIKA-hybrid rabbits were divided into three feeding groups. One group (control group) got pelleted diet for rabbits without addition of oil. The two other groups got diets, to which was added 4.5% and 9.0% rapeseed oil respectively. This lead to a rise of crude fat content in the diet up to 8.8 and 11.7% (control group : 4.0%) and also of the energy content (see table 1). Further components of the diets were especially alfalfa meal, maize gluten, soybean meal, sunflower meal, wheat, barley, maize germ meal, vitamins and minerals. All diets were given in ad libitum feeding. The fattening time was 8 weeks (5.-12. week of life). Rabbits were caged in single boxes. Every two weeks the consumption of feed and the weight of the rabbits were examined. At the end of the fattening period 30 rabbits per group were gutted and the quality of the carcass was estimated. Especially dressing percentage, weight of organs, kidney fat and the different parts of the carcass were determined. Also sensoric parameters were noted. In order to estimate the sensoric parameters an examination group (7 persons) tasted samples of the hindleg and gave notes from 1 to 6. The best result was "6".

Statistical analyses were conducted using a SPSS-X (statistical package for the social sciences) program. The score of variation included in the model was type of diet. The probability value was 5%. Significant differences will be pointed out in the following paper by different letters.

**Table 1 : Nutrients and energy contents of the experimental diets (analysed values)**

	Control group	Experimental groups	
	without rapeseed oil addition	added 4.5% rapeseed oil	added 9.0% rapeseed oil
Dry matter (%)	89.4	89.9	90.5
Crude protein (%)	17.7	17.7	18.1
Crude fat (%)	4.0	8.8	11.7
Crude fibre (%)	14.7	15.1	15.2
Crude ash (%)	7.2	7.2	7.4
Starch (%)	14.5	13.1	11.9
Sugar (%)	3.7	3.3	3.0
Digestible energy (MJ/kg)*	12.27	13.22	14.39

\* Determined by digestible trial

## RESULTS

The high fat level and the high energy content of the fat-enriched diets decreased the daily feed intake, while the intake of energy did not change. The daily weight gain of the rabbits with the diet added 4.5% rapeseed oil was significant higher than that of the rabbits with the 9.0%-diet and the control group, but there was no significant effect of the feed on final live weight of the rabbits (table 2).

Rabbits of the 4.5%-rapeseed-oil group were the smallest at the beginning of the trial, however the summaried weight gain was the highest (difference between final weight and weight at the beginning). The feed conversion efficiency was improved significantly by rapeseed oil addition. In view of the carcass yield the diet had no effect on dressing percentage, organ weights, weights of skin and hair, drip loss and the parts of foreleg and intermediate part (table 3), but the percentage of kidney fat at the carcass was higher in fat-enriched groups.

**Table 2 : Fattening performance of the rabbits**

	Control group	Experimental groups	
	without rapeseed oil addition	added 4.5% rapeseed oil	added 9.0% rapeseed oil
Live weight 28th day (g)	640 a ± 77	591 b ± 88	629 a ± 74
Live weight 84th day (g)	3028 a ± 245	3064 a ± 264	2986 a ± 301
Daily weight gain (g)	42.7 ab ± 4.4	43.8 a ± 4.1	42.1 b ± 5.0
Feed intake (g/day)	154 a ± 16	142 b ± 15	130 c ± 17
Feed conversion efficiency (g feed/g gain)	3.6 a ± 0.3	3.2 b ± 0.3	3.1 b ± 0.2
Daily intake of digestible energy (MJ)	1.89 a ± 0.19	1.87 a ± 0.20	1.86 a ± 0.25

(Different letters at one parameter describe significant differences)

**Table 3 : Carcass yield of the rabbits**

	Control group	Experimental groups	
	without rapeseed oil addition	added 4.5% rapeseed oil	added 9.0% rapeseed oil
Dressing percentage (%)	57.0 ± 1.7	57.2 ± 1.8	57.5 ± 1.6
Drip loss(%)	2.0 ± 0.3	2.0 ± 0.2	1.9 ± 0.3
Foreleg (%)	23.3 ± 0.9	23.6 ± 0.8	23.7 ± 1.0
Intermediate part (%)	33.1 ± 1.4	32.8 ± 1.5	33.1 ± 1.6
Hindleg (%)	33.5 a ± 1.2	33.1 a ± 1.0	31.7 b ± 1.6
Kidney fat content (%)	2.2 a ± 0.5	2.6 a ± 0.6	3.1 b ± 0.2

(Different letters at one parameter describe significant differences)

The fatty acid composition of the meat was also effected by diet (picture 1). Rapeseed oil contains more than 50% of oleic acid (C 18:1) and 20% of linoleic acid (C 18:2). The content of linolenic acid (C 18:3) is nearly 9% and palmitic acid (C 16:0) is about 5%. Rapeseed oil contains a high amount especially of monounsaturated fatty acids. Just like rapeseed oil the fatty acids C 18:1, C 18:3 and C 20:1 in the meat of hindleg increased and the acids C 14:0, C 16:0 and C 18:2 decreased by feeding fat enriched diets. To sum up it is to point out that the content of saturated fatty acids decreased, while the amount of unsaturated fatty acids increased.

The saturated/unsaturated fatty acids ratio from control group with 0.6 descended to 0.3 in experimental groups. The meat of the 9.0%-rapeseed oil group contained more monounsaturated fatty acids also in comparison with the 4.5%-rapeseed oil group. However there were no differences between all groups in view of polyunsaturated fatty acids (as part of total fatty acids).

Figure 1 : Fatty acid composition of the diets and the meat (% of total fatty acids)

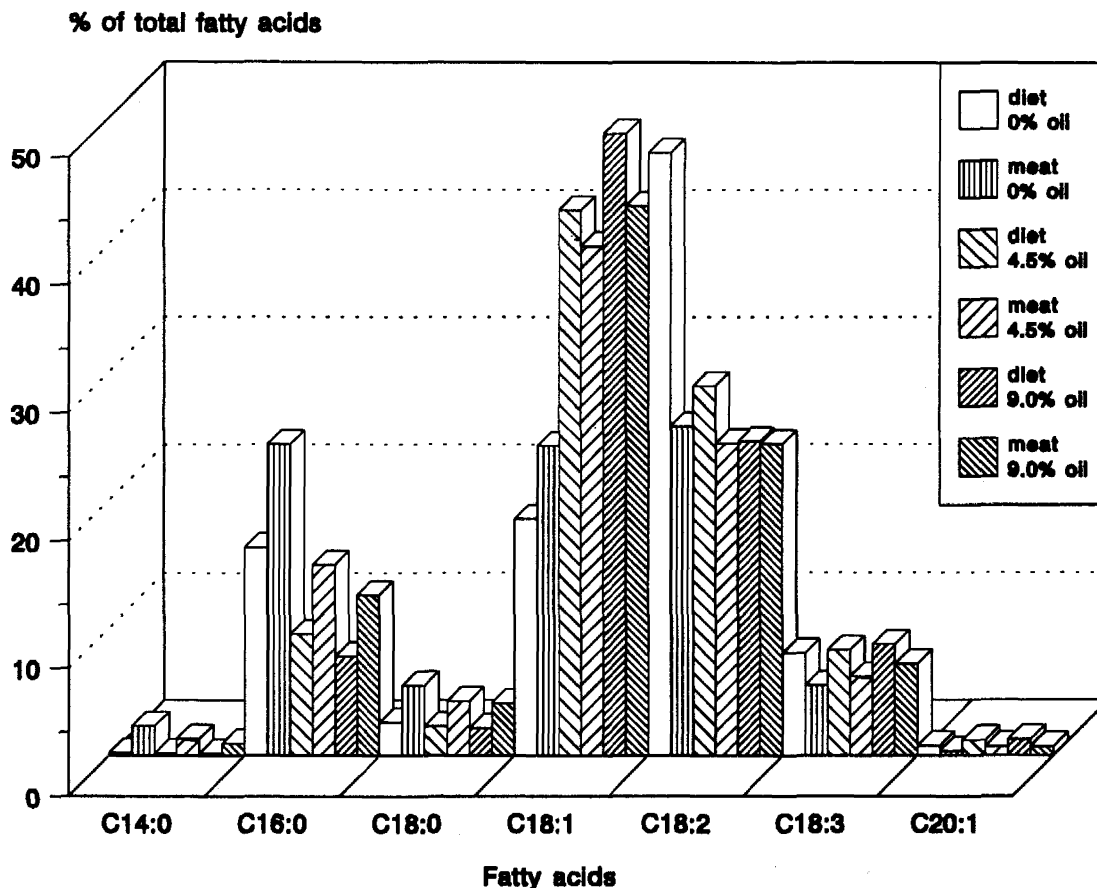


Table 4 : Sensoric parameters of the meat

	Control group	Experimental groups	
	without rapeseed oil addition	added 4.5% rapeseed oil	added 9.0% rapeseed oil
Tenderness	4.5 a ± 0.6	4.2 a ± 0.4	4.2 a ± 0.4
Succulence	4.3 a ± 0.5	4.3 a ± 0.8	4.0 a ± 0.0
Aroma	3.7 a ± 0.5	3.7 a ± 0.5	4.2 a ± 0.4
General impression	3.8 a ± 0.4	3.7 a ± 0.5	4.0 a ± 0.0

(Different letters at one parameter describe significant differences)

There was no significant effect of rapeseed oil on sensoric parameters. The meat of the hindleg of the 9.0 %-rapeseed oil group seems to be better in aroma than that of the other two groups. The fat content of the carcass meat increased by addition of rapeseed oil to the diet.

Compared with the hindleg there was a lower crude fat content in the intermediate part also by rapeseed oil addition. Significant differences were found only at the hindleg (table 5).

**Table 5 : Fat content of the meat**

	Control group	Experimental groups	
	without rapeseed oil addition	added 4.5% rapeseed oil	added 9.0% rapeseed oil
Hindleg	4.9 a ± 1.1	7.4 b ± 2.0	7.9 b ± 3.0
Intermediate part	2.9 a ± 0.8	3.3 a ± 0.6	3.8 a ± 1.1

(Different letters at one parameter describe significant differences)

## DISCUSSION

Rabbits adapt their feed into account of the energy level of the feed (DAVIDSON and SPREADBURY, 1975). Fat addition induces a decreased feed intake (FEKETE et al., 1990; FERNANDEZ and FRAGA, 1992), concurring with the described experiments. Other authors, however, found out a higher energy intake by fat addition in rabbit nutrition (PARTRIDGE et al., 1986; ABDELHAMID, 1989) or no effect (ABU and EKPENYONG, 1993). Daily gains and weight of the rabbits were not effected. On that account the feed conversion efficiency was significantly improved by rapeseed oil addition. In the literature there are different opinions about this. BERSCHAUER et al. (1980) and BEYNEN et al. (1988) have seen the reasons for this in the different composition of the feed, especially in view of crude protein content and the resulting different amount of intake of energy and protein. Dressing percentage was not impaired by fat addition in introduced examinations as well as other authors (PARTRIDGE et al., 1986; FERNANDEZ and FRAGA, 1992; BEYNEN et al., 1990). An increased content of kidney fat like in this study was found out by FERNANDEZ and FRAGA (1992) and a raised fat content of the meat was described by COBOS et al. (1993). Fatty acid composition of the feed effected the fatty acid composition of the meat of rabbits. Rapeseed oil improved the content of oleic and linolenic acid as part of total fatty acids. These results are also pointed out by KEBLER and PALLAUF (1991). Concurring with OUHAYOUN (1992) there were no differences of sensoric parameters by rapeseed oil added feed.

Considering all these results it is possible to add rapeseed oil up to 9% to rabbit feed in view of growth performance, dressing percentage and organoleptic meat quality. However, the raising content of fat in carcass and meat should be taken into consideration.

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**Zum Einfluß von Rapsöl auf die Mast- und Schlachtleistung sowie Inhaltsstoffe und sensorische Parameter des Fleisches von Mastkaninchen** - Es wurde der Einfluß von Rapsöl unterschiedlicher Zulagehöhen zu Kaninchenmastrationen auf Mast- und Schlachtleistung sowie Fettgehalt, Fettsäurezusammensetzung und sensorische Parameter des Fleisches geprüft. Die Untersuchungen ergaben, daß die Rapsözulagen die tägliche Futtermittelaufnahme, jedoch nicht die Gewichtsentwicklung der Tiere verringerten. Infolgedessen verminderte sich der Futteraufwand signifikant. Die Schlachtleistung wurde durch die Fettzulagen nicht beeinflusst; es erhöhte sich jedoch der Nierenfettanteil am Schlachtkörper. Auch der Rohfettgehalt und die Fettsäurezusammensetzung des Fleisches wurden durch die Fütterung beeinflusst. Der Rohfettgehalt der Teilstücke Rücken und Keulen erhöhte sich, wobei das Fleisch der Keulen höhere Fettanteile aufwies. Die gesättigten Fettsäuren Myristinsäure und Palmitinsäure verminderten sich, während der Anteil der einfach ungesättigten Fettsäuren, wie der Ölsäure, stieg. Der Anteil der mehrfach ungesättigten Fettsäuren blieb unverändert. Die organoleptischen Parameter wurden durch die Fettzulagen nicht signifikant beeinflusst.

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