

## CO1995 B20: ANIMAL NUTRITION

### THE INFLUENCE OF FEEDING RAPESEED TO PIGS ON GROWTH PERFORMANCE AND ON THE COMPOSITION OF BACKFAT AND INTRAMUSCULAR FAT

W. KRACHT, H. JEROCH, W. MATZKE

Institute of Animal Nutrition of Agricultural Faculty of Martin-Luther-University, Halle-Wittenberg, Emil-Abderhalden-Str. 25b, D-06108 Halle (Saale)

KARIN, NÜRNBERG, K. ENDER

Research Institute of the Biology of Farm Animals, D-18196 Dummerstorf F.R. Germany

W. SCHUMANN

Research Institute of Agriculture and Fishery of Mecklenburg-Vorpommern, Dorfplatz 1, D-18276 Gülzow

#### ABSTRACT

In three feeding experiments with growing-finishing pigs the influence of different 00-rapeseed levels of the feed mixtures on feed intake, growth performance and the fatty acid composition of backfat and intramuscular fat was studied. With rising rapeseed levels feed intake and daily gains were decreased and the content of polyunsaturated fatty acids in both fat tissues was increased.

#### INTRODUCTION

The increase of the genetic based growth performance of agricultural animals rises the requirements for high energy feeds. The including fullfat rapeseed into feed mixtures is a suitable way to produce feed mixtures with a high energy content.

The inclusion level of 00-rapeseed in pig-feeds is limited by the glucosinolate content and the content of polyunsaturated fatty acids (=PUFA). The following experiments had the aim to find limits for the use of 00-rapeseed in pig feeds.

#### EXPERIMENTAL

##### Materials and Methods

In trial I pigs were housed in pens with ten animals. Six pens were assigned to one group. A total of 240 female and castrated male pigs were used to study the effect of 0, 5, 7,5 and 10 % 00-rapeseed levels replacing soybean oil meal and cereals. The feed mixtures of all groups contained nearly equal amounts of crude protein, lysine and metabolizable energy. The rapeseed contained 14  $\mu\text{mol}$  glucosinolates (GSL)/g and was ground with a roller mill.

In trial II castrated male pigs were housed in single boxes. 10 animals were assigned to one group. Following rapeseed levels were compared ( 0, 5, 7,5 and 10

%). The higher levels (7,5 and 10 %) were substituted ground (g) and ground plus hydrothermal treated (g+h).

In trial III mixtures with increasing rapeseed levels (0, 5, 10, 15, 20 %) were fed to 10 single kept animals. The levels of 15 and 20 % rapeseed were fed either till to the 70. day of the experimental period or till to slaughter (126 days). The animals of groups 5 and 7 received after the 70. day the mixture of group 1, without rapeseed. In the slaughter house samples of backfat and meat (only trial I) were taken from 10 carcasses of each group to analyse the fatty acid composition of backfat and intramuscular fat, according to a method described by Nürnberg et.al. (1994)

## Results and Discussion

Trial I: With increasing rapeseed levels the daily gains decreased, although the feed intake was not diminished (Table 1).

Table 1. Experiment I (30-105 kg live weight)

group	1	2	3	4
rapeseed %	0	5	7,5	10
GSL mmol/kg feed	-	0,7	1,1	1,4
PUFA g/kg feed	12,0	16,7	19,6	22,8
feed intake/d kg	2,24	2,12	2,24	2,27
daily gain g	767a	716b	705b	676c
feed/gain kg	2,92	2,96	3,18	3,36
backfat (1)PUFA %	9,9	12,7	13,6	16,0
backfat (2)PUFA %	9,5	10,1	11,7	13,8
intramuscular fat				
(1) PUFA %	7,6	11,2	11,1	13,2
intramuscular fat				
(2) PUFA %	8,2	9,1	9,5	10,2

(1) female animals, (2) castrated male animals

Table 2. Experiment II Effect of hydrothermal treatment

group	1	2	3	4	5	6
treatment	-	g	g	g+h	g	g+h
rapeseed %	0	5	7,5	7,5	10	10
GSL mmol/kg feed	-	0,8	1,2	0,6	1,6	0,8
PUFA g/kg feed	11,50	15,20	23,50	19,80	25,70	22,00
feed intake /d kg	2,52	2,36	2,33	2,41	2,28	2,53
daily gain g	762a	781a	725b	759a	710b	748a
backfat PUFA %	9,1	14,1	15,9	13,2	16,6	14,7

The PUFA content of backfat and of intramuscular fat increased with rising PUFA contents in feed. Following regression equations were calculated for these

relationships: PUFA in backfat of female pigs % =  $3,36 + 0,54x$  (PUFA g/kg feed)  
 PUFA in backfat of male pigs % =  $4,24 + 0,40x$  (PUFA g/kg feed)

Table 3. Experiment III Influence of a shortened feeding time of rapeseed on PUFA content in backfat

Group	rapeseed level + feeding time %		daily feed intake kg	daily gain g	PUFA kg feed g 3)	PUFA in backfat % female castrated males
1	0	(1	2,51	670	13,6	10,3 7,3
2	5	(1	2,46	673	17,1	10,2 9,4
3	10	(1	2,47	662	19,1	15,7 13,7
4	15	(1	2,45	657	26,0	17,5 16,6
5	15	(2	2,51	676	19,5	11,5 11,7
6	20	(1	2,49	663	29,3	19,5 19,7
7	20	(2	2,46	675	20,8	12,5 12,7

1)=rapeseed continuously fed 1.-126. day of trial, 2)= rapeseed fed till 70. day of trial ,3) = in average of trial time

In backfat of female animals there is a greater elevation of PUFA in backfat per g PUFA in feed than in castrated male pigs, Male pigs deposit larger amounts of fat in the body than females. By this the PUFA of the feed, which are passing unchanged into the body, are more diluted. This was also shown by Fischer et. al. (1992).

Trials II: By hydrothermal treatment (95-105 °C) of rapeseed the GSL content was diminished from 15,5 to 8,5 µmol/g. Hereby the decrease of daily gains with rising rapeseed levels was avoided. The PUFA content in the feed was diminished by hydrothermal treatment about 3,5 g/kg, and the PUFA in backfat about 2 - 2,5 %. This was effected by splitting the double bonds of the fatty acids. The upper limit for the PUFA content in backfat of pigs, which was published by Fischer et. al. (1992) to be 15%, was found for castrates at a rapeseed level of 7 % or 21 g PUFA/ kg feed.

Trial III: By reducing the time of rapeseed feeding to 70 days or to nearly 50 % of the grower-finisher period, the PUFA content in backfat was diminished to about 65-70 %. Thereby it is possible to include 20 % rapeseed in a feed mixture, which was only fed in the grower phase.

Summarizing it must be recommended not to exceed a rapeseed level of 7 % and a PUFA level of 21 g/kg feed for feeding mixed groups of female and male pigs.

#### REFERENCES

- Fischer, K., Freudenreich, P., Hoppenbrock, K.H. und Sommer, W. (1992). Einfluß produktionstechnischer Bedingungen auf das Fettsäuremuster im Rückenspeck von Mastschweinen. *Fleischwirtschaft*, 72, 2, 200.
- Nürnberg, Karin, Kracht, W. und Nürnberg, G. (1994). Zum Einfluß der Rapskuchenfütterung auf die Schlachtkörper- und Fettqualität beim Schwein. *Züchtungskunde* 66, 3, 230-241.