FULL FAT RAPESEED AND RAPESEED PRESS CAKE IN PIG FEEDING

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ABSTRACT

Rapeseed (RS) and rapeseed press cake (RPC) were tested in two longterm experiments with a total of 98 pigs. RS contained 21 mmol, RPC 19 mmol glucosinolates kg^{-1} DM. Level of rapeseed products tested amounted to 0 (control), 50 g, 100 g and 150 g per kg diet. At 150 g level also moisture/heat treated RS or RPC with extremely low glucosinolate content were fed. Feed intake and growth were decreased by 150 g rapeseed products kg^{-1} diet, in case of RS significantly. The thyroid weight was increased, the serum thyroxine concentration and the thyroid iodine store decreased with ≥ 100 g rapeseed products kg^{-1} diet. More iodine delayed the impairment of thyroid function by glucosinolates. An upper limit of 100 g rapeseed products kg^{-1} diet seems acceptable also with regard to polyenic fatty acid level of body fat. A relatively low glucosinolate content and an additional iodine application are prerequisite for using of rapeseed products in pig feeding.

INTRODUCTION

Rapeseed (RS) with >40 % fat and rapeseed press cake (RPC) with 10 % - 20 % fat are "energy feedstuffs". In pig feeding RS or RPC must be limited because polyenic fatty acids increase oxidation susceptibility of body fatand the glucosinolates may impair feed intake, growth and thyroid function. Objectives of present pig experiments were to vary dietary RS and RPC levels, however, also iodine dosage to find out tolerance of polyenic acids and glucosinolates.

EXPERIMENTAL

The RS contained 20 mmol glucosinolates kg^{-1} dry matter, the RPC 18.5 mmol kg^{-1} DM. Composition of both feedstuffs is described in another paper of these proceedings (SCHÖNE et al. 1995). Experiment 1: During 15 weeks 6 x 8 pigs (Pietrain x German Landrace x Large White) received grain diets without oilseed (control), with 20 % toasted soyabeans (2) or with 5 % (3), 10 % (4) or 15 % (5) ground RS. At highest level the RS was treated with moisture and heat (6) to reduce glucosinolate content (2.1 mmol kg^{-1} DM). Each group was subdivided into 2 x 4 pigs., either with 125 µg supplementary iodine kg^{-1} feed (requirement NRC 1988) or with the doubled dosage. Experiment 2: During 16 weeks 5 x 10 pigs received grain soya-bean meal diets without RPC (control) or with 5 % (2), 10 % (3) or 15 % untreated (4) RPC or (5) moisture/heat treated RPC (0.3 mmol glucosinolates kg^{-1} DM). In both experiments blood was sampled to detect thyroxine in serum. At slaughtering thyroid and liver were

weighed, the iodine content of thyroid was determined (SCHÖNE et al. 1990). In backfat and in intramuscular fat (from chops of 13 th/14th rib) fatty acid composition was determined with capillary GC after FOLCH-extraction and methylation.

RESULTS AND DISCUSSION

In Exp. 1 15 % untreated RS significantly decreased the feed intake and live weight gain (SCHÖNE et al. 1993). Treatment of RS with water and heat cancelled the performance depression. Kind and amount of dietary fat affected body fat composition, mainly that of backfat. Diet with 20 % soya beans (70 g crude fat kg^{-1} diet) caused 20 % polyenic acids in backfat (control 9 %). In case of similar consumption of rapeseed fat only 14 % polyenic acids were detected in backfat. With exception to production of specialities like air dried sausage this polyenic acid percentage seems to be acceptable.

Iodine dosage did not show any effect on body weight (Tab. 1). However iodine and glucosinolates affected the thyroid hormone status significantly. Up to 5 % dietary RS no or only slight effects could be detected. With higher RS levels the low iodine dosage was not sufficient to sustain the serum T_4 concentration. There was a drop of T_4 also in the group with RS moisture/heat treated indicating goitrogenic compounds. A dietary level of 10 % RS increased thyroid weight significantly, however, only with low iodine dosage. In the group with 15 % RS the thyroid weight was increased irrespective of iodine dosage or treatment. The iodine concentration of thyroid tissue varied from <200 µg g^{-1} to > 1000 µg g^{-1} between groups. RS or glucosinolates enlarge the organ resulting in a dilution effect respective lower iodine content of thyroid. Both factors, iodine and glucosinolates, significantly affected the iodine depot of total thyroid (not shown). Therefore a decrease of thyroid iodine by glucosinolates or an increase by iodine supply only partially results from different organ size.

In Exp. 2 RPC affected the thyroid and its iodine content in a similar way like in Exp. 1 (not shown). Feed intake, weight gain and feed efficiency (Tab. 2) were not signifcantly affected by dietary RPC level. There were tendencies - in the group with 50 g rapeseed cake kg^{-1} diet an 4 % increased daily gain and 3 % lower feed efficiency - in the group with 150 g RPC kg^{-1} diet a 4 % decreased daily gain and 2 % higher feed efficiency (control without rapeseed press cake = 100 %).

REFERENCES

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Table 1. Experiment 1 - Final weight and thyroid status (4 pigs/group, initially 31.5 kg body weight, BW)

Oilseed level Glucosinolate content kg^{-1} diet	Supplementary iodine	Body weight	Serum concentration	Thyroid criteria	
				Weight	Iodine content
	$\mu g\ kg^{-1}$	kg	T_4 $mmol\ l^{-1}$	$mg\ kg^{-1}$ BW	$\mu g\ g^{-1}$
Control	125	105	56	93	636
<0.1 mmol	250	108	55	58	1110
Soybean, toasted	125	114	55	77	456
20 %; <0.1 mmol	250	110	62	77	1024
Rapeseed, untreated	125	111	48	95	270
5 %; 1 mmol	250	118	50	83	526
10 %; 2 mmol	125	116	41	164	194
	250	106	59	92	404
15 %; 3 mmol	125	112	38	139	170
	250	105	57	147	270
Rapeseed, treated	125	113	40	141	239
15 %; 0,3 mmol	250	115	56	119	448
SEM		0.8	1.1	4.8	15.4
Significance					
- Glucosinolates		0.04	0.018	0.001	0.000
- Iodine		0.21	0.000	0.026	0.000

Table 2. Results of Experiment 2 (10 pigs per group, duration 111 days, initial live weight 23 kg, Differences are statistically not significant (P>0.05))

Rapeseed press cake Glucosinolate content kg^{-1} diet	Feed intake $kg\ day^{-1}$	Live weight gain $g\ day^{-1}$	Feed efficiency $kg\ feed\ kg^{-1}$ gain
Control, <0.1 mmol	2.40	758	3.17
Rapeseed press cake, untreated			
5 %; 0.8 mmol	2.42	790	3.06
10 %; 1.6 mmol	2.44	758	3.21
15 %; 2.5 mmol	2.36	726	3.25
Rapeseed press cake, treated			
15 %; <0.1 mmol	2.38	767	3.10
SEM	0.030	8.7	0.033