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INVESTIGATIONS into feeding full-fat canola seed and canola meal to poultry



Canola seed is used in animal nutrition either as full-fat seed or as the protein-rich residue canola meal. Both components are different in their composition and therefore also require different feeding strategies. The effective use of these feedstuffs in poultry feed was the aim of the investigations presented in this article.

Full-fat canola seed

The experiment with broiler chickens was conducted over six weeks using 360 day-old male fattening hybrids (Ross). The animals were divided into six groups. Full-fat canola seed was included in proportions of 0, 5, 10, 15, 20 and 25% of the compound feeds as a replacement for soya bean meal. The locally grown canola seed contained 22,1% crude protein, 43,1% crude fat in dry matter (DM) and 15,4 µmol glucosinolates/g seed.

The diets were based on wheat and were optimally supplemented with minerals and vitamins. They contained 29% crude protein and 14,7MJME$_{N\text{-}corr}$ in DM. They were isoenergetic and isonitrogeneous and adequate in all essential amino acids (Roth-Maier and Kirchgeßner, 1995). The criteria measured were the growth development, feed intake and feed conversion.

Selected results of the experiment are summarised in *Table 1*. This data indicates that increasing proportions of canola seed in the diet continuously reduce performance. The depressing effects of the seed already occurred after the first week and continued during the whole fattening period.

Table 1: Full-fat canola seed to fattening chickens.

Canola seed, %	0	5	10	15	20	25
Live weight, g	1 913^{a}	1 785^{b}	1 754^{b}	1 651^{c}	1 585^{c}	1 460^{d}
Feed intake, g	3 069^{a}	2 940^{ab}	2 980^{ab}	2 809^{b}	2 767^{b}	2 600^{c}
Feed conversion, kg feed / kg live weight gain	1,63^{d}	1,68^{dc}	1,73^{bc}	1,74^{bc}	1,79^{ba}	1,83^{a}

Laying hens (light white laying hybrids, 5 x 12 hens per group) were kept individually and were also fed isonitrogenous and isoenergetic diets with 0, 10, 15, 20 and 25% canola seed in the diet on a wheat, barley and soya bean meal basis. The diets contained 17% crude protein and 12,5MJME$_{N\text{-}corr}$ in DM. The parameters were live weight, egg production, daily egg mass, odour and flavour of the eggs, the fat content and the fatty acid proportions of the egg yolk (Roth-Maier and Kirchgeßner, 1995).

The performance data (*Table 2*) indicates that 10% canola seed in the diet already reduced performance, which was obvious in the distribution of the egg sizes in the soya bean meal group (control group).

Table 2: Full-fat canola seed to laying hens.

Canola seed, %	0		10		15		20		25	
Daily feed intake, g	127	a	119	ab	120	ab	115	b	116	b
Egg weight, g	71,6	a	69,0	ab	67,3	b	65,6	b	66,2	b
Egg production, %	83		80		81		79		82	
Daily egg mass, g	59,1		54,8		54,3		51,6		54,0	
Yolk fat, %	29,2		29,2		30,1		29,7		29,9	
Yolk fatty acids, g of 100g total fatty acids										
C18:0	9,8	a	9,0	b	8,4	c	7,4	d	7,2	d
C18:1	36,4	c	41,9	d	45,1	c	47,9	b	50,9	a
C18:2 n-6	24,4	a	20,5	b	18,3	c	17,2	d	14,8	e
C18:3 n-3	2,5	c	2,7	bc	2,9	ab	3,0	a	3,0	a
C20:4 n-6	1,7	a	1,6	b	1,5	b	1,5	b	1,4	c
C22:6 n-3	1,4	ab	1,4	ab	1,4	ab	1,3	b	1,5	a



Fifty five percent of the egg weights were in the range of >75–70g. With 10% canola seed, only 32% of the eggs reached this size and this effect continued in response to increasing canola seed quantities. With respect to the sensory quality, no difference occurred between the groups.

The proportions of unsaturated and essential fatty acids in the eggs reflected the amount of intake and the composition of the canola oil. Increasing canola proportions resulted in increasing oleic acid proportions, reduced linoleic and arachidonic acid proportions and significantly higher proportions of linolenic acid in the yolk.

Based on these experiments, it is concluded that even low amounts of full-fat canola seed in the diets have detrimental effects on poultry performance and use in feeding cannot be recommended. These effects may be explained by the contents of intact glucosinolates and also their degradation products, which may induce more metabolic disturbances than the degradation products of the residue canola meal.

Canola meal

The influence of feeding the protein feedstuff, canola meal, to broilers was tested in a fattening trial of five weeks (Roth-Maier and Kirchgeßner, 1987). Six groups, of 90 animals each, were given 0, 10, 15, 20, 25 and 30% canola meal as a replacement of soya bean meal in isonitrogenous and isoenergetic diets based on wheat, corn, animal fat blend, fishmeal, corn gluten and soya bean meal. The parameters measured were performance, sensory traits of the meat and weights of the thyroid glands.

Table 3: Canola meal to fattening chickens.

Canola meal, %	0		10		15		20		25		30	
Live weight, g	1 523	a	1 510	ab	1 458	bc	1 444	c	1 417	c	1 358	d
Daily feed intake, g	68,6	a	68,3	a	65,9	ab	63,7	b	63,5	b	60,5	c
Feed conversion, kg feed / kg live weight gain	1,62	a	1,63	a	1,63	a	1,59	a	1,62	a	1,61	a
Thyroid gland mg / kg live weight	91,70	c	109,6	bc	120,2	b	145,3	a	150,0	a	143,5	a

The results (*Table 3*) indicate that proportions up to 15% canola meal can be used in diets for fattening chickens, because feed conversion was still similar as in the control group – although weight gains and feed intake were reduced by 4%. The sensory quality of the meat remained unchanged, even when 30% canola was given.

Similar recommendations for practical diets, including canola meal, can be given for laying hens. This was tested in a one-year experiment, starting at the beginning of the laying period of the hens (25 weeks old). 72 light white laying hybrids (LSL) were kept individually and divided into six groups with 0, 6,7, 10, 13,3, 16,7, and 20% canola meal (Roth-Maier and Kirchgeßner, 1988).

The proportions of unsaturated and essential fatty acids in the eggs reflected the amount of intake and the composition of the canola oil.

Table 4: Canola meal to laying hens.

Canola meal, %	0		6,7		10		13,3		16,7		20	
Daily weight gains, g	0,53		0,59		0,62		0,48		0,81		0,52	
Daily feed intake, g	110	a	105	ab	108	ab	107	ab	106	ab	101	b
Egg production, %	86		87		89		89		89		89	
Egg weight, g	61,5		61,8		61,2		61,3		61,6		59,9	
Egg mass, g	53,1		53,9		54,4		54,3		55,0		53,2	
Feed per kg egg mass, kg	2,08		1,94		1,99		1,98		1,97		1,92	

Table 4 shows selected results of this experiment. 20% canola meal reduced feed intake significantly. The other parameters were not influenced by the various canola meal proportions. However, the distribution of the egg weight classes was influenced in such a way that in response to the higher canola meal proportions, the production of lower-sized eggs increased.

In the control group, 34% of the eggs were in the range up to 60g and 28% had egg weights >65g. However, in the 20% canola meal group, 53% of the eggs were in the range up to 60g egg weight and only 15% of the eggs weighed >65g. Odour and flavour of the eggs were not influenced by feeding canola meal.

From these results, it is concluded that canola meal can be utilised up to 15% of the diet for broilers and white laying hens. This recommendation, however, is valid only for laying hens that produce white-shelled eggs, because in brown layers the risk of tainted eggs cannot be ruled out.

References are available from the author. Contact Dora Roth-Maier at Roth-Maier@weihenstephan.de for more information.