CO1995 B16: ANIMAL NUTRITION

PERFORMANCE OF BROILER CHICKS AND LAYING HENS FED DIETS CONTAINING RAPESEED MEAL FROM A LOW-GLUCOSINOLATE VARIETY KULTA (*Brassica campestris cv.*)

T.O. KIISKINEN

Agricultural Research Centre of Finland, FIN-31600 Jokioinen, Finland

ABSTRACT

Inclusion of 14% or more low glucosinolate rapeseed meal (LG-RSM) derived from *Brassica campestris cv.* Kulta (KRSM) in broiler diets significantly decreased feed intake and growth rate and impaired feed conversion. The levels of 6 and 12% KRSM (extr.) did not significantly affect feed intake and weight gain. Mortality in the KRSM groups was, generally, non-significantly higher than in the control groups. In laying diets 10 or 20% exracted RSM (KRSM or commercial meal) did not influence on laying rate but decreased egg weight, apparently due to reduction of energy supply as a result of the lower ME levels of the RSM diets and decreased consumption of the 20% RSM diets. RSM did not significantly increase mortality but incidence of liver lesions seemed to increase with the RSM content. These results suggest that a safe maximum recommendation for the practice could be 10% LG-RSM in poultry diets.

INTRODUCTION

Kulta is a relatively new Finnish summer rapeseed variety. It has been on the market from 1991 being nowadays the most cultivated variety in Finland. Its total glucosinolate content is 10-12 μmol/g and KRSM has been tested succesfully with growing pigs (Siljander-Rasi 1993). The present study was conducted to determine the effects of KRSM on the performance of broiler chickens and laying hens.

MATERIAL AND METHODS

KRSM contained crude protein (CP) 34.8% (expeller) and 39.0% (extracted) in dry matter. The values for crude fat (CF) were 10.7% and 4.4%, respectively. Commercial extracted RSM (CRSM) used as a control in Trial 3 contained CP 38.9% and CF 3.8% in DM.

Trials 1 and 2 were carried out with broiler chicks (Ross) and Trial 3 with laying hens (MÄ86). Trial 1 had a factorial design comprising two dietary fish meal (FM) levels (0%, 6/3% in starter/grower) and four RSM treatments (0, 14 and 28% KRSM expeller, 25% KRSM extr.). Trial 2 included four dietary levels of extracted KRSM (0, 6, 12 and 18%) and in Trial 3 extracted KRSM and CRSM were compared at dietary levels of 10 and 20%. In Trial 2 the diets contained FM 6% in the starters and 3% in the growers and in Trial 3 2.5%. In each trial RSM replaced soybean meal. The diets were formulated identical in ME and CP content. Methionine and lysine supplementations were used. The birds were provided feed and water *ad libitum*.

In Trials 1 and 2 each treatment group consisted of six replicate floor pens with 60 sexed broiler chicks, each. Trial 3 included 12 28-day periods and nine replicates of 20 laying hens in 4-hen cages were allotted for each treatment. In Trial 3 all dead hens were subjected to a post-mortem examination. At the end of the trials 16 (Trial 1) and 12 (Trial 2) broiler chickens and 10 laying hens (Trial 3) per RSM treatment were killed, their thyroid glands were removed and weighed.

RESULTS AND DISCUSSION

Inclusion of 14 % or more KRSM in the diets decreased 5-10% (P<0.001) weight gain of broiler chicks (Table 1). In Trial 1 the detrimental effect on live weight

Table 1. Performance of broiler chicks (Trials 1 and 2).

	KRSM %				
		Expeller	Expeller	Extr.	Signi-
Trial 1	0	14	28	25	ficance
Live weight g					
15th day	490^{c}	465^{b}	438^{a}	454^{b}	***
37th day	1873^{c}	1774^{b}	1684^{a}	1711^{a}	***
Feed intake g/bird/day					
1-15 days	41.7^{b}	40.6^{ab}	39.7^{a}	39.5^{a}	**
16-37 days	131^{c}	126^{b}	120^{a}	121^{a}	***
FCR	1.92^{a}	1.97^{b}	1.99^{b}	1.97^{b}	***
Mortality %	3.0^{a}	5.4^{ab}	6.6^{b}	4.9^{ab}	*
Relative thyroid w.	100^{a}	109^{ab}	141^{b}	119^{ab}	*
	KRSM %				
Trial 2	0	6	12	18	
Live weight g					
16th day	530	532	526	511	NS
39th day	1951^{b}	1952^{b}	1913^{ab}	1861^{a}	***
Feed intake g/bird/day					
1-16 days	43.1^{b}	43.0^{b}	41.4^{ab}	40.8^{a}	***
17-39 days	124	124	123	123	NS
FCR	1.89^{a}	1.89^{a}	1.90^{a}	1.95^{b}	**
Mortality %	4.1	6.8	5.8	10.1	NS(P<0.069)
Relative thyroid w.	100	106	120	122	NS

a-c Means with a different superscript letter within a row are significantly different (P<0.05). If no letters are used differences are non-significant.

was mostly due to significant reductions in feed intake. The highest KRSM level (18%) in Trial 2 significantly reduced feed intake only during the starting period. Feed efficiency (FCR) also was significantly depressed when the diets contained plenty of KRSM. Significant FM x KRSM interaction was not observed in Trial 1 and FM did not significantly affect final body weight or feed consumption. Mortality among the control chicks was in each trial lower than that of the birds fed KRSM and the difference between the highest KRSM level and the control was significant in Trial 1 and nearly significant in Trial 2. The relative weight of the thyroid gland increased with increasing of KRSM in the diets.

Dietary levels of 10 and 20% RSM did not significantly influence on laying rate but reduced egg weight (Table 2) which phenomen has been observed in many studies

Table 2. Performance of laying hens (Trial 3).

	RSM (extr.) %					
	0	CRSM 10	KRSM 10	CRSM 20	KRSM 20	Signif.
Laying %	83.0	82.5	85.0	84.4	83.2	*
Egg weight g	60.9[c]	60.2[bc]	59.4[ab]	59.1[ab]	58.7[a]	***
Feed intake g/bird/day	111[c]	111[c]	111[c]	108[a]	107[a]	***
ME MJ/bird/day	1.20	1.17	1.17	1.13	1.12	
CP g/bird/day	19.4	19.4	19.3	18.9	18.7	
FCR	2.23	2.27	2.22	2.19	2.22	NS
Increase in live w. %	26.3[c]	24.5[bc]	23.3[bc]	18.3[a]	20.4[ab]	***
Abdominal fat %	6.90[b]	6.76[ab]	6.68[ab]	5.68[ab]	5.01[a]	**
Mortality %	8.1[ab]	10.0[ab]	5.0[a]	12.2[b]	9.7[ab]	**
Relative thyroid w.	100[a]	152[bc]	122[ab]	183[c]	155[bc]	***
Liver lesions per dead hens	6/25	14/31	9/16	16/38	13/30	

a-c See Table 1

(e.g. Kiiskinen 1983 and 1989, Summers et al. 1987). Decrease in egg size was apparently due to reduction of 30-80 KJ in daily ME supply per bird which is in agreement with the conclusions of Summers et al. (1987). The determined ME values for the RSM diets were 2-3% lower than that of the control diet and a significant reduction in consumption of the 20% RSM diets was ascertained. Obviously, palatability of the diets was impaired. As a result of the reduced ME supply especially the hens fed 20% RSM were lighter and contained less abdominal fat than the control hens. Differences in FCR were non-significant. There were no significant differences in laying performance or feed consumption between KRSM and CRSM. Mortality did not significantly increase by the inclusion of RSM in the laying diet. However, incidence of liver lesions (fatty, fragile, haemorrhagic, broken) was higher in the RSM groups than in the control group.

REFERENCES

Kiiskinen, T. (1983). Effects of Regent rapeseed meal fed during the rearing and laying period on the performance of chickens. *Annales Agriculturae Fenniae* **22**, 221-231.

\- (1987). Effects of long-term use of rapeseed meal on egg production. *Annales Agriculturae Fenniae* **28**, 385-396.

Siljander-Rasi, H.(1993). Rypsirouhe sopii sialle. *Sika* **4**, 14-15.

Summers, J.D., Leeson, S. & Spratt, D. (1987). Canola meal and egg size. *Canadian Journal of Animal Science* **68**, 907-913.