

THE USE OF LOW GLUCOSINOLATE-TYPE RAPESEED MEAL
IN RATIONS FOR LAYERS AND BROILERS

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New low glucosinolate varieties of rapeseed have been developed in Canada. One of the varieties is a *B. napus* cultivar called Tower and another is a yellow-seeded *B. campestris* cultivar named Candle. The experiments reported herein were conducted to study the use of meals derived from the new varieties in rations for laying hens and broilers.

MATERIALS AND METHODS

Amino acid determinations

The amino acid composition of samples of Tower and Candle rapeseed meals (RSM) was determined using a JLC-5AH Amino Acid Analyzer (Jeol. Co. Japan).

Laying hen experiments

Three experiments were conducted in which RSM from the variety Tower was fed to laying hens at levels ranging from 0 to 15%. In each experiment, a control ration with the following composition was fed: ground wheat 49.2; ground oats 10; ground barley 10; wheat shorts 5; dehydrated alfalfa meal 2; stabilized animal fat 1; meat meal (53% protein) 2; herring meal 1; soybean meal (47.5% protein) 10; ground limestone 7; dicalcium phosphate (18% Ca - 21% P) 1.5; iodized salt 0.45 and micronutrient mix 0.85. The micronutrient mix supplied the following levels per kg of ration: manganous oxide 250 mg; zinc oxide 100 mg; vitamin A 6000 IU; vitamin D₃ 600 ICU; riboflavin 3 mg; calcium pantothenate 6 mg; niacin 15 mg and vitamin B₁₂ 7.5 µg. Additions of RSM were made so that the rations were kept isocaloric by substituting rapeseed meal and stabilized animal fat for wheat and soybean meal. The rations were fed in mash form. Feed and water were supplied ad libitum.

Details of the levels of RSM fed in each experiment are outlined in Table 1.

The hens used in experiments 1 and 3 were kept in floor pens while those in experiment 2 were kept in 30 x 40 cm. laying cages (2 birds per cage). Fourteen hours of light were provided each day.

Records were kept on mortality, feed consumption, egg production, average egg weight and Haugh unit values. At the conclusion of the experiment 16 birds from each treatment were killed and their thyroids removed and weighed.

Broiler experiment

Nine hundred and sixty, day-old, broiler type chicks (Dominant White ♂ x Hubbard ♀) were divided into 24 lots of 40 chicks each (20 male and 20 females) and kept in radiant heated floor pens. Three lots were placed on each of the ration treatments.

The composition of the control broiler ration was as follows: ground wheat 66.5; stabilized animal fat 1; dehydrated alfalfa meal 1;

meat meal 3; soybean meal (47.5% protein) 25; ground limestone 1; dicalcium phosphate (18% Ca - 21% P) 0.8; iodized salt 0.25; and micronutrients 1.45. The micronutrients supplied the following levels per kg of ration; manganous oxide 200 mg; zinc oxide 100 mg; selenium 0.1 mg; vitamin A 3000 IU; vitamin D₃ 300 IU; vitamin E 10 IU; menadione sodium bisulphate 1 mg; riboflavin 4 mg; calcium pantothenate 5 mg; niacin 20 mg; choline chloride 60 mg; folacin 1 mg; vitamin B₁₂ 10 µg; DL methionine 527 mg and amprolium 125 mg.

The rations were kept isocaloric and isonitrogenous by increasing the level of stabilized animal fat and decreasing the levels of wheat, soybean meal and dicalcium phosphate as the levels of Tower or Candle rapeseed meal in the rations were increased. Feed and water were supplied ad libitum.

Records were kept on mortality, feed consumption and incidence of perosis. The birds were weighed individually at 4 and 8 weeks of age. At the end of the experiment 4 males and 4 females from each replicate were killed and their thyroids were removed and weighed.

RESULTS AND DISCUSSION

Amino acid analysis conducted on samples of Tower RSM indicated that the amino acid composition of the new low glucosinolate varieties was similar to that of higher glucosinolate meals produced in Western Canada.

The results of the laying hen experiments (Table 1) indicated that 10% Tower RSM may be included in rations for laying hens without adversely affecting mortality, production rate, feed conversion or average egg weight. Even inclusion of 15% Tower RSM in the ration (Exp. 3) had little if any effect on productive performance. In contrast, use of 10 or 15% RSM of moderately high glucosinolate content in laying rations resulted in decreased hen-day production, decreased Haugh unit values and reduced final body weight. Egg weights and egg specific gravity were unaffected by use of high glucosinolate RSM.

The thyroid weights of the birds fed the low glucosinolate RSM were significantly higher than those fed the control ration containing soybean meal but were much lower than those fed high glucosinolate RSM. The hens fed low glucosinolate meals had thyroids that were approximately twice as large as the controls while the thyroids of those fed high glucosinolate RSM were about thirteen times as large as the controls. Treatments used had no significant effect on weights of the liver and spleens.

The results of the broiler experiment indicated that the inclusion of 10 or 20% of either Tower or Candle RSM to rations had no adverse effects on mortality, rate of growth or feed conversion of broilers at 4 or 8 weeks of age. Addition of 30% of either RSM resulted in a small, non significant decrease in rate of growth as compared to levels of 10 or 20% RSM but mortality and feed conversion were not affected.

Incidence of perosis was slightly higher in the groups fed 20 or 30% RSM as compared to the controls or those receiving 10% Tower or Candle RSM. A higher incidence was noted at 8 weeks as compared to 4 weeks of age indicating a possible relationship to increased body weight.

Thyroid weights were affected by the levels of either Tower or Candle RSM in the rations fed. As the level of RSM was increased an increase in thyroid weight occurred. There were however, no apparent adverse effects on productivity resulting from the enlargement that occurred. Thyroid weights of birds fed the Candle meal were slightly lower at each level of inclusion than those of birds fed the corresponding level of Tower meal. This probably is a reflection of the slightly lower level of glucosinolate in Candle as compared to Tower RSM.

SUMMARY

Rapeseed meals from the new low glucosinolate varieties, Tower and Candle, may be used at higher levels than those recommended for higher glucosinolate RSMs. Based on the results obtained it is suggested that a maximum level of 10% Tower RSM for laying hens and 20% of either Tower or Candle RSM for broilers be recommended. This compares to previously recommended levels of 5% and 15% RSM for laying hens and broilers respectively.

TABLE 1

LOW GLUCOSINOLATE RSM IN RATIONS FOR LAYING HENS

Exp ¹ No	Level of RSM	Egg Prod ² %	Feed/ doz kg	Avg Egg wt. g	Mort- ality %	Mg Thyroid/100 g body weight
1	0	79.6	1.86	59.7	3.4	7.8
	5% Tower	78.5	1.83	59.8	5.8	13.5
	10% Tower	81.3	1.78	59.0	4.0	19.4
	5% Tower	81.5	1.82	59.4	1.8	10.2
	10% Tower	80.5	1.80	59.1	5.4	11.8
2	0	72	1.93	62.4	4.1	8.5
	5% Tower	71.1	1.99	62.3	4.1	11.0
	10% Tower	71.9	1.93	62.5	3.1	15.9
	15% Tower	72.2	1.94	61.7	5.8	19.4
3	0	81.6	1.74	59.2	1.1	7.9
	10% Tower	81.6	1.72	59.6	1.4	14.6
	12.5% Tower	79.1	1.76	59.4	2.1	17.9
	15% Tower	78.6	1.70	59.0	4.3	16.7
	10% HG ³	76.8	1.75	59.2	4.3	104.6
	15% HG	74.9	1.81	58.8	3.5	103.8

¹In Exp. 1 & 3, two groups of 35 and two groups of 70 Shaver 288 White Leghorns were placed on each ration for a 44 test period. In Exp. 2, 4 groups of 44 Shaver Leghorns were placed on each ration.

²Hen-day production

³Moderately high glucosinolate RSM.