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Feeding Rapeseed Meal to Rabbits: Digestibility, Performance and Carcass Characteristics

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Abstract: Two experiments were conducted to investigate the effects of different levels of Rapeseed Meal (RSM), as a source of protein, on digestibility (Experiment 1), performance and carcass characteristics (Experiment 2) in rabbits. Dietary Soybean Meal (SBM) was replaced with RSM at 0, 7, 14 and 21% (dry matter basis). No differences were obtained for Crude Protein Digestibility (CPD) coefficients of experimental diets. However, Dry Matter Digestibility (DMD) and Organic Matter Digestibility (OMD) decreased in diet containing 21% RSM. The daily weight gain values ranged between 27.1 and 28.5 g and tended to decrease as the level of RSM increased in the diet. The feed efficiency was not significantly affected by the inclusion of RSM, although rabbits on 21% RSM diet had the poorest efficiency (4.8) while the best feed efficiency (4.6) was obtained from the rabbits fed on RSM diet. The percentage values of liver and peripheral fat were not affected by the diet. The results showed that RSM could replace up to 14% of dietary soybean meal in the diets of rabbits without adverse effects on digestibility, performance and carcass characteristics.

Key words: Rabbits, rape seed meal, digestibility, growth, carcass

Introduction

Many feedstuffs especially the agro-industrial by-products which are usually of no feeding value to humans could alternatively be fed at cheaper cost to animals. Rape Seed Meal (RSM) is a good source of protein, energy, calcium, potassium, phosphorus and magnesium for various species of animals (e.g., cows, sheep, fish, broiler, pig). However, it contains several antinutritional factors (e.g., glucosinolates, phytic acid, tannins, sinapine and erucic acid). Content of goitrogens (glucosinolates) has been markedly reduced through genetic selection, however at feeding higher levels of RSM, the higher concentration of glucosinolates can occur in the diets. These constituents can cause liver damage, decrease feed consumption and performance and can have a negative effect on reproductive performance (Tripathi, 2006). Hence, most reports recommended a limited inclusion level of RSM depending on the glucosinolate content of the meal. The aim of this study was to determine the effects of different levels of RSM in the diets of rabbit on digestibility, growth performance and carcass characteristics in rabbits.

Materials and Methods

Animals and Treatments

Four diets were prepared in a pelleted form using the same batches of raw material. Diets were formulated to contain an increasing proportion of RSM: 0, 7, 14 and 21% DM for diets D1, D2, D3 and D4, respectively, by the substitution of a decreasing proportion (21, 14, 7 and 0%) of SBM. The

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Table 1: Ingredients and chemical composition of the diets

	Diets			
	D1	D2	D3	D4
Items	(0% RSM)*	(7% RSM)	(14% RSM)	(21% RSM)
Ingredients (g DM kg^{-1} diet)				
Soybean meal	210	140	70	0
Rapeseed meal	0	70	140	210
Lucerne dehydrated	400	400	400	400
Maize	330	330	330	330
Molasses	30	30	30	30
Calcium phosphate	22	22	22	22
Mineral supplement**	3	3	3	3
Salt	5	5	5	5
Chemical composition (g kg^{-1} DM)				
Organic matter	810	809	801	795
Crude protein	177	172	167	161
Crude fibre	110	124	126	130

*Rapeseed meal; ** Composition (per kg diet): $CuSO_4$ (1 g); $ZnSO_4$ (3 g); $FeSO_4$ (16 g); KI (0.15 g).

diets did not contain any drug supplementation (antibiotic or coccidiostatic). The RSM (a double low-RSM varieties) had 34.9% Crude Protein (CP) and 13.7% Crude Fibre (CF). Ingredients and chemical composition of the diets are given in Table 1.

In experiment 1, 24 crossbred rabbits were randomly divided into four groups (6 rabbits per diet) and housed individually to determine the apparent digestibility of DM, OM and CP. Following a fifteen-day period of adaptation to metabolism cages, the total faecal output was recorded for each rabbit over a seven-day period. Faeces were stored at -20°C and afterwards dried at 80°C for 48 h and grounded through a 1 mm screen.

In experiment 2, 128 crossbred rabbits aged 28 days and weighing on average 1043 g were equally divided into four groups of 32 (four replicates of 4 male and 4 female rabbits each). The rabbits were placed in collective cages with 4 individuals each and fed *ad libitum* until 13 weeks of age, at which commercial slaughter weight in Tunisia (about 2.5 kg) was expected to be reached. The experimental period lasted 6 weeks. Since the rabbits were housed as subgroups, they were weighed individually however feed consumption per cage was recorded at weekly intervals. The average values for body weight gain, feed consumption and feed/gain on a per-rabbit basis were calculated for each cage. Mortality was recorded daily. Rabbits that died during the study were weighed and used to adjust feed consumption data. At the end of the experiment, 12 rabbits from each group selected randomly were weighed and slaughtered without fasting. After the limbs and head were removed, each carcass was skinned, the abdomen opened, gut and internal organs removed. The weights of warm carcass, liver, peripheral fat and gastrointestinal tract were recorded.

Chemical analyses of diets were done with using the methods of the AOAC (1990) for proximate analyses.

The collected data were subjected to analysis of variance using the statistical analysis system (SAS, 1989).

Results and Discussion

Chemical Composition

Diets were designed to be isonitrogenous. However, because the CP content of RSM was lower than of SBM, the CP content decreased with levels of RSM incorporation but still in agreement with the recommendations for growing rabbits (De Blas and Mateos, 1998). In contrast, the fibre content expressed in CF increased with levels of RSM incorporation.

Table 2: Effect of the inclusion of rapeseed meal on coefficient of total apparent digestibility of dietary compounds, growth performance, carcass yield and proportions of various organs of rabbits

	Diets				
Items	D1 (0% [1]RSM)	D2 (7% RSM)	D3 (14% RSM)	D4 (21% RSM)	p-level
Digestibility (%)	n = 6	n = 6	n = 6	n = 6	
Dry matter	63.7[a]	61.6[a]	60.5[a]	55.9[b]	*
Organic matter	64.9[a]	63.5[a]	62.4[a]	58.3[b]	*
Crude protein	67.5[a]	66.9[a]	67.8[a]	66.0[a]	NS
Growth performance	n = 32	n = 32	n = 32	n = 32	
Initial live weight (g)	1253[a]	1264[a]	1256[a]	1198[a]	NS
Final live weight (g)	2592[a]	2590[a]	2566[ab]	2471[b]	*
Average daily gain (g)	28.5[a]	28.2[a]	27.8[ab]	27.1[b]	*
Daily feed intake (g)	131[a]	134[a]	133[a]	130[a]	NS
Feed efficiency (kg kg^{-1})	4.6[a]	4.7[a]	4.7[a]	4.8[a]	NS
Mortality (%)	3[a]	4[a]	3[a]	3[a]	NS
Carcass characteristics	n = 12	n = 12	n = 12	n = 12	
Carcass yield (%)	65.2[a]	65.3[a]	64.2[ab]	63.0[b]	*
Full gastrointestinal tract (% LW)	13.8[b]	13.7[b]	15.5[a]	16.4[a]	*
Liver (% Carcass)	4.7[a]	4.5[a]	4.4[a]	5.0[a]	NS
Peripheral fat (% Carcass)	1.6[a]	1.8[a]	1.7[a]	1.6[a]	NS

[1]Rapeseed meal; *: $p<0.05$; NS: $p>0.05$, Mean values with the same superscript are not significantly different

Digestibility

The RSM level in the diet affected ($p<0.05$) DMD and OMD (Table 2). The lowest DMD and OMD values were obtained from the rabbits fed on 21% RSM diet. This could be due to the fact that RSM dry matter is less degraded than SBM dry matter (Bravo *et al*., 2000). Lower digestibility of DM constituents was also reported by Sharma *et al*. (1980) in calves fed RSM diets compared to SBM diets. However, the results presented in Table 2 indicate that the replacement of SBM by RSM had no effect on CPD, probably due to similarity of the protein amount in tested diets. Generally there is a positive correlation between CP content and its digestibility.

Growth Performance

The data on final live weight, daily gain and feed efficiency are given in Table 2. The rabbits on the four diets gained 27.1 to 28.5 g day^{-1}. The final live weight attained during 6 weeks varied from 2471 to 2592 g. The values of daily gain recorded in the present study were similar to that of Tripathi *et al*. (2003) obtained with Soviet Chinchilla rabbits fed mustard (*Brassica juncia*) meal. The lowest final live weight (2471 g) and daily gain (27.1 g) were obtained from the rabbits fed on 21% RSM diet (Table 2). This result agrees with those of Esonu *et al*. (1996) who reported that the inclusion of 20% raw bean (*Canavilia ensiformis*) in the rabbit diets reduced the weight gain but cooking improved the weight gain. The inclusion of RSM did not affect feed intake and feed efficiency although rabbits on the control diet had the best feed efficiency (4.6) while the poorest feed efficiency (4.8) was obtained from the rabbits fed on 21% RSM diet. Similarly, Berchiche *et al*. (1995) found that feed consumption and feed efficiency were not different among group of rabbits receiving SBM (control), or faba bean meal with lucerne, wheat bran and barley, or sun flower oil meal.

Carcass Characteristics

The RSM level in the diet affected carcass yield and gastrointestinal tract (Table 2). Average carcass yields were 65.2, 65.3, 64.2 and 63.0% in D1, D2, D3 and D4, respectively. These values were slightly higher than that reported by Cobos *et al*. (1995) with New Zealand White x California growing rabbits, but much higher than those found in other experiments (Yalçin *et al*., 2001, 2003). This difference may be due to the dependency of carcass yield on breed, age and the number of internal organs left with the carcass of the rabbit at slaughter.

According to Tripathi *et al*. (2001), the presence of dietary glucosinolate increases peripheral fat content and induces metabolic disorders such as liver hypertrophy. In this study, there were no significant differences among the groups of rabbits neither for liver nor for the peripheral fat proportions. Also, there was no effect of replacing SBM with RSM on mortality. This could indicate that glucosinolate level in the tested diets is still within a tolerable level.

In conclusion, the inclusion of 21% RSM in rabbit diet had no adverse effects on animal health but resulted in lower DMD, OMD. Daily gain and carcass yield were also reduced but remained acceptable. However, the inclusion of 14% RSM gave a similar performance to that for the control diet (containing 21% of SBM). It is therefore, possible to reduce the use of expensive feedstuffs such as SBM for growing rabbits by replacing part of the diet with RSM. This will reduce the overall cost of feeding.

References

AOAC., 1990. Association of Official Analatycal Chemists. 15th Edn., Washington D.C.

Berchiche, M., F. Lebas and J. Ouhayoun, 1995. Utilization of field beans by growing rabbits. 2. Effects of various plant supplementation. World Rabbit Sci., 3: 63-67.

Bravo, D., F. Meschy, C. Gogaert and D. Sauvant, 2000. Ruminal phosphorus availability from several feedstuffs measured by the nylon bag technique. Reprod. Nutr. Develop., 40: 149-162.

Cobos, A., L. Hoz, M. Cambero and J. Ordonez, 1995. Sugar-Beet Pulp as an alternative ingredient of barley in rabbit diets and its effect on rabbit meat. Meat Sci., 39: 113-121.

De Blas, C. and G. Mateos, 1998. Feed Formulation, In: The Nutrition of the Rabbit. De Blas C. and J. Wiseman (Eds.), Chap. 13, CABI Publishing, pp: 241-254.

Esonu, B., A. Udedibie, U. Herbert and J. Odey, 1996. Comparative evaluation of raw and cooked jackbean (*Canavalia ensiformis)* on the performance of weaner rabbits. World Rabbit Sci., 4: 139-141.

SAS., 1989. SAS User's Guide Int., Version 6, 4th Edn. Statistical Analysis Institute, Inc., Cary, NC, USA.

Sharma, H., J. Ingalls and T. Demolin, 1980. Apparent digestibility of tower and candle rapeseed meals by Holstein bull calves. Can. J. Anim. Sci., 60: 915-918.

Tripathi, M.K., I.S. Agrawal, S.D. Sharma and D.P. Mishra, 2001. Effect of substitution of soybean meal with treated or untreated high glucosinolate mustard (*Brassica juncea*) meal on intake, digestibility, growth performance and body composition of calves. Anim. Feed Sci. Technol., 94: 137-146.

Tripathi, M.K., A.S. Mishra, A.K. Misra, R. Prasad, D. Mondal and R.C. Jakhmola, 2003. Effect of graded levels of high glucosinolate mustard meal (*Brassica juncea*) meal inclusion on nutrient utilisation, growth performance, organ weight and carcass composition of growing rabbits. World Rabbit Sci., 11: 211-226.

Tripathi, M.K., 2006. Glucosinolates in animal nutrition: A review. Anim. Feed Sci. Technol. (In Press).

Yalçin, S., E. Hacioğlu, T. Gürdoğan, N. Oğuz and I. Onbaşilar, 2001. The usage of poplar sawdust in the rations of rabbit as a source of fiber. Tavukçuluk Araştirma Derg., 3: 47-52. Turkish with English summary.

Yalçin, S., I. Tuncer, S. Yalçin and E. Onbaşilar, 2003. The use of different levels of common vetch seed (*Vicia sativa* L.) in diets for fattening rabbits. Livest. Prod. Sci., 84: 93-97.