

TRIFOLIUM PRATENSE L. HAY IN DIETS OF GROWING RABBITS*

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Introduction

Among forage leguminosae, red clover is one of the most diffused and cultivated species, present in the five continents. In Europe, the countries where it is most present are France, Germany and Italy, with an agriculturally cultivated area equivalent to 270,000, 200,000 and 200,000 ha respectively.

In the context of a vast research program on the characterization of alternate feeds for rabbit (Battaglini et alii, 1983,1985; Battaglini e Grandi, 1983; Grandi e Battaglini, 1985; Grandi e Cagiotti. 1985.) and on account of the importance of this crop, it could be of interest to verify if it is possible to make use of red clover hay in diets of growing rabbits.

Material and methods

Red clover used in this investigation was fertilized with 100 units P O /ha before sowing time and harvested at about 20% bloom.

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The rearing trial was carried out with 56 N.Z.W. rabbits of both sexes assigned to four homogeneous groups, which were fed diets with 0%, 10%, 20% and 30% red clover hay, as a substitute for dehydrated alfalfa meal. Some slight changes in the amount of soybean oil meal solvent were made in diets with 20% and 30% red clover, so as to render them isoproteic (table 1).

Animals were fed ad libitum; their weight and feed intake were controlled every ten days.

During the last week of trial ingesta-excreta balance was carried out on six rabbits per group.

Analytical determinations were carried out according to the methods proposed by Martillotti et alii (1987) and gross energy was determined with an adiabatic calorimeter. Data were submitted to analysis of variance, comparing differences among means two by two (Pilla, 1985).

Results and discussion

Red clover hay (table 2) is characterized by a fairly high level of crude protein (14.67% d.m.), ether extract (3.02% d.m.) and ash (9.80% d.m.); the level of crude fibre was quite high (30.64% d.m.).

Among the components determined according to Van Soest, lignin reached 6.19% d.m., cellulose 31.46% d.m. and insoluble ash content was very low (0.52% d.m.). Gross energy was 17.86 MJ/kg d.m.

Digestibility of diets (table 3) was quite homogeneous; in fact, the utilization coefficients of dry matter, organic matter and energy fluctuated, respectively, between: 57.89% and 59.54% (20% and 30% diets); 59.19% and 61.35% (10% and 30% diets); 59.09% and 61.15% (10% and 30% diets). Obviously, such a trend also influenced the nutritive value, which showed similar levels in the four compared groups.

Concerning nutrients, significant differences resulted for ash, ADF and cellulose.

In connection with the results of ingesta-excreta balance, rearing performance (table 4) was encouraging for red clover diets, since daily average weight gain reached, in the 30% group, the highest value (33.61g/d)

which corresponds to the one of control (33.58 g/d). Feed conversion was also slightly better in the 30% group (3.71) and reached a maximum of 3.85 in the 20% group. The animal's state of health was not affected; in fact, mortality rates in experimental groups were lower than in the control.

Conclusions

Red clover hay, cut at 20% bloom, is characterized by a fairly high protein content (14.67%), ether extract (3.02%), and high level of crude fibre (30.64%).

Its use in balanced diets, as a substitute for alfalfa meal, gave remarkable results. In fact, groups fed red clover hay showed productive performance similar to the control, both for average weight gain and feed conversion.

These data influenced ingesta-excreta balance which gave homogeneous values in digestibility coefficients of dry matter, organic matter, energy and also in nutritive value.

Therefore it can be concluded that red clover hay can be used in rabbit diets with or in substitution of alfalfa meal, without affecting rearing performance.

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Table 1 - Percent composition of diets.

	Red clover (% of diet)			
	0	10	20	30
Dehydrated alfalfa meal	33.0	23.0	11.5	---
Soft wheat bran	20.0	20.0	20.0	20.0
Barley meal	13.0	13.0	13.0	13.0
Soybean oil meal solv. (50%)	12.0	12.0	13.5	15.0
Oat meal	11.0	11.0	11.0	11.0
Maize meal	5.0	5.0	5.0	5.0
Red clover meal	---	10.0	20.0	30.0
Lignosulfite	2.0	2.0	2.0	2.0
Dicalcium phosphate	1.8	1.8	1.8	1.8
Calcium carbonate	0.7	0.7	0.7	0.7
Sodium choride	0.5	0.5	0.5	0.5
Vitamin-mineral premix	1.0	1.0	1.0	1.0
DL methionine g/q	50.0	50.0	50.0	50.0

Table 2 - Chemical and energetic characteristics of *Trifolium pratense* hay and diets.

		Red clover	Diets with red clover percent of:			
		hay	0	10	20	30
Dry matter	%	88.20	87.25	86.50	86.18	86.52
Crude protein (Nx6.25)	% d.m.	14.67	17.78	17.65	17.38	17.41
Ether extract	% d.m.	3.02	4.21	3.53	3.35	3.35
Crude fibre	% d.m.	30.64	13.05	13.30	13.45	13.65
Ash	% d.m.	9.80	9.12	8.92	8.95	8.85
N-free extract	% d.m.	41.87	55.84	56.60	56.87	56.74
N D F	% d.m.	51.10	---	---	---	---
A D F	% d.m.	38.17	18.41	18.83	19.57	19.53
A D L	% d.m.	6.19	3.05	3.26	3.22	3.39
Cellulose	% d.m.	31.46	14.63	15.12	15.75	15.61
Hemicellulose	% d.m.	12.93	---	---	---	---
A I A	% d.m.	0.52	0.73	0.45	0.60	0.53
Gross energy	MJ/kg d.m.	17.86	17.82	18.07	17.77	17.55

Table 4 - Rearing performance

	Red clover (% of diet)				Error mean square
	0	10	20	30	
Number of rabbits	16	16	16	16	
Initial live weight	965.8	974.7	967.5	966.4	16825.329
Final live weight	2309.0	2288.7	2278.7	2310.8	25745.184
Number of dead rabbits	2	1	1	1	
Weight gain (g/d)					
0 - 10 d	30.44	29.61	30.04	31.24	28.165
10 - 20 d	33.35	32.44	31.98	32.71	35.427
20 - 30 d	35.68	34.08	34.73	35.06	31.343
30 - 40 d	34.89	35.23	34.37	35.43	32.448
0 - 40 d	33.58	32.85	32.78	33.61	13.255
Feed conversion					
(kg feed/kg wt. gain)					
0 - 10 d	2.91	2.95	3.01	2.84	0.105
10 - 20 d	3.48	3.40	3.49	3.26	0.129
20 - 30 d	3.75	3.96	4.01	3.83	0.147
30 - 40 d	4.86	4.85	4.89	4.91	0.135
0 - 40 d	3.75	3.79	3.85	3.71	0.070

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Feeding and digestibility trials were carried out in order to check the possibility of using *Trifolium pratense* hay, as a partial substitute for alfalfa meal, in diets of growing rabbits. With this aim, 4 groups of animals were fed diets containing 0, 10, 20 and 30% *Trifolium pratense*. Results pointed out that such Leguminosa, cut at 20% flowering, had a level of crude protein and fibre of 14.67% d.m. and 30.64 d.m., respectively. Digestibility of diets was rather omogeneous with dry matter utilization coefficients equal to 59.20% (0%), 58.35% (10%), 57.89% (20%) and 59.54% (30%). Rearing performance was satisfactory; in fact, average growth rate reached 33.61 g/d in the 30% group in comparison to 33.58 g/d in the control. Feeding efficiency showed e similar trend: 3.71 (30%) and 3.75 (control).

Sono state eseguite una prova di alimentazione ed una di digeribilità per verificare la possibilità di impiegare il fieno di *Trifolium pratense* in diete per conigli in accrescimento, a parziale sostituzione della farina di medica. A tal fine sono stati istituiti 4 gruppi di animali che hanno ricevuto altrettanti mangimi contenenti 0,10,20 e 30% di trifoglio. I risultati hanno messo in luce che il fieno di tale Leguminosa, sfalciata quando circa il 20% delle piante erano in fioritura, ha un contenuto di protidi grezzi e di fibra grezza pari al 14,67% s.s. e al 30,64% s.s., rispettivamente. La digeribilità delle diete è risultata abbastanza omogenea, con coefficienti di utilizzazione della sostanza secca del 59,20% (0%), 58,35% (10%), 57,89% (20%) e 59,54% (30%). Le performance di allevamento sono state confortanti, infatti l'accrescimento medio ha raggiunto nella tesi al 30% i 33,61 g/d contro i 33,58 g/d del controllo. Anche la conversione globale dell'alimento è stata lievemente migliore nel gruppo al 30% (3,71) rispetto al testimone (3,75).

