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NUTRITIVE VALUE OF ROBINIA (*Robinia pseudoacacia*) LEAVES IN GROWING SOVIET CHINCHILLA RABBITS.

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ABSTRACT : For determining the nutritive value of robinia (*Robinia pseudoacacia*) leaves, widely distributed in the temperate and humid Himalayan ranges (29°25N and 79°35E), containing OM 89.9; CP 20.7; EE 3.8; CF 21.7; NFE 43.7; NDF 60.1; ADF 29.6; Ca 2.4 and P 0.2 per cent on DM basis, ten Soviet Chinchilla rabbits of six week old (mean body weight 792+73 g) were fed freshly lopped green robinia leaves as a sole feed for 56 d. The green leaves were offered individually at 400g/rabbit/day. A metabolism trial of 6 day was conducted after 21 d of experimental feeding. The digestibility of DM, OM, CP, EE, NDF and ADF was 74.3; 77.4; 36.8; 73.2; 60.3 and 29.4%, respectively. The average intake of DM was 145.3g/d and 143.7g/kg $W^{0.75}$, DCP 11.2g/d and 11.1g/kg $W^{0.75}$ and DE 407.6 Kcal/d and 402.4Kcal/kg $W^{0.75}$, which could not only meet the maintenance requirement but also supported 10.4g daily body weight gain. The dry matter of robinia leaves contained 8.0 percent DCP and 2.81 kcal DE/g. Results suggest that robinia leaves may be used as a sole feed for maintenance. This may also be used for the development of production rations by supplementation of energy and if necessary proteinacious feeds.

RESUME : Valeur nutritive des feuilles de robinier pseudoacacia pour des lapins Chinchilla Soviétiques en croissance.
Dix lapins Chinchilla Soviétiques âgés de 6 semaines (poids vif moyen 792 ±73 g) ont été utilisés pour déterminer la valeur nutritive des feuilles d'acacia largement utilisées dans la région tempérée et humide himalayenne située 29°25 N et 79°35 E. Au cours d'un essai de 56 jours les lapins ont été nourris exclusivement de feuilles d'acacia fraîchement cueillies, contenant, en % de la matière sèche, 89,9% de matières organiques, 20,7%de protéines brutes, 3,8% d'extrait éthéré, 21,7% de cellulose brute, 43,7% d'extractif non azoté, 60,1% de NDF, 29,6% d'ADF, 2,4% Ca et 0,2% P. Chaque lapin recevait individuellement chaque jour 400g de feuilles vertes. Des mesures de digestibilité ont été effectuées pendant 6 jours après le 21ème jour de l'essai. La digestibilité de la matière sèche, de la matière organique, des protéines brutes, de l'extrait éthéré, de NDF et ADF ont été respectivement de : 74,3 ; 77,4 ; 36,8 ; 73,2 ; 60.3 et 29,4 %. La consommation de matière sèche moyenne a été de 145,3 g/jour et 143,7 g/kg $PV^{0.75}$ ce qui permet de couvrir non seulement les besoins et mais aussi d'assurer un gain de poids vif journalier de 10,4 g. La matière sèche des feuilles d'acacia contient 8,0% de protéines digestibles et 2,81 kcal/g. Ces résultats suggèrent que les feuilles d'acacia peuvent être utilisées comme aliment unique pour assurer l'entretien et qu'elles peuvent aussi être utilisées dans des rations de croissance en apportant un supplément d'énergie et si nécessaire un complément protéique.

INTRODUCTION

In India, presently rabbit farming is attracting the attention of the farmers and the scientists owing to its development as an enterprise (DESHMUKH *et al.*,1993). It has already been established that rabbits are good converters of fibrous feeds into lean meat and they can tolerate substantial fibre levels in their diets (CHEEKE, 1987). Moreover, LALL *et al.* (1985) also observed that the use of various leaf meals helps to curtail costly feed ingredients like cereal grains and oil cakes from the diets of rabbits. In the Himalayan region, the contribution of tree foliage towards feeds and fodder is about 30 % which indicates the role of tree leaves in solving the forage problems in the Hills (SINGH, 1990). In the last 5 years, robinia (*Robinia pseudoacacia*) trees were extensively planted on the hills under afforestation programmes, hence the large amounts of green leaves are produced which have a great potential as animals feeds. It is a leguminous tree (nitrogen fixing plant) thus leaves are rich in CP content i.e. 17-20% and other nutrients too (HORTON and CRISTEN, 1981; AYRES *et al.*, 1996). Robinia leaves contain a phytotoxin "robin" besides phenolic compounds like tannins which can impair nutrient utilization (NEGI *et al.*, 1979; KUMAR and HORIGOME, 1986). AYRES *et al.* (1996) also reported that the presence of tannin in black locust leaves impaired protein as well as other nutrients digestibility when it was incorporated in the diet of rabbit at a level of 25 %. The objective of the present study was to assess the feeding value of robinia leaves in growing Soviet Chinchilla rabbit fed solely on green leaves.

MATERIALS AND METHODS

Ten healthy growing Soviet Chinchilla broiler rabbits of 5-6 weeks old weighing 680 to 850 g (average 792 ± 73 g) body weight were housed individually in metallic cages having arrangements for feeding, watering and faeces collection. The green leaves of robinia were lopped and collected manually at 8.0 a.m. and offered at 400g to appetite by allowing 10-20 % as refusals. After 21 d of experimental feeding, a metabolism trial of 6 days duration was conducted to study the nutrients utilization by rabbits. Experimental feeding was continued for 56 days. Daily feed intake and weekly change in body weight was recorded throughout experimental feeding.

Chemical Analysis

Representative samples of leaves offered, residue left and faeces voided were analysed for dry matter (DM), organic matter (DM), ether extract (EE), crude protein (CP), calcium (Ca) and phosphorus (P) as per AOAC (1990) and neutral detergent fibre (NDF) and acid detergent fibre (ADF) as per GOERING and VAN SOEST (1970).

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Table 1 : Chemical composition of Robinia leaves
(% of DM and nutrients on % DM basis)

Nutrients	Offered	Residue
Dry matter (Fresh leaves)	44.4	50.4
Organic matter	89.9	89.3
Crude protein	20.7	19.5
Ether extract	3.8	3.5
Crude fibre	21.7	23.4
Nitrogen free extract	43.7	42.9
NDF	60.1	64.3
ADF	29.6	34.2
Calcium	2.4	2.2
Phosphorus	0.2	0.2

Statistical analysis

The mean and standard error (SE) of the data were analysed following the methods of SNEDECOR and COCHRAN (1967).

RESULTS AND DISCUSSION

The rabbit consumed readily robinia leaves and refusals were little, indicating that the leaves were quite palatable. The chemical composition of the feed offered and left over (Table 1) was more or less similar indicating that there was little selective feeding. The observed chemical composition of robinia leaves was within the range of reported values (HORTON and CHRISTENSEN, 1981), but CF and NDF contents were higher in the present study that may be owing to stage at which leaves were lopped and the strain of the robinia tree.

Mean body weight, feed conversion efficiency and plane of nutrition of rabbits are presented in Table 2. Mean DM intake by rabbits was 144 g per kg $W^{0.75}$, which was fairly higher than the recommended levels (DESHMUKH *et al.*, 1990, 1991). Nutrient requirement given by CHEEKE *et al.* (1987) indicates that for maintenance purpose the diet of rabbit should contain 12 to 15% CP and 2100 to 2200 kcal DE/kg. In the present study, DE (2810 kcal/kg) as well as CP (20.7%) contents of robinia leaves was quite high indicating that it may be used as a ration for growing rabbits, which was confirmed from the growth rate (10.4 g/d) given in Table 2. Although this gain was less than the normal daily gain (24 g) of Soviet Chinchilla rabbits (BISWAS *et al.*, 1995). The intake of energy and protein was more than the required for 10g/d gain on standard ration. In present study reduced gain may be due to the incriminating factors present in robinia leaves (NEGI *et al.*, 1979). In some published results, reduction in CP and fibre digestibility and growth rate in rabbits was found (HARRIS *et al.*, 1984; RAHARJO *et al.*, 1990). The digestibility of DM, DM, EE and NDF was fairly high and was quite comparable with the digestibility of green berseem reported by DESHMUKH *et al.* (1990) in New Zealand White rabbits except CP and ADF digestibility which were substantially lower in present study. The lower digestibility of CP may be possibly due to tannins present in robinia leaves. KUMAR and SINGH (1984) reported that phenolic compounds like tannins, form tannin–protein complex and reduced protein utilization by animals. However, the digestibility in our experiment was higher than the reported values of HORTON and CHRISTENSEN (1981) in sheep. This higher digestibility in present study may be due to caecotrophy by rabbits. Recently, LUICK *et al.* (1992) reported that practice of caecotrophy might have improved the digestibility of tannin rich feeds in rabbits. From the present study it is evident that sole feeding of robinia leaves supports up to 10g daily body weight gain in growing rabbits.

Table 2 : Mean body weight, feed conversion efficiency and plane of nutrition of rabbits

Particulars	Mean ± SE	Range
Number of animals	10	–
Initial body weight	792 ± 73	680– 850
Final body weight	1373 ± 47	1200– 1560
Average body weight during trial period (kg)	1.01 ± 0.07	0.8– 1.24
Dry matter intake (g/d)	145.3 ± 9.6	121– 127
DMI/kg $W^{0.75}$ (g/d)	143.7 ± 2.8	132– 150
Total DMI in 56 d (kg)	6.9 ± 0.5	5.1– 7.3
Feed conversion ratio	11.6 ± 0.8	10.2– 12.0
Crude protein intake (g/d)	30.3 ± 2.8	25.1– 37.0
DCP intake (g/d)	11.2 ± 0.9	8.5– 15.6
DCP intake (g/kg $W^{0.75}$)	11.1 ± 1.2	10.2– 14.7
DE intake (kcal/d)	408 ± 31	372– 474
DE intake (kcal/kg $W^{0.75}$/d)	420 ± 10	374– 480

Table 3 : Mean values of digestibility and nutritive value of robinia leaves

Particulars	Mean ± SE	Range
Digestibility (%)		
Dry matter	74.3 ±0.7	70.8–79.3
Organic matter	77.4 ±0.8	74.6–79.7
Crude protein	36.8 ±1.1	33.3–40.1
Ether extract	73.2 ±1.4	69.6–77.6
NDF	60.3 ±1.0	56.9–63.9
ADF	29.4 ±1.5	27.5–35.7
Nutritive value (% DM)		
DCP	8.0 ±1.1	6.2–10.5
DE (kcal/g)	2.81 ±0.3	2.6– 3.1

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