GROWTH PATTERNS IN SOVIET CHINCHILLA WEANERS FED FOUR LEVELS OF ROBINIA LEAVES

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Abstract - Twenty eight Soviet chinchilla animals weaned at 42 days age were fed 4 completely pelleted diets without or with dried Robinia leaves at 25, 50 or 75 percent level up to 84 days age. Results indicated improvements in body weight (9.33 %), nutrient utilization and dressing percent in 25 % Robinia supplemented group. The DCP and TDN of dried leaves were 5.56 ± 0.50 and 33.7 ± 0.80 percent, respectively. It was concluded that Robinia leaves could be added @ 25 % in such rations for improving gains in broiler rabbits.

INTRODUCTION

Black locust (*Robinia pseudoacacia*), a nitrogen fixing tree, is a potential source of nitrogen for animal feeding. Its leaves are rich in protein and contain tannins reported as anti-bloat agent in ruminant animals (JONES *et al.* 1976). Rabbits utilize high roughage diets and plant proteins efficiently (HARRIS *et al.* 1981). Leaves were also reported to contain a lectin (Robin) which impair nutrient absorption in the intestines (MORAN, 1981). Singh and NEGI (1986) reported growth depression in Angora and broiler rabbits when fed free choice roughage. This was attributed to poor utilization of nutrients by HARRIS *et. al.* (1984). The present experiment was planned to study its optimum level of inclusion, its nutritive value and its effect on carcass composition in broiler rabbits.

MATERIAL AND METHODS

Twenty-eight, 42 days weaned rabbits of Soviet chinchilla breed were weighed and separated into -4 similar groups with 4 males and 3 females in each group. These animals individually received ad lib. complete pelleted diets containing 0, 25, 50 and 75 percent dried and coarsely ground Robinia leaves. Physical composition of the experimental diets is listed in Table 1. Drinking water was provided *ad libitum*. Daily feed intake and weekly body weights were recorded up to 84 days age. During the last week a metabolic trial was conducted on 16 animals to assess the nutrient utilization. Feed residue, faeces and urine, collected for 5 days, were analysed for proximate principles along with calcium by the methods proposed by AOAC (1985). Phosphorous, fibre fractions were analysed as per the methods of PARKS and DUNN (1964) and GOERING and VAN SOEST (1970), respectively. The data were analysed by completely randomised design according to the methods given by SNEDECOR and COCHRAN (1967). On 84th day age, all the rabbits were slaughtered after 12 hr. fasting and dressing percentage calculated. The proximate analysis of meat sample taken from thigh region was done as per AOAC (1985) methods.

Table 1 : Physical Composition of Experimental Diets

Feed ingredients	R_0	R_1	R_2	R_3
Maize	40	30	20	10
Deoiled Groundnut Cake	30	22.5	15	7.5
Wheat Bran	5	3.75	2.5	1.25
Rice Polish	10	7.50	5.0	2.50
Fish Meal	5	3.75	2.5	1.25
Molasses	8.0	6.0	4.0	2.0
Common Salt	0.500	0.375	0.250	0.125
Supplvit M	1.500	1.125	0.750	0.375
Lysomix (g)	10	7.5	5.0	2.5
Methiomix (g)	10	7.5	5.0	2.5
Robinia Leaves (%)	-	25	50	75
	100	100	100	100

RESULTS AND DISCUSSION

The chemical composition of experimental diets has been given in Table 2. The crude protein content of experimental diet decreased, where as fibre level increased with Robinia leaves incorporation. It was due to low, crude protein and high fibre level of Robinia leaves. Ether extract, and total ash and calcium level increased and Nitrogen free extract and Acid insoluble ash value decreased with Robinia leaves incorporation. Among the fibre fractions, cellulose level increased with Robinia incorporation.
Gross energy value determined by Chromic acid oxidation also decreased with Robinia incorporation.

Table 2 : Chemical Composition of Experimental Diets

Nutrient	R_0 Control	R_1 Robinia 25 %	R_2 Robinia 50 %	R_3 Robinia 75 %
DM	93.73	87.36	85.95	86.59
CP	20.65	19.42	18.55	17.85
CF	6.93	8.26	9.52	12.85
EE	3.57	4.30	4.05	3.83
Total Ash	8.09	9.99	11.59	12.11
Nitrogen Free Extract	60.76	58.03	56.29	53.36
Acid Insoluble Ash	3.25	2.10	51.90	01.32
Calcium	1.73	2.25	2.40	2.63
Acid Detergent Fibre	29.39	20.46	27.72	32.62
Neutral Detergent Fibre	44.57	43.48	42.18	41.97
Hemicellulose	15.17	23.02	14.46	9.35
Cellulose	5.35	10.44	13.19	16.21
Gross Energy (Kcal/g)	3.92	3.25	3.18	2.94

Biological performance of rabbits fed Robinia leaves has been shown in Table 3. Body weight increased with Robinia leaves incorporation at 25 % level (1591 ± 49.8 g) and was significantly ($P \leq 0.05$) higher than the other treatments with 50 and 75 % incorporation. Body weight decreased slightly but the differences were non-significant when compared with control group. Gain in weight and average daily gain followed the same trend as the weight at 84 d age. At 25 % Robinia leaf supplementation growth rate increased by 9.33 %. These results are contrary to those reported by CHEEKE *et al.* (1983) who reported 30 % depression in growth rate with 20 % incorporation of Robinia leaves. Feed intake decreased with the incorporation of Robinia leaves and highest value (4548.8 ± 132.2 g) was observed with 75 % Robinia leaves (R_3 diet) Feed : gain deteriorated with the addition of Robinia leaves and it was highest (4.96 ± 0.4) with 75 % Robinia leaves addition. Feed intake data was contrary to those of HARRIS *et al.* (1983) who reported least palatability of Robinia leaves as compared to other fresh green leaves. This disparity may be due to the change in feeding regime as complete diet has been used in this experiment. Nutrient intake data showed significant ($P \leq 0.05$) differences among different treatments. Daily DCP and TDN intakes were significantly (P ($P \leq 0.05$) higher in group fed 25 % Robinia leaves. This data corresponds with the growth performance.

Table 3 : Overall Biological Performance of Rabbits Fed Different Levels of Robinia Leaves

Parameter	R_0 Control	R_1 Robinia 25 %	R_2 Robinia 50 %	R_3 Robinia 75 %
Weaning (42d) wt. (g)	533.3 ± 21.7	545.0 ± 17.8	538.3 ± 25.7	534.1 ± 15.4
Final (84d) body wt (g)	1490.0^a ± 80.6	1591.0^b ± 49.8	1483.3^a ± 71.3	1450.0^a ± 39.6
Gain in wt (g)	956.7^a ± 74.9	1046.0^b ± 46.3	945.0^a ± 66.3	915.9^a ± 37.5
Av. Daily gain (g)	22.8^a ± 1.9	24.90^b ± 1.2	22.5^a ± 1.7	21.8^a ± 0.6
Feed Intake (g)	2852.0^a ± 82.9	4131.7^c ± 120.1	3773.0^b ± 109.7	4548.8^c ± 132.2
Feed : gain	2.98^a ± 0.20	3.94^b ± 0.10	3.99^b ± 0.30	4.96^c ± 0.40
Nutrient intake :				
Daily feed Intake	67.9^a ± 2.0	98.3^c ± 2.8	89.8^b ± 2.6	108.3^d ± 3.1
Feed intake g/kg w 0.75/day	50.3^a	69.4^b	66.8^b	80.60^c
Daily DCP intake (g)	10.45^a ± 1.25	12.65^b ± 1.40	9.01^a ± 1.10	9.53^a ± 1.30
Daily TDN intake (g)	43.3^a ± 2.1	55.6^b ± 3.2	43.9^a ± 2.1	43.3^a ± 2.2

Values bearing different superscripts in a line differ significantly ($P \leq 0.05$).

Digestibility of nutrients and nutritive value of Robinia leaves have been given in Table 4. Significant ($P \leq 0.05$) differences among treatment groups were observed for the digestibility of DM, CP, CF, EE, NFE and DCP and TDN values. Highest value for DM (62.78 %), CP digestibility (74;53 %) and N retention (59.88 %) were observed in control group which decreased with increasing level of Robinia leaves. These results are in agreement to those of HARRIS *et al.* (1983) and SINGH and NEGI (1986). HORIGOME *et al.* (1984)

suggested that low digestibility of Robinia leaves was due to the presence of condensed tannins. Robinia also contains lectins and other phenolic compounds which hinder in the utilization of nutrients (CHEEKE and SHULL, 1985). Crude fibre, ether extract and Nitrogen free extract digestibilities were higher with 25 % Robinia leaves indicating 25 % Robinia leaves as the optimum concentrate ; roughage level for rabbit feeding. Nutritive value of Robinia leaves calculated by subtracting the nutrients digested from the concentrate diet (R_0) was found to be DCP 5.56 ± 0.5 % and TDN 33.7 ± 0.8 %. These values are less than those reported by SINGH and NEGI (1986).

Table 4 : Digestibility (%) of nutrients in rabbits fed diets supplemented with a different level of Robinia leaves.

Parameter	R_0 Control	R_1 Robinia 25 %	R_2 Robinia 50 %	R_3 Robinia 75 %	Mean
DM	62.78^{c} ± 2.12	55.43^{b} ± 2.25	48.2^{a} ± 3.15	45.11^{a} ± 1.01	
CP	74.53^{d} ± 2.96	66.28^{c} ± 4.27	54.17^{b} ± 1.34	49.3^{a} ± 3.02	
CF	17.28^{ab} ± 1.65	19.59^{b} ± 3.68	15.91^{a} ± 0.62	17.42^{ab} ± 3.22	
EE	37.89^{a} ± 3.92	66.62^{c} ± 3.92	47.45^{b} ± 3.08	40.7^{a} ± 5.60	
NFE	72.72^{c} ± 2.66	61.47^{b} ± 2.21	58.73^{b} ± 3.96	47.75^{a} ± 1.05	
N retention as % of intake	59.88^{d} ± 1.78	50.90^{c} ± 2.64	41.80^{b} ± 1.95	35.58^{a} ± 1.32	
DCP	15.39^{b} ± 1.96	12.87^{ab} ± 3.27	10.04^{a} ± 1.25	8.80^{a} ± 2.02	
TDN	63.8^{d} ± 2.79	56.6^{c} ± 3.16	48.94^{b} ± 2.85	40.02^{a} ± 2.95	
Nutritive value of Robinia leaves					
DCP %	-	5.32	4.76	6.62	5.56 ± 0.50
TDN %	-	35.0	34.08	32.1	33.7 ± 0.80

Values bearing different superscripts in the line differ significantly ($P \leq 0.05$)

Data for carcass characteristics have been shown in Table 5. Significant differences ($P \leq 0.05$) were observed in dressing percentage, fat and nitrogen free extract contents. Higher dressing percentage (53.55 ± 3.60 %) in group R_1 was due to the higher body weight of the animals in this group. The data for carcass composition is in agreement with those reported by KULKARNI *et al.* (1995). Low fat content in carcass of R_1 and R_0 group than others showed increased lean meat growth than fat and is close to consumer's preference.

It could be concluded that Robinia leaves at 25 % level inclusion gave higher growth performance, nutrient utilization and carcass composition than other treatment groups. At 50 % level the performance was comparable with control group.

Table 5 : Carcass characteristics of Rabbits fed diet supplement with different levels of Robinia leaves

Parameter	R_0 Control	R_1 Robinia 25 %	R_2 Robinia 50 %	R_3 Robinia 75 %
Dressing percentage	48.84^{ab} ± 2.07	53.55^{b} ± 3.60	51.19^{ab} ± 0.59	47.65^{a} ± 1.51
DM	26.55 ± 0.62	26.12 ± 0.57	26.36 ± 0.21	26.62 ± 0.99
CP	23.29 ± 0.20	22.58 ± 0.78	20.96 ± 0.49	22.17 ± 1.86
EE	0.9^{a} ± 0.1	0.89^{a} ± 0.20	2.135^{b} ± 0.40	2.09^{b} ± 0.30
Total ash	1.04 ± 0.33	1.39 ± 0.30	1.35 ± 0.25	1.18 ± 0.32
NFE	1.32 ± 0.10	1.26 ± 0.20	1.92 ± 0.20	1.18 ± 0.30

Values bearing different superscripts in the line differ significantly ($P \leq 0.05$).

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