

Original Research Article

Effect of Wild Vetch (*Vicia sativa*) Seed Feeding on the Growth Performance and Economics of Goats

Manikant Sinha^{1*}, Chandramoni¹, Pankaj Kumar Singh¹, Kaushalendra Kumar¹, Sanjay Kumar¹, Subhash Kumar Das Arya², Ranjan Parth Sarthi¹, Sanjeev Kumar Singh³, Arun Kumar³, Md. Armanullah⁴, Anish Kumar⁵, Sikandar Yadav¹ and Ajay Kumar Mandal⁶

¹Department of Animal Nutrition, ²Department of Veterinary Pathology, ³Department of Livestock Production and Management, ⁴Department of Veterinary Microbiology, ⁵Department of Veterinary Medicine and ⁶Department of Veterinary Gynecology and Obstetrics. Bihar Veterinary College, Bihar Animal Science University, Patna-800014, Bihar, India

*Corresponding author

ABSTRACT

Keywords

Wild vetch,
Soyabean meal,
Goats, Growth
performance,
Economics

An experiment was conducted for 90 days to evaluate the growth performance and economics of growing male kids fed diet containing wild vetch (*Vicia sativa*) seed replaced by soyabean meal as protein source in the diet. Eighteen male (Black Bengal) goats (3-4 months of age; average body weight: 5.98±0.61 kg) were assigned to three treatment groups. For feeding three isonitrogenous, isocaloric concentrate mixtures were prepared such that soyabean meal @20% (T₁) in concentrate mixture was replaced by wild vetch at 50% (T₂) and 100% (T₃) levels. Body weight gain and feed intake was recorded at fortnightly intervals and feed conversion ratio and economics of feeding was calculated. The body weight gain was maximum for T₁ group (3.88 ± 0.17) kg and minimum for T₃ group (3.69 ± 0.24) daily. Total feed cost/kg wt. gain was maximum in T₃ group (117.93/kg) and in T₂ group (116.40/kg) was minimum. Feeding of goats with wild vetch seed is cost effective and can be recommended to farmers. It was concluded that Wild vetch (*vicia sativa*), a locally available feed ingredient can be included upto 10 % replacing 50% of soyabean in the concentrate mixture of growing male kids without any harmful effect.

Introduction

The poor productivity and low feed conversion efficiency of tropical ruminants are attributed mainly to the poor quality and unavailability of feeds. Natural pasture and crop residues constituting the feed base are characterized by their bulkiness, low nitrogen content and low digestibility, which result in low intake and sub-optimal animal production (McSweeney *et al.*, 2001).

Common vetch seed or Akti or Akra (*Vicia Sativa*) is an example of legume seed that has potential as an alternative of soyabean. Wild vetch is a weed of wheat and lentil. It is available in plenty in Bihar and has high yield. The plant is resistance to draught, well adapted in semi arid region and has the ability to grow in poor soil. Its seed have high protein content. Seed of wild vetch contain 92.61% dry matter, 28.4% crude

protein, 4.7% crude fibre, 1.65% ether extract, 4.0% ash, 61.25% nitrogen free extract, 0.26% calcium, 0.57% phosphorus and 0.28% magnesium. Keeping the nutritional quality of wild vetch seed in view, an experiment was conducted to evaluate the feeding value of wild vetch seed in growing male goats.

Materials and Methods

Eighteen Black Bengal growing male kids of 3-4 months age with average body weight of 6.5 kg were distributed into three groups of six animals each on the basis of body weight in a randomized block design. Kids were maintained in the Institutional livestock farm complex, Bihar Veterinary College (ILFC, BVC), Patna for three months.

Feeding management

The goats were penned individually in a well ventilated shed with cement floor. The animals were fed graded level of wild vetch seed (0%, 50% and 100%) mixed in concentrate mixture replacing soyabean meal in the total mixture ration (TMR) which is shown in Table 1. For growth performance, the animals were weighed fortnightly upto 90 days. The feeding experiment was followed by a metabolism trial of 10 days.

Metabolic trial

Metabolic trial was conducted for accessing nutrient utilization and nitrogen balance in kids by placing the animals in specially designed metabolic cages with facility for separate collection of faeces and urine. The animals were kept in metabolic cages for 4 days, prior to actual collection for 6 days, to acclimatize the animals to the new surroundings. Body weight of the animals was recorded before and after the metabolic

trial. The appropriate aliquots of feed offered, residue left, faeces and urine were preserved animal wise each day for chemical analysis.

Laboratory analyses and statistics

The dry matter (DM), organic matter (OM) and ash, crude protein (CP), ether extract (EE), crude fibre (CF) and NFE of the feed offered, residue left and faeces excreted were analyzed by methods of AOAC (2003). Neutral detergent fibre (NDF), acid detergent fibre (ADF), acid detergent lignin (ADL), hemi cellulose and cellulose (expressed inclusive of ash) were estimated without amylase as per method of Van Soest *et al.* (1991) and nitrogen contents in urine and faeces were estimated by macro-Kjeldahl technique (AOAC, 2003).

All statistical analyses were performed as per standard method (Snedecor and Cochran, 1994) by using SPSS (2003) computer package. For comparison of multiple groups Generalized Linear model ANOVA (one way) procedures and Duncan's multiple range tests were utilized.

Results and Discussion

Nutritional composition (on D.M basis) of feeds (concentrate mixture, jackfruit leaf, *Vicia sativa* and soyabean meal) fed to the kids is depicted in Table 2. *Vicia sativa* was included at the rate of 50 percent and 100 percent of protein replacement of soyabean. All the three feed were isonitrogenous and isocaloric.

Effect of feeding *Vicia sativa* on plane of nutrition on goat

Result (Table 3) showed that there was significant difference ($p < 0.05$) in dry matter intake by the experimental goats. Highest

intake was in T₃ group and lowest in control. Protein and energy intake due to wild vetch seed was also not influenced, showing wild vetch seed is palatable to the animal. Result is in confirmation with the findings of (Smith *et al.*, 1989; Kitalyi and Owen, 1993; Pathirana and Ørskov, 1995; Minson and Milford, 1967). Increased nutrient intake

with incremental level of forage legumes as supplement to low quality roughages has also been recorded earlier. Pathirana and Orskov (1995) reported 48% increase in intake of rice straw as the amount of *Glyricidia sepium* was raised from 0% (Control) to 15% in the diet.

Table.1 Composition of ingredients used in basal diet during experiment

Feed Ingredients	GROUPS		
	T ₁	T ₂	T ₃
Maize	33	27	22
Soyabean meal	20	10	0
Wheat Bran	38	37	37
Vicia sativa	00	10	20
Mustard Oil Cake	6	13	18
Mineral mixture	2	2	2
Salt	1	1	1

Table.2 Chemical composition of Feed Ingredients (DM Basis)

Attributes	Concentrate Mixture	Vicia Sativa	Jackfruit leaf	Soyabean meal
DM	93.6	92.61	85.3	92.10
OM	89.8	88.61	82.44	87.24
CP	31.1	28.4	14.9	40.5
EE	1.4	1.65	3.1	2.3
CF	4.25	4.7	2.86	2.12
NFE	59.45	61.25	66.9	52.83
Total Ash	3.8	4	12.24	2.25

Table.3 Effect of feeding *Vicia sativa* on plane of nutrition on experimental goat

Attributes	GROUPS			SEM	P-value
	T ₁	T ₂	T ₃		
Body weight	10.13±0.42	10.09±0.54	10.21±0.92	0.42	0.263
Metabolic body size	5.68±0.18	5.64±0.24	5.70±0.39	0.18	0.259
<u>Dry matter (g/day)</u>					
Conc.mix	209.37±2.08	209.78±5.88	216.42±8.73	3.3	0.682
Roughage	305.94±1.80	309.48±4.15	312.43±8.16	2.85	0.709
DMI g/d	515.3 ^a ±1.23	519.29 ^{ab} ±1.8	528.4 ^b ±5.99	2.72	0.057
DMI (g/kgW ^{0.75})	90.99±3.04	92.07±4.72	93.70±7.28	3.24	0.306
R.C Ratio	1.46±.02	1.48±0.06	1.45±0.09	0.09	0.955
<u>Dry matter intake (% BW)</u>					
Conc.mix	2.08±0.09	2.95±0.61	2.16±0.21	0.24	0.264
Roughage	3.06±0.13	3.60±0.29	3.13±0.35	0.16	0.365
Total DMI	5.14±4.24	6.55±2.7	5.2±3.0	4.78	0.275
<u>CP Intake</u>					
g/day	62.5±1.33	63.64±1.25	63.9±1.69	0.75	0.774
g/kgW ^{0.75}	11.05±0.54	12.65±0.65	11.34±1.04	0.46	0.356
<u>DCP Intake</u>					
g/day	39.57±0.82	39.74±0.84	38.17±0.64	0.46	0.351
g/kgW ^{0.75}	7.0±0.35	7.9±0.39	6.76±0.49	0.27	0.20
<u>TDN Intake</u>					
g/day	333.94±8.08	343.24±19.59	329.6±24.87	9.65	0.875
g/kgW ^{0.75}	59.04±3.22	68.12±4.17	58.11±4.67	2.58	0.237

^{ab}Means with different superscript within a row differ significantly (p<0.05)

Table.4 Effect of feeding *Vicia sativa* on average daily weight gain in experimental goats

Attributes	GROUPS			SEM	P-Value
	T ₁	T ₂	T ₃		
Initial B.W(Kg)	6.13±0.30	5.96±0.58	5.91±0.61	0.28	0.951
Final B.W(Kg)	10.01±0.28	9.66±0.57	9.60±0.52	0.26	0.804
B.W gain(Kg)	3.88±0.17	3.70±0.24	3.69±0.24	0.21	0.36
A.D.G gd ⁻¹	43.142±1.65	41.094±2.19	41.089±0.17	2.589	0.018

^{ab} Means with different superscript within a row differ significantly (p<0.05)

Table.5 Economics of feeding of *Vicia Sativa*

Attributes	GROUPS		
	T ₁	T ₂	T ₃
Conc.mix. g/d	209.37gm	209.78gm	216.42gm
Total intake for 90 days	18.85 kg	18.89 kg	19.48 kg
Feed cost/Kg	24.25	22.80	22.35
Total feed cost for 90 days	457.11	430.69	435.38
Wt .gain for 90 days	3.88 kg	3.70 kg	3.69 kg
Total feed cost/kg wt. gain	117.81	116.40	117.99

^{ab} Means with different superscript within a row differ significantly (p<0.05)

Effect of feeding *Vicia sativa* on average daily gain in body weight in experimental goats

Body weight gain (Table 4) was maximum for T₁ group (3.88 ± 0.17) kg and minimum for T₃ group (3.69 ± 0.24) daily. Average daily weight gain in gram per day for T₁, T₂ & T₃ was 43.142 ± 1.65 kg, 41.094 ± 2.19kg & 41.089 ± 0.17kg, respectively without showing any statistical difference. Results indicate that wild vetch seeds may be incorporated into diets of goats without any adverse effect. Kaya and Yalc in (2000), who studied the nutritional value of incorporation of common vetch seeds into

the diets of crossbreed male lambs and reported that increasing the level of supplementation did not affect body weight gain.

Economics of feeding

Total feed cost/kg wt. gain (Table 5) was maximum in T₃ group (117.93/kg) and in T₂ group (116.40/kg) was minimum. Cost of feed decreased due to inclusion of wild vetch seed as wild vetch seed is locally available and cheaper than soyabean.

In conclusion, wild vetch (*vicia sativa*), a locally available feed ingredient can be

included upto 10 % replacing 50% of soyabean in the concentrate mixture of growing male kids without any harmful effect. Goats fed diet with wild vetch seed made goat production effective and therefore, can be recommended to farmers under Bihar condition.

Acknowledgement

The research facility provided by the Dean, Bihar Veterinary College, Patna, India and the financial assistance in the form of research grant provided by Vice-Chancellor, Bihar Agricultural University, Sabour, Bhagalpur, India are gratefully acknowledged.

References

- AOAC. 2003. Official methods of analytical chemist. 18th ed. Association of Official Analytical Chemists, Arlington, VA, USA.
- Kaya, D. and Yalcin, S. 2000. The effects of rations containing different amounts of common vetch seed on growth performance, digestibility and some blood and Rumen metabolites in male lambs. *Turkish Journal of Veterinary and Animal Sciences*, 24:307–316.
- Kitalyi, A. and Owen, E. 1993. S. stover and lablab bean haulm as food for lactating cattle in the agropastoral system of central Tanzania. In: *Animal Production in Developing*.
- McSweeney, C.S., Palmer, B., McNeill, D.M. and Krause, D.O. 2001. Microbial interactions with tannins: nutritional consequences for ruminants. *J. Anim. Feed Sci. Technol.*, 91:83-93.
- Minson, D. J. and Milford, R. 1967. The voluntary intake and digestibility of diets containing different proportions of legume and mature pangola grass (*Digitaria decumbens*). *Australian Journal of Experimental Agriculture and Animal Husbandry*. 7: 545-551.
- Pathirana, K. K. and Orskov, E. R. 1995. Effect of supplementing rice straw with urea and glycidia forage on intake and digestibility by sheep. *Livestock Research for Rural Development*, Vol.7, No.2.
- Smith, T. Manyuchi, B. and Mikairi, S. 1989. Legume supplementation of maize stover. In: *Utilization of research results on forage and agricultural byproduct materials as animal feed resources in Africa* (eds. B. H. Dzowela, A. N. Said, A. Wendem-Agenehu and J. A. Kategile). ILCA, Addis Ababa, Ethiopia pp. 303-320.
- Snedecor, George W. and Cochran, William G. 1994. *Statistical Methods*, Eighth Edition, *Iowa State University Press*.
- Van Soest, P.J., Robertson, J.D. and Lewis, B.A. 1991. Methods for dietary fibre, neutral detergent fibre and non-starch polysaccharides in relation to animal nutrition. *J. Dairy Sci.*, 74:3583-3597.