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Effect of Feeding Hydroponic Horse Gram Sprouts on Growth Performance of Konkan Kanyal Goats

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ABSTRACT

Background: The word hydroponics derivated from the Greek words; hydro (water), ponos (work). Sprouting of grains for a limited period causes increased activities of hydrolytic enzymes, improvement in the contents of certain essential amino acids, total sugars and B-group vitamins and a decrease in dry matter, starch and anti-nutrients. In India, limited research work has been done on feeding value of hydroponic horse gram sprouts for small ruminants. Horse gram is one of the cheapest sources of protein for both human beings and animals (Katiyar, 1984).

Methods: In this field experiment, during 2018-2019, at the Instructional Dairy Farm, College of Agriculture, Dapoli, District Ratnagiri (M.S.) India. different levels of hydroponic horse gram sprouts were fed to Konkan kanyal goats and observed their growth performance. Randomized block design was used in this experiment.

Result: The overall chemical composition of hydroponic horse gram sprouts were significantly higher than basal feed. It has provided higher nutrients for better growth performance of Konkan Kanyal goats.

Key words: Body weight, DM intake, Hydroponic horse gram sprouts, Konkan Kanyal goat.

INTRODUCTION

Feeding is an important aspect of goat rearing enterprise and may be the highest expense of any meat goat operation. Goats raised for meat need high quality feed in most situations and require an optimum balance of many different nutrients to achieve maximum profit potential. To overcome the production potential of goats in terms of meat, milk and skin, incorporating proper feeding schedule and development, identification and evaluation of newer feed resources are the need of the hour. It is also a need of the future to explore and develop the possibility of improved fodder production technology of more nutritious feed. The word hydroponics derives from the Greek words; hydro (water), ponos (work). Sprouting of grains for a limited period causes increased activities of hydrolytic enzymes, improvement in the contents of certain essential amino acids, total sugars and B-group vitamins and a decrease in dry matter, starch and anti-nutrients. In India, limited research work has been done on feeding value of hydroponic horse gram sprouts for small ruminants. Horse gram is one of the cheapest sources of protein for both human beings and animals (Katiyar, 1984). Therefore, the study was aimed to determine the " effect of feeding hydroponic horse gram sprouts on growth performance of Konkan Kanyal goats ".

MATERIALS AND METHODS

Hydroponic horse gram sprouts were produced at a hydroponic fodder machine of 30.3 × 8.2 × 6.0 ft in length, height and width, respectively at the Dairy farm, College of Agriculture, Dapoli, District- Ratnagiri (M.S.)- India. Hydroponic fodder machine was used for production of hydroponic horse gram sprouts. The temperature and humidity inside the hydroponic machine were controlled through micro-sprinklers irrigation to maintain a range of 22-27°C temperature and 70-80% relative humidity. Horse gram seeds were soaked for 12 hrs in tap water. After 12 hrs of germination in gunny bag, sprouted seeds were spread on the hydroponic tray at a rate of 500 gm per tray sized 2 ft^2 and 1.5-2 cm layer thickness. After five days of maximum growth period, 3-4 kg hydroponic horse gram sprouts were produced per kg of dry seeds. Twenty Konkan Kanyal male kids, each aged between 4-6 months and with average weight of 10.8.6±0.13 kg were used for this study. The goats were randomly assigned to the feeding trial was lasted for 90 days.

A digestibility cum metabolic trial of 7 days conducted to evaluate the nutritive value as well as nutrient digestibility of experimental diets (ICAR, 1998). A total of 20 goat kids were used for this study. They were placed in an individual metabolic cage with slatted floor made for faecal and urine collection. Experimental diets fed were the same as those

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used in the growth study. After feeding of 90 days, five days adaptation period followed by seven days collection period was conducted in the metabolic cages with the facilities for quantitative collection of faeces and urine separately.

Treatment details

T_1- Basal feed: Finger millet straw (500 gm) + Green Mulato grass (700 gm)+concentrate 200 g.
T_2- Basal feed (85%)+hydroponic horse gram sprouts (15%).
T_3- Basal feed (70%)+hydroponic horse gram sprouts (30%).
T_4- Basal feed (55%)+hydroponic horse gram sprouts (45%).

RESULTS AND DISCUSSION

In the present study, as depicted in Table 1 the chemical composition of horse gram sprouts contained 95.7, 10.54, 26.68,12,1.8,4.3, 55.22 and 1.5 per cent organic matter, dry matter, crude protein, crude fibre, ether extract, total ash, nitrogen free extract and acid insoluble ash, respectively. Concentrate contained 92.2, 90.64, 15.75, 4.1, 2.05,7.8, 70.3 and 0.8 per cent organic matter, dry matter, crude protein, crude fibre, ether extract, total ash, nitrogen free extract and acid insoluble ash, respectively. Finger millet straw contained 94.3, 88.34, 2.18, 25.2, 1.5, 5.7, 53.76 and 1.4 per cent organic matter, dry matter, crude protein, crude fibre, ether extract, total ash, nitrogen free extract and acid insoluble ash, respectively. This result was higher than the report (6.49%, 7.97%, 9.32%) in hydroponic cowpea, wheat hydroponic fodder and wheat hydroponic fodder by Naik *et al*. (2016).

Table 1: Chemical composition of basal diet (DM).

Attribute	Horse gram sprouts	Concentrate mixture	Finger millet straw	Green mulato
OM	95.70	92.20	94.30	90.70
DM	10.54	90.64	88.34	33.37
CP	26.68	15.75	2.18	14.0
CF	12.0	4.10	25.20	21.05
EE	1.80	2.05	1.50	1.90
TA	4.30	7.80	5.70	9.30
NFE	55.22	70.3	53.76	53.75

Table 2: Total water intake (lit) of experimental goats.

Treatments	Water/day/kids (lit)	Total water intake/kid (lit)
T_1	0.65^a	58.06^a
T_2	0.56^b	50.38^b
T_3	0.55^b	49.81^b
T_4	0.57^b	51.05^b
Mean	0.6	52.3
SE±	0.01	0.71
CD (5%)	0.02	2.20

Means under each class in the same column with different superscripts differ significantly.

The average water intake in the treatments, as depicted in the Table 2 water intake /day/goat (lit) and water intake/ kids over the experimental period (lit) is presented in Table 2. The water intake/ day/goat (lit) of treatments was found as 0.65 lit for treatment group T_1, 0.56 lit for treatment group T_2, 0.55 lit for treatment group T_3, 0.57 lit for treatment group T_4, respectively. Statistically, the water consumption rate of goats of treatment group T_1 was significantly higher than water consumption rate of other treatment group may be due to the incorporation of more dry feeds in their ration and more DMI as compared to the other treatment groups received hydroponic horse gram sprouts. While the average water intake in the treatment group T_2, T_3, T_4 was observed as values was not significantly different from each other. In the present study, average water intake across the treatment groups was generally low may be due the incorporation of hydroponic horse gram sprouts in their diet.

In the present investigation, average daily dry matter intake was observed as depicted in Table 3 to be 614.74 g/ day in treatment group T_1, 653.21 g/day in treatment group T_2, 690.47 g/day in treatment group T_3, 742.20 g/day in treatment group T_4. Furthermore, daily feed intake of animals showed that, there is good consumption of hydroponic horse gram sprouts and no waste at all. The above findings were higher than the reports of Weldegerima (2015a) in their trial, nutritional benefit and economic value of feeding hydroponically grown maize and barley fodder for Konkan Kanyal goats. The author revealed the intake/100 kg B.W. as 2.91, 3.10, 3.16, 2.76, 2.76 and 3.33 for T_0, T_1, T_2, T_3, T_4 and T_5, respectively.

In the present investigation, results on growth performance of experimental goats were found that the initial body weight

Table 3: Average intake of nutrients (g/day) by experimental goats (DM basis).

Treatment	Nutrients intake (g/day)							
	OM	DM	CP	CF	EE	Total Ash	NFE	AIA
T_1	569.29^d	614.74^d	59.69^d	108.45^d	10.95^d	45.45^b	360.45^d	7.15^d
T_2	607.17^c	653.21^c	69.48^c	120.41^c	11.47^c	46.03^b	374.35^c	8.02^c
T_3	643.01^b	690.49^b	79.40^b	125.61^b	13.40^a	47.47^b	394.12^b	8.61^b
T_4	692.08^a	742.20^a	89.02^a	134.09^a	12.91^a	50.11^a	422.46^a	9.36^a
Mean	627.9	675.2	74.4	122.1	12.2	47.3	387.8	8.3
SE±	6.32	6.79	0.75	1.39	0.16	0.48	3.83	0.09
CD (5%)	19.47	20.92	2.31	4.27	0.49	1.47	11.79	0.27

Means under each class in the same column with different superscripts differ significantly.

Table 4: Total body weight gain of experimental goats (kg).

Treatment	Initial BW (kg)	Final BW (kg)	Total gain in BW (kg)	Gain in weight (g/day)
T_1	10.21^{b}	18.16^{c}	7.95^{c}	88.33^{b}
T_2	11.10^{a}	19.28^{b}	8.18^{bc}	90.89^{b}
T_3	11.27^{a}	19.48^{ab}	8.21^{b}	91.24^{b}
T_4	10.55^{b}	19.88^{a}	9.33^{a}	103.64^{a}
Mean	10.8	19.2	8.4	93.5
SE±	0.13	0.16	0.16	1.76
CD (5%)	0.41	0.50	0.49	5.43

Means under each class in the same column with different superscripts differ significantly.

(kg), final body weight (kg), gain in body weight (kg), gain in body weight (g/day) reported and presented in Table 4.

In the present investigation, as depicted in Table 4 the body weight gain (g/day) for treatment groups T_1, T_2, T_3 and T_4 were found as 88.33, 90.89, 91.24 and 103.64 g/day, respectively. Present results supported with the report values by Weldegerima (2015) studied nutritional benefit and economic value of feeding hydroponically grown maize and barley fodder for Konkan Kanyal goats and investigated the daily body weight gain as -1.17, 37.56, 34.74, 61.93, 51.44 and 56.70 g/day for T_0, T_1, T_2, T_3, T_4 and T_5, respectively. The gain in body weight showed that the hydroponic horse gram sprouts offered all nutrients required for the proper growth of animal.

CONCLUSION

Based on the results, the following conclusions can be drawn. The overall chemical composition of hydroponic horse gram sprouts was significantly higher than basal feed. It has provided higher nutrients for better growth performance of Konkan Kanyal goats. The body weight gain (kg) also daily body weight gain (g/day) was higher for goats fed with hydroponic horse gram sprouts than control group. The haematological blood parameters were significantly higher in goats fed with hydroponic horse gram sprouts than control group. The total returns, net profit and benefit cost ratio were significantly higher in the supplemented treatment group with hydroponic horse gram sprouts than the control group. Based on the present investigation, it is concluded that 15% horse gram sprouts with 85% basal feed are beneficial for better growth performance and economic profitability of Konkan Kanyal goat.

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